Wandoan Coal Project, MLA area and surrounds

Terrestrial ecology impact assessment

November, 2008

Wandoan Joint Venture

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2133006C-RPT028-C:pm

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Date: November, 2008.....

Distribution: Wandoan Joint Venture, PB File, PB Library .....

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Acronyms

Acronym	Definition
CHPP	Coal Handling 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 applications
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 (the 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 between Xstrata Coal Queensland Pty Ltd (XCQ), ICRA RPW Pty Ltd and Sumisho Coal Australia Pty Ltd. Parsons Brinkerhoff Australia (PB) Pty Ltd, 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

The Project involves the development of thermal coal resources and includes the construction and operation of an open cut coal mine and supporting infrastructure. The mining of coal will be undertaken using a combination of truck, shovel, dozer and dragline mining equipment. Coal production is estimated at around 30 million tonnes per annum (Mtpa) run of mine (ROM) coal. Coal extracted from pits will be crushed, sized and washed to a yield of around 70% before being railed to port for export.

The Project will require development of a range of infrastructure including coal handling preparation plant units, office buildings, workshops, fuel and oil storage facilities, vehicle wash down facilities, a water management system, light vehicle access roads and heavy vehicle haul roads, a rail loop, tailings storage facilities, potentially a gas supply pipeline from the lateral Peat-Scotia gas pipeline, potential on-site power generation, communications infrastructure, a potential on site landfill, accommodation facilities, groundwater extraction from the Great Artesian Basin for potable water and construction raw water supply.

Washing and processing of coal on site will require a constant reliable supply of water that will need to be sourced from outside the MLA areas. A number of water supply options are currently being considered including:

- treated by-product water and pipeline from coal seam methane (CSM) from the Berwyndale South CSM extraction fields, south of Miles
- treated by-product water and pipeline from CSM from extraction wells located at Spring Gully and Fairview, approximately 100 km west of the Wandoan Coal Project site
- raising of the Glebe Weir and pipeline from the Dawson River approximately 83 km north east the Wandoan Coal Project.

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 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, the subject of this assessment)

- Wandoan Coal Project — Coal Seam Methane Water Supply South (referral reference number 2008/4287)
- 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 mining activities and associated infrastructure are the subject of Volume 1 of the EIS with the water supply options being the subject of Volumes 2–4 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 requirements and 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. Two seasonal surveys of the MLA areas were done in October 2007 (spring survey) and March-April 2008 (autumn survey). The gas pipeline route was surveyed between 19 and 21 August 2008 (late winter) and will require further seasonal survey.

The survey of terrestrial flora involved verification of Regional Ecosystem (RE) type and remnant status as mapped by Environmental Protection Agency, mapping and description of other vegetation regrowth (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.

The survey of terrestrial fauna aimed to compile a comprehensive list of species of animal and their habitats that occur in the study area. The surveys involved a range of survey methods to provide a census of terrestrial vertebrate fauna including 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 Study Area was found to be largely cleared of remnant vegetation as a result of grazing and dryland agriculture. The remaining remnant vegetation was generally restricted to the main drainage lines traversing the study area including Spring Creek and Mud Creek, which flow through the western MLA area (MLA 50229); Wandoan Creek and Woleebee Creek which flow through the central MLA area (MLA 50231); and Halfway Creek, Frank Creek, Two Mile Creek and Juandah Creek which flow through the eastern MLA area (MLA 50230). Vegetation along these drainage lines was dominated by RE 11.3.25 (*Eucalyptus tereticornis* or *E. camaldulensis* woodland fringing drainage lines) with RE 11.3.2 (*Eucalyptus populnea* woodland on alluvial plains) spreading across the floodplains. The remnant vegetation along these drainage lines forms continuous linear patches that form part of a wider regional corridor network linking the Mt Oragon and Hinchley State Forests to the south east of the Study Area to Juandah Creek to the north east of the Study Area. This vegetation is also recognised as having regional significance (significant for biodiversity at the sub-bioregional scale) under the Environmental Protection Agency's Biodiversity Planning Assessment for the Brigalow Belt bioregion.

Other remnant vegetation in the Study Area was highly fragmented and comprised two similar REs dominated by *Acacia harpophylla* (Brigalow) and *Eucalyptus populnea* (Poplar box) (RE 11.9.5, RE 11.9.6 and RE 11.9.10). In addition to the remnant vegetation mapped by the Environmental Protection Agency, over 1,000 ha of vegetation regrowth (non-remnant vegetation) was mapped and described. The non-remnant vegetation was dominated by *Acacia harpophylla* analogous with RE 11.9.5 and small areas of highly modified semi-evergreen vine thicket (analogous with RE 11.9.4).

RE 11.9.4 has a conservation status of endangered under the Queensland *Vegetation Management Act 1999* (VM Act), however this only applies to patches of remnant vegetation, of which none occurs in the Study Area. Vegetation analogous with RE 11.9.4 (remnant and non-remnant) is however consistent with semi-evergreen vine thickets of the Brigalow Belt (north and south) and Nandewar Bioregions, and endangered ecological community listed under the EPBC Act.

RE 11.9.5 has a conservation status of endangered under the VM Act and is also consistent, in part, with the Brigalow (*Acacia harpophylla* dominant co-dominant) endangered ecological community listed under the Commonwealth EPBC Act.

The field surveys of the study area identified 465 species of plant (388 native species) and 232 species of vertebrate fauna (220 native species) in the study area. This included one threatened species of plant and four rare or threatened species animals:

- Belsons Panic (a grass, *Homopholis belsonii*)
- Brigalow Scaly-foot (a lizard, *Paradelma orientalis*)
- Golden-tailed Gecko (*Strophurus taenicauda*)
- Glossy Black-cockatoo (*Calyptorhynchus lathami*)
- Little-pied Bat (*Chalinolobus picatus*).

In addition to these species, 15 other rare or threatened species of animal were considered likely to occur in the study area and surrounds:

- Rough Frog (*Cyclorana verrucosa*)
- Dunmall's Snake (*Furina dunmalli*)
- Common Death Adder (*Acanthophis antarcticus*)
- Yakka Skink (*Egernia rugosa*)
- Cotton Pygmy Goose (*Nettapus coromandelianus*)
- Grey Goshawk (*Accipiter novaehollandiae*)
- Grey Falcon (*Falco hypoleucos*)
- Square-tailed Kite (*Lophoictinia isura*)
- Black-necked Stork (*Ephippiorhynchus asiaticus*)
- Australian Painted Snipe (a wader bird, *Rostratula australis*)
- Squatter Pigeon (southern race) (*Geophaps scripta scripta*)
- Pink Cockatoo (*Cacatua leadbeateri*)
- Black-chinned Honeyeater (*Melithreptus gularis*)
- Painted Honeyeater (*Grantiella picta*)
- Greater Long-eared Bat (*Nyctophilus timoriensis*).

Potential impacts and mitigation measures

The Project has potential to result in a range of direct and indirect impacts to the terrestrial ecology in the Study Area and surrounds including threatened ecological communities, threatened species, their habitats. The loss of vegetation and associated habitats will be the main impact to terrestrial ecology resulting from the Project. Clearing of native vegetation has been avoided where possible nonetheless, total avoidance of vegetation clearing will not possible and 1,175 ha (673 ha of remnant vegetation and 502 ha of regrowth (non-remnant) vegetation) will be cleared as a result of the Project. 63% of remnant vegetation and 51% of regrowth (non-remnant) vegetation will be however be retained within the MLA areas.

Other impacts to terrestrial ecology will include:

- creek diversions and the loss of associated riparian vegetation

- habitat fragmentation and loss of connectivity
- direct mortality
- increase in weeds and pest species`
- noise and dust.

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

- detailed design of mitigation measures such as fauna underpasses and fencing (as required)
- 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 where practical
- vegetation clearing protocols
- rehabilitation and restitution of adjoining habitat where possible
- 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 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). Any proposed Green Offsets Package for the Project should be developed in consultation with the Environment Protection Agency and the Department of the Environment, Water, Heritage and the Arts giving consideration to relevant State and Commonwealth policies relating to offsets (outlined below). Any Green Offsets Package should address both state and Commonwealth offsetting requirements including:

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

Conclusions of terrestrial impact assessment

The Wandoan Coal Project is located in an area that is largely cleared of remnant vegetation as a result of grazing and dryland agriculture in which the remaining remnant vegetation was generally restricted to the main drainage lines. Other vegetation in the Study Area is highly fragmented and consists predominantly of regrowth (non-remnant vegetation).

The Study Area and surrounds however still retains important biodiversity values including threatened ecological communities, threatened species, migratory species and priority taxa for the Brigalow Belt South bioregion, and their habitats. Remnant vegetation in the Study Area also provides important ecological functions in the Study Area and surrounds forming wildlife corridors that link the Mt Oragon and Hinchley State Forests to the south east of the Study Area to Juandah Creek to the north east of the Study Area.

The Project will result in a range of impacts to these biodiversity values however, 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. Nonetheless, the impacts of the Project will 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 (the 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 (see Figure 1-1). The coal reserves 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 as shown in 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 between Xstrata Coal Queensland Pty Ltd (XCQ), ICRA RPW Pty Ltd and Sumisho Coal Australia Pty Ltd.

Parsons Brinkerhoff 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

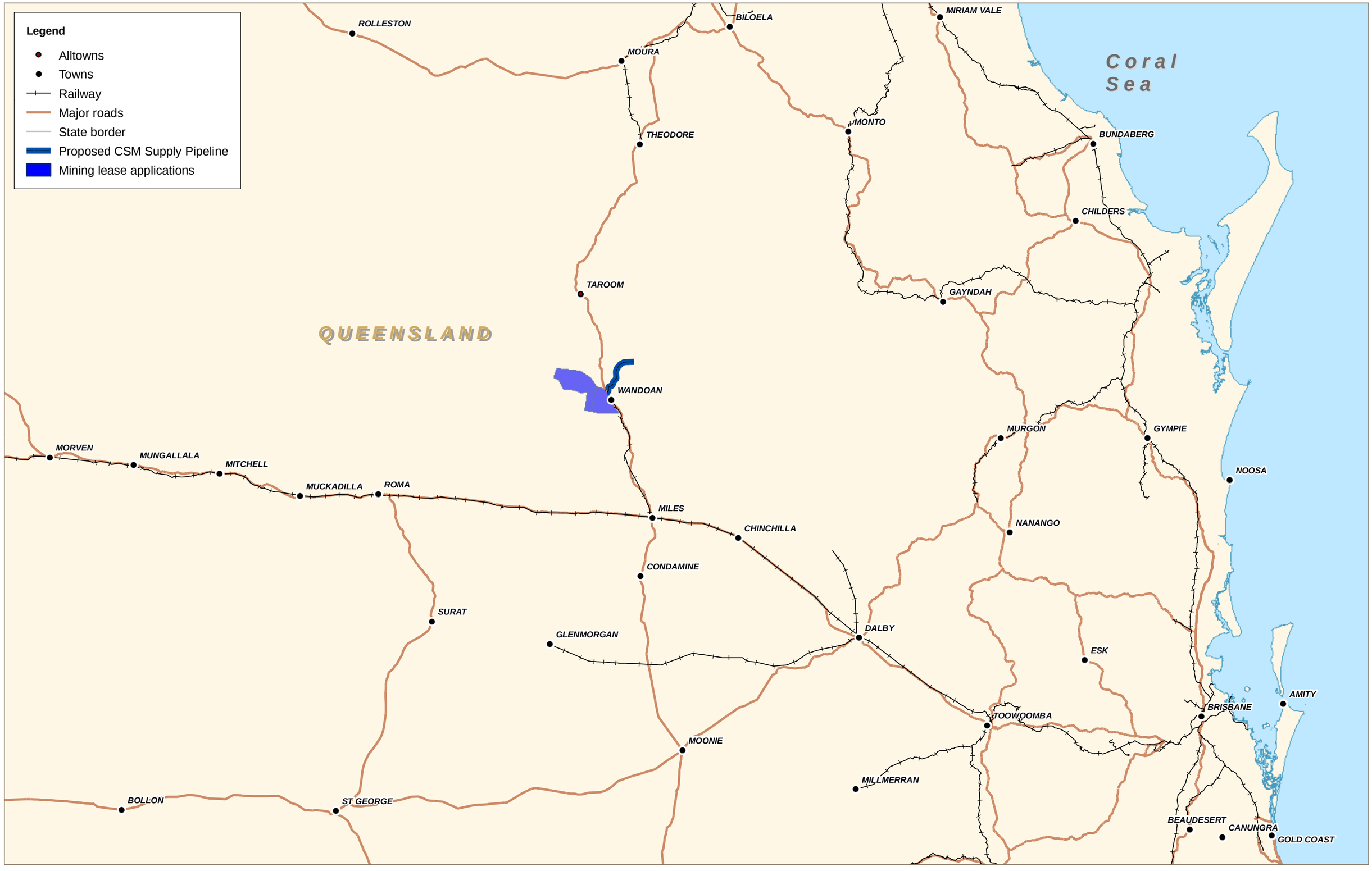
In preparation of the Environmental Impact Statement (EIS), PB have undertaken technical studies of terrestrial ecology with the assistance of Lewis Ecological Services and Place Environmental. Aquatic Ecology has been assessed separately by frc environmental.

1.2 Context and scope of this assessment

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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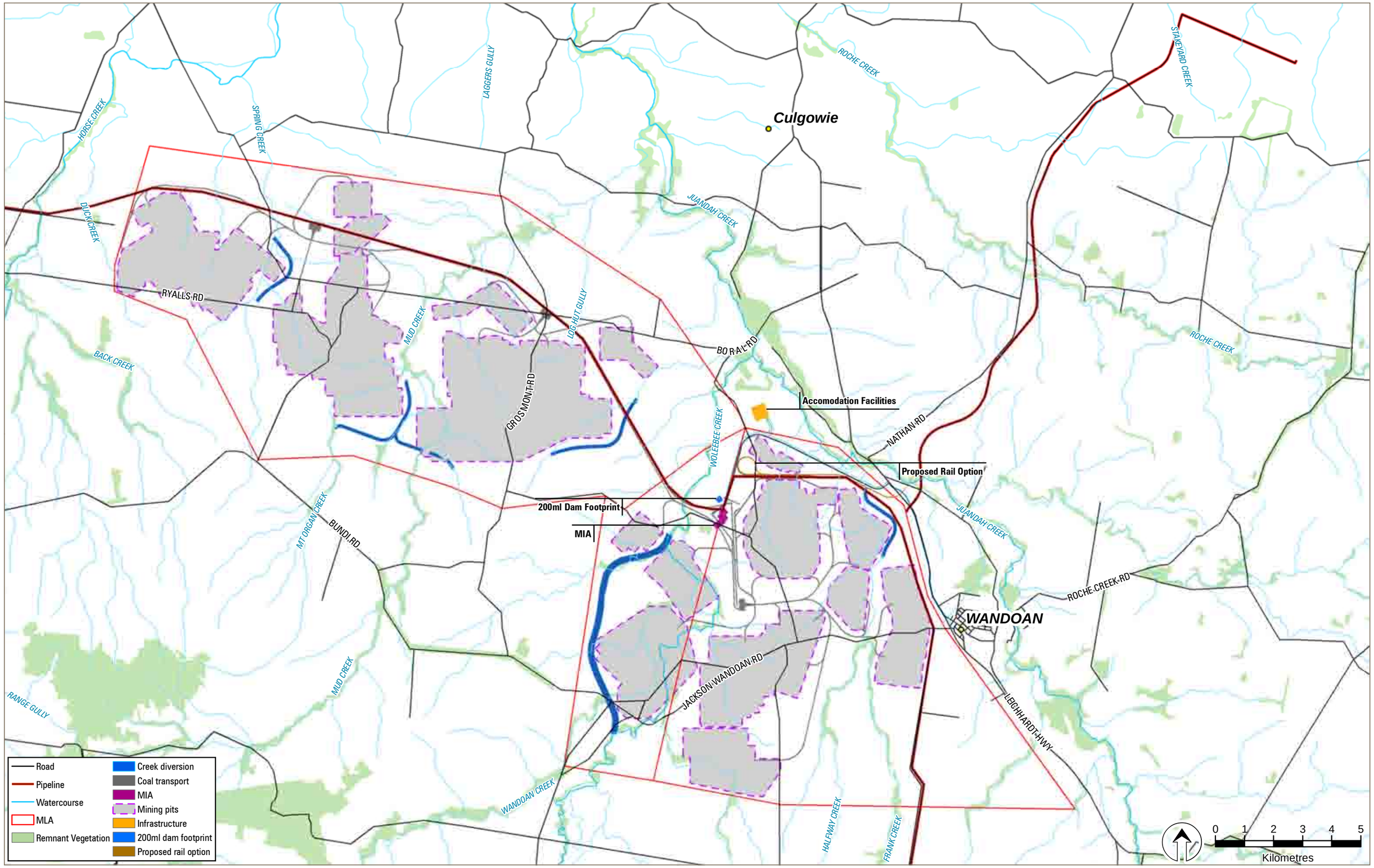
0 25 50 75 100 125
Kilometers

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

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.

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) 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.

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 and SunWater on behalf of the WJV).

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 relevant parts 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 based on the Project ToR 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 EPBC Act. 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.
  - important communities, habitats of species listed under the *Nature Conservation Act 1992* (NC Act) and/or the EPBC Act as presumed extinct, critically endangered, 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 'Presumed extinct', '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 and
- 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 and
  - 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
  - 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) and
  - 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 and
  - identification of the conservation importance of identified populations at the regional, state and national levels.
- to outline measures to mitigate the impacts of the Project 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 Project'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 Project details and study area

For the purpose of this assessment the following definitions apply:

- **footprint:** the extent of direct impacts 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. 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 potential new high pressure gas pipeline from the Peat-Scotia gas line to the mine running 26 km to the north east (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).

The study area consists of extensive, undulating to nearly flat terrain with two gently-sloping ridges aligned north-south. The landscape has been highly modified by past land uses (predominantly grazing and cropping) and remnant vegetation has been extensively cleared, with less than 10% of remnant cover remaining.

The Project involves the development of thermal coal resources and includes the construction and operation of an open cut coal mine and supporting infrastructure located on three MLA areas. Potential mining pit areas have been identified for the mining operations within the MLA areas. The mining operations will commence in the eastern deposits and progressively expand to the west of Woleebee Creek.

The mining of coal will be undertaken using a combination of truck, shovel, dozer and dragline mining equipment. Coal production is estimated at around 30 million tonnes per annum (Mtpa) run of mine (ROM) coal. Coal extracted from pits will be processed by three modular coal handling preparation plant (CHPP) units. The coal will be crushed, sized and washed to a yield of around 70% before being railed to port for export. The initial CHPP layout will allow for the possible addition of a fourth CHPP modular unit. The mine is anticipated to consist of:

- open cut pits
- out of pit spoil dumps
- ROM stockpiles
- a water management system
- light vehicle access roads
- heavy vehicle haul roads
- coal handling and preparation facilities including crushing facilities, coal stockpile pads, rejects stockpiles
- rail spur and rail loading facilities
- tailings storage facilities
- mine infrastructure area including office buildings, workshops, fuel and oil storage facilities, and vehicle wash down facilities
- explosives raw material storage facilities and magazines
- high voltage transmission lines/poles and reticulation facilities within the MLAs
- communications infrastructure
- infrastructure allowing site access from the local road system.

The Project will also require the following components in addition to the aforementioned infrastructure:

- accommodation facilities to house the majority of the workforce
- groundwater extraction from the Great Artesian Basin (GAB) from either a bore within the mining lease area or from the existing Wandoan town water supply facility for supply of construction water during construction of the Wandoan Coal Project and potable water supply during construction and mine operations for the mine, accommodation facilities, and Wandoan township
- raw water supply for mine operations to wash 30 Mtpa of ROM coal and provide dust suppression. Options currently being considered for the supply of raw water to the Project for mine operations include:

  - treated by-product water from coal seam methane (CSM) extraction, supplied via a new pipeline from CSM operations to either the south or west of the MLA areas (the subject of Volumes 2 and 3 of the EIS)
  - raising of Glebe Weir on the Dawson River (the subject of Volume 4 of the EIS).
- upgrade of the existing Wandoan water and wastewater treatment systems
- CSM gas supply pipeline and on-site power generation
- potential on site landfill.

These additional components may occur partially or wholly outside of the three mining lease application areas.

Other actions related to the Wandoan Coal Project which are outside the scope of this EIS, include:

- planning and construction of the Surat Basin Railway.
- Port Alma Expansion
- Wiggins Island Coal Terminal Project
- 132 kV Transmission Line to supply power for the mine and associated infrastructure
- mineral development licences (MDL) and exploration permits for coal activities such as bulk sampling and on-going exploration activities under relevant environmental authorities
- surrounding coal tenements that may be mined at a later time.

2. Relevant legislation

This section outlines the State and Commonwealth legislation and statutory framework relevant to the current ecological assessment with specific reference to legislation, policy, permits and licenses relating to the protection of biodiversity. Refer to Chapter 3 of Volume 1of the EIS for further details of the key approvals applying to the Project.

2.1 Commonwealth assessment framework

The EPBC Act relates to projects that involve or impact upon matters of national environmental significance and addressed Australia's commitments to international environmental law and treaties. 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 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, the subject of this assessment)**
- Wandoan Coal Project — Coal Seam Methane Water Supply South (referral reference number 2008/4287)
- 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 Coal Project Mine and Infrastructure identified as an action that is likely to have a significant impact on listed threatened species and communities, specifically:

- Brigalow (*Acacia harpophylla* dominant and co-dominant) Endangered ecological community
- Star Finch (*Neochmia ruficauda ruficauda*) Endangered species

- Squatter Pigeon (*Geophaps scripta scripta*) Vulnerable species.

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 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).

The other components of the Project addressed in the other inter-related referrals above have potential affect other threatened ecological communities, threatened species or migratory species. These communities and species are addressed in the relevant terrestrial ecological assessments relating to those actions.

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.

2.2 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 Act* (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.

2.2.1 State Development and Public Works Organisation Act 1971 Act (SDPWO 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 (CoG) 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 requirements under various Acts, and may state conditions for the following:

- any project development applications that would be assessed using the Integrated Development Assessment System under the IP Act, the CG's report can state conditions that must attach to the development approval, that the development approval must be for part only of the development or be for a preliminary approval only (section 39 of the SDPWO Act)
- the proposed mining lease under the MR Act (section 45 of the SDPWO Act)
- the draft environmental authority under the EP Act for the proposed environmental authority (mining activities) (section 49 of the SDPWO Act).

2.2.2 *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 establishes a framework to facilitate mining-related activities, through the granting of prospecting and exploration permits, mineral development license, and mining leases by the Queensland Department of Mines and Energy (DME). The Wandoan Joint Venture has already secured two MDLs over the area 221 and 222. This EIS supports an application for the Project's three mining leases under Part 7 of the MR Act, being MLA 50299, MLA 50230 and MLA 50231.

2.2.3 *Integrated Planning Act 1997*

The IP Act is Queensland's principal 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, Schedule 9, Table 5, of the IP Act exempt from assessment against a planning scheme all aspects of development for mining activities authorised under the MR Act and all aspects of development for a mining activity to which an environmental authority (mining activities) under the EP Act applies.

However, on the MLA areas, development applications are still required where:

- there is a material change of use for an Environmentally Relevant Activity under the EP Act (schedule 8 of the IPA)
- the development is carrying out plumbing or drainage works, or other forms of operational works not assessed under the relevant planning scheme.

With regards to development outside of the MLA areas, the abovementioned exemptions do not apply. Where required, the Wandoan Joint Venture will submit development applications for development off MLA areas.

2.2.4 *Environmental Protection Act 1994*

The 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.

In reference to the Project, Chapter 5 of the EP Act establishes a process for obtaining an environmental authority (EA) for mining activities. A Level 1 EA (mining activities) is applicable to the Project. In addition, an Environmental Management Plan is also required under section 201 of the EP Act. Under the EP Act, the Environmental Protection Agency is the regulatory authority which has responsibility for granting the EA, as well as compliance, auditing and monitoring of the environmental management of the Project mining activities.

It is also noted that section 319 of the EP Act places a general environmental duty on the Wandoan Joint Venture to ensure that it does not carry out any activity that causes, or is likely to cause, environmental harm unless the Wandoan Joint Venture takes all reasonable and practicable measures to prevent or minimise the harm.

2.2.5 *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 Project:

- 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.

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 KCP, 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 Project will need to follow the intent of the KCP offsets policy.

2.2.6 *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 Project is dependant initially on whether the clearing would 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 where the clearing supports a mining activity
- clearing of native vegetation on the MLA associated with elements of the Project that are not directly associated with the Project however may require a permit under the VM Act
- where off 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 any proposed offsets will be determined at such time as detailed design for the Project occurs, the siting of Project infrastructure is confirmed and other infrastructure locations (such as the accommodation facilities) are determined.

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. As

such, the requirements of the aforementioned policies and codes do not strictly apply to vegetation clearing associated with mining-related activities in the MLA areas. 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 requirements and acceptable solutions for clearing of vegetation for projects declared to be a significant project under the SDPWO Act. The stated acceptable solutions 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) 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 Project will also consider the Queensland Government Environmental Offsets Policy (2008) and are discussed further in Section 8.

2.2.7 *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.

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 terrestrial ecological impact assessment, 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
Andrew McMillan	PB	BSc (Hons)	Zoologist — field surveys
Ed Meyer	PB	BSc(Hons), PhD	Zoologist — technical review
Chris Hanson	Place Environmental	BMedSc, BSc (Hons)	Botanist — field surveys and reporting
Ben Lewis	Lewis Ecological Services	BAppSci(Hons)	Zoologist — field surveys and reporting
Mitchell Taylor	Place Environmental	BSc	Zoologist — field surveys (spring)
Greg Ford	Consultant Ecologist	BAppSci	Bat call analysis (spring and winter)
Rob Gration	PB	M Wild Mgt	Bat call analysis (autumn)

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 (works for the Spring survey were done under Place Environmental's Permit: Bribie 27/11/04 No 040)
- 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.

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 (refer Table 3-2) to compile a list of conservation significant species and other ecologically 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 dtudy 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: 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	Environment Protection Authority (Environmental Protection Agency 2007)	—	Regional extent	Version 5.2	Regional ecosystems
Biodiversity Planning Assessment	Environment Protection Authority (2003)	—	Brigalow Belt Bioregion	Version 1.2	Wildlife Corridor, Essential Habitat and biodiversity significance levels mapping
State wildlife corridors mapping.	Environment Protection Authority (2004b)	—	Regional extent	Version 1.0	State Wildlife Corridor mapping
Brigalow Belt South Biodiversity Planning Assessment flora expert panel report	Environment Protection Authority (2002b)	—	—	—	Bioregional priority taxa (flora)
Brigalow Belt South Biodiversity Planning Assessment fauna expert panel report	Environment Protection Authority (2002a)	—	—	—	Bioregional priority taxa (fauna)

Database/data source name	Organisation maintaining database/data source	Database search date[1]	Database search areas	Publication version	Data type
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	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 Authority (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.

Terrestrial flora and fauna surveys of the MLA areas were undertaken between 1 and 17 October 2007 (spring survey) and 23 March and 7 April 2008 (autumn survey). The gas pipeline route was surveyed between the 19 and 21 August 2008 (late winter).

3.4.1 Survey weather conditions

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 (the closest registered Bureau of Meteorology weather station) in the month prior to surveys, however, was almost twice the July average (Bureau of Meteorology 2008).

Weather conditions during the spring survey in October of 2007 were hot with some light shower activity on days eight and nine (0.9 mm and 2 mm respectively) and some afternoon thunderstorms resulting in moderate falls on days 11 and 12 (9.5 mm and 18.8 mm respectively) (Bureau of Meteorology 2008, Taroom weather station October 2007). Daily maximum temperatures were hot and in the high 30s (up to 38.4°C) and overnight temperatures were warm, averaging 19°C.

Weather conditions preceding and during the autumn survey period in March 2008 were relatively mild. Daily maximum temperatures were generally above 27°C (up to 32.8 °C) while night time temperatures ranged from 20.4 to 7°C (Bureau of Meteorology 2008, Taroom weather station March 2008). Conditions were generally dry during autumn surveys, though there was some light shower activity on days five and six (0.4 mm and 2.6 mm).

Weather conditions during surveys of the gas pipeline in August 2008 were generally cool with daytime maximum temperatures ranging between 19.8 °C and 24.8°C (Bureau of Meteorology 2008, Taroom weather station August 2008). Temperatures overnight were variable ranging from 14.1 °C to extremely cold nights of -1.6°C. No rainfall events occurred during surveys of the gas pipeline.

More detailed information on weather conditions for this survey periods is provided in Attachment A and Chapter 7 of Volume 1 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, 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	Spring survey	Autumn survey	Total effort
Primary sites	surveys sites	0	0	0
Secondary sites	surveys sites	3	6	9
Tertiary sites	surveys sites	48	21	69
Quaternary sites	surveys sites	55	41	96

Primary sites

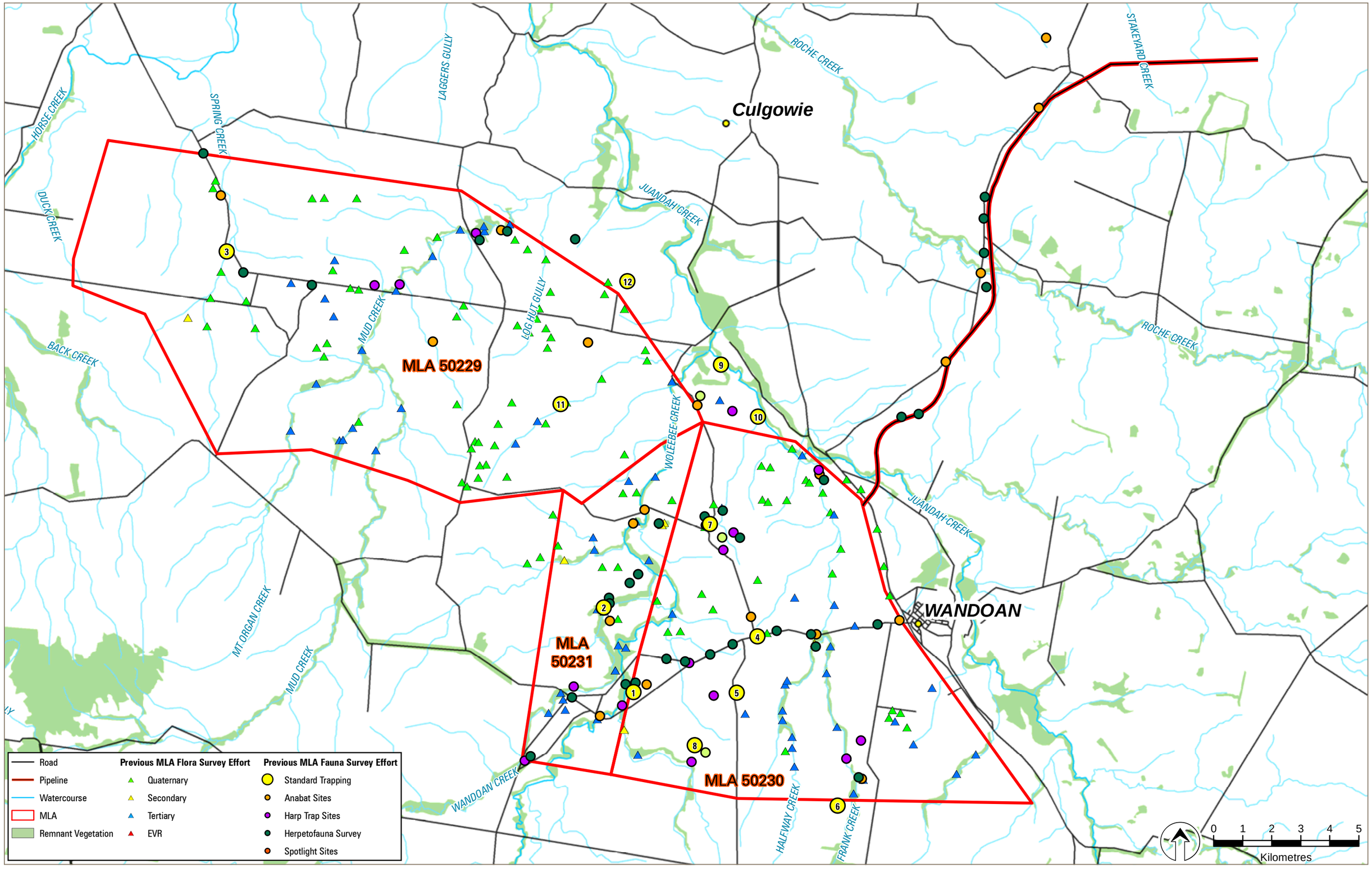
Primary sites are permanently marked plots where the individual trees and shrubs are marked or permanently located so that the growth of individual plants can be monitored over time. Primary sites will often include the collection of secondary site attributes with additional data depending on the aims 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 were also recorded.



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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

At secondary sites a range of sample techniques are used to describe flora composition and vegetation structure including:

- **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%.
- **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 (see 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 based on crown separation estimate (Walker & Hopkins 1990) rated as closed or dense, mid-dense, sparse, very sparse. Up to five predominant species are also recognised as dominant, codominant, associated, suppressed or occasional.
- **tree basal area (Bitterlich Method)**: another measure of structure used to calculate 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 site surveys provide a rapid assessment to validate REs based on location, environmental and overall structural information (as per secondary site surveys) and are also used to compile a comprehensive list of woody species present (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.

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

Tertiary site surveys were undertaken within the study area in both remnant and non-remnant vegetation representing all RE types.

Quaternary sites

Quaternary site data are used primarily as a record of field traverses and to verify RE mapping. Quaternary site surveys provide the minimum data required to validate vegetation communities and remnant status. In cases where the results of the quaternary site assessment were inconclusive, a tertiary site was established to collect more data.

Quaternary sites are 'plot-less', with attributes being recorded within a 360 degree arc out to approximately 20 m. The Queensland Herbarium's quaternary site methodology (Neldner et al. 2005) was refined to produce two methods for qualifying EPA mapped and non-mapped vegetation:

a) assessment of structural composition within representative areas of EPA mapped remnant and non-remnant vegetation, wherein the composition, canopy cover, canopy height range, site co-ordinates and terrain attributes of all strata were recorded

b) binocular and random sampling of isolated patches to record the dominant species present, along with their abundance and median height and cover. (This approach was used mainly for non-remnant vegetation and small or difficult-to-access vegetation).

Targeted searches and traverses

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 1971a, 1971b) as well as aerial photographs from 2006.

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 Global Positioning System (GPS) and 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 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 predominantly focused 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 are often difficult to detect. Suitable habitat is, therefore, an important factor to consider when determining the potential presence of threatened 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 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), 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 surveys at ‘standard trapping site’ and ‘supplementary sites’. Standard trapping sites were established to survey broad habitat types within the study area. Four standard sites were established during the spring survey period, eight during the autumn survey period and one during the winter survey period of the gas pipeline (see Figure 3-1 and Attachment D for detailed summary of fauna survey effort).

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

- habitat assessment (as described above)
- ground trapping (10 x Elliott traps, 5 x pitfall traps)
- funnel traps (4 x traps, autumn and winter only)
- microbat harp trapping (1 x harp)
- spotlighting (2 people x 30 minute survey)
- ultrasonic bat detection (Anabat) (1 night)
- herpetofauna active searches (2 people x 20 minutes)
- call broadcast for Powerful Owl (*Ninox strenua*) (autumn survey only).

Supplementary sites were selected to target specific habitat features likely to be used by Rare and 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:

- microbat harp trapping
- ultrasonic bat detection
- herpetofauna active searches
- nocturnal vehicle traverses
- spotlighting.

The fauna survey techniques 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 alternatively with either a vegetable (peanut butter, honey and oats) or meat based (dog biscuit) bait (spring and autumn only). Traps were checked early each morning and re-baited as necessary.

Pitfall traps were used to census small ground dwelling mammals, frogs and reptiles over a four night period. 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.

During the autumn survey, two funnel traps (750 mm x 20 mm; WA Poultry Equipment) were set against the drift fence at the end of each pitfall line to target larger vertebrates, particularly snakes that may escape from a pitfall trap. During the winter survey for the gas supply pipeline, two funnel traps per side were set against both ends of the drift fence (for a total of four funnel traps per line).

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 techniques were used to census microbats.

Stationary ultrasonic bat detection surveys were done using an Anabat CF Storage ZCAIM (Titley Electronics, Ballina) for one night at each standard site in addition to five supplementary sites in spring, six supplementary sites in autumn and four supplementary sites in winter (see Figure 3-1 and Attachment D). At each sampling 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.

Standard harp trapping (using an Ausbat 4.2 m^2 trap) was the primary method used to capture microbats. Harp traps were set for two consecutive nights along tracks, flyways along riparian habitats, easements and around focal trees at each standard site in addition to eleven supplementary sites in spring and five supplementary sites in autumn (see Figure 3-1 and Attachment C). During the autumn surveys of the MLA and winter surveys of the gas pipeline route, two to three traps were set in unison at each supplementary site to increase the probability of capturing microbats. Captured microbats were identified to species level using Churchill (1998) and released at the site of capture at dusk.

Herpetofauna active searches

Herpetofauna active searches involved looking for basking reptiles and actively turning rocks, logs, raking debris and peeling decorticating bark to search for reptiles and frogs. Each active search involved two persons searching for a 20 minute period. These searches were undertaken at each of the standard sites and at an additional 22 sites in spring, four sites in autumn and nine sites in winter (see Figure 3-1 and Attachment C). Species were identified using nomenclature outlined in Wilson (2005).

Spotlighting and nocturnal drive transects

Walk traverse spotlight surveys were used to census nocturnal herpetofauna as well as arboreal, flying and large ground dwelling mammals. These surveys were undertaken on foot by two persons using a 50-watt or 100-watt variable hand held spotlight over a 30 minute census period. Spotlight surveys were undertaken at each of the standard sites and an additional three sites in autumn. One spotlight survey was undertaken at Juandah Creek during the winter survey for the gas pipeline. Additional or supplementary spotlight surveys were not undertaken during this survey period due to the sub-optimal conditions for detection of nocturnal reptiles and small mammals.

Nocturnal drive transects were undertaken over 21 nights in spring and 11 nights in autumn across the entire study area (see Attachment D). This technique involved the slow driving (i.e. 30–40 km/h) along bitumen and dirt roads and tracks to observe nocturnal fauna including frogs, reptiles and a range of mammals. This technique allowed coverage of large areas of the study area each night.

Fauna features traverse

Fauna features traverses were undertaken to assess the suitability of habitat for fauna (particularly threatened, migratory and priority taxa 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 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	Spring survey	Autumn survey	Gas pipeline	Total effort
Elliot A (ground trapping)	trap nights	160	380	40	480
Pitfall traps (ground trapping)	trap nights	80	160	20	260
Funnel traps	trap nights	—	96	16	112
Ultrasonic bat surveys	survey nights	9	14	5	28
Harp traps	trap nights	30	36	1	67
Herpetofauna active searches	search hours	17	8	7	32
Spotlighting	search hours	4	11	1	16
Nocturnal drive transects	search hours	48	19	—	67
	km traversed	829	254	—	1,083
	survey nights	21	11	—	32

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 locality 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 locality, 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 and 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 impact assessment was completed is provided in Attachment I. These profiles outline the species, communities or REs conservation status, distribution, habitat, threats, ecology and occurrence (or likelihood of occurrence) within the study area. The likely impacts of the Project and relevant mitigation measures for each species, communities or REs is also outlined.

Impact assessments have not been undertaken for 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 for all surveys, varying degrees of non-uniformity of flora and fauna habitats are encountered. Also, site conditions and hence the detectability and presence of species can change with time. 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 about the site from recognised data sources and the field surveys, including habitat assessments, which support the likelihood of occurrence assessments for rare, threatened and priority taxa species not recorded.

The weather conditions preceding and during the survey periods also have an influence on site access and the detectability and identification of species. Rainfall preceding and during the spring survey period limited access to some areas of the Study Area. Rainfall during the spring survey also reduced the ability to conduct, and effectiveness of, some Anabat surveys. These conditions however also resulted in increased growth and flowering of many herbaceous and graminoid species, thus improving their detectability and identification. Rainfall during the spring survey was also optimal for detecting much of the herpetofauna likely to occur on site.

Cool and dry weather conditions during the autumn and winter surveys improved access across the study area. However, during this survey period much of the herbaceous and graminoid species were drying off or not in flower, making the detection and identification of these species difficult. These conditions were also sub-optimal for detecting much of the herpetofauna likely to occur in the study area.

Access was not granted by the landholders of the following properties for the terrestrial field surveys:

- Lot 36 FT 575 (MLA 50229) during both surveys
- Lot 37 FT575 and Lot 18 SP 127560 (MLA 50229) during the autumn survey.

4. Existing environment

4.1 Regional context

The study area is located within the Taroom Downs subregion of the Brigalow Belt 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.

The Brigalow Belt bioregion has been largely cleared of woodlands for grazing and dryland agriculture, with the larger remaining areas of vegetation now occurring on the rockier hilly terrain, as roadside vegetation, or as relatively small isolated remnants (see Figure 4-1). The study area is characteristic of areas of the bioregion that have been cleared for grazing and dryland agriculture.

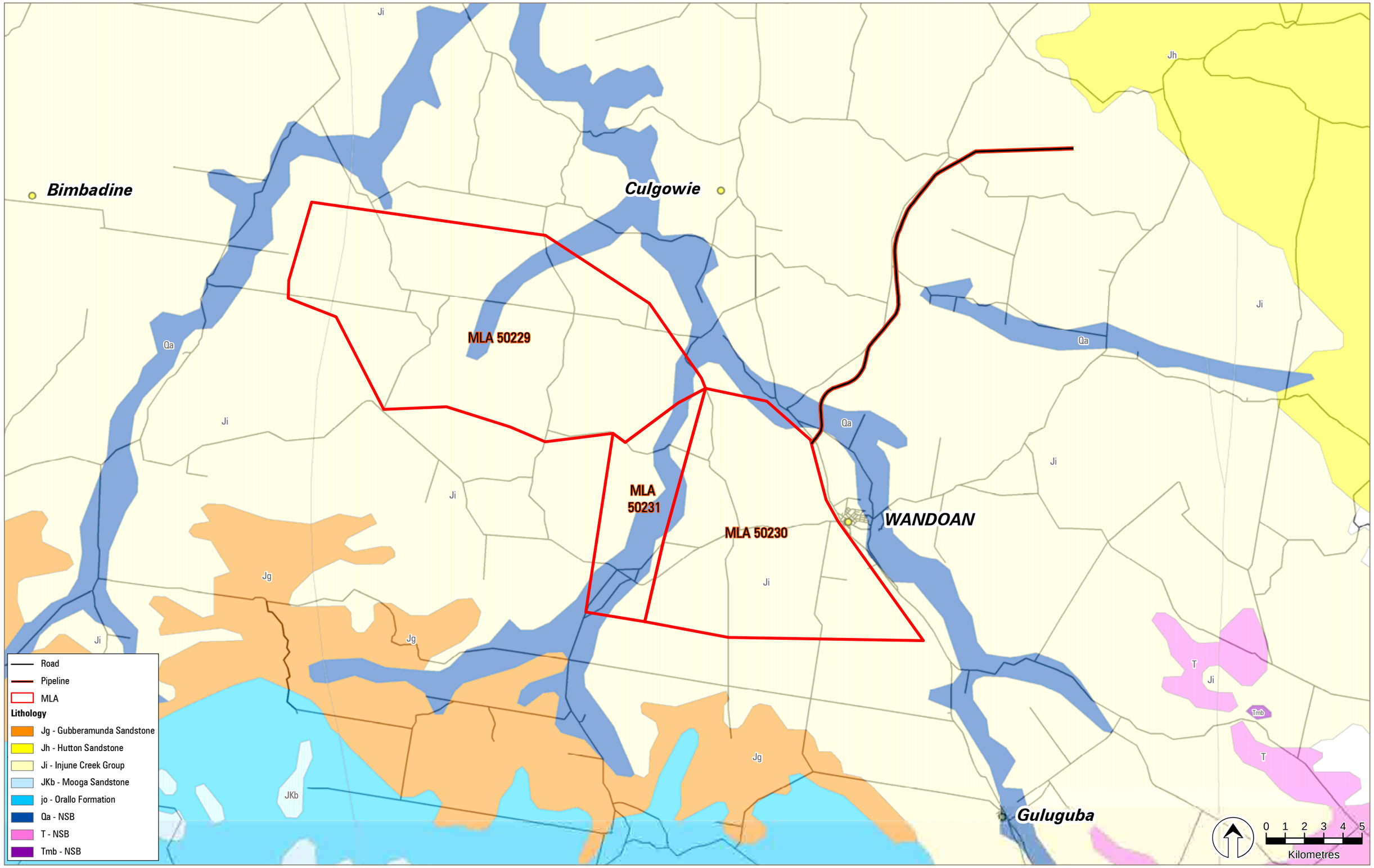
A number of state forests and national parks surround the Project area including Precipice National Park (60 km north of the MLA areas), Isla Gorge National Park (70 km north of the MLA areas) and extensive areas of State Forests to the east.

4.2 Drainage lines

The waterways of the MLA areas are within the upper Dawson River Catchment in the Taroom sub-catchment. The major creeks of the Project area include Spring Creek and Mud Creek, which flow through MLA 50229; Halfway Creek, Frank Creek, Two Mile Creek and Juandah Creek, which flow through MLA 50230; and Blackant Creek, Wandoan Creek and Woleebee Creek, which flow through MLA 50231. These creeks flows into Juandah Creek, which then flows into the Dawson River approximately 75 km north of the MLA areas, just south of Taroom. The Dawson River eventually flows into the Fitzroy River, approximately 85 km south west of Rockhampton. The Dawson River is the largest tributary of the Fitzroy River, and the Dawson Catchment covers 35% of the Fitzroy Basin (Joo et al. 2000).

4.3 Lithology and land zones

Two geological formations and associated land zones occur within the study area (see Table 4-1 and Figure 4-1). A third formation, the Gubberamunda sandstone, is located in close proximity to the southern boundary of the MLA areas. Small unmapped sections of this formation may occur within the study area.



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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

Table 4-1: Geological formation and corresponding land zone

Map symbol[1]	Formation name, age[1]	Lithology[1]	Land Zone[2]
Ji	Injune Creek Group, Middle to upper Jurassic	Mudstone; labile sandstone , siltstone, some calcareous; coal	Land Zone 9
Jug	Gubberamunda sandstone, Middle to upper Jurassic	Cross-bedded quartzose to sublabile sandstone, some pebbly; conglomerate, siltstone. Fossil wood	Land Zone 10
Qa	Alluvium, Quaternary	Alluvium	Land Zone 3

1. Map symbol, formation name, age and lithology based on the 1:120,000 Geological Series Sheet SG 55-12 (Bureau of Mineral Resources Geology and Geophysics 1971b).
2. Land Zone as defined by the Environmental Protection Agency (2004a). Land Zone 3 = Quaternary alluvial systems, Land Zone 9 = fine grained sedimentary rocks, Land Zone 10 = coarse-grained sedimentary rocks.

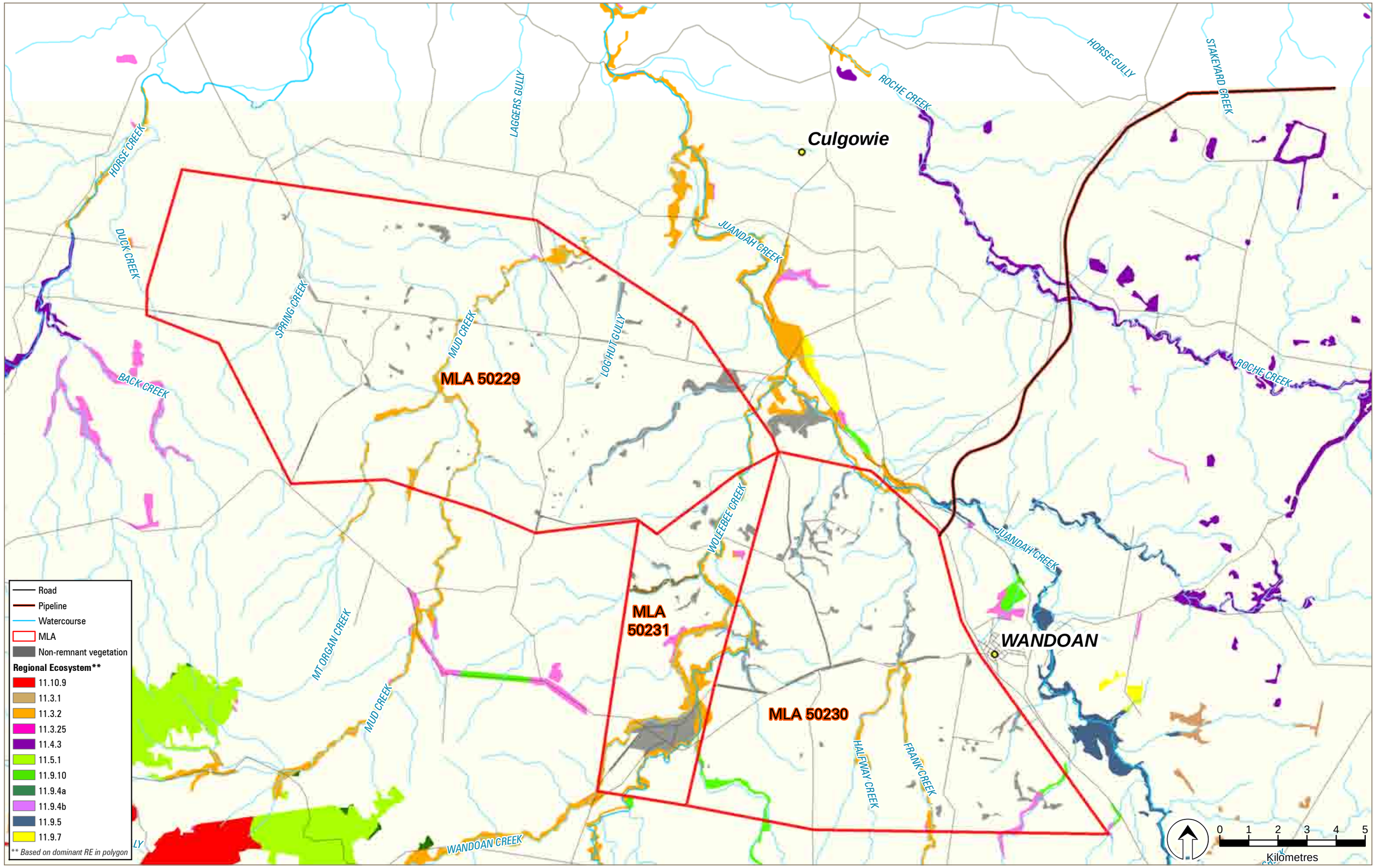
The Injune Creek Group is the main geological formation across the study area. This formation is traversed by Quaternary alluvium along Woleebee Creek, Wandoan Creek and the lower reaches of Mud Creek.

The extent of quaternary alluvium in the MLA has been mapped by Xstrata Coal Queensland at a finer scale (Snodin 2004) through photogeological interpretation and extensive borehole drilling for coal exploration. This mapping identifies additional alluvium along the sections of the following drainage lines in the study area: Frank Creek, One Arm Man Creek, the entire length of Mud Creek, Mt Organ Creek and most of Spring Creek. Remnant RE mapping (EPA) is consistent with the finer scale mapping and as such this has been followed where determining the status of non-remnant RE during field investigations.

The Gubberamunda sandstone formation is located in close proximity to the south of the MLA. This formation is not mapped within the study area, however one RE corresponding with Land Zone 10 was identified in the study area. It is taken that this occurrence of this RE is on a small or residual unmapped occurrence of coarse-grained sedimentary rock (Land Zone 10).

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). Eight REs were identified within the study area (see Table 4-2 and Figures 4-2 and 4-3) and these are described below. Mapping of REs and non-remnant vegetation at 1:50,000 scale is provided in Attachment E.



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

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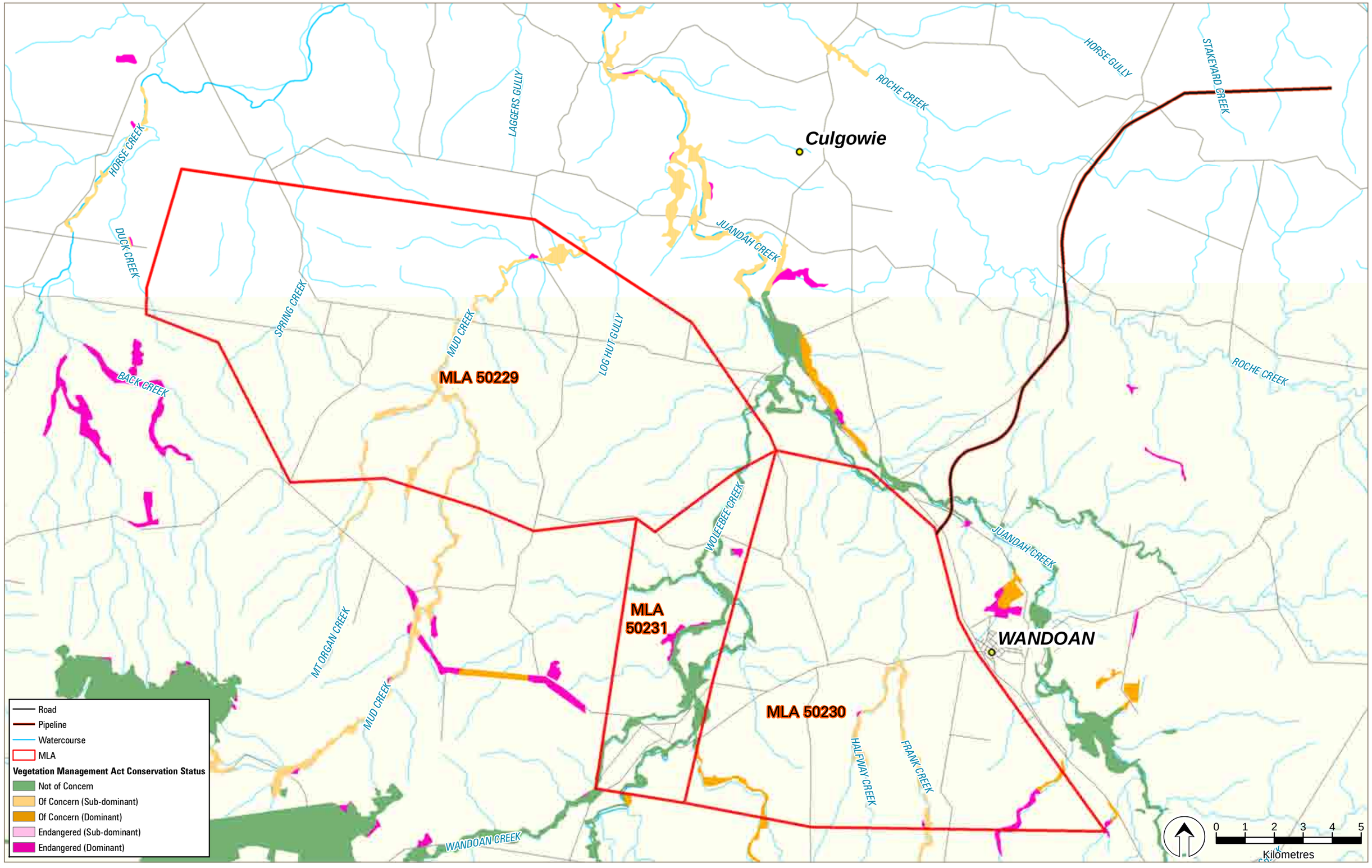
Figure 4-2

Regional Ecosystems and Regrowth (non - remnant vegetation)



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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 4-3

Regional Ecosystem Status Under the Vegetation Management Act

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	Not 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
11.9.4	Semi-evergreen vine thicket on fine grained sedimentary rocks	Endangered	Endangered	Endangered
11.9.5	*Acacia harpophylla* and/or *Casuarina cristata* open forest on fine-grained sedimentary rocks	Endangered	Endangered	Endangered
11.9.6	*Acacia melvillei +/- Acacia harpophylla* open forest on fine-grained sedimentary rocks	Endangered	Endangered	Endangered
11.9.7	*Eucalyptus populnea*, *Eremophila mitchellii* shrubby woodland on fine-grained sedimentary rocks	Of concern	Of concern	Not listed
11.9.10	*Acacia harpophylla*, *Eucalyptus populnea* open forest on fine-grained sedimentary rocks	Of concern	Endangered	Not listed
11.10.9	*Callitris glaucophylla* woodland on coarse-grained sedimentary rocks	Not of concern	No concern at present	Not listed

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 number of remnant and non-remnant patches, generally in association with more contiguous vegetation (predominantly RE 11.3.25) along the creeks that traverse the study area. RE 11.3.2 may occur on a range of landforms on Quaternary alluvium such as floodplains, alluvial plains, alluvial fans and levees. In the study area, this RE most frequently occurred on the floodplain terraces beyond the high banks of creeks, fringing riparian vegetation (11.3.25).

Canopy: The canopy of this RE was dominated by *Eucalyptus populnea* (Poplar box) with *Eucalyptus melanophloia* (Silver-leaved Ironbark), *Acacia harpophylla* (Brigalow), *Acacia salicina* (Sally Wattle) and *Casuarina cristata* (Belah) also present. The median height range of canopy trees was 12 to 17 m (see Photo 4-1). The low tree layer generally included

juvenile canopy species, *Acacia excelsa* (Ironwood) or *Brachychiton rupestris* (Queensland Bottle Tree).

Mid-stratum: The mid-stratum was dominated by *Geijera parviflora* (Wilga), with variously associated juvenile canopy species including, *Pittosporum angustifolium* (Cattle Bush), *Alectryon diversifolius* (Scrub Boonaree), *Alectryon oleifolius* ssp*. elongatus* (Western Rosewood), *Santalum lanceolatum* (Northern Sandalwood), *Citrus glauca* (Limebush), *Acacia decora* (Pretty Wattle) and *Eremophila mitchellii* (Bastard Sandalwood).

Ground layer: The ground layer in remnant patches was dominated generally by the introduced **Cenchrus ciliaris* (Buffel Grass) and/or *Aristida calycina* var*. praelta* (Dark Wiregrass), *Chloris divaricata* (Slender Chloris), **Panicum maximum* var*. trichoglume* (Green Panic), *Bothriochloa bladhii* (Forest Bluegrass), *Salsola kali* (Soft Roly-poly), *Enchylaena tomentosa* (Red-berry Saltbush), *Calotis* spp*.* (burr daisies), **Verbena tenuisecta* (Mayne's Pest), *Rhodanthe polyphylla* (no common name) and *Einadia nutans* var. *nutans* (no common name).

Condition: The majority of vegetation within this RE was identified as non-remnant including narrow patches restricted to shallowly incised overflow channels on floodplains. Due to the impact of cattle, these patches were generally devoid of an intact native mid and lower strata. Weed incursion was limited to the ground layer in the form of a dense cover of **C. ciliaris.*

The remnant occurrences of this RE were in moderate condition with evidence of routine thinning via mechanical 'pulling', markedly reducing the recruitment in the low tree layers. Further, the groundcover layer in remnant patches was dominated commonly by **C. ciliaris*, while the shrub layer supported the occasional **Opuntia tomentosa* (Velvety Tree Pear), a Class 2 pest under the *Land Protection (Pest and Stock Route Management) Act 2002*).

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

Remnant status: No homogeneous polygons of remnant RE 11.3.2 have been 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 11.9.10 was the dominant RE. One homogeneous polygon of RE 11.3.2 in the study area was defined during field verification and consisted of non-remnant vegetation that was generally contiguous with broader areas of RE 11.3.25.

Conservation status: RE 11.3.2 is listed as 'Not of concern' under the VM Act, but has a biodiversity status of 'Of concern'. This RE is not considered representative of any of the threatened ecological communities listed under the EPBC Act.

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

Within the study area, RE 11.3.25 consisted of *Eucalyptus tereticornis* (Queensland Blue Gum) open-forest and woodland on Quaternary alluvial systems (Land Zone 3). This RE was the most abundant remnant RE type within the study area and occurred as remnant vegetation along Blackant, Frank, Halfway, Juandah, Mud, Mt. Organ, Two Mile, Wandoan and Woleebee Creeks. RE 11.3.25 occurred from the channel floor to the high banks of creeks as well as in overflow channels and floodplain depressions.

Canopy: The canopy of this RE was dominated by *Eucalyptus tereticornis* with *Eucalyptus melanophloia*, *Angophora floribunda* (Rough-barked Apple) and *Acacia salicina* (Sally Wattle) occurring as canopy species occasionally to frequently. *Casuarina cunninghamiana* (River Oak), *Casuarina cristata* and/or *Acacia harpophylla* were also common canopy species at some sites. No *E. camaldulensis* was identified in the study area. The median height of canopy trees in this RE ranged from 16 to 26 m (Photo 4-2). The low tree layer was dominated primarily by juvenile canopy species and *Acacia excelsa*.

Photo 4-2: RE 11.3.25 - *Eucalyptus tereticornis* open forest to woodland fringing drainage lines

Mid-stratum: The mid-stratum of this RE was dominated by *Geijera parviflora*, with variously associated juvenile canopy species such as *Alectryon diversifolius*, *Alectryon oleifolius* ssp. *elongatus*, *Santalum lanceolatum*, *Citrus glauca, Capparis mitchellii* (Wild Orange), *Acacia decora, Acacia farnesiana* (Mimosa Bush) and *Eremophila mitchellii*.

Ground layer: The ground layer was variable in composition across the sampled areas. Upon the upper banks and adjoining terraces the groundcover layer was dominated generally by the introduced pastoral grasses **Panicum maximum var. trichoglume* (Green Panic) and/or **Cenchrus ciliaris*, with occasional occurrences of *Aristida calycina* var. *praelta*, *Aristida ramosa* (a speargrass), *Chloris divaricata*, *Salsola kali*, *Enchylaena tomentosa*, **Verbena tenuisecta*, *Rhodanthe polyphylla, Einadia nutans* var. *nutans, Tetragonia tetragonoides* (New Zealand Spinach), *Atriplex muelleri* (Annual Saltbush) and *Austrostipa verticillata* (Stout Bamboo Grass). Upon the toe of bank and terraces within the watercourse channel the groundcover layer was comprised of *Leptochloa digitata* (Umbrella Cane Grass), *Bothriochloa bladhii*, **Cynodon dactylon* (Couch), *Centipeda minima* (no common name), and occasionally *Lomandra longifolia* (Spiny-headed Mat-rush), *Sarga leiocladum* (Wild Sorghum) and *Cyperus gymnocaulos* (no common name).

Condition: Due to variability in land management practices across MLA areas, the condition of RE 11.3.25 varies throughout the study area. Generally this community was found to support a dense cover of palatable forage and was subsequently mechanically maintained to provide a sparse mid-stratum. Weed incursion was limited to the ground layer in the form of a dense cover of **Panicum maximum* var. *trichoglume* and/or **C. ciliaris*, while the shrub layer supported occasional **Opuntia tomentosa* and **Acacia farnesiana*. In places, **A. farnesiana* provided the predominant cover within the low shrub layer.

Remnant status: RE 11.3.25 was the most abundant remnant RE in the study area with large homogenous polygons of the RE mapped along most drainage lines (Figure 4-3). This RE also occurred as a minor component of heterogeneous polygons in which RE 11.9.10 was the dominant RE. Some additional areas of non-remnant RE 11.3.25 were also defined during field verification of RE mapping.

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 considered representative of any threatened ecological communities listed under the EPBC Act.

RE 11.9.4 Semi-evergreen vine thicket on fine-grained sedimentary rocks

RE 11.9.4 semi-evergreen vine thicket on fine grained sedimentary rocks (Land Zone 9) characteristically occurred on crests, mid-slopes, undulating plains and rises. No remnant RE 11.9.4 was mapped within the study area (Environmental Protection Agency 2005), however some small fragmented non-remnant patches of this RE were identified and mapped during field verification of RE mapping. Within the study area, this RE occurs as isolated patches within the north-western extent of MLA 50229 in the vicinity of Booral Road, a small grove associated with riparian vegetation along Wandoan Creek in the south-western extent of MLA 50231 and an isolated copse in the vicinity of Paradise Downs Road (see Figure 4-2).

Canopy: The sparse canopy of this RE was moderately variable but generally comprised of *Ventilago viminalis* (Vine Tree), *Lysiphyllum carronii, Brachychiton rupestris*, *Acacia fasciculifera* (Scrub Ironbark), *Casuarina cristata* and *Owenia acidula* (Emu Apple). Canopy trees within this RE attained a maximum height of 18 m, with a median height of 12 m (Photo 4-3). In several places *Eucalyptus orgadophila* (Mountain Coolibah) occurred as a dominant canopy species and/or emergent to approximately 23 m in height.

Mid-stratum: The mid-dense to dense sub-canopy/mid-stratum was comprised primarily of vine thicket species including *Geijera parviflora*, *Pouteria cotinifolia var. aborescens* (Yellow Lemon), *Ehretia membranifolia* (Peach Bush), *Alectryon oleifolius* ssp*. elongatus, Elaeodendron australe* var*. integrifolium* (Narrow-leaved Red Olive Plum), *Croton insularis* (Silver Croton) and *Flindersia collina* (Leopard Ash). The low shrub layer was dominated by *Carissa ovata* (Klunkerberry), *Capparis mitchellii*, *Alectryon diversifolius, Jasminum* spp*.* (Native Jasmine), *Parsonsia lanceolata* (Rough Silkpod), *Pittosporum spinescens* (Wallaby Apple)*, Bursaria incana* (Prickly Pine)*, Diospyros humilis* (Small-Leaved Ebony) and *Psydrax* spp*.* (Canthium). This stratum reached a median height of 6 m.

Photo 4-3: Vegetation representative of non-remnant semi-evergreen vine thicket on sedimentary rocks (analogous to RE 11.9.4)

Ground layer: The ground layer was moderately to sparsely vegetated and was generally dominated by **Cenchrus ciliaris,* and associated *Einadia* spp*., Rhagodia gaudichaudiana* (no common name), *Tetragonia tetragonioides* and juvenile upper strata species. Ground layer specialists typical of semi-evergreen vine thicket were present although generally scarce such including *Austrostipa ramosissima* (Stout Bamboo Grass), *Ancistrachne uncinulata* (Hooky Grass) and *Spartothamnella juncea* (Native Broom).

Condition: Within the study area, RE 11.9.4 was highly fragmented and modified. All occurrences of this RE surveyed within the study area represented regrowth vegetation. Nowhere within the study area was this RE excluded from grazing and all had evidence of selective thinning and utilisation as refugia by livestock ('cattle camps'). Weed incursion was limited generally to the dense cover of **Cenchrus ciliaris*, reflecting the open and fragmented nature of the canopy.

Remnant status: No remnant polygons of RE 11.9.4 have been mapped or identified in the study area. All areas of RE 11.9.4 identified during surveys were classified as non-remnant vegetation.

Conservation status: RE 11.9.4 is listed as Endangered under the VM Act as well as having a biodiversity status of Endangered. The VM Act status however only applies to remnant patches of this RE. Thus, none of the areas of RE 11.9.4 within the study area would be considered endangered under the VM Act.

RE 11.9.4 is also representative of an endangered ecological community listed under the EPBC Act: 'Semi-evergreen vine thickets of the Brigalow Belt and Nandewar Bioregions', Vegetation representative of this community is listed as Endangered under the Act, regardless of condition or remnant status. Areas of RE 11.9.4 within the study area are therefore considered to represent an EPBC Act-listed Endangered ecological community.

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 in several remnant patches and extensively as non-remnant vegetation within the study area (see Figure 4-2). Remnant patches of this RE generally occurred as heterogeneous polygons contiguous with larger areas of remnant vegetation dominated by 11.3.25. However, extensive areas of non-remnant RE 11.9.5 were identified during field surveys across much of the study area. The non-remnant polygons of the RE were predominantly fragmented patches of regrowth consisting of retained woodlots and/or 'cattle camps' as well as mid-dense regrowth within road reserves.

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 median height of canopy trees was highly variable ranging from 4 to 11 m (see Photo 4-4).

Mid-stratum: Due to the broad canopy height range of this RE, the mid-stratum was dominated either by juvenile canopy species or *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 dominated by *G. parviflora, Capparis lasiantha* (Nipan), *Enchylaena tomentosa* and/or *Carissa ovata.*

Ground layer: The sparse ground layer was limited by the presence of a mid-dense to dense layer of 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).

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

Condition: This community consisted primarily of regrowth *Acacia harpophylla*, with evidence of thinning and grazing by cattle. Small patches showed evidence of degradation from edge effects. Mature **Opuntia tomentosa* were encountered commonly within this vegetation type.

Remnant status: Only three polygons of RE 11.9.5 possessed the height, cover and population size characteristics which were favourable for consideration of remnant status. The remainder of RE 11.9.5 polygons consisted of regrowth that is either too low, lacks sufficient canopy cover to be considered as remnant status. Areas that have been mapped by the EPA as remnant vegetation were found to generally transition into RE 11.9.10, or have this RE as a co-dominant component.

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 remnant vegetation.

Remnant RE 11.9.5 is consistent with 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 exclude non-remnant vegetation, rather age and conditions are determining factors. Brigalow regrowth (non-remnant vegetation) in the study area was of poor quality and generally lacked the species composition and structural elements typical of that found in undisturbed areas of Brigalow and is therefore not considered part of the

Brigalow ecological community that is listed under the EPBC Act (Threatened Species Scientific Committee 2001).

RE 11.9.6 *Acacia melvillei +/- Acacia harpophylla* open forest on fine-grained sedimentary rocks

RE 11.9.6 *Acacia melvillei* +/- *Acacia harpophylla* open forest on fine-grained sedimentary rocks (Land Zone 9) occurred in the study area entirely as non-remnant, fragmented regrowth within road reserves in association with monotypic stands of regrowth *Acacia harpophylla* (non-remnant RE 11.9.5). Generally occurring as small, isolated groves, this vegetation type was not large enough to be mapped by the EPA (2005) or qualify as remnant vegetation.

Canopy: *Acacia melvillei* (Miligee) dominated the canopy, with associated *Acacia harpophylla* at median height of around 6 m (see Photo 4-5).

Mid-stratum: The mid-stratum was moderately sparse and was dominated by *Eremophila mitchellii* and *Geijera parviflora*, with associated *Acacia salicina* occurring very infrequently.

Ground layer: The ground layer was dominated by **Cenchrus ciliaris, Atriplex muelleri, Tetragonia tetragonoides, Aristida* spp*. and Enteropogon acicularis*.

Condition: This vegetation type was generally sparsely distributed, subject to edge effects and modified through routine road maintenance.

Photo 4-5: Vegetation representative of *Acacia melvillei +/- Acacia harpophylla* open forest on fine-grained sedimentary rocks (analogous to RE 11.9.6)

Remnant status: This community does not satisfy the height, area and cover requirements to be considered as remnant vegetation by the EPA.

Conservation status: RE 11.9.6 has a VM Act and EPA biodiversity status of Endangered. The VM Act status however only applies to remnant patches of this RE.

Remnant RE 11.9.6 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 characteristic of RE 11.9.6 was however of poor quality and generally lacked the species composition and structural elements typical of that found in undisturbed areas of the listed Brigalow and is therefore not considered part of the Brigalow ecological community that is listed under the EPBC Act (Threatened Species Scientific Committee 2001).

RE 11.9.7 *Eucalyptus populnea* shrubby woodland on fine-grained sedimentary rocks

RE 11.9.7 occurs as remnant vegetation between along Blackant Creek, a tributary of Woleebee Creek (refer Figure 4-2).

Canopy: *Eucalyptus populnea* dominated the canopy with an average height of 14 m (see Photo 4-6). *Eucalyptus tereticornis* and *E. melanophloia* also occurred in this RE, however less frequently, and *Acacia harpophylla* also locally dominant.

Photo 4-6: Vegetation representative of Eucalyptus populnea shrubby woodland on fine-grained sedimentary rocks (analogous to RE 11.9.7)

Mid-stratum: The mid stratum is moderately sparse and is dominated by *Eremophila mitchellii* and *Geijera parviflora*, with associated *Alectryon oleifolius* ssp*. elongatus* and *Acacia excelsa* occurring very infrequently.

Ground layer: The ground layer is generally dominated by **Cenchrus ciliaris, Atriplex muelleri, *Lepedium bonariense, Tetragonia tetragoniodes, Austrostipa scaber* (no common name), *Aristida* spp*.* (wiregrasses), *Eragrostis spp.* (lovegrasses) *and Chloris divaricata*.

Condition: This community has been moderately thinned and fragmented through selective removal of sub-canopy trees.

Remnant status: This community generally satisfies the height, area and cover requirements to be considered as remnant vegetation by the EPA, and is analogous with RE 11.9.7, '*Eucalyptus populnea*, *Eremophila mitchellii* shrubby woodland on fine-grained sedimentary rocks'.

Conservation status: RE 11.9.7 has a VM Act and biodiversity status of 'of concern'. Although RE 11.9.7 features *Acacia harpophylla* as dominant or co-dominant species*,* it is not included in the list of REs used to define 'Brigalow (*Acacia harpophylla* dominant and co-dominant)' as listed under the EPBC Act (Environment Australia 2003).

RE 11.9.10 *Acacia harpophylla, Eucalyptus populnea* open forest on fine-grained sedimentary rocks

RE 11.9.10 *Acacia harpophylla, Eucalyptus populnea* open forest on fine-grained sedimentary rocks generally occurred in association with smaller drainage lines incised within an *in situ* soil profile of fine grained sediments (Land Zone 9) beyond the extent of Quaternary alluvial deposition, or on slopes immediately adjacent to alluvium (Land Zone 3) (see Figure 4-2).

Canopy: *Eucalyptus populnea* dominated the canopy with associated *Eucalyptus melanophloia* occurring sporadically. The canopy within remnant occurrences possessed a median height of 14 m (see Photo 4-7). The low tree layer was dominated by *Acacia harpophylla*, juvenile canopy species and *Casuarina cristata* while *Acacia excelsa*, *Alectryon oleifolius* ssp*. elongatus, Lysiphyllum carronii* (Ebony Tree) and *Brachychiton rupestris* occurred infrequently.

Mid-stratum: The mid-stratum was dominated by *Geijera parviflora*, with various associated juvenile canopy species; *Eremophila mitchellii, Alectryon diversifolius*, *Alectryon oleifolius* ssp*. elongatus*, *Psydrax oleifolium*, *Citrus glauca*, *Atalaya hemiglauca* (Whitewood), *Acacia decora* and *Capparis mitchellii*.

Ground layer: The ground layer in the remnant patches was dominated generally by *Chloris divaricata*, *Aristida* spp*.*, *Enteropogon acicularis*, *Bothriochloa ewartiana* (Desert Bluegrass), **Cenchrus ciliaris*, *Salsola kali*, *Eragrostis* spp*.*, *Enchylaena tomentosa*, *Calotis* spp*.*, **Verbena tenuisecta*, *Sclerolaena* spp*.* (saltbushes), *Vittadinia* spp*., Sida* spp*.* and *Einadia nutans* var*. nutans*.

Photo 4-7: Vegetation representative *of Acacia harpophylla*, *Eucalyptus populnea* woodland on alluvial plains (RE 11.9.10)

Condition: The remnant occurrences were generally contiguous with extant remnant vegetation and were situated primarily on the lower slopes of undulating rises that flow downslope toward the remnant vegetation associated with the creeks that traverse the site. None of the areas described have had livestock excluded and thinning of sub-canopy trees was apparent at all survey sites supporting this RE.

The non-remnant vegetation analogous with this RE occurred generally as small, fragmented patches that had been retained as shade/shelter for livestock, potential woodlots and/or stabilisation of narrowly incised drainage corridors.

Weed incursion was limited to the ground and shrub layer in the form of a sparse to mid-dense cover of **Cenchrus ciliaris,* very sporadic **Bryophyllum delagoense X B. daigremontianum* (hybrid Mother-of-millions), **Opuntia tomentosa* and **Opuntia stricta* (Prickly Pear). The latter three species are declared Class 2 pests under the Queensland *Land Protection (Pest and Stock Route Management) Act 2002.*

Remnant status: Remnant RE 11.9.10 has been mapped in the study area in homogeneous polygons as well as the dominant RE in heterogeneous polygons along the drainage line in which RE 11.3.2 or RE 11.3.25 were subdominant REs.

Conservation status: RE 11.9.10 has a VM Act status of 'of concern' and biodiversity status of 'endangered'. Although RE 11.9.10 features *Acacia harpophylla* as dominant or co-dominant species, it is not included in the list of REs used to define 'Brigalow (*Acacia*

harpophylla dominant and co-dominant)' as listed under the EPBC Act (Environment Australia 2003).

RE 11.10.9 *Callitris glaucophylla* open forest on coarse-grained sedimentary rocks

RE 11.10.9 occurs as three small patches within the north-western extent of MLA 50231 (see Figure 4-2). This RE occurs on an area with geology mapped as Injune Creek Group (Bureau of Mineral Resources Geology and Geophysics 1971b) which is consistent with Land Zone 9 (fine-grained sedimentary rocks). However, Gubberamunda sandstone formation is located in close proximity to the south of the MLA. This formation is not mapped within the study area, however one RE corresponding with the Land Zone 10 was identified in the study area. It appears that this RE is situated on a small or residual unmapped occurrence of coarse-grained sedimentary rock.

Canopy: *Callitris glaucophylla* (White Cypress Pine) dominates the canopy with associated *Eucalyptus melanophloia* occurring sporadically, and *Lysiphyllum carronii, Brachychiton rupestris* and *Eucalyptus populnea* generally restricted to the periphery of the community. The canopy possesses a median height of 11 m (see Photo 4-8).

Mid-stratum: The sparse mid-stratum is dominated by *Geijera parviflora*, with variously associated juvenile canopy species *Psydrax oleifolium*, *Psydrax johnsonii* and *Eremophila mitchellii* occurring infrequently.

Ground layer: The ground layer is generally dominated by *Vittadinia encelioides* (no common name), **Cenchrus ciliaris, Commelina cyanea* (Native Wandering Jew), *Einadia spp, Vittadinia dissecta, Crassula colorata* (no common name) and *Sida spp.,* with *Ancistrachne uncinulata* occurring very sporadically.

Condition: This vegetation type occurs as small, fragmented patches which have been retained as shade/shelter for livestock and potential woodlots. None of the areas described have had livestock excluded and sub-canopy trees appeared to have been thinned at all sites surveyed. Weed incursion is limited to the ground and shrub layer in the form of a sparse to mid-dense cover of **Cenchrus ciliaris* and **Opuntia tomentosa.*

Remnant status: This RE has not been mapped within the study area by the EPA (Environmental Protection Agency 2007). Coarse-grained sedimentary soils have also not been mapped as occurring within this area. Despite this, the vegetation type is most representative of RE 11.10.9, '*Callitris glaucophylla* woodland on coarse-grained sedimentary soils'. The absence of this RE from EPA mapping may be explained by the higher elevation at which the community occurs and the limited extent and isolated occurrence of coarse-grained sedimentary soils at this site which, as a stand-alone entity, are too small to map at 1:100,000 scale. RE 11.10.9 is afforded a VM Act and EPA biodiversity status of 'not of concern' and 'no concern at present' respectively.

Photo 4-8: Vegetation representative of *Callitris glaucophylla* woodland on coarse-grained sedimentary soils (RE 11.10.9)

Cleared areas

The majority of the study area consisted of cleared pasture or highly disturbed vegetation (non-remnant) that is no longer analogous with any RE.

Canopy: Isolated, small patches and individual paddock trees occurred throughout this vegetation type and generally aligned with canopy trees that would have historically dominated the landscape. A preference for the retention of *Brachychiton rupestris* (Queensland Bottle Tree) and, to a lesser extent *Brachychiton populneus* (Kurrajong), was observed (see Photo 4-9).

Mid-stratum: The mid-stratum was generally absent.

Ground layer: The ground layer provided the predominant vegetative cover throughout cleared areas and, where not overgrazed, was dominated by **Cenchrus ciliaris.* Areas subjected to continual overgrazing were found to support a range of species from the Asteraceae, Malvaceae and Chenopodiaceae families including *Sclerolaena* spp*., Sida* spp*. *Malvastrum* spp., *Einadia* spp*., Vittadinia* spp*., Calotis* spp*., Enchylaena tomentosa, Salsola kali, *Gamochaeta* spp*.* and *Rhodanthe polyphylla.* 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.

Photo 4-9: Cleared vegetation including retained Queensland Bottle Tree

Small melon holes, creek overflows and ancient oxbows, with varying capacities for holding water, were encountered throughout the study area. The condition and vegetative composition of these was variable due to degree and persistence of inundation, cattle access/grazing pressure and exposure. Species commonly associated with impeded drainage encountered in these wetter areas included *Cyperus bifax* (no common name), *Leptochloa decipiens* (no common name), *Monochoria cyanea* (Monochoria), *Pseudoraphis spinescens* (Mud Grass), *Paspalum distichum* (Water Couch), *Ammannia multiflora* (no common name), *Eleocharis cylindrostachys* (a bog rush), *Cyperus concinnus* (no common name) and *Carex appressa* (Tall Sedge).

Remnant status: Cleared areas are not analogous with any described regional ecosystem.

Conservation status: Cleared areas that are not analogous with any described regional ecosystem have no conservation status under the VM Act, nor are they assigned a biodiversity status.

4.4.1 Inconsistencies in RE mapping

No changes were made to the extent of remnant vegetation defined by the EPA RE mapping (2007). All patches of regrowth (non-remnant) vegetation were however surveyed, mapped based on aerial photography, 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 (2007) was however changed based on the surveys undertaken for this assessment. Remnant

vegetation in the study area consisted predominantly of riparian vegetation dominated by RE 11.3.25 (*Eucalyptus tereticornis* or *E. camaldulensis* woodland fringing drainage lines) with RE 11.3.2 (*Eucalyptus populnea* woodland on alluvial plains) spreading across the floodplains. Current EPA RE mapping (2007) has these polygons mapped as heterogeneous polygons consisting of RE 11.4.3/11.4.7 (percentage 70/30). The RE type of these polygons was changed for the purpose of this assessment.

4.5 Species of plant

Searches of relevant databases identified records of 649 species of plant in the study area and surrounds (see Attachment B). The field surveys of the study area identified 465 species of plant, of which 388 (84%) are native (see Attachment E). The most diverse family was the grasses (Poaceae) of which 109 species were recorded (81.6% of which are native).

One threatened species of plant was recorded within the study area: *Homopholis belsonii* (discussed further in Section 5.1.2). The identification of this species has been confirmed by the Queensland Herbarium. *Homopholis belsonii* is also a only priority taxa species of plant for the Brigalow Belt South (Environmental Protection Agency and Environmental Planning Southwest Queensland 2002a). *Acacia melvillei* (Yaran) was the only other priority plant taxa for the Brigalow Belt South recorded in the study area.

Seven species recorded in the study area are 'declared plants' listed under the *Land Protection (Pest and Stock Route Management) Act 2002* (see Table 4-3), all of which are listed as Class 2 pests. Class 2 pests are species established in Queensland which have, or could have, an adverse economic, environmental or social impact. The control and management of these pest species is a coordinated effort involving State and Local government, community and landowners.

Table 4-3: Declared plants recorded in the study area

Species	Common name	Class
**Bryophyllum delagoense*	*Mother of Millions*	2
**Bryophyllum* x *houghtonii* (syn. *Bryophyllum delagoense* x *B. daigremontianum*)	*Hybrid Mother of Millions*	2
**Opuntia stricta*	*Prickly Pear*	2
**Opuntia tomentosa*	*Velvet Tree Pear*	2
**Parthenium hysterophorus*	*Parthenium*	2
**Sporobolus africanus*	*Parramatta Grass*	2
**Xanthium spinosum*	*Bathurst Burr*	2

4.6 Fauna habitats

Five broad fauna habitat types exist within the study area: Eucalypt woodlands, non-eucalypt woodlands, riparian, cleared lands and wetlands (natural or artificial). These fauna habitats are broad groupings of the vegetation types/REs 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	Corresponding RE code
Eucalypt woodland	RE 11.3.2, RE 11.9.7, RE 11.9.10
Non-Eucalypt woodland	RE 11.9.4, RE 11.9.5, RE 11.9.6, RE 11.10.9
Riparian	RE 11.3.25
Wetland (artificial/natural)	—
Cleared lands	—

4.6.1 Eucalypt woodlands

Eucalypt woodland habitat within the study area includes areas of woodland and open forest dominated by *Eucalyptus populnea* and or *E. melanophloia* (corresponding to REs 11.3.2 and 11.9.7). The definition of woodland habitat applied here excludes riparian vegetation dominated by *E. tereticornis*, which has been classified as riparian habitat (see Section 4.7.3, below).

Within the study area, eucalypt woodland habitat was associated mainly with alluvial plains and low hills. Areas of eucalypt woodland in the study area were either contiguous with other areas of non-eucalypt woodland and/or riparian habitat, or occurred as discrete remnants. The structure of eucalypt woodland habitat varied across the study area reflecting past land use and current management practices (e.g. logging, grazing, thinning of vegetation for grazing purposes, fuel reduction burns) (see Attachment F for details). Eucalypt woodlands typically ranged from 12 m to 18 m in height with a sparse crown cover (average of approximately 25% crown cover). Various species of Mistletoe were also locally abundant within the canopy of eucalypt woodlands providing potential foraging habitat for nomadic honeyeaters (e.g. the Rare Painted Honeyeater, *Grantiella picta*). As well as eucalypt species, some remnants contained sporadic occurrences of *Callitris*. The understorey of woodland remnants was generally sparse (10 to 25% cover).

Hollow-bearing trees occurred at varying densities within eucalypt woodland, with density estimates ranging from zero to ten trees per hectare. At most eucalypt woodland sites, hollow-bearing trees were recorded at densities of around five per hectare. Hollow-bearing trees in areas of eucalypt woodland provided a range of trunk and limb hollows suitable for bats, gliders, possums, larger birds including parrots and cockatoos, arboreal snakes, and monitors.

The groundcover was comprised largely of leaf litter (20-40% cover) and low vegetation (25-40% cover) with rock and log cover varying from site to site (see Attachment F). The extent of bare soil at eucalypt woodland sites appeared to reflect grazing intensity and varied both within and across lands of different tenure.

The eucalypt woodland habitat within the study area was generally devoid of surface water except near major drainage lines (e.g. Woleebee Creek, Wandoan Creek and One Arm Man Creek) where water formed ephemeral and possibly semi-permanent pools. The disturbance regime in this fauna habitat type was influenced largely by the extent of grazing, logging and weed incursion at each site (see Attachment F). The condition of eucalypt woodland habitat within the study area was variable and reflected past land use but was generally considered to be in moderate condition.

4.6.2 Non-eucalypt woodlands (including Brigalow)

Non-eucalypt woodlands habitat type comprised areas of RE 11.9.4, RE 11.9.5, RE 11.9.6 and RE 11.10.9 (remnant and non-remnant patches). This fauna habitat type was dominated by *Acacia harpophylla* regrowth in addition to *Acacia melvillei*, *Casuarina cristata* or *Callitris* spp. Patches of semi-evergreen vine thicket were also included in this fauna habitat type. Non-eucalypt woodlands were distributed throughout the study area on a range of soil types, with deep underlying clays.

Non-eucalypt woodlands in the study area were dominated by patches of non-remnant vegetation and were therefore highly variable in structure. Typically they had a moderately sparse to mid-dense canopy (circa 30% crown cover) up to 15 m tall. The mid-stratum, where present, was generally sparse (<10% crown cover) comprising of regenerating canopy species or semi-evergreen vine thicket in some patches adjacent to Booral Road (i.e. non-remnant vegetation analogous to RE 11.9.4).

In mature stands of non-eucalypt woodlands, tree hollows occurred at moderate densities (5 per hectare) but these were generally absent in stands that failed to reach remnant heights of 12–15 m (i.e. non-remnant patches). Generally, the hollows were small to medium in size and could largely be described as crevices (i.e. less than 5–10 cm deep) suitable for bats, arboreal snakes and possibly small gliders in the larger homogenous stands. At the time of spring surveys only *Casuarina cristata* provided an obvious foraging resource for Glossy Black-cockatoos with 25% of stems producing suitable cones. Approximately 2% of the *Acacia harpophylla* trees showed visible signs of exuding sap, a known food source for the vulnerable Brigalow Scaly-foot (*Paradelma orientalis*) (see Wilson, S. 2005).

Most of the non-eucalypt woodlands in the study area were subject to extensive disturbance arising from clearing and grazing, including roadside vegetation. Many of the roadside reserves are reportedly subject to fuel reduction burns every 5–10 years (anonymous local landholder, Ben Lewis pers. comm. April 2008). Despite this, several of the sites visited had extensive cover of leaf litter (58%) and logs (25%) suggesting that not all areas were subject to this management regime. The deep and extensive leaf litter and humus layer provide suitable habitat for fossorial skinks and legless lizards, including the Vulnerable Brigalow Scaly-foot that was recorded along the proposed gas pipeline alignment during winter surveys.

Like much of the study area, areas of Brigalow woodland were largely devoid of surface water other than ephemeral soaks and drainage lines which provide potential habitat for frog fauna including the rare Rough Frog (*Cyclorana verrucosa*) (a species likely to occur on site) and the Salmon-striped Frog (*Limnodynastes salmini)* (a priority taxa recorded on site during surveys). The condition of non-eucalypt woodland habitat within the study area reflected extensive past and current disturbance and was considered to be in poor condition.

4.6.3 Riparian areas

Riparian areas consisted predominantly of RE 11.3.25. This fauna habitat type was dominated by large *Eucalyptus tereticornis* and occurred along the majority of named drainage lines within the study area, forming important wildlife corridors (discussed further in Section 4-7).

Densities of hollow-bearing trees within wooded riparian habitat were high averaging 10 trees per hectare (the highest density in the study area). Large tree hollows were

particularly common in this habitat providing valuable habitat for many hollow-dependant or obligate species including Greater Gliders (*Petauroides volans*), possums, cockatoos, parrots and owls (e.g. Pacific Barn Owl, *Tyto javanica*).

Groundcover attributes were often consistent with disturbance, with only a shallow layer of leaf litter and humus and a predominance of weeds or disturbance-tolerant grasses. Parts of this habitat contained extensive areas of bare soil attributable to creek bank erosion and cattle grazing. The condition of riparian habitat within the study area reflected past and current land use and was generally considered to be in poor-moderate condition.

4.6.4 Cleared land

The majority of the study area comprised cleared land that does not correspond with any remnant or non-remnant vegetation. These areas are used predominantly for grazing of cattle and/or cropping. Grazing areas generally contained scattered paddock trees or small cattle camps (small patches of *Acacia harpophylla* regrowth < 0.5 ha), while cropping areas were generally devoid of tree cover other than that growing on contour strips and linear roadside reserves.

The grazing land within the study area provided limited habitat for native vertebrate fauna. Isolated hollow trees in paddocks did, however, provide refuge for microchiropteran bats (microbats) as well as nesting and foraging resources for 'edge tolerant' bird species. Other species of tree that grow within the fragmented patches of vegetation across the study area, such as *Acacia harpophylla,* may also provide foraging opportunities and/or shelter as well as facilitating movement or dispersal of birds (possibly including the Rare Painted Honeyeater).

Cropping areas provided limited habitat value to native vertebrate fauna. Grass species grown for cattle feed (i.e. *Sorghum* spp.) may however provide a supplementary feeding resource on a seasonal basis for some common granivorous bird species. Some species of reptiles may also seek refuge within the cracking clays on the floodplains in the study area that are utilised for cropping. 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.

4.6.5 Wetland (natural and artificial)

Natural wetlands were restricted to the Wandoan/Woleebee Creek floodplain on MLA areas 50230 and 50231. Though few in number and small (<10 ha) in size, these wetland areas have been included as a discrete habitat type given their value to fauna. A few large farm dams within the study area were also grouped with this habitat type as these are known to provide a suitable wetland surrogate for vertebrate fauna.

Wetlands in the study area were generally situated on heavy clays and had limited aquatic vegetation (mostly sedges and grass tussocks) at the time of surveys.

While mostly bare, wetland habitat within the study area did provide habitat suitable for a number of frogs and reptiles. Wetlands also provided suitable habitat for many of the species of aquatic birds recorded in the study area. The condition of natural and artificial wetland habitat within the study area was considered to be in poor-moderate condition.

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
- 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& Lindenmayer 1995).

How a species uses corridors depends largely on the home and activity ranges of the species, its habitat requirements and the ecological characteristics of the corridor. For example, some large or mobile species may make direct movements through a network of corridors, moving from one patch of habitat to another. These direct movements may be on the scale of a foraging expedition or a migration (Bennett 1990b). Other species may pause in corridors while moving between habitat patches. These pauses may be fleeting or of extended duration (i.e. weeks or 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.

Vegetation within the study area and surrounds is highly fragmented with much of the surrounding landscape cleared. Within the study area there may be only limited connectivity among habitat patches given the extent of clearing and the distance separating larger areas of core habitat. Under these circumstances, even small patches may provide important stepping stones for animals traversing a fragmented landscape (Bennett 1993).

Much of the remaining vegetation within the study area comprises linear strips adjacent to creeks. Most of this vegetation comprises REs 11.3.25 and 11.3.2. These continuous linear patches of woodland form part of a wider regional corridor network that links habitats in the Mt Oragon and Hinchley State Forests to the south east of the Study Area to Juandah Creek to the north east of the Study Area. This wildlife corridor is likely to play an important role in the movement of wildlife throughout the landscape, particularly for species such as the Koala (*Phascolarctos cinereus*) and Greater Glider, which were both observed in these habitats. These linear patches are recognised by State Wildlife Corridor mapping (Environmental

Protection Agency 2004b) and are of regional significance under the Biodiversity Planning Assessment for the Brigalow Belt bioregion (Environmental Protection Agency 2003) (see Sections 5.1.4 and 5.1.6 respectively).

4.8 Species of animal

Database searches (Section 3.4) returned records of 288 terrestrial vertebrate species within the study area and surrounds comprising 181 species of bird, 22 species of frog, 26 species of mammal and 59 species of reptile.

Field surveys of the study area recorded 232 species of vertebrate fauna including 220 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 reptiles, mammals and frogs (see Table 4-5).

Table 4-5: Summary of species of terrestrial fauna identified in the study area

Taxa	MLA areas (spring surveys)	MLA areas (autumn surveys)	Gas pipeline	Native species	Introduced species	Total
Mammals	31	26	19	27	7	34
Birds	107	103	75	132	3	135
Frogs	16	13	4	15	1	16
Reptiles	36	26	10	46	1	47
Total	**190**	**168**	**108**	**217**	**12**	**232**

During field surveys, four rare and threatened species were recorded in the study area:

- Glossy Black-cockatoo (*Calyptorhynchus lathami*) — vulnerable
- 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 two migratory species were recorded in the study area (see Attachment F).

Fauna species detection within the MLA areas was highest in spring, with 190 species recorded during surveys. In autumn, 168 species were recorded on MLA areas including 39 species not recorded on summer surveys. Only two additional species were recorded within the study area during the gas pipeline survey.

Species diversity was broadly comparable across fauna habitat types with the exception of wetland habitat, where only 85 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 147 (non-eucalypt woodland) to 115 species (eucalypt woodland habitats).

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

Group	Non-Eucalypt woodland (Brigalow/ SEVT)	Eucalypt woodland (Ironbark dominated)	Eucalypt woodland (Poplar Box dominated)	Riparian	Cleared	Wetland/ dam
Frogs	10	8	10	15	13	16
Reptiles	30	15	22	18	17	4
Mammals	28	25	25	27	16	14
Birds	79	67	79	86	71	51
Total	**147**	**115**	**136**	**146**	**117**	**85**

4.8.1 Mammals

Thirty-four species of mammal were recorded during the survey (see Attachment F) including seventeen 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

Microbats were the most diverse group of mammals recorded in the study area with seventeen species detected during surveys. Anabat ultrasonic call detection recorded high levels of microbat activity. Amongst the more commonly detected species within the study area were eastern bent-wing Bat (*Miniopterus schreibersii oceanensis*), Yellow-bellied Sheath-tail Bat (*Saccolaimus flaviventris*), Gould's Wattled Bat (*Chalinolobus gouldii*), Little Broad-nosed Bat (*Scotorepens greyii*), Beccari's Free-tail Bat (*Mormopterus beccarii*), Eastern Free-tail Bat (*Mormopterus* species 2), White-striped Mastiff Bat (*Tadarida australis*) and Little Pied Bat (*Chalinolobus picatus*).

The Northern Free-tail Bat (*Chaerephon jobensis*) and Common Sheath-tail Bat (*Taphozous georgianus*) were identified from Anabat detection, but only with a low level of certainty. These species were not verified by captures and each would represent a significant range extension southwards based on current field texts. Given the uncertainty with the species identification, these records were omitted (these records were not of species of threatened or regionally significant conservation value).

Seven species of microbat were identified from captures in harp traps including Gould's Wattled Bat (*Chalinolobus 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 and wooded riparian areas within the study area and was considered locally common. The Eastern Bent-wing Bat (*Miniopterus schreibersii oceanenis*), 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.

Two other species of microbat recorded during surveys are considered regionally significant due to their occurrence at or beyond their distributional limit, within the study area. These species are the Large Forest Bat (*Vespadelus darlingtoni*) and Little Forest Bat (*Vespadelus vulturnus*).

Arboreal and terrestrial mammals

Three arboreal species of mammal were recorded in the study area: Koala, Greater Glider and Common Brush-tail Possum (*Trichosurus vulpecula*). All three species are considered priority taxa within the southern Brigalow Belt bioregion (Environmental Protection Agency and Environmental Planning Southwest Queensland 2002a). Koalas were recorded at several locations in riparian vegetation along the major drainage lines including Wandoan and Woleebee Creeks. Greater Gliders were recorded in the study area along Woleebee Creek within riparian vegetation. Mature *E. tereticornis* associated with riparian habitats was the only species of tree in the study area that provided an abundance of large hollows suitable for Greater Gliders. The species' diet is quite restricted (Strahan 1995) and may be limited to *E. tereticornis* in the study area. The Common Brushtail Possum is considered in serious decline in the Brigalow Bioregion South due to tree clearing (Environmental Protection Agency and Environmental Planning Southwest Queensland 2002a). These possums, however, were relatively common within the study area in eucalypt woodlands, non-eucalypt woodlands and riparian habitats.

Large ground-dwelling mammals including the Eastern Grey Kangaroo (*Macropus giganteus*), Red-necked Wallaby (*Macropus rufogriseus*), Swamp Wallaby (*Wallabia bicolor*), Wallaroo (*Macropus robustus*) and Red Kangaroo (*Macropus rufus*) were recorded within the study area in association with most fauna habitat types (see Attachment F).

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.

4.8.2 Birds

Birds were the most diverse group of terrestrial vertebrate fauna with 135 species recorded during the field surveys (see Attachment F). Most of these were common species associated with woodland, grassland and/or wetland habitat.

Only one threatened bird species, the Glossy Black-cockatoo was recorded in the study area during field surveys, of which two individuals were observed foraging in *Casuarina cristata*. Two migratory species listed under the EPBC Act were also recorded during surveys: the Great Egret (*Ardea alba*) and Rainbow Bee-eater (*Merops ornatus*). One non-threatened Priority species was also recorded — the Grey-crowned Babbler (*Pomatostomus temporalis temporalis*). 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.

4.8.3 Frogs

Sixteen species of frog comprising three families were recorded during the survey (see Attachment F for details). Frog diversity was highest in the riparian and wetland habitats. Cleared areas also supported a high diversity of frogs.

None of the species of frog recorded are threatened or at their distributional limit, although the Salmon-Striped Frog (*Limnodynastes salmini*) is a priority taxa of the southern Brigalow Belt bioregion (Environmental Protection Agency and Environmental Planning Southwest Queensland 2002a). This species was recorded from a range of habitats within the study area including gravel borrow pits, vegetated and non-vegetated farm dams, roadside vegetation and drainage lines.

4.8.4 Reptiles

Forty-seven species of reptile were recorded during the field surveys, comprising two species of turtle, nine species of gecko, two species of pygopod lizard, one flap footed lizard, fifteen species of skink, eleven species of snake, one species of dragon, three species of monitor and three species of blind snake (see Attachment F for details). Two rare and threatened priority taxa, the Golden-tailed Gecko (*Strophurus taenicauda*) and the Brigalow Scaly-foot (*Paradelma orientalis*), were detected through active herpetofauna searches and both were found in association with *Acacia harpophylla* dominated vegetation (non-eucalypt woodland habitat type). One non-threatened priority taxa, Krefft's Turtle, (*Emydura macquarii*) was recorded within the study area in association with the wetlands/dams.

Two *Morethia adelaidensis* (a skink) were captured in *Acacia harpophylla* dominated vegetation adjacent to Peakes Road on MLA 50230. The occurrence of this species within the study area represents an easterly extension of the species' previously known distribution by approximately 500 km.

5. Threatened biodiversity and other significant matters

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

5.1 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 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

Two 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.

Brigalow (*Acacia harpophylla* dominant and co-dominant) corresponded with remnant RE 11.9.5, RE 11.9.6 in the study area.

The listing of Brigalow (*Acacia harpophylla* dominant and co-dominant) under the EPBC Act includes both remnant and non-remnant vegetation, but excludes regrowth vegetation in poor condition (i.e. regrowth lacking structure and species composition typical of remnant Brigalow). Brigalow regrowth (non-remnant vegetation) in the study area characteristic of RE 11.9.6 and RE 11.9.6 was of poor quality and generally lacked the species composition and structural elements typical of that found in remnant Brigalow (RE 11.9.5) in the study area. Regrowth (non-remnant vegetation) within the study area was therefore not considered

part of the Brigalow ecological community that is listed under the EPBC Act (Threatened Species Scientific Committee 2001).

Semi-evergreen vine thickets of the Brigalow Belt (north and south) and Nandewar Bioregions are considered likely to occur in the study area (Department of the Environment Water Heritage and the Arts 2008c), however no remnant vegetation consistent with the ecological community is mapped within the study area (Environmental Protection Agency 2005).

The patches of this RE in the study area were small, fragmented and highly modified in structure and composition. Nonetheless, these patches are still consistent with this ecological community (the definition of this endangered ecological community does not exclude patches on the basis of size or conditions) and require assessments of the significance of the impacts of the Project.

5.1.2 Threatened species

Four threatened species of plant and fourteen 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, Appendices G and H). *Homopholis bensonii* was not predicted to occur by the Protected Matters Search Tool, however was recorded in the study area.

Table 5-1: EPBC Act listed threatened species predicted to occur in the study area

Name	Conservation status[1]	Likelihood of occurrence
Plants		
Eriocaulon carsonii	E	Low
Cadellia pentastylis	V	Low
Diuris tricolor (syn *Diuris sheaffiana*)	V	Moderate
Commersonia sp. Cadarga (G.P.Guymer 1642)	V	Low
*Homopholis belsonii**	V	High (recorded)
Mammals		
Large-eared pied bat (*Chalinolobus dwyeri*)	V	Low
Greater long-eared bat (*Nyctophilus timoriensis*)	V	Moderate
Birds		
Australian painted snipe (*Rostratula australis*)	V	Moderate
Black-breasted button quail(*Turnix melanogaster*)	V	Low
Squatter pigeon (southern race) (*Geophaps scripta scripta*)	V	Moderate
Swift parrot (*Lathamus discolor*)	E	Low
Red Goshawk (*Erythrotriorchis radiatus*)	V	Low
Star finch (*Neochimia ruficauda ruficauda*)	E	Low

Name	Conservation status[1]	Likelihood of occurrence
Reptiles		
Fitzroy tortoise (*Rheodytes leukops*)	V	Low
Collared delma (*Delma torquata*)	V	Low
Brigalow scaly-foot (*Paradelma orientalis*)	V	High (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)

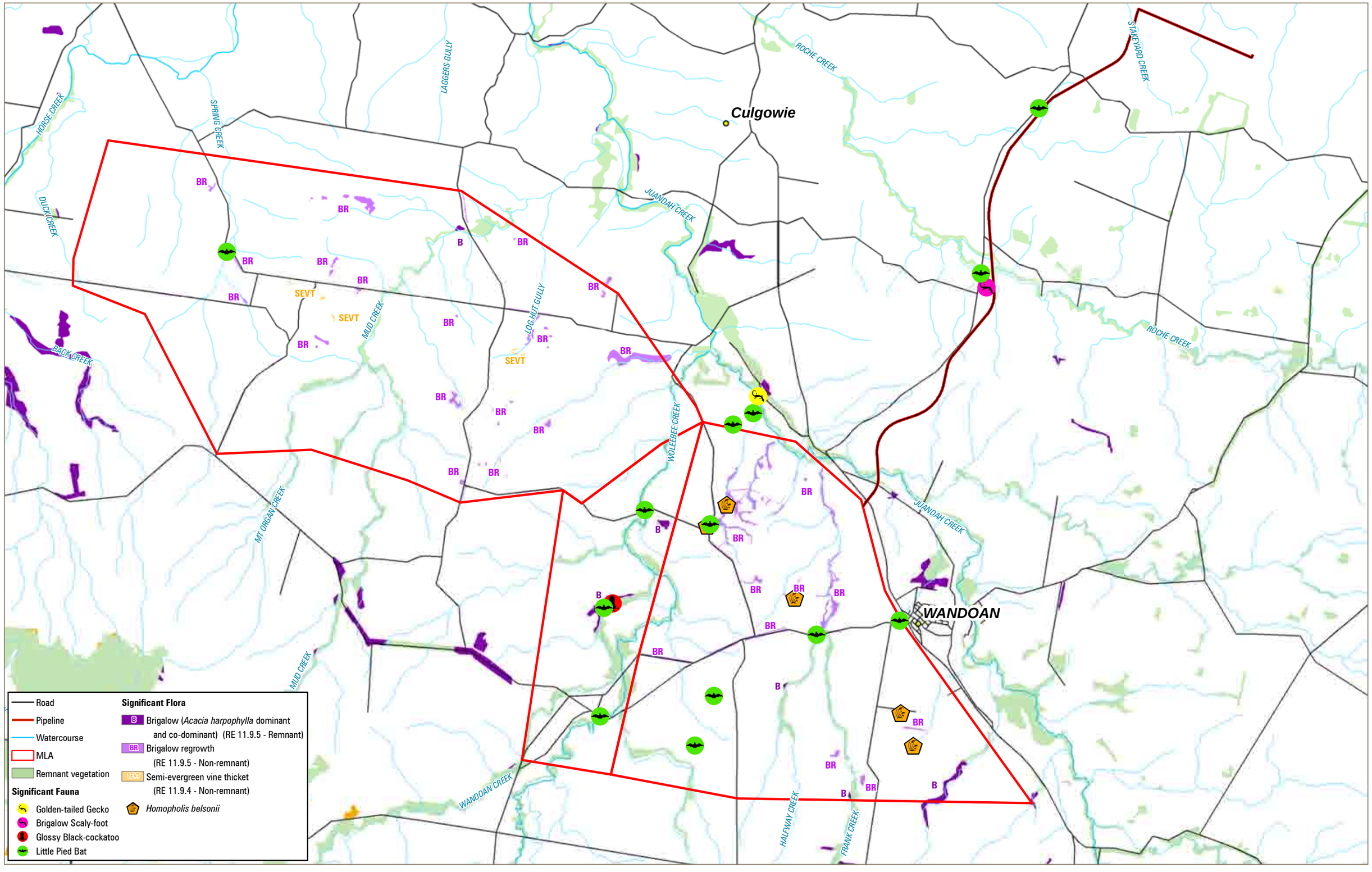
* *Homopholis bensonii* was not predicted to occur in the study area by the Protected Matters Search Tool (Department of the Environment Water Heritage and the Arts 2008c)

Homopholis bensonii was the only EPBC Act listed threatened species of plant recorded during the field surveys undertaken for this assessment (see Figure 5-1). This species was recorded at four locations within the study area within non-remnant vegetation analogous with RE 11.9.5 (*Acacia harpophylla* and/or *Casuarina cristata* open forest on fine-grained sedimentary rocks). No other threatened species of plant listed under the EPBC Act were considered likely to occur in the study area based on likelihood-of-occurrence assessment (see Attachment G).

Brigalow Scaly-foot (*Paradelma orientalis*) was the only EPBC Act-listed threatened species of animal recorded during the surveys undertaken for this assessment (see Figure 5-1). This species was recorded at one location within the study area in association with non-remnant vegetation analogous with RE 11.9.5 (*Acacia harpophylla* and/or *Casuarina cristata* open forest on fine-grained sedimentary rocks), adjacent to Roche Creek along the proposed gas pipeline route. Other remnant and non-remnant vegetation analogous with RE 11.9.5 in the study area could potentially provide suitable habitat for this species.

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*)
- Australian painted snipe (*Rostratula australis*)
- Greater long-eared bat (*Nyctophilus timoriensis*).



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

PARSONS BRINCKERHOFF

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Kilometres

Figure 5-1

Threatened and Other Significant Biodiversity

5.1.3 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*. These species are considered Matters of National Environmental Significance under the *Environment Protection and Biodiversity Conservation Act 1999*.

Two species of bird, the Great Egret (*Ardea alba*) and Rainbow Bee-eater (*Merops ornatus*) recorded within the study area are recognised under the migratory provisions of the EPBC Act (see Attachment F). A further 10 migratory species were predicted to occur in the study area and surrounds based on the Department of the Environment, Water, Heritage and the Arts Protected Matters Search Tool (see Attachment D).

Although two migratory species of bird were recorded and other migratory birds may potentially utilise resources in the study area, the study area is not considered 'important habitat' for these species, 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 Project would significantly affect migratory species predicted to occur within the study area. As such, significance 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 which concluded that the impact was unlikely to be significant (see Attachment I).

5.1.4 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.

5.1.5 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 Project 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.

5.2 Matters of State significance

5.2.1 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 a RE as defined under section 22 of the VM Act is 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 is listed in the Vegetation Management Regulation 2000. The vegetation management status only applies to remnant vegetation
- **biodiversity status:** the non-statutory status of a RE as defined by the EPA is endangered, of Concern or not of concern at present. This status is based on assessment of the condition of remnant vegetation in addition to the pre-clearing and remnant extent of a regional ecosystem. Although not of statutory significance, the biodiversity status of a RE 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 5-2 and Figure 5-1).

Table 5-2: Endangered or of concern REs in the study area

RE Code	RE short description	VM Act status
11.9.5	*Acacia harpophylla* and/or *Casuarina cristata* open forest on fine-grained sedimentary rocks	Endangered
11.9.7	*Eucalyptus populnea, Eremophila mitchellii* shrubby woodland on fine-grained sedimentary rocks	Of concern
11.9.10	*Acacia harpophylla*, *Eucalyptus populnea* open forest on fine-grained sedimentary rocks	Of concern

RE 11.9.4 Semi-evergreen vine thicket on fine grained sedimentary rocks and RE 11.9.6 *Acacia melvillei +/- Acacia harpophylla* open forest on fine-grained sedimentary rocks are also listed as Endangered, however all occurrence of these REs within the study area are of non-remnant status.

5.2.2 Threatened flora of State significance

Seven threatened plant species listed under the NC Act were identified as potentially occurring within the study area or surrounds from the desk-based assessment (see Attachment G). Only one of these species, *Homopholis bensonii,* was recorded during surveys undertaken for this assessment. This species was recorded at four locations within the study area, within non-remnant vegetation analogous with RE 11.9.5 (*Acacia harpophylla* and/or *Casuarina cristata* open forest on fine-grained sedimentary rocks) (Figure 5-1).

No other threatened species listed under the NC Act or priority taxa species of plant for the southern Brigalow Belt bioregion were considered likely to occur in the study area due to lack of suitable habitat (see Attachment G).

5.2.3 Threatened fauna of State significance

Nineteen 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). Four of these species were detected within the study area during the field surveys undertaken for this assessment (see Table 5-3).

Table 5-3: Threatened species of animal predicted to occur within the study area

Name	Conservation status[1]		Likelihood of occurrence
	State	Priority Taxa	
Rough frog (*Cyclorana verrucosa*)	R	Yes	Moderate
Dunmall's snake (*Furina dunmalli*)	V	Yes	Moderate
Brigalow Scaly-foot (*Paradelma orientalis)*	V	Yes	High (recorded)
Golden-tailed Gecko (*Strophurus taenicauda*)	R	Yes	High (recorded)
Common Death Adder (*Acanthopis antarcticus*)	R	Yes	Moderate
Yakka skink (*Egernia rugosa*)	V	Yes	Moderate
Cotton Pygmy Goose (*Nettapus coromandelianus*)	R	Yes	Moderate
Grey Goshawk (*Accipiter novaehollandiae)*	R	Yes	Moderate
Grey Falcon (*Falco hypoleucos)*	R	Yes	Moderate
Square-tailed kite (*Lophoictinia isura*)	R	Yes	Moderate
Black-necked stork (*Ephippiorhynchus asiaticus*)	R	Yes	High
Australian painted snipe (*Rostratula australis*)	V	Yes	Moderate
Squatter pigeon (southern race) (*Geophaps scripta scripta*)	V	Yes	Moderate
Pink Cockatoo (*Cacatua leadbeateri)*	V	Yes	Moderate

Name	Conservation status[1]		Likelihood of occurrence
	State	Priority Taxa	
Glossy Black-cockatoo (*Calyptorhynchus lathami)*	V	Yes	High (recorded)
Black-chinned honeyeater (*Melithreptus gularis*)	R	Yes	Moderate
Painted honeyeater (*Grantiella picta*)	R	Yes	Moderate
Little-pied Bat (*Chalinolobus picatus*)	R	Yes	High (recorded)
Greater long-eared bat (*Nyctophilus timoriensis*)	V	Yes	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).

5.3 Matters of regional significance

5.3.1 Biodiversity Planning Assessment (BPA)

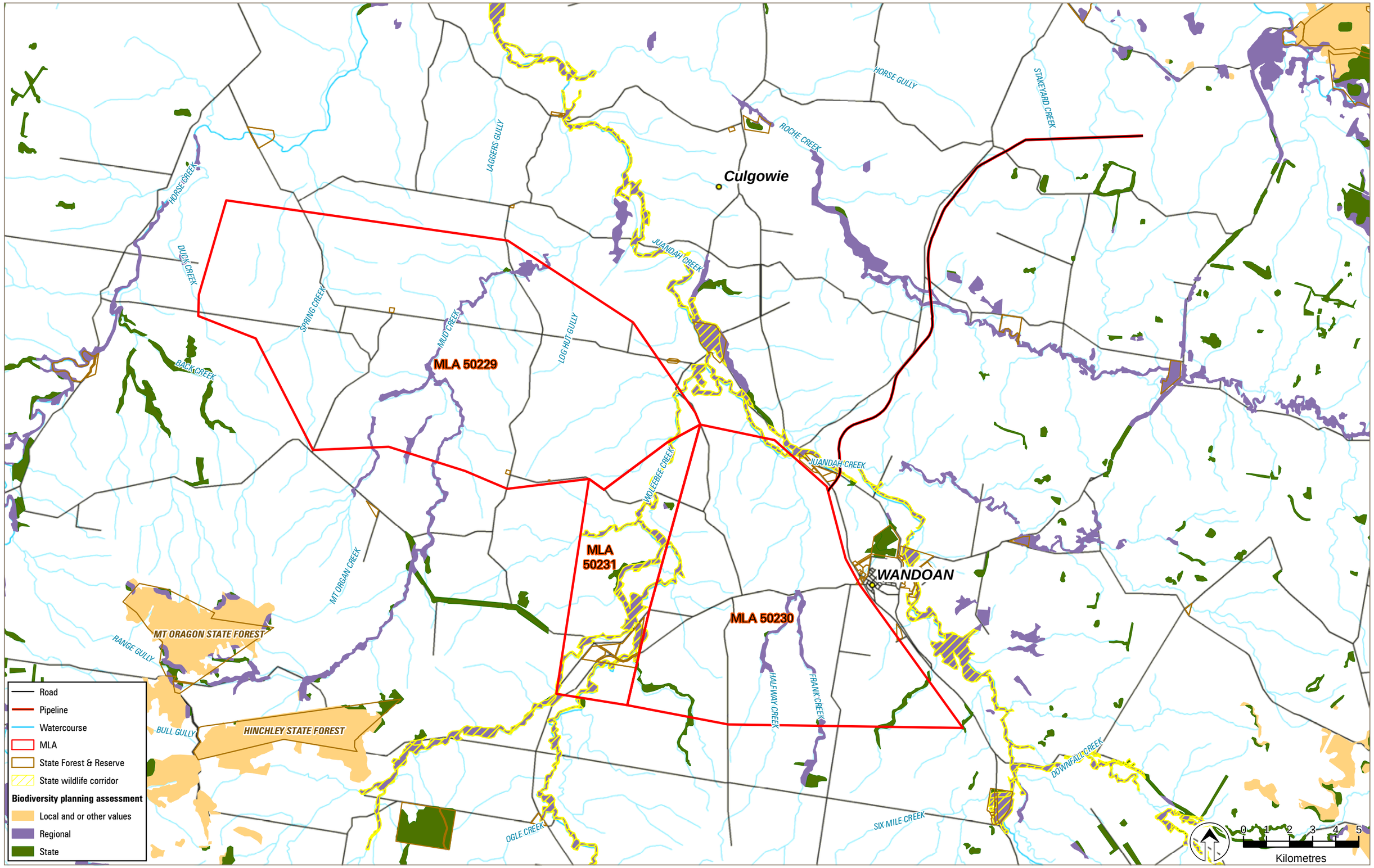
The Biodiversity Assessment and Mapping Methodology (Environmental Protection Agency 2002) has been prepared to provide a consistent approach for assessing biodiversity values at the landscape scale in Queensland. The Biodiversity Planning Assessment (BPA) draws upon EPA remnant vegetation mapping and 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.

A number of areas of regional and/or State significance exist in the study area. These correspond with remnant vegetation along Mud Creek, Woleebee Creek, Halfway Creek and Frank Creek (see Figure 5-2).

5.3.2 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).



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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

Priority taxa of plant

The Brigalow Belt South flora expert panel considered 221 taxa as priority taxa for declaration of core habitat in the Brigalow Belt South bioregion which included threatened species, non-Threatened species and other culturally significant species. *Acacia melvillei* (Yarran) and *Swainsona swainsonioides* (Downy Swainson-pea) were the only priority taxa species of plant for the Brigalow Belt South recorded in the study area. *Acacia melvillei* was recorded in patches of 11.9.5 and 11.9.6 (remnant and regrowth) while *Swainsona swainsonioides* was recorded infrequently in RE 11.3.25.

Priority taxa of animal

Thirty-one 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). Thirteen of these species were detected within the study area during the field surveys undertaken for this assessment (see Table 5-4).

Table 5-4: Brigalow Belt South priority taxa fauna

Name	Conservation status[1]		Likelihood of occurrence
	State	Priority Taxa	
Salmon-striped Frog (*Limnodynastes salmini*)	—	Yes	High (recorded)
Broad-shelled River Turtle (*Chelodina expansa*)	—	Yes	Moderate
Macquarii/Krefft's Turtle (*Emydura macquarii/ kreffti*)	—	Yes	High (recorded)
Leaden Delma (*Delma plebeia*)	—	Yes	Moderate
Shingleback Lizard (*Trachydosaurus rugosus asper*)	—	Yes	High (recorded)
Striped Skink (*Ctenotus ingrami*)	—	Yes	Moderate
Jacky Lizard (*Amphibolurus muricatus*)	—	Yes	Moderate
Eastern Water Dragon (Physignathus lesueurii)	—	Yes	High
Pale-headed Snake (*Hoplocephalus bitorquatus*)	—	Yes	High
Spotted Black-snake (*Pseudechis guttatus*)	—	Yes	High
Carpentaria Snake (*Rhinoplocephalus boschmai*)	—	Yes	High (recorded)
Bush Stone-curlew (*Burhinus grallarius*)	—	Yes	High
Barking Owl (*Ninox connivens*)	—	Yes	Moderate
Grass Owl (*Tyto capensis*)	—	Yes	Moderate
Speckled Warbler (*Chthonicola sagittata*)	—	Yes	High (recorded)
Grey-crowned Babbler (*Pomatostomus temporalis*)	—	Yes	High (recorded)
Hooded Robin (*Melanodryas cucullata*)	—	Yes	Moderate
Diamond Firetail (*Stagonopleura guttata*)	—	Yes	Moderate

Name	Conservation status[1]		Likelihood of occurrence
	State	Priority Taxa	
Yellow-bellied Glider (southern subspecies) (*Petaurus australis*)	—	Yes	Moderate
Northern Brown Bandicoot (*Isoodon macrourus*)	—	Yes	High (recorded)
Rufous Bettong (*Aepyprymnus rufescens*)	—	Yes	High (recorded)
Black-striped Wallaby (*Macropus dorsalis*)	—	Yes	High (recorded)
Koala (*Phascolarctos cinereus*)	—	Yes	High (recorded)
Greater Glider (*Petauroides volans*)	—	Yes	High (recorded)
Yellow-bellied Glider (southern subspecies) (*Petaurus petaurus australis*)	—	Yes	Moderate
Squirrel Glider (*Petaurus norfolcensis*)	—	Yes	Moderate
Common Ringtail Possum (*Pseudocheirus peregrinus*)	—	Yes	Moderate
Common Brushtail Possum (*Trichosurus vulpecula*)	—	Yes	High (recorded)
Little bent-wing Bat (*Miniopterus australis*)	—	Yes	Moderate
Eastern Bent-wing Bat (*Miniopterus schreibersii oceanensis*)	—	Yes	High (recorded)
Central Eastern Broad-nosed Bat (*Scotorepens sp.*)	—	Yes	Moderate

[1] priority taxa as identified by the Brigalow Belt South Flora Expert Panel

5.3.3 Essential habitat mapping

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.

Essential habitat is an area or location with essential resources for the maintenance of populations of priority taxa (which includes threatened and non-threatened species of regional significance) (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. No essential habitat has been mapped within the study area or surrounds (Environmental Protection Agency 2003).

5.3.4 State wildlife corridors

A review of State wildlife corridor mapping (Environmental Protection Agency 2004b) identified vegetation along Woleebee and Wandoan Creeks within the Study Area and surrounds as forming part of a State wildlife corridor (see Figure 5-2). This corridor corresponds broadly with a bioregional wildlife corridor mapped under the Biodiversity Planning Assessment (Environmental Protection Agency 2003).

5.3.5 Other regionally significant species

Two species of microbat recorded during field surveys are considered regionally significant due to their occurrence at or beyond their distributional limit, within the study area. These species are the Large Forest Bat (*Vespadelus darlingtoni*) and Little Forest Bat (*Vespadelus vulturnus*). Both species were identified from Anabat call detection and harp trap capture.

Two *Morethia adelaidensis* (a skink) were captured during active herpetofauna searches in association with *Acacia harpophylla* scrub adjacent to Peakes Road on MLA50230. This species has a previously recorded distribution limit some 500 km further to the west around Cunnamulla and Quilpie in south-west Queensland.

6. Potential impacts

6.1 Loss of vegetation and habitats (land clearance)

The Project will result in the loss of vegetation and associated habitats. Clearing of native vegetation has been avoided where possible through the mine layout and pipeline route selection and design process and within the MLA areas, 63% of remnant vegetation and 51% of regrowth (non-remnant) vegetation will be retained. Nonetheless, total avoidance of vegetation clearing will not possible and 1175 ha (673 ha of remnant vegetation and 502 ha of regrowth (non-remnant) vegetation) will be cleared as a result of the Project (see Table 6-1). The total extent of vegetation may change through the detailed design phase.

Loss of vegetation results in a range of direct and indirect impacts to vegetation communities and species of plant and animal including:

- reduction in the extent of vegetation communities and associated habitats
- loss of local populations of individual species
- fragmentation of remnants of vegetation communities or local populations of individual species
- reduction in the viability of ecological communities resulting from loss or disruption of ecological functions
- destruction of flora and fauna habitat and associated loss of biological diversity (habitat removal may include removal of hollow bearing trees, loss of leaf litter layer, and resultant changes to soil biota)
- riparian zone degradation
- increased habitat for invasive species.

The residual impact of loss and vegetation and habitats, and other potential impacts on each threatened community or species and priority animal taxa assessed as having a moderate or high likelihood of occurrence in the study area is summarised in Section 7.

Table 6-1: RE's and their extent in the three MLA areas and potential clearing due to proposed pits and associated infrastructure

Mine component	Remnant Status	Extent of each RE type directly affected (ha)									
		11.3.2	**11.3.25**	**11.9.4**	**11.9.5**	**11.9.6**	**11.9.7**	**11.9.10**	**11.10.9**	**Other non-remnant vegetation**	**Total**
Mining pits (50 m buffer)	Remnant	100.7	445.9		35.4			71.6			**653.7**
	Non-remnant	6.1	1.5	8.8	159.3		6.8	203.8		12.0	**398.3**
Coal transport	Remnant	2.1	10.1				0.1	0.1			**12.4**
	Non-remnant		6.3	3.9	69.1		0.1	6.0	2.9		**88.3**
Water infrastructure	Remnant	0.3	0.1								**0.4**
	Non-remnant		0.6	4.0	2.0				4.7		**11.2**
MIA (no vegetation clearing required)	Remnant										**-**
	Non-remnant										**-**
Gas pipeline	Remnant		1.1								**1.1**
	Non-remnant		0.2								**0.2**
Accommodation facility	Remnant										**0.0**
	Non-remnant							3.7			**3.7**
Total proposed clearing	**Remnant**	**103.1**	**457.2**	**0.00**	**35.4**	**0.0**	**0.1**	**71.7**	**0.0**	**0.0**	**667.7**
	Non-remnant	6.1	8.6	16.7	230.4	0.0	6.9	213.5	7.6	12.0	501.7
Total extent within MLA	Remnant	258.7	1254.7	0.00	92.7	0.0	4.4	182.7	0.0	0.0	1,793.1
	Non-remnant	50.1	17.2	23.2	386.1	0.6	59.1	374.6	15.2	83.3	1,009.5
Extent remaining in MLA following clearing[1]	Remnant	155.6	797.5	0.0	57.3	0.0	4.3	111.0	0.0	0.0	1125.4

Mine component	Remnant Status	Extent of each RE type directly affected (ha)									
		11.3.2	11.3.25	11.9.4	11.9.5	11.9.6	11.9.7	11.9.10	11.10.9	Other non-remnant vegetation	Total
	as percent	60%	63%		62%		98%	61%			63%
	Non-remnant	44.0	8.6	6.5	155.7	0.6	52.2	161.1	7.6	71.3	507.8
	as percent	88%	51%	28%	40%	100%	88%	44%	51%	86%	51%

1. The extent remaining in MLA is based on the Total extent within MLA minus vegetation clearing associated with the mining pits, coal transport, water infrastructure and MIA. The gas pipeline and accommodation are located outside of the MLA.

6.2 Creek diversions

The Project includes the diversion of the following drainage lines within the study area:

- Spring Creek
- Mount Organ Creek
- Mud Creek
- an unnamed tributary of Juandah Creek
- Woleebee Creek
- Frank Creek.

Mount Organ Creek, Mud Creek, Woleebee Creek and Frank Creek are recognised as being of regional significance under the Biodiversity Planning Assessment (Environmental Protection Agency 2003). In addition, Woleebee Creek is recognised as a state significant wildlife corridor (Environmental Protection Agency 2004b). Diversion of these creeks will reduce the extent of riparian habitats and contribute to habitat fragmentation, as discussed below.

6.3 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 habitat fragments. The loss of vegetation and creek diversions proposed as part of the Project will result in significant regional scale habitat fragmentation.

Creek diversions will significantly modify state significant wildlife corridors along Woleebee Creek, and other regional wildlife corridors along Frank Creek, Mount Organ Creek and Mud Creek. Modification of these wildlife corridors will have the greatest impact on arboreal mammals including the following priority taxa recorded or considered likely to occur in the study area: Koala, Greater Glider, Yellow-bellied Glider, Squirrel Glider, Common Ringtail Possum and Common Brushtail Possum. For these species, the riparian habitats provide landscape-scale linkage between Hinchley and Mount Organ State Forests to the south-west and Juandah Creek to the north-east. The loss of riparian habitats would also reduce landscape scale connectivity for other species.

The loss of other woodland habitats within the study area will also contribute to habitat fragmentation in the study area. Although vegetation in many patches in the study area is of insufficient size to maintain viable populations, in many cases there may be only limited connectivity among the patches, given the extent of clearing and the distance to core areas. Even small patches may, however, provide stepping stones within the wider landscapes (Bennett 1993).

The new dividing habitat type is often artificial and inhospitable to the species remaining within these fragments (Bennett 1990a, 1993; Lindenmayer & Fischer 2006; MacNally 1999) or is generally used by some generalists species, those species that are often considered aggressive, (e.g. Noisy Miners, Loyn *et al.* 1983), thus further decreasing population levels of the species remaining in the fragments. Revegetation and habitat restoration will assist in offsetting the fragmentation, however it will take many years for these new creek diversions

to achieve habitat values equivalent to the existing drainage lines (e.g. development of abundant tree hollows).

In addition to the loss of total habitat area, the process of fragmentation can impact on the 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:

6.3.1 Barrier effects

Barrier effects occur where particular species are either unable or are unwilling to move between suitable areas of fragmented habitat. This could result in either a complete halt to movement or a reduced level of movement between fragments. Species most vulnerable to barrier effects include rare species (where even a small reduction in movements can reduce genetic continuity within a population, hence reducing the effective population size), smaller ground-dwelling species and species with low mobility. Species least vulnerable to barrier effects tend to be those that are highly mobile (e.g. birds and bats), although even these species can vary in their response to barriers.

6.3.2 Genetic isolation

Genetic isolation occurs where individuals from a population within one fragment are unable to interbreed with individuals from populations in adjoining fragments. Genetic isolation can lead to problems with inbreeding and genetic drift for populations isolated within a fragment.

While the proposed Project will create a barrier to dispersal within the broader regional landscape (see Section 6.2.1) it is unlikely that this would result in total genetic isolation. The newly separate populations would have connectivity (although reduced) through regional connections to both the east and west of the study area.

6.3.3 Edge effects

Edge effects are zones of changed environmental conditions (e.g. altered light levels, wind speed, temperature) occurring along the edges of habitat fragments. These new environmental conditions along the edges can promote the growth of different vegetation types (including weeds), allow invasion by pest animals specialising in edge habitats or change the behaviour of resident animals (Moenting & Morris 2006). Edge zones can be subject to higher levels of predation by introduced mammalian 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. Within the study area the vegetation/habitat is already highly fragmented and as a result will already be subject to significant edge effects such as weed invasion. It is therefore unlikely that the Project would significantly increase the overall extent of edge effects in the local area.

6.4 Mortality

Fauna injury or death has the greatest potential to occur during the start-up phase of construction 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, could find it difficult to move rapidly over relatively large distances. threatened species that could be affected by the clearing include microbats and the Brigalow Scaly Foot.

Entrapment of wildlife in the gas pipeline trench during construction is another potential cause of fauna injury or death. Species most likely to become trapped in the pipeline trench are ground dwelling species that are too small to climb out of the trench such as frogs, reptile and mammals.

There is a small chance of fauna mortality during the operation of the Project through vehicle collision. Generally, rates of vehicle strike mortality are directly proportional to the distance of native vegetation/fauna habitat crossed by a Project (Forman *et al.* 2000) and the number of vehicles present. Considering the nature of the Project, this impact is likely to be very low.

Entrapment of wildlife in pits, water detention basins, trenches or other excavations is another potential cause of fauna injury or death during operation of the mine. Species most likely to become trapped in pits or other excavations during operation of the mine are larger ground dwelling species that are capable of moving across a modified landscape in the absence of woodland habitat. Species in this category will include macropods and many of the reptile species.

Fauna injury and mortality can be minimised with appropriate management strategies (discussed further in Section 7).

6.5 Weeds and pest species

Seventy-seven species of weed were recorded in the study area (see Attachment E). Amongst these were seven declared plants as listed under the *Land Protection (Pest and Stock Route Management) Act 2002* (see Table 4-3).

Without appropriate management strategies, the construction and operation of the Project 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 Project 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. The majority of the vegetation within the study area, however, already has weed growth; therefore, the overall extent of habitat modification is not likely to increase significantly.

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. Under the *Land protection (Pest and Stock Route Management)* Act 2002 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	*Bufo marinus*	Non-declared animal
Asian House Gecko	*Hemidactylus frenatus*	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
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.*

The construction and operation of the Project has the potential to disperse pest species out of the study area across the surrounding landscape. It is likely that the pest species recorded in the study area already exist in vegetation and habitats surrounding the study area and, as such, the Project is unlikely to result in the establishment of pest species into areas where they are currently absent. However, the dispersal of these species may result in an increase in predation on or competition with native wildlife in areas into which they re-establish.

6.6 Noise and dust

During construction and operation of the Project, there will be increased noise and dust in the Study Area and surrounds. This may cause disturbance for some fauna. A number of factors are thought to influence the reaction of animals to noise including the volume, the frequency and the characteristic of the noise (e.g. short and percussive versus long and constant). How fauna located in the local area will respond to the noise is not known, but given the degree of current habitat disturbance in the local area and the presence of many common and generalist species, it is not likely to be significant.

6.7 CO_2 and climate change

Current scientific evidence indicates that modification of the environment by humans can result in climate change, including the production of carbon emissions into the atmosphere, which changes climate at a faster rate than has previously occurred naturally (CSIRO 2001). Human-induced climate change can impact on the habitats of a range of species, including threatened species (Department of Environment and Heritage 2005).

Atmospheric climate controls how the spatial distribution of most species, populations and communities is determined and has been a major driving force for evolution, resulting in biodiversity. Human-induced climate change by the emission of greenhouse gases (including carbon dioxide) is known to impact on threatened species of flora and fauna. It is also recognised as a Key Threatening Process under the EPBC Act, listed as loss of terrestrial climatic habitat caused by anthropogenic emissions of greenhouse gases.

The response of organisms to future climate change (however caused) is likely to differ from that in the past because it would occur in a highly modified landscape in which the distribution of natural communities is highly modified. This may limit the ability of organisms to survive climate change through dispersal (Department of Environment and Heritage 2005). Species at risk include those with long generations, poor mobility, narrow ranges, specific host relationships and isolated and specialised species (Busby & Pearman 1988). Pest species may, however, be advantaged by climate change. Fire regimes may also change and affect species composition and the structure of ecological communities (NSW Scientific Committee 2000).

Modelling of the distribution of species under realistic climate change scenarios suggests that many species (including threatened ones) would be adversely affected unless populations are able to move across the landscape (Hughes & Westoby 1994). Changes in essential microhabitat conditions in areas that are fragmented from suitable habitats and/or are at the limit of a species' distribution could result in localised extinctions, affecting the recovery of threatened species. Conservation reserves, including national parks and nature reserves that contain significant refuges for threatened species, have not been designed specifically to accommodate climate change, and the present biodiversity values of the protected area system may not all survive under different climatic conditions (NSW Scientific Committee 2000).

Chapter 14 of the EIS describes the scope 1, 2 and 3 greenhouse gas emissions from the relevant components of the Project.

6.8 Cumulative impacts

The potential biodiversity impacts of the Project have been considered as a consequence of the construction and operation of the Project 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 Project within a strategic context. This is necessary so that impacts associated with the Project and other activities within the region are examined collectively.

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

- other mines that may be opened in the future in the region
- the coal transport corridor for the Project
- the proposed water sources 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.

7. Mitigation measures

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

- avoid environmental impacts
- minimise impacts
- mitigate the impacts
- where impacts cannot be avoided or minimised, compensate for the residual impacts using other mitigation measures such as offsets.

These principles should be followed, where possible, for the Project.

7.1 Avoiding environmental impacts

Avoiding environmental impacts has been planned for where possible throughout the Project planning and design phases. There will also be ongoing opportunities to further avoid impacts at a local scale through the detailed design process.

The capacity of major components of the Project, such as the pit layout and creek diversions, to avoid environmental impacts while achieving the objectives of the Project (coal extraction) is limited. However, much of the design and layout of much of the remaining infrastructure, such as the coal transport infrastructure, water infrastructure, proposed gas supply pipeline and MIA have been positioned to avoid or limit impacts to remnant vegetation and regrowth and the associated flora and fauna habitats. As such, 63% of the remnant vegetation within the MLA area and 51% of regrowth (non-remnant) vegetation will be retained. Further avoidance should be an aim during further detailed design.

7.2 Management of the mitigation process

The impacts and mitigation associated with the Project are discussed below in general terms. As part of the detailed design, and prior to the start of construction, it is recommended that detailed mitigation measures be developed and presented in a biodiversity management plan relating to the construction and operation of the mine. The plan should include, where appropriate, procedures for:

- detailed design of mitigation measures such as fauna underpasses and fencing (as required)
- 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 where practical
- vegetation clearing protocols
- rehabilitation and restitution of adjoining habitat where possible
- 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 should include clear objectives and actions for the Project including, where appropriate:

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

This biodiversity management plan will be an important document for the environmental field supervisor or ecologist in enacting the 'avoid and mitigate' principles during the construction phase. The biodiversity management plan should include detailed information such as protocols for vegetation clearing, feral animal and pest control, rehabilitation objectives, monitoring activities and further detailed design measures (see Table 7-1).

Table 7-1: Summary of mitigation measures

Mitigation measure	Design	Construction	Operation
Additional surveys along the route of the proposed pipeline should be undertaken at a suitable time of year.	Y		
Identify locations and design of fauna underpasses, where appropriate, in the design of access tracks.	Y		
Designated areas for stockpiles and equipment lay-down should be placed in cleared areas to avoid or minimise impact to vegetation and habitat.		Y	Y
Staff/contractor inductions on site should be conducted by the ecologist/fauna spotter catcher or environmental officer.		Y	Y
Dust suppression should be implemented in order to reduce biodiversity impacts.		Y	Y
Appropriate erosion and sediment control strategies should be implemented.		Y	Y
Preferred seed mixes for revegetation works, ideally to be collected from the study area and surrounds, should be used.		Y	Y
Procedures for specific targeted species searches for those threatened species and priority taxa considered to have potential to occur prior to any staged development should be implemented. 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
A weed and feral animal management plan should be developed, including vehicle wash down procedures to limit edge effects such as the establishment of aggressive weeds, and the spread of annual and perennial exotic herbs. Methods to minimise the potential for the introduction and/or spread of weeds or plant disease should include, where appropriate, the following: Determination of the potential for the introduction of or facilitation of exotic, non-indigenous and noxious plants management process to identify origin of construction materials, machinery and		Y	Y

Mitigation measure	Design	Construction	Operation
equipment vehicle inspection points for weed free status on entering and exiting the project area vehicle wash down protocols, in particular a protocol that all vehicles and equipment must be cleaned on entering the project area. The washdown water should be managed to ensure it does not enter creek, other water ways or gullies.			
Sensitive areas, such as those containing fauna habitat, should be cleared of fauna prior to construction and operational activities commencing by 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 or areas of significant fauna habitat) to avoid unnecessary vegetation and habitat removal collect native seed for use in the revegetation of disturbed areas 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	Y
During the life of the mine, areas not required for operation of the mine should be revegetated following a revegetation/rehabilitation plan. This plan should include: 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 koalas and hollow dependent 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 areas rehabilitated for nature conservation objectives.		Y	Y
A flora and fauna monitoring program for the Project should be developed and implemented aimed at achieving a better understanding of impacts and rehabilitation actions to flora and fauna throughout the study area. Monitoring will also include exotic weeds and feral animals. The plan will be adaptive and identify trigger points and responses for ongoing impacts to flora and fauna.		Y	Y

7.3 Vegetation and habitat loss

In order to avoid further disturbance to areas outside of those necessary for the operation of the Project, ecologically sensitive areas should be clearly identified and managed in accordance with the flora and fauna management plan so as to avoid, remedy or mitigate potential impacts. Ecologically sensitive areas will include all patches of remnant vegetation, non-remnant vegetation (regrowth) that provides likely habitat for rare or threatened species, areas rehabilitated for ecological objectives, non-remnant vegetation incorporated in green offsets and buffers to these areas.

These should be marked on maps provided to staff and/or fenced. No direct disturbance should occur in these areas, including vehicle access.

A trained ecologist or other suitably qualified environmental field supervisor should precede or accompany clearing crews when clearing significant vegetation (all EPA mapped (2007) remnant vegetation and Brigalow regrowth) in order to ensure disturbance to rare, threatened or other significant fauna is minimised. The trained ecologist or equivalent would actively search for and relocate threatened ground fauna (such as the Brigalow Scaly Foot) and spot larger trees for arboreal species such as koalas and monitor fauna fleeing the clearing zone to minimise direct mortalities.

Ancillary infrastructure, such as access tracks and buildings should be designed and located so as to minimise further impacts to the ecological values of the local area. The design, location and construction of such infrastructure should meet the following performance criteria:

- no vegetation communities listed as endangered at either the national or state level will be affected, where suitable alternatives exist
- 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.

7.4 Revegetation and rehabilitation

Where possible, revegetation of disturbed areas should be undertaken, thereby increasing the habitat value and visual amenity of affected areas while reducing the likelihood for establishment and proliferation of weeds or risks associated with soil erosion.

This initial focus of rehabilitation should be soil erosion and sediment control measures and will involve the implementation of physical controls as outlined in the environmental management plan. Following stabilisation of the site, the focus of revegetation should be the active management of non-remnant REs in order to achieve remnant status. Revegetation of the areas should include:

- planting of a range of locally occurring native shrubs, trees and groundcover plants in consultation with the Environment Protection Agency and the Department of the Natural Resources and Water regarding the choice of species, particularly in areas where the revegetation would be adjacent to existing patches of native vegetation, including Endangered ecological communities/REs

- inclusion of logs, dead trees and stumps in the landscaping/rehabilitation works
- increasing the overall vegetation cover within the study areas
- incorporation of existing natural vegetation where possible
- linking of vegetation remnants
- focusing on riparian vegetation to protect waterways (including any creek diversions and realignments)
- maintenance of plantings through a revegetation plan
- management of weeds and pest animals through a weed and pest animal management plan.

In general revegetation should aim to enhance the suitability of the site for wildlife (within operational safety bounds), however some areas will be rehabilitated to pastures as per the existing land use. Rehabilitation of areas for nature conservation purposes should follow the principles at the site, block and landscape levels (Bennett et al. 2000) as follows:

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.

7.5 Mortality

Where significant vegetation (all EPA mapped remnant vegetation (2007) and Brigalow regrowth) is to be cleared, protocols will be put in place to minimise injury or mortality of fauna. These protocols should include, where appropriate:

- the staging of clearing operations at a pace that allows fauna to progressively escape
- clearing of the understory first, and temporarily retaining habitat trees, to encourage fauna to move away from the clearing zone before habitat trees are removed
- preparing an inventory of significant habitat trees and hollows to be removed
- use of experienced and qualified spotter-catchers to capture and relocate animals to nearby areas of habitat, prior to and during clearing
- provision of nest boxes or salvaged tree hollows in nearby habitat for translocated hollow-dependent species.

Mortality or injury of animals in trenches dug during construction of pipelines may be avoided by:

- grading of the ends of the trenches to facilitate fauna escape from trenches
- the use of experienced and qualified spotter-catchers to rescue animals from trenches, should any fall in
- minimising the amount of time trenches are left open
- trenches being backfilled so as to cover as much open trench as practicable by the end of each day's work and where 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.

7.6 Monitoring

Monitoring and reporting of the outcomes of management actions is important in ensuring their effectiveness. Details of management actions undertaken must be recorded along with any subsequent outcomes. As part of the management plan a detailed program would be developed to monitor impacts on threatened species and communities and determine the effectiveness of mitigation measures such as the habitat rehabilitation. It is well documented that natural systems experience significant natural spatial and temporal variability and to be able to detect environmental impact associated with anthropogenic disturbance, sampling designs must be capable of accounting for and explaining this variability. A logical scientific framework is therefore required to measure any impacts. The commonly accepted monitoring design to do this is the 'Beyond BACI' design (Underwood 1992), with BACI referring to before/after control/impact and the 'beyond' element relating to the use of multiple control sites. Where suitable, such a monitoring program will be included in conjunction with more subjective measures such as standard photographic points. Results of the monitoring should feed back to the management plan in an adaptive manner.

7.7 Further survey

Two seasonal surveys have been completed across the MLA areas. As such, further detailed survey of these habitats is not considered necessary. Surveys of the proposed gas pipeline were however undertaken in late winter which is sub-optimal for detection of many species of plant and animal. As such, it is recommended that additional targeted survey for flora and fauna be competed along this section of the study area at an appropriate time of year.

8. Significance of impacts

A number of threatened REs, communities, species of plant and species of animal have either been recorded in the study area or are considered likely to occur (moderate or high likelihood), that may be affected by the Project.

Impacts on threatened species and communities listed under the EPBC Act are required to be assessed following the *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.

A summary of significance assessments undertaken for threatened biodiversity is provided below in Table 8-1. The impact assessments conclude that the Project 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	Primary reason for the outcome
REs					
RE 11.9.5	E		E	No	Small extent of fragmented and modified remnant RE to be removed
RE 11.9.6	E		E	No	Small extent of fragmented and modified remnant RE to be removed
Ecological communities					
Brigalow (dominant co-dominant)	E			No	Small extent of fragmented and modified EEC to be removed, with 62% to be retained within MLA
SEVT	E			No	Small extent (16.7ha) of highly modified and poor condition EEC to be removed
Plants					
Homopholis belsonii	V	E	Y	No	Low density of occurrence within study area and availability of habitat in the local area
Reptiles					
Brigalow Scaly-foot (*Paradelma orientalis*)	V	V	—	No	Low density of animals recorded (2) 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	Primary reason for the outcome
Birds					
Australian Painted Snipe (*Rostratula australis*)	V and M	V	—	No	Not recorded within study area and no important habitat present
Squatter Pigeon (southern race) (*Geophaps scripta scripta*)	V	V	—	No	Not recorded within study area and no important habitat present
Pink Cockatoo (*Cacatua leadbeateri*)	—	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
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

9. Residual impacts and offsets

Residual impacts are those that remain after implementation of the Project and all associated mitigation and other environmental management measures have been undertaken. Residual impacts for this Project include the removal of 1,175 ha (673 ha of remnant vegetation and 502 ha of regrowth (non-remnant) vegetation) of 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).

9.1 Offsets

It is recommended that a Green Offsets Package for the Project be developed in consultation with EPA and DEWHA giving consideration to relevant State and Commonwealth policies relating to offsets (outlined below). This Green Offsets Package should address both State and Commonwealth offsetting requirements.

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 Project 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. 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 MNES will be negotiated with through the development of the Green Offsets Package to ensure all relevant requirements are met.

10. Conclusions

The Wandoan Coal Project is located in a landscape that has been largely cleared of vegetation as a result of grazing and dryland agriculture. The remaining vegetation generally occurs in continuous linear patches along the main drainage lines traversing the study area and is dominated by RE 11.3.25 (*Eucalyptus tereticornis* or *E. camaldulensis* woodland fringing drainage lines) with RE 11.3.2 (*Eucalyptus populnea* woodland on alluvial plains) spreading across the floodplains. This remnant vegetation forms part of a wider regional corridor network that is recognised by State Wildlife Corridor mapping (Environmental Protection Agency 2004b) and is of regional significance under the Biodiversity Planning Assessment for the Brigalow Belt bioregion (Environmental Protection Agency 2003). Other remnant vegetation in the study area is highly fragmented and comprises two similar REs dominated by *Acacia harpophylla* (Brigalow) and *Eucalyptus populnea* (Poplar box) (RE 11.9.5, RE 11.9.6 and RE 11.9.10). In addition to the remnant vegetation mapped by the Environmental Protection Agency (2007), over 1,000 ha of vegetation regrowth (non-remnant vegetation) has been mapped and described. The non-remnant vegetation is dominated by *Acacia harpophylla* analogous with RE 11.9.5 and small areas of highly modified Semi-evergreen vine thicket (analogous with RE 11.9.4).

Four hundred and sixty-five species of plant (388 native species) and 232 species of vertebrate fauna (220 native species) were recorded in the study area. This included one threatened species of plant and four rare or threatened species animal:

- Belsons Panic (a grass, *Homopholis belsonii*)
- Brigalow Scaly-foot (*Paradelma orientalis*)
- Golden-tailed Gecko (*Strophurus taenicauda*)
- Glossy black-cockatoo (*Calyptorhynchus lathami*)
- Little-pied Bat (*Chalinolobus picatus*).

In addition to these species, a further 15 threatened species of animal were considered likely to occur in the study area and surrounds based on the presence of suitable habitat. No further threatened species of plant was considered likely to occur.

The Wandoan Coal Project will result in a range of direct and indirect impacts to biodiversity in the study area, with clearing of native vegetation and the associated loss of habitat being the most substantial direct impact to biodiversity. Clearing of native vegetation has been avoided where possible through the mine layout and pipeline route selection and design process and within the MLA, 63% of remnant vegetation and 51% of regrowth (non-remnant) vegetation will be retained. Nonetheless, total avoidance of vegetation clearing is not possible and 1,175 ha (673 ha of remnant vegetation and 502 ha of regrowth (non-remnant) vegetation) will be cleared as a result of the Project.

In addition to the direct loss of habitat, vegetation clearing associated with the Project will also result in fragmentation of important wildlife corridors associated with the drainage lines which provide landscape-scale linkage between Hinchley and Mount Organ State Forests to the south-west and Juandah Creek to the north-east.

Assessment of the significance of impacts associated with the Project 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); endangered ecological communities and REs (threatened and of concern).

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. Nonetheless, the impacts of the Project will require detailed mitigation measures to ensure that all possible impacts are avoided, reduced or mitigated. As such, as part of the detailed design, and prior to the start of construction, detailed mitigation measures will be developed and presented in a biodiversity management plan relating to the construction and operation of the mine.

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.

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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) deliniated on a map of regional ecosystems (REs) comprising a mixture of RE types. Mapping of hetereogenous 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

Term	Definition
	management considerations (Neldner et al. 2005).
Homogeneous RE polygon	An area (polygon) delineated on a map of regional ecosystems (REs) 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

Term	Definition
	smaller or ▪ the population size of the wildlife has declined, or is likely to decline, at a 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 include 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	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

Term	Definition
vegetation	and cover of that stratum and is dominated by species characteristic of the vegetation's undisturbed canopy (Neldner *et al.* 2005).
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, 000 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 Taroom weather station during spring surveys of the MLA areas. Data sourced from Australian 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	
2007	October	1	16.6	34	0	45	0	NE	6	24	4	ESE	9
2007	October	2	17.9	31.2	0	50	7	NNE	6	22	6	NNE	17
2007	October	3	18.9	34.1	0	30	2	NNW	13	16	1	NE	13
2007	October	4	18.1	37	0	45	2	NNE	17	13	2	NW	17
2007	October	5	13.3	35.8	0	37	0	NNE	4	14	1	W	13
2007	October	6	17.3	35.9	0	45	0	W	17	21	3	W	9
2007	October	7	19.3	35.5	0	62	7	N	15	22	3	N	15
2007	October	8	19.7	36.2	0.9	58	0	NNW	13	29	2	WNW	13
2007	October	9	19.4	35.2	2	66	7	NNW	24	32	4	NNW	13
2007	October	10	19.2	38.4	0	49	6	NW	4	26	7	NNE	24
2007	October	11	19.9	32.7	9.5	76	7	N	6	54	8	W	6
2007	October	12	19	33.1	18.8	77	1	NNW	13	46	5	SW	17
2007	October	13	12.8	24.4	0	25	0	S	24	27	0	S	17
2007	October	14	8.4	28.1	0	33	0	ESE	17	20	0	WSW	4
2007	October	15	11.9	30.8	0	53	0	ESE	4	23	0	ESE	6
2007	October	16	15.4	32.8	0	43	0	NNE	6	17	0	ESE	6
2007	October	17	16.1	34.6	0	38	0	SW	4	14	0	SE	13

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

Table A-2: Weather conditions recorded at Taroom weather station during summer surveys of the MLA areas. Data sourced from Australian 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	March	24	16	31.1	0	68	2	ESE	9	46	6	NW	4
2008	March	25	16	31.7	0	67	2	ESE	9	35	6	SE	9
2008	March	26	18.6	32.8	0	66	6	NNE	13	44	7	NNW	2
2008	March	27	20.4	31.2	0	69	8	W	2	43	7	SE	9
2008	March	28	18.4	21.6	0.4	43	8	S	4	81	8	NW	2
2008	March	29	10.9	27.3	2.8	69	2	NW	4	23	7	NNE	2
2008	March	30	7.7	27.4	0	36	6	ESE	4	46	6	SW	4
2008	March	31	7.2	30.2	0	41	0	SSW	6	17	0	S	4
2008	April	1	7	31	0	46	0	NNW	2	18	0	ESE	4
2008	April	2	12	30	0	40	0	NNE	13	30	0	NNE	13

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

Table A-3 Weather conditions recorded at Taroom weather station during winter surveys of the northern gas pipeline alignment. Data sourced from Australian 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	19	-0.4	19.8	0	62	0	S	4	19	0	S	9
2008	August	20	-1.6	23	0	33	0	SW	6	68	0	NNE	9
2008	August	21	8.9	24.2	0	61	8	NNE	4	39	7	NNW	6
2008	August	22	14.1	24.8	0	74	4	W	24	21	8	WSW	17

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		Source
				State	National	
Acanthaceae	*Brunoniella australis*		Y	LC	-	CORVEG
Acanthaceae	*Dipteracanthus australasicus subsp. corynothecus*		Y	LC	-	HEBRECS WO
Acanthaceae	*Hypoestes floribunda R.Br.*		Y	LC	-	HEBRECS
Acanthaceae	*Pseuderanthemum variabile*	pastel flower	Y	LC	-	WO
Acanthaceae	*Rostellularia adscendens*		Y	LC	-	WO
Adiantaceae	*Cheilanthes distans*	bristly cloak fern	Y	LC	-	HEBRECS WO
Adiantaceae	*Cheilanthes sieberi subsp. sieberi*		Y	LC	-	WO
Adiantaceae	*Cheilanthes tenuifolia*		Y	LC	-	CORVEG
Aizoaceae	*Tetragonia tetragonioides*	New Zealand spinach	Y	LC	-	WO
Aizoaceae	*Trianthema portulacastrum*		N	-	-	HEBRECS
Aizoaceae	*Trianthema triquetra*		Y	LC	-	HEBRECS
Amaranthaceae	*Achyranthes aspera*		Y	LC	-	WO
Amaranthaceae	*Alternanthera sessilis*		N	-	-	WO
Amaranthaceae	*Amaranthus viridis*	green amaranth	N	-	-	WO
Amaranthaceae	*Deeringia amaranthoides*	redberry	Y	LC	-	HEBRECS WO
Amaranthaceae	*Deeringia amaranthoides (Lam.) Merr.*		Y	LC	-	
Amaranthaceae	*Nyssanthes diffusa*	barbed-wire weed	Y	LC	-	WO
Amaranthaceae	*Nyssanthes erecta*		Y	LC	-	CORVEG HEBRECS
Amaranthaceae	*Ptilotus exaltatus var. semilanatus*		Y	LC	-	HEBRECS WO
Amaranthaceae	*Ptilotus macrocephalus*	green pussytails	Y	LC	-	HEBRECS WO
Anacardiaceae	*Euroschinus falcatus*		Y	LC	-	WO
Anacardiaceae	*Rhodosphaera rhodanthema*	tulip satinwood	Y	LC	-	WO
Annonaceae	*Melodorum leichhardtii*		Y	LC	-	WO
Apiaceae	*Cyclospermum leptophyllum*		N	-	-	HEBRECS WO
Apiaceae	*Daucus glochidiatus*	Australian carrot	Y	LC	-	HEBRECS WO
Apiaceae	*Eryngium plantagineum*	long eryngium	Y	LC	-	WO
Apiaceae	*Platysace ericoides*		Y	LC	-	HEBRECS
Apocynaceae	*Alstonia constricta*	bitterbark	Y	LC	-	CORVEG WO
Apocynaceae	*Carissa ovata*	currantbush	Y	LC	-	CORVEG HEBRECS WO
Apocynaceae	*Marsdenia australis*		Y	LC	-	CORVEG
Apocynaceae	*Marsdenia viridiflora*		Y	LC	-	CORVEG HEBRECS
Apocynaceae	*Parsonsia eucalyptophylla*	gargaloo	Y	LC	-	WO
Apocynaceae	*Parsonsia lanceolata*	northern silkpod	Y	LC	-	CORVEG WO
Apocynaceae	*Parsonsia leichhardtii*	black silkpod	Y	LC	-	WO
Apocynaceae	*Sarcostemma viminale subsp. brunonianum*		Y	LC	-	HEBRECS WO
Apocynaceae	*Sarcostemma viminale subsp. brunonianum*		Y	LC	-	
Apocynaceae	*Secamone elliptica*		Y	LC	-	WO
Araceae	*Lemna aequinoctialis*	common duckweed	Y	LC	-	WO
Araliaceae	*Hydrocotyle sp.*		Y	LC	-	WO
Aspleniaceae	*Pleurosorus rutifolius*	blanket fern	Y	LC	-	WO
Asteraceae	*Acmella grandiflora var. brachyglossa*		Y	LC	-	WO
Asteraceae	*Adenostemma lavenia*		Y	LC	-	WO
Asteraceae	*Aster subulatus*	wild aster	N	-	-	WO
Asteraceae	*Bidens bipinnata*	bipinnate beggar's ticks	N	-	-	HEBRECS WO
Asteraceae	*Bidens pilosa*		N	-	-	WO
Asteraceae	*Brachyscome ciliaris var. ciliaris*		Y	LC	-	HEBRECS WO
Asteraceae	*Brachyscome microcarpa*		Y	LC	-	WO
Asteraceae	*Brachyscome trachycarpa*		Y	LC	-	HEBRECS
Asteraceae	*Brachyscome whitei*		Y	LC	-	HEBRECS
Asteraceae	*Calotis cuneata*		Y	LC	-	HEBRECS WO
Asteraceae	*Calotis cuneifolia*	burr daisy	Y	LC	-	WO
Asteraceae	*Calotis lappulacea*		Y	LC	-	HEBRECS
Asteraceae	*Camptacra barbata*		Y	LC	-	HEBRECS WO

Family	Species	Common name	Native	Conservation status		Source
				State	National	
Asteraceae	*Cassinia laevis*		Y	LC	-	HEBRECS
Asteraceae	*Centaurea melitensis*	Maltese cockspur	N	-	-	WO
Asteraceae	*Centaurea melitensis L.*		N	-	-	HEBRECS
Asteraceae	*Centipeda minima subsp. minima*		Y	LC	-	HEBRECS WO
Asteraceae	*Chrysocephalum apiculatum*		Y	LC	-	HEBRECS
Asteraceae	*Cirsium vulgare*	spear thistle	N	-	-	WO
Asteraceae	*Conyza sumatrensis*	tall fleabane	N	-	-	WO
Asteraceae	*Cotula australis*	common cotula	Y	LC	-	WO
Asteraceae	*Cyanthillium cinereum*		Y	LC	-	WO
Asteraceae	*Eclipta prostrata*	white eclipta	Y	LC	-	WO
Asteraceae	*Epaltes australis*	spreading nutheads	Y	LC	-	WO
Asteraceae	*Euchiton sphaericus*		Y	LC	-	WO
Asteraceae	*Flaveria australasica Hook.*		Y	LC	-	HEBRECS
Asteraceae	*Gamochaeta pensylvanica*		N	-	-	WO
Asteraceae	*Gamochaeta pensylvanica (Willd.) Cabrera*		N	-	-	HEBRECS
Asteraceae	*Glossocardia bidens*	native cobbler's pegs	Y	LC	-	WO
Asteraceae	*Helianthus annuus*		N		-	HEBRECS WO
Asteraceae	*Helichrysum collinum*		Y	LC	-	WO
Asteraceae	*Helichrysum oxylepis subsp. (Thulimbah R.W.Johnson 2918)*		Y	LC	-	WO
Asteraceae	*Hypochaeris glabra*	smooth catsear	N	-	-	WO
Asteraceae	*Lagenophora gracilis*		Y	LC	-	WO
Asteraceae	*Leiocarpa brevicompta*		Y	LC	-	WO
Asteraceae	*Leiocarpa brevicompta*		Y	LC	-	HEBRECS
Asteraceae	*Olearia canescens*		Y	LC	-	CORVEG
Asteraceae	*Olearia microphylla (Vent.) Maiden & Betche*		Y	LC	-	HEBRECS
Asteraceae	*Ozothamnus cassinioides*		Y	LC	-	WO
Asteraceae	*Ozothamnus diosmifolius*	white dogwood	Y	LC	-	WO
Asteraceae	*Parthenium hysterophorus*	parthenium weed	N	-	-	HEBRECS WO
Asteraceae	*Podolepis longipedata*	tall copper-wire daisy	Y	LC	-	HEBRECS WO
Asteraceae	*Podolepis longipedata*		Y	LC	-	
Asteraceae	*Pterocaulon sphacelatum*		Y	LC	-	HEBRECS
Asteraceae	*Pycnosorus chrysanthes*	golden billy buttons	Y	LC	-	HEBRECS WO
Asteraceae	*Rhodanthe polyphylla*		Y	LC	-	HEBRECS WO
Asteraceae	*Rutidosis crispata*		Y	R	-	WO
Asteraceae	*Rutidosis murchisonii F.Muell.*		Y	LC	-	HEBRECS
Asteraceae	*Senecio brigalowensis*		Y	LC	-	HEBRECS WO
Asteraceae	*Silybum marianum*	variegated thistle	N	-	-	WO
Asteraceae	*Sonchus oleraceus*	common sowthistle	N	-	-	WO
Asteraceae	*Verbesina encelioides*	crownbeard	N	-	-	WO
Asteraceae	*Vittadinia cuneata var. hirsuta*		Y	LC	-	WO
Asteraceae	*Vittadinia pterochaeta*		Y	LC	-	HEBRECS
Asteraceae	*Vittadinia sulcata*		Y	LC	-	CORVEG HEBRECS
Asteraceae	*Wedelia spilanthoides*		Y	LC	-	HEBRECS
Azollaceae	*Azolla pinnata*	ferny azolla	Y	LC	-	WO
Boraginaceae	*Cynoglossum australe*		Y	LC	-	HEBRECS WO
Boraginaceae	*Echium plantagineum*	Paterson's curse	N	-	-	HEBRECS WO
Boraginaceae	*Ehretia acuminata*		Y	LC	-	WO
Boraginaceae	*Ehretia membranifolia*	weeping koda	Y	LC	-	CORVEG WO
Boraginaceae	*Halgania brachyrhyncha*		Y	LC	-	WO
Boraginaceae	*Heliotropium europaeum L.*		N	-	-	HEBRECS
Boraginaceae	*Heliotropium indicum*		N	-	-	WO
Brassicaceae	*Lepidium africanum*	common peppercress	N	-	-	WO
Brassicaceae	*Lepidium bonariense*	Argentine peppercress	N	-	-	HEBRECS WO

Family	Species	Common name	Native	Conservation status		Source
				State	National	
Brassicaceae	*Rapistrum rugosum*		N	-	-	HEBRECS WO
Brassicaceae	*Rorippa eustylis*		Y	LC	-	WO
Brassicaceae	*Sisymbrium thellungii*	African turnip-weed	N	-	-	WO
Brassicaceae	*Sisymbrium thellungii O.E.Schulz*		N	-	-	HEBRECS
Cactaceae	*Opuntia stricta*		N	-	-	WO
Cactaceae	*Opuntia tomentosa*		Y	LC	-	CORVEG
Caesalpiniaceae	*Cassia tomentella*		Y	LC	-	WO
Caesalpiniaceae	*Lysiphyllum carronii*	ebony tree	Y	LC	-	HEBRECS WO
Caesalpiniaceae	*Senna barclayana*		Y	LC	-	HEBRECS WO
Caesalpiniaceae	*Senna coronilloides*		Y	LC	-	HEBRECS
Caesalpiniaceae	*Senna sophera var. (40Mile Scrub J.R.Clarkson+ 6908)*		Y	LC	-	HEBRECS WO
Callitrichaceae	*Callitriche sonderi*		Y	LC	-	WO
Campanulaceae	*Isotoma axillaris*	australian harebell	Y	LC	-	WO
Campanulaceae	*Wahlenbergia communis*	tufted bluebell	Y	LC	-	WO
Campanulaceae	*Wahlenbergia graniticola*	granite bluebell	Y	LC	-	HEBRECS WO
Capparaceae	*Apophyllum anomalum*	broom bush	Y	LC	-	CORVEG HEBRECS WO
Capparaceae	*Capparis arborea*	brush caper berry	Y	LC	-	HEBRECS WO
Capparaceae	*Capparis lasiantha*	nipan	Y	LC	-	CORVEG HEBRECS WO
Capparaceae	*Capparis loranthifolia*		Y	LC	-	HEBRECS WO
Capparaceae	*Capparis mitchellii*		Y	LC	-	HEBRECS WO
Capparaceae	*Capparis sarmentosa*	scrambling caper	Y	LC	-	WO
Capparaceae	*Capparis sp*		Y	LC	-	CORVEG WO
Caryophyllaceae	*Polycarpaea corymbosa var. corymbosa*		Y	LC	-	WO
Caryophyllaceae	*Spergularia rubra*	sand spurry	N	-	-	WO
Caryophyllaceae	*Stellaria angustifolia*	swamp starwort	Y	LC	-	WO
Casuarinaceae	*Casuarina cristata*		Y	LC	-	CORVEG HEBRECS
Casuarinaceae	*Casuarina cunninghamiana Miq. subsp. cunninghamian*		Y	LC	-	HEBRECS
Celastraceae	*Denhamia oleaster*		Y	LC	-	WO
Celastraceae	*Denhamia pittosporoides*		Y	LC	-	WO
Celastraceae	*Elaeodendron australe var. integrifolium*		Y	LC	-	HEBRECS WO
Celastraceae	*Maytenus cunninghamii*		Y	LC	-	CORVEG HEBRECS
Celastraceae	*Maytenus disperma*	orange boxwood	Y	LC	-	WO
Celastraceae	*Maytenus silvestris*	narrow-leaved orange bark	Y	LC	-	WO
Chenopodiaceae	*Atriplex muelleri*	lagoon saltbush	Y	LC	-	HEBRECS WO
Chenopodiaceae	*Atriplex semibaccata*		Y	LC	-	HEBRECS
Chenopodiaceae	*Chenopodium carinatum*	green crumbweed	Y	LC	-	HEBRECS WO
Chenopodiaceae	*Chenopodium pumilio*	small crumbweed	Y	LC	-	WO
Chenopodiaceae	*Dysphania glomulifera subsp. glomulifera*		Y	LC	-	WO
Chenopodiaceae	*Einadia hastata*		Y	LC	-	WO
Chenopodiaceae	*Einadia nutans*		Y	LC	-	CORVEG HEBRECS WO
Chenopodiaceae	*Einadia nutans subsp. linifolia*		Y	LC	-	HEBRECS
Chenopodiaceae	*Enchylaena tomentosa*		Y	LC	-	CORVEG HEBRECS WO
Chenopodiaceae	*Maireana enchylaenoides*		Y	LC	-	HEBRECS
Chenopodiaceae	*Maireana microcarpa*		Y	LC	-	HEBRECS WO
Chenopodiaceae	*Rhagodia spinescens R.Br.*		Y	LC	-	HEBRECS
Chenopodiaceae	*Salsola kali*	soft roly-poly	Y	LC	-	HEBRECS WO
Chenopodiaceae	*Sclerolaena birchii*	galvanised burr	Y	LC	-	HEBRECS WO
Chenopodiaceae	*Sclerolaena muricata*		Y	LC	-	HEBRECS
Chenopodiaceae	*Sclerolaena tetracuspis*	brigalow burr	Y	LC	-	HEBRECS WO
Collemataceae	*Collema sp.*		Y	LC	-	HEBRECS
Collemataceae	*Physma sp.*		Y	LC	-	HEBRECS
Commelinaceae	*Commelina diffusa*	wandering jew	Y	LC	-	WO
Commelinaceae	*Commelina sp.*		Y	LC	-	CORVEG WO

Family	Species	Common name	Native	Conservation status		Source
				State	National	
Convolvulaceae	*Convolvulus arvensis*		N	-	-	HEBRECS WO
Convolvulaceae	*Convolvulus clementii*		Y	LC	-	HEBRECS
Convolvulaceae	*Convolvulus graminetinus*		Y	LC	-	HEBRECS WO
Convolvulaceae	*Cuscuta campestris*	dodder	N	-	-	HEBRECS WO
Convolvulaceae	*Dichondra repens*	kidney weed	Y	LC	-	WO
Convolvulaceae	*Evolvulus alsinoides*		Y	LC	-	WO
Convolvulaceae	*Jacquemontia paniculata*		Y	LC	-	WO
Convolvulaceae	*Polymeria pusilla*		Y	LC	-	WO
Cucurbitaceae	*Diplocyclos palmatus subsp. affinis*		Y	LC	-	WO
Cupressaceae	*Callitris endlicheri*		Y	LC	-	HEBRECS
Cyperaceae	*Abildgaardia ovata*		Y	LC	-	HEBRECS
Cyperaceae	*Baumea juncea*	bare twigrush	Y	LC	-	WO
Cyperaceae	*Bolboschoenus fluviatilis*		Y	LC	-	WO
Cyperaceae	*Carex appressa*		Y	LC	-	HEBRECS WO
Cyperaceae	*Carex inversa*		Y	LC	-	HEBRECS
Cyperaceae	*Cyperus betchei subsp. betchei*		Y	LC	-	HEBRECS WO
Cyperaceae	*Cyperus bifax*	western nutgrass	Y	LC	-	WO
Cyperaceae	*Cyperus bulbosus*		Y	LC	-	WO
Cyperaceae	*Cyperus difformis*	rice sedge	Y	LC	-	WO
Cyperaceae	*Cyperus exaltatus*	tall flatsedge	Y	LC	-	HEBRECS WO
Cyperaceae	*Cyperus flavidus*		Y	LC	-	WO
Cyperaceae	*Cyperus gracilis*		Y	LC	-	HEBRECS WO
Cyperaceae	*Cyperus lucidus*		Y	LC	-	WO
Cyperaceae	*Cyperus rigidellus*		Y	LC	-	WO
Cyperaceae	*Cyperus rotundus*	nutgrass	N	-	-	WO
Cyperaceae	*Cyperus sanguinolentus*		Y	LC	-	WO
Cyperaceae	*Cyperus sp.*		Y	LC	-	CORVEG
Cyperaceae	*Cyperus sphaeroideus*		Y	LC	-	WO
Cyperaceae	*Cyperus unioloides*		Y	LC	-	WO
Cyperaceae	*Eleocharis cylindrostachys*		Y	LC	-	HEBRECS WO
Cyperaceae	*Eleocharis dietrichiana*		Y	LC	-	WO
Cyperaceae	*Eleocharis equisetina*		Y	LC	-	WO
Cyperaceae	*Eleocharis pallens*	pale spikerush	Y	LC	-	WO
Cyperaceae	*Fimbristylis dichotoma*	common fringe-rush	Y	LC	-	WO
Cyperaceae	*Fimbristylis nutans*		Y	LC	-	WO
Cyperaceae	*Schoenoplectus mucronatus*		Y	LC	-	WO
Cyperaceae	*Schoenoplectus validus*		Y	LC	-	WO
Cyperaceae	*Schoenus kennyi*		Y	LC	-	WO
Cyperaceae	*Scleria mackaviensis*		Y	LC	-	HEBRECS WO
Cyperaceae	*Scleria mackaviensis Boeck.*		Y	LC	-	
Dilleniaceae	*Hibbertia cistoidea*		Y	LC	-	HEBRECS
Droseraceae	*Drosera burmanni*		Y	LC	-	WO
Droseraceae	*Drosera peltata*		Y	LC	-	HEBRECS
Ebenaceae	*Diospyros geminata*	scaly ebony	Y	LC	-	WO
Ebenaceae	*Diospyros humilis*	small-leaved ebony	Y	LC	-	CORVEG WO
Elatinaceae	*Elatine gratioloides*	waterwort	Y	LC	-	WO
Ericaceae	*Agiortia pleiosperma*		Y	LC	-	HEBRECS
Ericaceae	*Lissanthe pluriloculata*		Y	LC	-	HEBRECS
Ericaceae	*Melichrus urceolatus*	honey gorse	Y	LC	-	HEBRECS WO
Eriocaulaceae	*Eriocaulon scariosum*		Y	LC	-	WO
Erythroxylaceae	*Erythroxylum australe*	cocaine tree	Y	LC	-	WO
Erythroxylaceae	*Erythroxylum sp. (Splityard Creek L.Pedley 5360)*		Y	LC	-	CORVEG WO
Euphorbiaceae	*Acalypha eremorum*	soft acalypha	Y	LC	-	CORVEG HEBRECS WO

Family	Species	Common name	Native	Conservation status		Source
				State	National	
Euphorbiaceae	*Bertya oleifolia*		Y	LC	-	WO
Euphorbiaceae	*Bertya pedicellata*		Y	R	-	WO
Euphorbiaceae	*Chamaesyce dallachyana (Baill.) D.C.Hassall*		Y	LC	-	HEBRECS
Euphorbiaceae	*Chamaesyce drummondii*	caustic-weed	Y	LC	-	WO
Euphorbiaceae	*Claoxylon tenerifolium subsp. tenerifolium*		Y	LC	-	WO
Euphorbiaceae	*Croton insularis*	Queensland cascarilla	Y	LC	-	CORVEG WO
Euphorbiaceae	*Croton phebalioides*	narrow-leaved croton	Y	LC	-	CORVEG HEBRECS WO
Euphorbiaceae	*Croton verreauxii*	green cascarilla	Y	LC	-	WO
Euphorbiaceae	*Euphorbia tannensis subsp. eremophila*		Y	LC	-	HEBRECS WO
Euphorbiaceae	*Excoecaria dallachyana*	scrub poison tree	Y	LC	-	WO
Euphorbiaceae	*Mallotus philippensis*	red kamala	Y	LC	-	WO
Euphorbiaceae	*Ricinocarpos ledifolius*	scrub wedding bush	Y	LC	-	WO
Fabaceae	*Austrosteenisia blackii*	bloodvine	Y	LC	-	HEBRECS WO
Fabaceae	*Crotalaria dissitiflora subsp. dissitiflora*		Y	LC	-	WO
Fabaceae	*Crotalaria incana*		N	-	-	HEBRECS
Fabaceae	*Cullen tenax*	emu-foot	Y	LC	-	WO
Fabaceae	*Daviesia ulicifolia subsp. stenophylla G.Chandler*		Y	LC	-	HEBRECS
Fabaceae	*Desmodium brachypodum*	large ticktrefoil	Y	LC	-	HEBRECS WO
Fabaceae	*Desmodium varians*	slender tick trefoil	Y	LC	-	HEBRECS WO
Fabaceae	*Glycine sp.*		Y	LC	-	WO
Fabaceae	*Hovea longifolia*	purple bush pea	Y	LC	-	WO
Fabaceae	*Hovea longipes*	brush hovea	Y	LC	-	CORVEG HEBRECS WO
Fabaceae	*Hovea parvicalyx*		Y	LC	-	WO
Fabaceae	*Indigofera linnaei Ali*		Y	LC	-	HEBRECS
Fabaceae	*Indigofera pratensis*		Y	LC	-	CORVEG
Fabaceae	*Indigofera sp.*		Y	LC	-	WO
Fabaceae	*Jacksonia scoparia R.Br.*		Y	LC	-	HEBRECS
Fabaceae	*Lotus australis*		Y	LC	-	HEBRECS
Fabaceae	*Macroptilium atropurpureum*	siratro	N	-	-	WO
Fabaceae	*Macroptilium lathyroides*		N	-	-	WO
Fabaceae	*Medicago polymorpha*	burr medic	N	-	-	WO
Fabaceae	*Medicago truncatula*		N	-	-	HEBRECS
Fabaceae	*Melilotus indicus*	hexham scent	N	-	-	HEBRECS WO
Fabaceae	*Pultenaea spinosa*		Y	LC	-	HEBRECS
Fabaceae	*Rhynchosia minima var. australis*		Y	LC	-	HEBRECS WO
Fabaceae	*Swainsona luteola*		Y	LC	-	HEBRECS
Fabaceae	*Tephrosia dietrichiae*		Y	LC	-	HEBRECS
Fabaceae	*Trifolium subterraneum*		N	LC	-	HEBRECS
Gentianaceae	*Schenkia australis*		Y	LC	-	HEBRECS WO
Geraniaceae	*Erodium crinitum*		Y	LC	-	HEBRECS
Goodeniaceae	*Goodenia fascicularis*		Y	LC	-	HEBRECS WO
Goodeniaceae	*Goodenia glabra*		Y	LC	-	WO
Goodeniaceae	*Goodenia grandiflora*		Y	LC	-	WO
Goodeniaceae	*Goodenia sp.*		Y	LC	-	WO
Haloragaceae	*Haloragis aspera*	raspweed	Y	LC	-	HEBRECS WO
Haloragaceae	*Myriophyllum verrucosum*	water milfoil	Y	LC	-	HEBRECS WO
Hemerocallidaceae	*Dianella brevipedunculata*		Y	LC	-	WO
Hemerocallidaceae	*Dianella longifolia var. stupata*		Y	LC	-	WO
Hemerocallidaceae	*Dianella sp.*		Y	LC	-	WO
Hydrocharitaceae	*Ottelia ovalifolia*	swamp lily	Y	LC	-	HEBRECS WO
Juncaceae	*Juncus aridicola*		Y	LC	-	HEBRECS
Juncaceae	*Juncus flavidus*		Y	LC	-	WO
Juncaceae	*Juncus polyanthemus*		Y	LC	-	WO

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Juncaceae	*Juncus prismatocarpus*	branching rush	Y	LC	-	WO
Juncaceae	*Juncus usitatus*		Y	LC	-	WO
Juncaginaceae	*Triglochin dubium*		Y	LC	-	WO
Lamiaceae	*Ajuga australis*	Australian bugle	Y	LC	-	WO
Lamiaceae	*Clerodendrum floribundum*		Y	LC	-	WO
Lamiaceae	*Glossocarya hemiderma*		Y	LC	-	WO
Lamiaceae	*Prostanthera cryptandroides subsp. euphrasioides*		Y	LC	-	WO
Lamiaceae	*Prostanthera saxicola var. bracteolata*		Y	LC	-	HEBRECS
Lamiaceae	*Salvia plebeia*	common sage	Y	LC	-	WO
Lamiaceae	*Salvia reflexa*		N	-	-	WO
Lamiaceae	*Spartothamnella juncea*	native broom	Y	LC	-	CORVEG HEBRECS WO
Lamiaceae	*Spartothamnella puberula*		Y	LC	-	WO
Lamiaceae	*Vitex melicopea*		Y	LC	-	WO
Lamiaceae	*Westringia cheelii*		Y	LC	-	HEBRECS
Laxmanniaceae	*Lomandra longifolia*		Y	LC	-	WO
Laxmanniaceae	*Lomandra multiflora*		Y	LC	-	CORVEG
Lentibulariaceae	*Utricularia dichotoma*	fairy aprons	Y	LC	-	WO
Lentibulariaceae	*Utricularia gibba*	floating bladderwort	Y	LC	-	WO
Loganiaceae	*Logania albiflora*		Y	LC	-	HEBRECS
Loranthaceae	*Amyema bifurcata*		Y	LC	-	HEBRECS
Loranthaceae	*Amyema biniflora*		Y	LC	-	HEBRECS
Loranthaceae	*Amyema congener subsp. rotundifolia*		Y	LC	-	HEBRECS WO
Loranthaceae	*Amyema miquelii*		Y	LC	-	HEBRECS WO
Loranthaceae	*Amyema quandang var. bancroftii*	broad-leaved grey mistletoe	Y	LC	-	WO
Loranthaceae	*Lysiana subfalcata*		Y	LC	-	HEBRECS
Malvaceae	*Abutilon fraseri*		Y	LC	-	HEBRECS
Malvaceae	*Abutilon oxycarpum*		Y	LC	-	CORVEG HEBRECS WO
Malvaceae	*Abutilon oxycarpum var. incanum*		Y	LC	-	WO
Malvaceae	*Abutilon sp.*		Y	LC	-	WO
Malvaceae	*Abutilon tubulosum*		Y	LC	-	HEBRECS
Malvaceae	*Anoda cristata*		N	-	-	HEBRECS
Malvaceae	*Hibiscus brachysiphonius*		Y	LC	-	HEBRECS
Malvaceae	*Hibiscus sp.*		Y	LC	-	HEBRECS
Malvaceae	*Hibiscus sturtii*		Y	LC	-	WO
Malvaceae	*Hibiscus sturtii var. sturtii*		Y	LC	-	WO
Malvaceae	*Malvastrum americanum (L.) Torr. var. americanum*		Y	LC	-	CORVEG HEBRECS WO
Malvaceae	*Sida corrugata*		Y	LC	-	HEBRECS
Malvaceae	*Sida filiformis*		Y	LC	-	WO
Malvaceae	*Sida pleiantha*		Y	LC	-	WO
Malvaceae	*Sida rhombifolia*		N	-	-	WO
Malvaceae	*Sida sp.*		Y	LC	-	CORVEG WO
Malvaceae	*Sida spinosa*	spiny sida	N	-	-	WO
Malvaceae	*Sida trichopoda*		Y	LC	-	WO
Marsileaceae	*Marsilea hirsuta*	hairy nardoo	Y	LC	-	WO
Meliaceae	*Melia azedarach*	white cedar	Y	LC	-	WO
Meliaceae	*Owenia venosa*	crow's apple	Y	LC	-	WO
Meliaceae	*Owenia x reliqua*		Y	LC	-	WO
Meliaceae	*Turraea pubescens*	native honeysuckle	Y	LC	-	WO
Menispermaceae	*Pleogyne australis*	wiry grape	Y	LC	-	WO
Menispermaceae	*Tinospora*		Y	LC	-	WO
Menispermaceae	*Tinospora smilacina*	snakevine	Y	LC	-	WO
Mimosaceae	*Acacia amblygona*	fan-leaf wattle	Y	LC	-	WO
Mimosaceae	*Acacia buxifolia*		Y	LC	-	HEBRECS

Family	Species	Common name	Native	Conservation status		Source
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Mimosaceae	*Acacia caroleae*		Y	LC	-	WO
Mimosaceae	*Acacia conferta*		Y	LC	-	WO
Mimosaceae	***Acacia curranii***	**Curly-bark Wattle**	**Y**	**NT**	**V**	**EPBC Tool**
Mimosaceae	*Acacia deanei*		Y	LC	-	HEBRECS
Mimosaceae	*Acacia decora*	pretty wattle	Y	LC	-	HEBRECS WO
Mimosaceae	*Acacia excelsa*		Y	LC	-	HEBRECS WO
Mimosaceae	*Acacia excelsa subsp. excelsa*		Y	LC	-	WO
Mimosaceae	*Acacia farnesiana*	mimosa bush	N	-	-	WO
Mimosaceae	*Acacia fasciculifera*	scaly bark	Y	LC	-	WO
Mimosaceae	*Acacia harpophylla*	brigalow	Y	LC	-	CORVEG HEBRECS WO
Mimosaceae	*Acacia implexa*	lightwood	Y	LC	-	WO
Mimosaceae	*Acacia juncifolia*		Y	LC	-	WO
Mimosaceae	*Acacia leiocalyx subsp. leiocalyx*		Y	LC	-	HEBRECS WO
Mimosaceae	*Acacia longispicata*		Y	LC	-	WO
Mimosaceae	*Acacia macradenia*	zig-zag wattle	Y	LC	-	WO
Mimosaceae	*Acacia melvillei*		Y	LC	-	HEBRECS WO
Mimosaceae	*Acacia oswaldii*	miljee	Y	LC	-	HEBRECS WO
Mimosaceae	*Acacia podalyriifolia*	Queensland silver wattle	Y	LC	-	HEBRECS WO
Mimosaceae	*Acacia rhodoxylon*	ringy rosewood	Y	LC	-	WO
Mimosaceae	*Acacia salicina*	doolan	Y	LC	-	WO
Mimosaceae	*Acacia sparsiflora*		Y	LC	-	WO
Mimosaceae	*Acacia stenophylla*	belalie	Y	LC	-	WO
Mimosaceae	*Acacia triptera*		Y	LC	-	HEBRECS
Mimosaceae	*Neptunia gracilis forma gracilis*		Y	LC	-	HEBRECS WO
Moraceae	*Ficus opposita*		Y	LC	-	WO
Myoporaceae	*Eremophila debilis*	winter apple	Y	LC	-	HEBRECS WO
Myoporaceae	*Eremophila deserti*		Y	LC	-	HEBRECS
Myoporaceae	*Eremophila longifolia*	berrigan	Y	LC	-	HEBRECS WO
Myoporaceae	*Eremophila mitchellii*		Y	LC	-	CORVEG HEBRECS WO
Myrsinaceae	*Myrsine variabilis*		Y	LC	-	WO
Myrtaceae	*Angophora floribunda*		Y	LC	-	HEBRECS
Myrtaceae	***Calytrix gurulmundensis***		Y	LC	**V**	**EPBC Tool**
Myrtaceae	*Calytrix tetragona*		Y	LC	-	HEBRECS
Myrtaceae	*Corymbia abergiana*	range bloodwood	Y	LC	-	HEBRECS WO
Myrtaceae	*Corymbia citriodora*	spotted gum	Y	LC	-	WO
Myrtaceae	*Corymbia clarksoniana*		Y	LC	-	WO
Myrtaceae	*Corymbia tessellaris*	Moreton Bay ash	Y	LC	-	WO
Myrtaceae	*Eucalyptus apothalassica L.A.S.Johnson & K.D.Hill*		Y	LC	-	HEBRECS
Myrtaceae	*Eucalyptus baileyana*		Y	LC	-	HEBRECS
Myrtaceae	*Eucalyptus camaldulensis*		Y	LC	-	HEBRECS WO
Myrtaceae	*Eucalyptus cambageana*	Dawson gum	Y	LC	-	HEBRECS WO
Myrtaceae	*Eucalyptus coolabah*	coolabah	Y	LC	-	WO
Myrtaceae	*Eucalyptus crebra*	narrow-leaved red ironbark	Y	LC	-	WO
Myrtaceae	*Eucalyptus crebra F.Muell. x E.orgadophila Maiden*		Y	LC	-	HEBRECS
Myrtaceae	*Eucalyptus exserta*	Queensland peppermint	Y	LC	-	HEBRECS WO
Myrtaceae	*Eucalyptus melanophloia*		Y	LC	-	HEBRECS WO
Myrtaceae	*Eucalyptus moluccana*	gum-topped box	Y	LC	-	WO
Myrtaceae	*Eucalyptus orgadophila*		Y	LC	-	HEBRECS
Myrtaceae	*Eucalyptus populnea*	poplar box	Y	LC	-	WO
Myrtaceae	*Eucalyptus tenuipes*		Y	LC	-	HEBRECS
Myrtaceae	*Eucalyptus tereticornis subsp. tereticornis*		Y	LC	-	HEBRECS WO
Myrtaceae	*Eucalyptus tholiformis*		Y	LC	-	WO
Myrtaceae	*Kardomia jucunda*		Y	LC	-	HEBRECS

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Myrtaceae	*Leptospermum neglectum*		Y	LC	-	WO
Myrtaceae	*Lophostemon confertus*	brush box	Y	LC	-	WO
Myrtaceae	*Lophostemon suaveolens*	swamp box	Y	LC	-	WO
Myrtaceae	*Lysicarpus angustifolius*	budgeroo	Y	LC	-	WO
Myrtaceae	*Melaleuca trichostachya*		Y	LC	-	WO
Myrtaceae	*Melaleuca viminalis*		Y	LC	-	WO
Nyctaginaceae	*Boerhavia dominii*		Y	LC	-	HEBRECS WO
Oleaceae	*Jasminum didymum subsp. didymum*		Y	LC	-	HEBRECS WO
Oleaceae	*Jasminum didymum subsp. racemosum*		Y	LC	-	HEBRECS WO
Oleaceae	*Jasminum simplicifolium*		Y	LC	-	WO
Oleaceae	*Jasminum simplicifolium subsp. australiense*		Y	LC	-	CORVEG HEBRECS WO
Oleaceae	*Jasminum sp.*		Y	LC	-	CORVEG
Oleaceae	*Notelaea microcarpa*		Y	LC	-	CORVEG WO
Oleaceae	*Olea europaea subsp. europaea*		N	-	-	HEBRECS WO
Onagraceae	*Epilobium billardierianum subsp. cinereum*		Y	LC	-	WO
Onagraceae	*Epilobium hirtigerum*		Y	LC	-	WO
Onagraceae	*Gaura parviflora*	clockweed	N	-	-	CORVEG HEBRECS WO
Onagraceae	*Ludwigia octovalvis*	willow primrose	Y	LC	-	WO
Orchidaceae	*Caladenia caerulea R.Br. var. caerulea*		Y	LC	-	HEBRECS
Orchidaceae	*Cymbidium canaliculatum*		Y	LC	-	HEBRECS WO
Orchidaceae	***Diuris tricolor (syn Diuris sheaffiana)***	**Tricolour Diuris**	Y	LC	**V**	**EPBC Tool**
Oxalidaceae	*Oxalis perennans*		Y	LC	-	HEBRECS WO
Oxalidaceae	*Oxalis perennans Haw.*		Y	LC	-	
Papaveraceae	*Argemone ochroleuca subsp. ochroleuca*	mexican poppy	N	-	-	HEBRECS WO
Parmeliaceae	*Parmotrema reticulatum*		Y	LC	-	HEBRECS
Passifloraceae	*Passiflora aurantia*		Y	LC	-	WO
Pentapetaceae	*Melhania oblongifolia*		Y	LC	-	WO
Pertusariaceae	*Pertusaria thiospoda C.Knight*		Y	LC	-	HEBRECS
Phyllanthaceae	*Breynia oblongifolia*		Y	LC	-	WO
Phyllanthaceae	*Bridelia leichhardtii*		Y	LC	-	HEBRECS WO
Phyllanthaceae	*Leptopus decaisnei var. decaisnei*		Y	LC	-	WO
Phyllanthaceae	*Phyllanthus gunnii*		Y	LC	-	WO
Phyllanthaceae	*Phyllanthus similis*		Y	LC	-	WO
Physciaceae	*Dirinaria confluens (Fr.) D.D.Awasthi*		Y	LC	-	HEBRECS
Picrodendraceae	*Petalostigma pubescens*	quinine tree	Y	LC	-	WO
Pittosporaceae	*Auranticarpa rhombifolia*		Y	LC	-	HEBRECS WO
Pittosporaceae	*Bursaria incana*		Y	LC	-	CORVEG WO
Pittosporaceae	*Bursaria spinosa*		Y	LC	-	CORVEG WO
Pittosporaceae	*Citriobatus spinescens*		Y	LC	-	CORVEG
Pittosporaceae	*Pittosporum angustifolium Lodd.*		Y	LC	-	HEBRECS
Pittosporaceae	*Pittosporum spinescens*		Y	LC	-	WO
Plantaginaceae	*Plantago turrifera*		Y	LC	-	WO
Poaceae	*Ancistrachne uncinulata*		Y	LC	-	HEBRECS
Poaceae	*Ancistrachne uncinulata*	hooky grass	Y	LC	-	CORVEG WO
Poaceae	*Aristida blakei*		Y	LC	-	HEBRECS
Poaceae	*Aristida calycina*		Y	LC	-	WO
Poaceae	*Aristida calycina var. praealta*		Y	LC	-	HEBRECS
Poaceae	*Aristida caput-medusae*		Y	LC	-	CORVEG WO
Poaceae	*Aristida echinata Henrard*		Y	LC	-	HEBRECS
Poaceae	*Aristida latifolia*	feathertop wiregrass	Y	LC	-	WO
Poaceae	*Aristida leptopoda*	white speargrass	Y	LC	-	WO
Poaceae	*Aristida vagans*		Y	LC	-	WO
Poaceae	***Arthraxon hispidus***		**Y**	**V**	**V**	**WO**

Family	Species	Common name	Native	Conservation status		Source
				State	National	
Poaceae	*Arundinella nepalensis*	reedgrass	Y	LC	-	WO
Poaceae	*Astrebla lappacea*		Y	LC	-	HEBRECS
Poaceae	*Austrostipa ramosissima*		Y	LC	-	CORVEG HEBRECS
Poaceae	*Austrostipa verticillata*	slender bamboo grass	Y	LC	-	HEBRECS WO
Poaceae	*Avena sterilis subsp. ludoviciana*	ludo wild oats	N	-	-	HEBRECS WO
Poaceae	*Bothriochloa bladhii*		Y	LC	-	WO
Poaceae	*Bothriochloa decipiens*		Y	LC	-	WO
Poaceae	*Bothriochloa decipiens var. decipiens*		Y	LC	-	WO
Poaceae	*Bothriochloa ewartiana*	desert bluegrass	Y	LC	-	WO
Poaceae	*Brachyachne convergens*	common native couch	Y	LC	-	HEBRECS WO
Poaceae	*Bromus catharticus*	prairie grass	N	-	-	HEBRECS WO
Poaceae	*Calyptochloa gracillima*		Y	LC	-	WO
Poaceae	*Capillipedium parviflorum*		Y	LC	-	HEBRECS
Poaceae	*Capillipedium spicigerum*	spicytop	Y	LC	-	HEBRECS WO
Poaceae	*Chionachne cyathopoda*	river grass	Y	LC	-	WO
Poaceae	*Chloris divaricata var. divaricata*	slender chloris	Y	LC	-	HEBRECS WO
Poaceae	*Chloris gayana*		N	-	-	HEBRECS
Poaceae	*Chloris truncata*		Y	LC	-	WO
Poaceae	*Chrysopogon fallax*		Y	LC	-	WO
Poaceae	*Chrysopogon filipes*		Y	LC	-	WO
Poaceae	*Cymbopogon bombycinus*	silky oilgrass	Y	LC	-	WO
Poaceae	*Cymbopogon obtectus*		Y	LC	-	HEBRECS
Poaceae	*Cymbopogon refractus*	barbed-wire grass	Y	LC	-	HEBRECS WO
Poaceae	*Cynodon nlemfuensis Vanderyst var. nlemfuensis*		N	-	-	HEBRECS
Poaceae	***Dichanthium queenslandicum***	**King Blue-grass**	Y	LC	**V**	**EPBC Tool**
Poaceae	*Dichanthium sericeum*		Y	LC	-	HEBRECS WO
Poaceae	*Dichanthium sericeum subsp. humilius*		Y	LC	-	WO
Poaceae	*Dichanthium sericeum subsp. sericeum*		Y	LC	-	WO
Poaceae	*Dichelachne crinita (L.f.) Hook.f.*		Y	LC	-	HEBRECS
Poaceae	*Dichelachne micrantha*	shorthair plumegrass	Y	LC	-	WO
Poaceae	*Digitaria brownii*		Y	LC	-	WO
Poaceae	*Digitaria ciliaris*	summer grass	N	-	-	WO
Poaceae	*Digitaria hystrichoides*	umbrella grass	Y	LC	-	WO
Poaceae	*Digitaria longiflora*		Y	LC	-	WO
Poaceae	***Digitaria porrecta***	**Finger Panic Grass**	Y	LC	**E**	**EPBC Tool**
Poaceae	*Digitaria violascens*	bastard summergrass	N	-	-	WO
Poaceae	*Echinochloa crus-galli*	barnyard grass	N	-	-	WO
Poaceae	*Echinochloa inundata P.W.Michael & Vickery*		Y	LC	-	HEBRECS
Poaceae	*Elymus multiflorus (Banks & Sol. ex Hook.f.) A.Lov*		Y	LC	-	HEBRECS
Poaceae	*Enneapogon gracilis*	slender nineawn	Y	LC	-	WO
Poaceae	*Enneapogon intermedius*		Y	LC	-	HEBRECS WO
Poaceae	*Enneapogon pallidus*	conetop nineawn	Y	LC	-	WO
Poaceae	*Enneapogon polyphyllus*	leafy nineawn	Y	LC	-	WO
Poaceae	*Enneapogon truncatus*		Y	LC	-	WO
Poaceae	*Enteropogon acicularis*	curly windmill grass	Y	LC	-	CORVEG HEBRECS WO
Poaceae	*Enteropogon paucispiceus*		Y	LC	-	WO
Poaceae	*Enteropogon ramosus*		Y	LC	-	HEBRECS WO
Poaceae	*Enteropogon unispiceus*		Y	LC	-	WO
Poaceae	*Eragrostis alveiformis Lazarides*		Y	LC	-	HEBRECS
Poaceae	*Eragrostis cilianensis (All.) Vignolo ex Janch.*		N	-	-	HEBRECS
Poaceae	*Eragrostis elongata (Willd.) J.Jacq.*		Y	LC	-	HEBRECS
Poaceae	*Eragrostis lacunaria*		Y	LC	-	CORVEG
Poaceae	*Eragrostis leptocarpa*	drooping lovegrass	Y	LC	-	CORVEG WO

Family	Species	Common name	Native	Conservation status		Source
				State	National	
Poaceae	*Eragrostis leptostachya*		Y	LC	-	WO
Poaceae	*Eragrostis longipedicellata*		Y	LC	-	WO
Poaceae	*Eragrostis megalosperma*		Y	LC	-	HEBRECS WO
Poaceae	*Eragrostis parviflora*	weeping lovegrass	Y	LC	-	HEBRECS WO
Poaceae	*Eragrostis sororia*		Y	LC	-	HEBRECS
Poaceae	*Eragrostis sp.*		Y	LC	-	HEBRECS
Poaceae	*Eragrostis spartinoides*		Y	LC	-	WO
Poaceae	*Eriochloa fatmensis*		Y	LC	-	WO
Poaceae	*Eriochloa procera*	slender cupgrass	Y	LC	-	WO
Poaceae	*Eulalia aurea*	silky browntop	Y	LC	-	WO
Poaceae	*Hemarthria uncinata var. spathacea*		Y	LC	-	WO
Poaceae	*Heteropogon contortus*		Y	LC	-	HEBRECS
Poaceae	***Homopholis belsonii***	**Belsons panic**	Y	LC	**V**	**HEBRECS EPBC Tool**
Poaceae	*Hordeum glaucum Steud.*		N	-	-	HEBRECS
Poaceae	*Hyparrhenia sp.*		N	-	-	CORVEG
Poaceae	*Isachne globosa*	swamp millet	Y	LC	-	WO
Poaceae	*Iseilema membranaceum*		Y	LC	-	HEBRECS
Poaceae	*Leersia hexandra*	swamp rice grass	Y	LC	-	WO
Poaceae	*Leptochloa decipiens*		Y	LC	-	WO
Poaceae	*Leptochloa decipiens subsp. peacockii*		Y	LC	-	HEBRECS WO
Poaceae	*Leptochloa digitata*		Y	LC	-	WO
Poaceae	*Leptochloa fusca subsp. fusca*		Y	LC	-	WO
Poaceae	*Leptochloa sp.*		Y	LC	-	WO
Poaceae	*Megathyrsus maximus*		N	-	-	WO
Poaceae	*Megathyrsus maximus var. pubiglumis*		N	-	-	HEBRECS
Poaceae	*Melinis repens*	red natal grass	N	-	-	HEBRECS WO
Poaceae	*Panicum buncei*		Y	LC	-	HEBRECS WO
Poaceae	*Panicum coloratum*		N	-	-	HEBRECS
Poaceae	*Panicum decompositum R.Br. var. decompositum*		Y	LC	-	HEBRECS
Poaceae	*Panicum effusum*		Y	LC	-	WO
Poaceae	*Panicum larcomianum*		Y	LC	-	WO
Poaceae	*Panicum simile*		Y	LC	-	WO
Poaceae	*Paspalidium caespitosum*	brigalow grass	Y	LC	-	CORVEG WO
Poaceae	*Paspalidium caespitosum C.E.Hubb.*		Y	LC	-	HEBRECS
Poaceae	*Paspalidium constrictum*		Y	LC	-	WO
Poaceae	*Paspalidium criniforme*		Y	LC	-	WO
Poaceae	*Paspalidium distans*	shotgrass	Y	LC	-	HEBRECS WO
Poaceae	*Paspalidium gracile*	slender panic	Y	LC	-	CORVEG WO
Poaceae	*Paspalidium gracile*		Y	LC	-	HEBRECS
Poaceae	*Paspalidium jubiflorum*	warrego grass	Y	LC	-	WO
Poaceae	*Paspalum dilatatum*		N	-	-	HEBRECS
Poaceae	*Paspalum distichum*	water couch	Y	LC	-	WO
Poaceae	*Paspalum scrobiculatum*	ditch millet	Y	LC	-	WO
Poaceae	*Pennisetum ciliare*		N	-	-	HEBRECS WO
Poaceae	*Pennisetum glaucum*		N	-	-	HEBRECS
Poaceae	*Perotis rara*		Y	LC	-	HEBRECS
Poaceae	*Sacciolepis indica*	Indian cupscale grass	Y	LC	-	WO
Poaceae	*Sarga leiocladum*		Y	LC	-	HEBRECS
Poaceae	*Sehima nervosum*		Y	LC	-	WO
Poaceae	*Setaria dielsii*		Y	LC	-	WO
Poaceae	*Setaria oplismenoides*		Y	LC	-	HEBRECS WO
Poaceae	*Sporobolus caroli*	fairy grass	Y	LC	-	WO
Poaceae	*Sporobolus creber*		Y	LC	-	WO

Family	Species	Common name	Native	Conservation status		Source
				State	National	
Poaceae	*Sporobolus mitchellii*	rat's tail couch	Y	LC	-	WO
Poaceae	*Sporobolus scabridus*		Y	LC	-	WO
Poaceae	*Thellungia advena*	coolibah grass	Y	LC	-	HEBRECS WO
Poaceae	*Thyridolepis xerophila*		Y	LC	-	WO
Poaceae	*Tragus australianus*	small burr grass	Y	LC	-	HEBRECS WO
Poaceae	*Triodia mitchellii*	buck spinifex	Y	LC	-	WO
Poaceae	*Triraphis mollis*		Y	LC	-	HEBRECS
Poaceae	*Urochloa foliosa*		Y	LC	-	HEBRECS WO
Poaceae	*Urochloa panicoides*		N	-	-	HEBRECS
Polygonaceae	*Emex australis Steinh.*		N	-	-	HEBRECS
Polygonaceae	*Fallopia convolvulus*	black bindweed	N	-	-	WO
Polygonaceae	*Muehlenbeckia florulenta*	lignum	Y	LC	-	WO
Polygonaceae	*Persicaria decipiens*	slender knotweed	Y	LC	-	WO
Polygonaceae	*Persicaria hydropiper*	water pepper	Y	LC	-	WO
Polygonaceae	*Persicaria lapathifolia*	pale knotweed	Y	LC	-	HEBRECS WO
Polygonaceae	*Persicaria orientalis*	princes feathers	Y	LC	-	WO
Polygonaceae	*Persicaria strigosa*		Y	LC	-	WO
Polygonaceae	*Rumex brownii*	swamp dock	Y	LC	-	WO
Polygonaceae	*Rumex tenax*		Y	LC	-	WO
Portulacaceae	*Portulaca bicolor*		Y	LC	-	WO
Portulacaceae	*Portulaca oleracea*	pigweed	N	-	-	WO
Proteaceae	*Grevillea decora Domin subsp. decora*		Y	LC	-	HEBRECS
Proteaceae	*Grevillea floribunda R.Br. subsp. floribunda*		Y	LC	-	HEBRECS
Proteaceae	*Grevillea parallela*		Y	LC	-	WO
Proteaceae	*Grevillea robusta*		Y	LC	-	WO
Proteaceae	*Grevillea striata R.Br.*		Y	LC	-	HEBRECS
Proteaceae	*Hakea lorea subsp. lorea*		Y	LC	-	WO
Putranjivaceae	*Drypetes deplanchei*	grey boxwood	Y	LC	-	WO
Ranunculaceae	*Clematis decipiens*		Y	LC	-	HEBRECS WO
Ranunculaceae	*Clematis microphylla*		Y	LC	-	HEBRECS
Ranunculaceae	*Ranunculus lappaceus*	common buttercup	Y	LC	-	WO
Rhamnaceae	*Alphitonia excelsa*	soap tree	Y	LC	-	WO
Rhamnaceae	*Cryptandra orbicularis*		Y	LC	-	WO
Rhamnaceae	*Ventilago viminalis*	supplejack	Y	LC	-	WO
Rubiaceae	*Asperula conferta*		Y	LC	-	HEBRECS WO
Rubiaceae	*Canthium odoratum*		Y	LC	-	CORVEG
Rubiaceae	*Canthium sp.*		Y	LC	-	CORVEG WO
Rubiaceae	*Cyclophyllum coprosmoides var. coprosmoides*		Y	LC	-	WO
Rubiaceae	*Everistia vacciniifolia*		Y	LC	-	WO
Rubiaceae	*Everistia vacciniifolia forma vacciniifolia*		Y	LC	-	WO
Rubiaceae	*Oldenlandia mitrasacmoides subsp. trachymenoides*		Y	LC	-	WO
Rubiaceae	*Pavetta australiensis*		Y	LC	-	WO
Rubiaceae	*Psydrax johnsonii*		Y	LC	-	HEBRECS WO
Rubiaceae	*Psydrax longipes*		Y	LC	-	WO
Rubiaceae	*Psydrax odorata*		Y	LC	-	WO
Rubiaceae	*Psydrax odorata forma buxifolia*		Y	LC	-	WO
Rubiaceae	*Psydrax odorata forma subnitida*		Y	LC	-	WO
Rubiaceae	*Psydrax oleifolia*		Y	LC	-	HEBRECS WO
Rubiaceae	*Spermacoce multicaulis*		Y	LC	-	WO
Rubiaceae	*Tarenna sp.*		Y	LC	-	WO
Rubiaceae	*Triflorensia ixoroides*		Y	LC	-	WO
Rutaceae	*Boronia glabra*		Y	LC	-	HEBRECS
Rutaceae	*Boronia occidentalis Duretto*		Y	LC	-	HEBRECS

Family	Species	Common name	Native	Conservation status		Source
				State	National	
Rutaceae	*Bosistoa sp.*		Y	LC	-	WO
Rutaceae	*Citrus glauca*		Y	LC	-	HEBRECS WO
Rutaceae	*Dinosperma erythrococcum*		Y	LC	-	WO
Rutaceae	*Flindersia collina*	broad-leaved leopard tree	Y	LC	-	WO
Rutaceae	*Geijera salicifolia*	brush wilga	Y	LC	-	WO
Santalaceae	*Anthobolus leptomerioides*		Y	LC	-	HEBRECS
Santalaceae	*Exocarpos latifolius*		Y	LC	-	WO
Santalaceae	*Santalum lanceolatum*		Y	LC	-	HEBRECS WO
Sapindaceae	*Alectryon connatus*		Y	LC	-	CORVEG HEBRECS
Sapindaceae	*Alectryon diversifolius*	scrub boonaree	Y	LC	-	CORVEG HEBRECS WO
Sapindaceae	*Alectryon oleifolius*		Y	LC	-	CORVEG
Sapindaceae	*Atalaya hemiglauca*		Y	LC	-	CORVEG
Sapindaceae	*Atalaya salicifolia*		Y	LC	-	WO
Sapindaceae	*Atalaya sp.*		Y	LC	-	WO
Sapindaceae	*Cupaniopsis parvifolia*	small-leaved tuckeroo	Y	LC	-	WO
Sapindaceae	*Dodonaea biloba*		Y	LC	-	WO
Sapindaceae	*Dodonaea filifolia*		Y	LC	-	WO
Sapindaceae	*Dodonaea peduncularis Lindl.*		Y	LC	-	HEBRECS
Sapindaceae	*Dodonaea viscosa*		Y	LC	-	WO
Sapindaceae	*Dodonaea viscosa subsp. spatulata*		Y	LC	-	HEBRECS WO
Sapindaceae	*Elattostachys nervosa*	green tamarind	Y	LC	-	WO
Sapindaceae	*Elattostachys xylocarpa*	white tamarind	Y	LC	-	WO
Sapotaceae	*Planchonella pubescens*		Y	LC	-	HEBRECS
Sapotaceae	*Pouteria cotinifolia*		Y	LC	-	CORVEG WO
Sapotaceae	*Pouteria cotinifolia var. pubescens*		Y	LC	-	WO
Schizaeaceae	*Lygodium microphyllum*	snake fern	Y	LC	-	WO
Scrophulariaceae	*Gratiola pedunculata*		Y	LC	-	WO
Scrophulariaceae	*Lindernia sp. (Bribie Island S.T.Blake 7089)*		Y	LC	-	WO
Scrophulariaceae	*Mimulus gracilis*	slender monkey flower	Y	LC	-	HEBRECS WO
Solanaceae	*Datura ferox*	fierce thornapple	N	-	-	WO
Solanaceae	*Nicotiana megalosiphon*		Y	LC	-	HEBRECS WO
Solanaceae	*Nicotiana megalosiphon subsp. megalosiphon*		Y	LC	-	WO
Solanaceae	*Solanum americanum*		N	-	-	HEBRECS WO
Solanaceae	*Solanum ellipticum*		Y	LC	-	HEBRECS
Solanaceae	*Solanum jucundum*		Y	LC	-	HEBRECS
Solanaceae	*Solanum mitchellianum*		Y	LC	-	WO
Solanaceae	*Solanum nemophilum*		Y	LC	-	HEBRECS
Solanaceae	*Solanum nigrum*		N	-	-	WO
Solanaceae	*Solanum opacum*		Y	LC	-	HEBRECS
Solanaceae	*Solanum parvifolium subsp. parvifolium*		Y	LC	-	HEBRECS WO
Solanaceae	*Solanum semiarmatum*	prickly nightshade	Y	LC	-	WO
Solanaceae	*Solanum sp.*		Y	LC	-	WO
Solanaceae	*Solanum stelligerum*	devil's needles	Y	LC	-	WO
Sparrmanniaceae	*Grewia latifolia*	dysentery plant	Y	LC	-	HEBRECS WO
Stackhousiaceae	*Stackhousia muricata*		Y	LC	-	WO
Stackhousiaceae	*Stackhousia viminea*	slender stackhousia	Y	LC	-	WO
Sterculiaceae	*Argyrodendron trifoliolatum*	booyong	Y	LC	-	WO
Sterculiaceae	*Brachychiton australis*	broad-leaved bottle tree	Y	LC	-	CORVEG HEBRECS WO
Sterculiaceae	*Brachychiton rupestris*		Y	LC	-	CORVEG WO
Sterculiaceae	***Commersonia sp. Cadarga (G.P.Guymer 1642)***		Y	LC	**V**	**EPBC Tool**
Surianaceae	***Cadellia pentastylis***	**Ooline**	**Y**	**LC**	**V**	**EPBC Tool**
Thelypteridaceae	*Ampelopteris prolifera*		Y	LC	-	WO
Thelypteridaceae	*Cyclosorus interruptus*		Y	LC	-	WO

Family	Species	Common name	Native	Conservation status		Source
				State	National	
Thymelaeaceae	*Pimelea latifolia*		Y	LC	-	WO
Verbenaceae	*Lantana camara*		N	-	-	WO
Verbenaceae	*Phyla canescens*		N	-	-	WO
Verbenaceae	*Verbena africana*		Y	LC	-	HEBRECS WO
Verbenaceae	*Verbena gaudichaudii*		Y	LC	-	HEBRECS
Verbenaceae	*Verbena halei*		N	-	-	HEBRECS
Verbenaceae	*Verbena officinalis*		Y	LC	-	WO
Viscaceae	*Viscum articulatum*	flat mistletoe	Y	LC	-	HEBRECS WO
Vitaceae	*Cissus opaca*		Y	LC	-	WO
Vitaceae	*Cissus opaca*		Y	LC	-	CORVEG
Vitaceae	*Clematicissus opaca*		Y	LC	-	HEBRECS WO
Zygophyllaceae	*Roepera apiculata*		Y	LC	-	HEBRECS WO
Zygophyllaceae	*Roepera glauca*		Y	LC	-	HEBRECS
Zygophyllaceae	*Tribulus terrestris*	caltrop	Y	LC	-	WO

Attachment C

Database Search Results – Fauna

Table C-1: Database Search Results – Fauna

Class	Scientific name	Common name	NC Act[1]	EPBC Act[2]	Priority Taxa rating	Source[3]
Birds	*Acanthagenys rufogularis*	Spiny-Cheeked Honeyeater	LC			BA WO
Birds	*Acanthiza apicalis*	Inland Thornbill	LC			BA WO
Birds	*Acanthiza chrysorrhoa*	Yellow-Rumped Thornbill	LC			BA WO
Birds	*Acanthiza nana*	Yellow Thornbill	LC			BA WO
Birds	*Acanthiza pusilla*	Brown Thornbill	LC			WO
Birds	*Acanthiza reguloides*	Buff-Rumped Thornbill	LC			BA WO
Birds	*Acanthiza uropygialis*	Chestnut-Rumped Thornbill	LC			BA
Birds	*Accipiter fasciatus*	Brown Goshawk	LC			WO
Birds	*Accipiter novaehollandiae*	Grey Goshawk	R	—	EVR Priority Taxa	BBS
Birds	*Acrocephalus australis*	Australian Reed-Warbler	LC			WO
Birds	*Acrocephalus stentoreus*	Clamorous Reed-Warbler	LC	M		BA
Birds	*Alisterus scapularis*	Australian King-Parrot	LC			WO
Birds	*Amytornis striatus*	Striated Grass Wren	R	—		LEWIS
Birds	*Anas gracilis*	Grey Teal	LC			BA
Birds	*Anas rhynchotis*	Australasian Shoveller	LC			QM
Birds	*Anas superciliosa*	Pacific Black Duck	LC			BA WO
Birds	*Anhinga melanogaster*	Darter	LC			BA
Birds	*Anhinga novaehollandiae*	Australasian Darter	LC			WO
Birds	*Anseranas semipalmata*	Magpie Goose	LC	M		DEWHA
Birds	*Anthus novaeseelandiae*	Richard's Pipit	LC	M		BA WO
Birds	*Aprosmictus erythropterus*	Red-Winged Parrot	LC			BA WO
Birds	*Apus pacificus*	Fork-Tailed Swift	LC	M		DEWHA
Birds	*Aquila audax*	Wedge-Tailed Eagle	LC			BA WO
Birds	*Ardea alba*	Great Egret	LC	M		BA

Class	Scientific name	Common name	NC Act[1]	EPBC Act[2]	Priority Taxa rating	Source[3]
Birds	*Ardea ibis*	Cattle Egret	LC	M		DEWHA
Birds	*Ardea intermedia*	Intermediate Egret	LC	M		BA WO
Birds	*Ardea modesta*	Eastern Great Egret	LC			WO DEWHA
Birds	*Ardea pacifica*	White-Necked Heron	LC			BA WO
Birds	*Ardeotis australis*	Australian Bustard	LC			BA QM
Birds	*Artamus cinereus*	Black-Faced Woodswallow	LC			WO
Birds	*Artamus leucorynchus*	White-Breasted Woodswallow	LC			WO
Birds	*Aythya australis*	Hardhead	LC			BA WO
Birds	*Burhinus grallarius*	Bush Stone-Curlew	LC		Non-EVR Priority Taxa	BBS
Birds	*Cacatua galerita*	Sulphur-Crested Cockatoo	LC			BA WO
Birds	*Cacatua leadbeateri*	Pink Cockatoo	V	-	EVR Priority Taxa	BBS
Birds	*Cacatua roseicapilla*	Galah	LC			BA WO
Birds	*Cacomantis flabelliformis*	Fan-Tailed Cuckoo	LC			WO
Birds	*Cacomantis pallidus*	Pallid Cuckoo	LC			WO
Birds	*Calyptorhynchus lathami*	Glossy Black Cockatoo	V	—	EVR Priority Taxa	BBS
Birds	*Centropus phasianinus*	Pheasant Coucal	LC			BA WO
Birds	*Ceyx azureus*	Azure Kingfisher	LC			WO
Birds	*Chalcites basalis*	Horsfield's Bronze-Cuckoo	LC			WO
Birds	*Chalcites lucidus*	Shining Bronze-Cuckoo	LC			WO
Birds	*Chalcophaps indica*	Emerald Dove	LC			WO
Birds	*Chenonetta jubata*	Australian Wood Duck	LC			BA WO
Birds	*Chlamydera maculata*	Spotted Bowerbird	LC			BA WO
Birds	*Chlidonias hybrida*	Whiskered Tern	LC			WO
Birds	*Chthonicola sagittata*	Speckled Warbler	LC		Non-EVR Priority Taxa	BBS WO

Class	Scientific name	Common name	NC Act[1]	EPBC Act[2]	Priority Taxa rating	Source[3]
Birds	*Climacteris picumnus*	Brown Treecreeper	LC	—	Non-EVR Priority Taxa	BBS WO
Birds	*Colluricincla harmonica*	Grey Shrike-Thrush	LC			BA WO
Birds	*Coracina maxima*	Ground Cuckoo-Shrike	LC			WO
Birds	*Coracina novaehollandiae*	Black-Faced Cuckoo-Shrike		M		BA WO
Birds	*Coracina papuensis*	White-Bellied Cuckoo-Shrike	LC			WO
Birds	*Coracina tenuirostris*	Cicadabird	LC			WO
Birds	*Corcorax melanorhamphos*	White-Winged Chough	LC			WO
Birds	*Cormobates leucophaea metastasis*	White-Throated Treecreeper (Southern)	LC			WO
Birds	*Corvus coronoides*	Australian Raven	LC			BA WO
Birds	*Corvus orru*	Torresian Crow	*			BA WO
Birds	*Cracticus nigrogularis*	Pied Butcherbird	LC			BA WO
Birds	*Cracticus tibicen*	Australian Magpie	LC			WO
Birds	*Cracticus torquatus*	Grey Butcherbird	LC			BA WO
Birds	*Cygnus atratus*	Black Swan	LC			BA WO
Birds	*Dacelo novaeguineae*	Laughing Kookaburra	LC			BA WO
Birds	*Daphoenositta chrysoptera*	Varied Sittella	LC			WO
Birds	*Dendrocygna eytoni*	Plumed Whistling-Duck	LC			BA
Birds	*Dicaeum hirundinaceum*	Mistletoebird	LC			BA WO
Birds	*Dicrurus bracteatus*	Spangled Drongo	LC			WO
Birds	*Dromaius novaehollandiae*	Emu	LC			BA WO
Birds	*Egretta novaehollandiae*	White-Faced Heron	LC			BA WO
Birds	*Elanus axillaris*	Black-Shouldered Kite	LC			WO
Birds	*Elseyornis melanops*	Black-Fronted Dotterel	LC			BA WO
Birds	*Entomyzon cyanotis*	Blue-Faced Honeyeater	LC			BA WO

Class	Scientific name	Common name	NC Act[1]	EPBC Act[2]	Priority Taxa rating	Source[3]
Birds	*Eopsaltria australis*	Eastern Yellow Robin	LC			WO
Birds	*Ephippiorhynchus asiaticus*	Black-Necked Stork	R	—	EVR Priority Taxa	BBS
Birds	*Erythrotriorchis radiatus*	Red Goshawk	E	V	EVR Priority Taxa	BBS DEWHA
Birds	*Eudynamis scolopacea*	Common Koel	LC	M		BA WO
Birds	*Eurostopodus argus*	Spotted Nightjar	LC	M		BA
Birds	*Eurystomus orientalis*	Dollarbird	LC	M		BA WO
Birds	*Falco berigora*	Brown Falcon	LC			BA WO
Birds	*Falco cenchroides*	Nankeen Kestrel	LC	M		BA WO
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 WO
Birds	*Geopelia cuneata*	Diamond Dove	LC			BA
Birds	*Geopelia humeralis*	Bar-Shouldered Dove	LC			BA WO
Birds	*Geopelia striata*	Peaceful Dove	LC			BA WO
Birds	*Geophaps scripta*	Squatter Pigeon	V	V	EVR Priority Taxa	BBS DEWHA
Birds	*Gerygone fusca*	Western Gerygone	LC			BA
Birds	*Gerygone olivacea*	White-Throated Gerygone	LC			BA WO
Birds	*Grallina cyanoleuca*	Magpie-Lark	LC	M		BA WO
Birds	*Grantiella picta*	Painted Honeyeater	R	—	EVR Priority Taxa	BBS
Birds	*Grus rubicunda*	Brolga	LC			WO
Birds	*Gymnorhina tibicen*	Australian Magpie	LC			BA
Birds	*Haliaeetus leucogaster*	White-Bellied Sea-Eagle	LC			WO DEWHA
Birds	*Haliastur sphenurus*	Whistling Kite	LC			WO
Birds	*Hieraaetus morphnoides*	Little Eagle	LC			BA
Birds	*Hirundapus caudacutus*	White-Throated Needletail	LC	M		DEWHA

Class	Scientific name	Common name	NC Act[1]	EPBC Act[2]	Priority Taxa rating	Source[3]
Birds	*Hirundo ariel*	Fairy Martin	LC			BA
Birds	*Hirundo neoxena*	Welcome Swallow	LC	M		BA WO
Birds	*Lalage sueurii*	White-Winged Triller	LC			BA WO
Birds	*Lathamus discolor*	Swift Parrot	E	E and M	EVR Priority Taxa	BBS DEWHA
Birds	*Lichenostomus chrysops*	Yellow-Faced Honeyeater	LC			WO
Birds	*Lichenostomus penicillatus*	White-Plumed Honeyeater	LC			WO
Birds	*Lichmera indistincta*	Brown Honeyeater	LC			BA WO
Birds	*Lonchura castaneothorax*	Chestnut-Breasted Mannikin	LC			WO
Birds	*Lophoictinia isura*	Square-Tailed Kite	R	—	EVR Priority Taxa	BBS WO
Birds	*Malacorhynchus membranaceus*	Pink-Eared Duck	LC			BA
Birds	*Malurus cyaneus*	Superb Fairy-Wren	LC			BA WO
Birds	*Malurus lamberti*	Variegated Fairy-Wren	LC			BA WO
Birds	*Malurus melanocephalus*	Red-Backed Fairy-Wren	LC			BA WO
Birds	*Manorina flavigula*	Yellow-Throated Miner	LC			BA WO
Birds	*Manorina melanocephala*	Noisy Miner	LC			BA WO
Birds	*Melanodryas cucullata*	Hooded Robin	LC	—	Non-EVR Priority Taxa	BBS
Birds	*Meliphaga lewinii*	Lewin's Honeyeater	LC			WO
Birds	*Melithreptus albogularis*	White-Throated Honeyeater	LC			WO
Birds	*Melithreptus brevirostris*	Brown-Headed Honeyeater	LC			WO
Birds	*Melithreptus gularis*	Black-Chinned Honeyeater	R	—	EVR Priority Taxa	BBS WO
Birds	*Merops ornatus*	Rainbow Bee-Eater	LC	M		BA WO
Birds	*Microcarbo melanoleucos*	Little Pied Cormorant	LC			WO
Birds	*Microeca leucophaea*	Jacky Winter	LC			BA WO
Birds	*Milvus migrans*	Black Kite	LC			WO
Birds	*Mirafra javanica*	Horsfield's Bushlark	LC			WO

Class	Scientific name	Common name	NC Act[1]	EPBC Act[2]	Priority Taxa rating	Source[3]
Birds	*Myiagra cyanoleuca*	Satin Flycatcher	LC	M		WO DEWHA
Birds	*Myiagra inquieta*	Restless Flycatcher	LC			WO
Birds	*Myiagra rubecula*	Leaden Flycatcher	LC			BA WO
Birds	*Myzomela sanguinolenta*	Scarlet Honeyeater	LC			BA WO
Birds	*Neochmia modesta*	Plum-Headed Finch	LC			WO
Birds	*Neochmia ruficauda ruficauda*	Star Finch (Eastern)	E	E	EVR Priority Taxa	BBS DEWHA
Birds	*Neochmia temporalis*	Red-Browed Finch	LC			WO
Birds	*Neophema pulchella*	Turquoise Parrot	R	—	EVR Priority Taxa	BBS
Birds	*Nettapus coromandelianus*	Cotton Pygmy-Goose	R	M	EVR Priority Taxa	BBS DEWHA
Birds	*Ninox connivens*	Barking Owl	LC	—	Non-EVR Priority Taxa	BBS
Birds	*Ninox novaeseelandiae*	Southern Boobook	LC			WO
Birds	*Ninox strenua*	Powerful Owl	V	—	EVR Priority Taxa	BBS
Birds	*Northiella haematogaster*	Blue Bonnet				BA WO
Birds	*Numenius minutus*	Little Curlew	LC	M		DEWHA
Birds	*Nycticorax caledonicus*	Nankeen Night-Heron	LC			WO
Birds	*Nymphicus hollandicus*	Cockatiel	LC			BA WO
Birds	*Ocyphaps lophotes*	Crested Pigeon	LC			BA WO
Birds	*Oriolus sagittatus*	Olive-Backed Oriole	LC			BA WO
Birds	*Pachycephala rufiventris*	Rufous Whistler	LC			BA WO
Birds	*Pardalotus striatus*	Striated Pardalote	LC			BA WO
Birds	*Passer domesticus*	House Sparrow	*			BA WO
Birds	*Pedionomus torquatus*	Plains Wanderer	V	V	EVR Priority Taxa	BBS
Birds	*Pelecanus conspicillatus*	Australian Pelican	LC			WO
Birds	*Petrochelidon ariel*	Fairy Martin	LC			WO
Birds	*Petrochelidon nigricans*	Tree Martin	LC			WO

Class	Scientific name	Common name	NC Act[1]	EPBC Act[2]	Priority Taxa rating	Source[3]
Birds	*Petroica goodenovii*	Red-Capped Robin	LC			WO
Birds	*Phalacrocorax carbo*	Great Cormorant	LC			WO
Birds	*Phalacrocorax melanoleucos*	Little Pied Cormorant	LC			BA
Birds	*Phalacrocorax sulcirostris*	Little Black Cormorant	LC			BA WO
Birds	*Phalacrocorax varius*	Pied Cormorant	LC			WO
Birds	*Phaps chalcoptera*	Common Bronzewing	LC			BA
Birds	*Philemon citreogularis*	Little Friarbird	LC			BA WO
Birds	*Philemon corniculatus*	Noisy Friarbird	LC			BA WO
Birds	*Platalea regia*	Royal Spoonbill	LC			WO
Birds	*Platelea flavipes*	Yellow-Billed Spoonbill	LC			BA WO
Birds	*Platycercus adscitus*	Pale-Headed Rosella	LC			BA WO
Birds	*Plectorhyncha lanceolata*	Striped Honeyeater	LC			BA WO
Birds	*Plegadis falcinellus*	Glossy Ibis	LC			WO
Birds	*Podargus strigoides*	Tawny Frogmouth	LC			WO
Birds	*Poephila cincta cincta*	Black-Throated Finch	V	V	EVR Priority Taxa	BBS
Birds	*Pomatostomus superciliosus*	White-Browed Babbler	LC	—	Non-EVR Priority Taxa	BBS
Birds	*Pomatostomus temporalis*	Grey-Crowned Babbler	LC		Non-EVR Priority Taxa	BBS BA WO
Birds	*Psephotus haematonotus*	Red-Rumped Parrot				BA
Birds	*Pyrrholaemus brunneus*	Redthroat	R	—	—	LEWIS
Birds	*Rhipidura fuliginosa*	Grey Fantail	LC			BA WO
Birds	*Rhipidura leucophrys*	Willie Wagtail	LC			BA WO
Birds	*Rhipidura rufifrons*	Rufous Fantail	LC			WO
Birds	*Rostratula benghalensis*	Australian Painted Snipe	R	V and M	EVR Priority Taxa	BBS DEWHA
Birds	*Scythrops novaehollandiae*	Channel-Billed Cuckoo	LC			WO

Class	Scientific name	Common name	NC Act[1]	EPBC Act[2]	Priority Taxa rating	Source[3]
Birds	*Sericornis frontalis*	White-Browed Scrubwren	LC			WO
Birds	*Smicrornis brevirostris*	Weebill	LC			BA WO
Birds	*Stagonopleura guttata*	Diamond Firetail	LC	—	Non-EVR Priority Taxa	BBS
Birds	*Stictonetta naevosa*	Freckled Duck	R	—	EVR Priority Taxa	BBS
Birds	*Strepera graculina*	Pied Currawong	LC			BA WO
Birds	*Struthidea cinerea*	Apostlebird	LC			BA WO
Birds	*Sturnus vulgaris*	Common Starling	LC			BA WO
Birds	*Tachybaptus novaehollandiae*	Australasian Grebe	LC			BA WO
Birds	*Taeniopygia bichenovii*	Double-Barred Finch	LC			BA WO
Birds	*Taeniopygia guttata*	Zebra Finch	LC			BA WO
Birds	*Threskiornis molucca*	Australian White Ibis	LC	M		BA WO
Birds	*Threskiornis spinicollis*	Straw-Necked Ibis	LC	M		BA WO
Birds	*Todiramphus macleayii*	Forest Kingfisher	LC			WO
Birds	*Todiramphus pyrrhopygius*	Red-Backed Kingfisher	LC			WO
Birds	*Todiramphus sanctus*	Sacred Kingfisher	LC			BA
Birds	*Todiramphus sanctus*	Sacred Kingfisher	LC	M		WO
Birds	*Trichoglossus chlorolepidotu*	Scaly-Breasted Lorikeet	LC			WO
Birds	*Trichoglossus chlorolepidotus*	Scaly-Breasted Lorikeet	LC			BA
Birds	*Trichoglossus haematodus*	Rainbow Lorikeet	LC			WO
Birds	*Trichoglossus haematodus moluccanus*	Rainbow Lorikeet	LC			BA
Birds	*Turnix melanogaster*	Black-Breasted Button Quail	V	V	EVR Priority Taxa	BBS WO DEWHA
Birds	*Tyto capensis*	Grass Owl	LC	—	Non-EVR Priority Taxa	BBS
Birds	*Tyto javanica*	Eastern Barn Owl	LC			WO
Birds	*Tyto novaehollandiae*	Masked Owl	LC	—	Non-EVR Priority Taxa	BBS

Class	Scientific name	Common name	NC Act[1]	EPBC Act[2]	Priority Taxa rating	Source[3]
Birds	*Vanellus miles*	Masked Lapwing	LC			BA WO
Birds	*Xanthomyza phrygia*	Regent Honeyeater	E	E	EVR Priority Taxa	BBS
Birds	*Zosterops lateralis*	Silvereye	LC	M		BA WO
Frogs	*Adelotus brevis*	Tusked Frog	V	—	EVR Priority Taxa	BBS
Frogs	*Crinia parinsignifera*	Beeping Froglet	LC			WO
Frogs	*Cyclorana alboguttata*	Green-Stripe Frog	LC			QM WO
Frogs	*Cyclorana brevipes*	Superb Collared-Frog	LC			QM WO
Frogs	*Cyclorana novaehollandiae*	Eastern Snapping Frog	LC			WO
Frogs	*Cyclorana verrucosa*	Warty Waterholding Frog	R	—	EVR Priority Taxa	BBS
Frogs	*Limnodynastes fletcheri*	Barking Frog	LC			WO
Frogs	*Limnodynastes ornatus*	Ornate Burrowing Frog	LC			QM
Frogs	*Limnodynastes peronii*	Striped Marshfrog	LC			WO
Frogs	*Limnodynastes salmini*	Salmon-Striped Frog	LC	—	Non-EVR Priority Taxa	BBS WO
Frogs	*Limnodynastes tasmaniensis*	Spotted Marshfrog	LC			QM WO
Frogs	*Limnodynastes terraereginae*	Scarlet Sided Pobblebonk	LC			WO
Frogs	*Litoria caerulea*	Common Green Treefrog	LC			WO
Frogs	*Litoria fallax*	Eastern Sedgefrog	LC			QM WO
Frogs	*Litoria latopalmata*	Broad-Palmed Rocketfrog	LC			QM WO
Frogs	*Litoria peronii*	Emerald Spotted Treefrog	LC			WO
Frogs	*Litoria rubella*	Naked Treefrog	LC			QM WO
Frogs	*Litoria wilcoxii*		LC			WO
Frogs	*Opisthodon ornatus*	Ornate Burrowing Frog	LC			WO
Frogs	*Pseudophryne major*	Great Brown Broodfrog	LC			WO
Frogs	*Pseudophryne raveni*	Copper Backed Broodfrog	LC			WO

Class	Scientific name	Common name	NC Act[1]	EPBC Act[2]	Priority Taxa rating	Source[3]
Frogs	*Rhinella marina*	Cane Toad	*			WO
Frogs	*Uperoleia laevigata*	Eastern Gungan	LC			WO
Frogs	*Uperoleia rugosa*	Sandy Gungan	LC		Non-EVR Priority Taxa	QM WO
Mammals	*Aepyprymnus rufescens*	Rufous Bettong	LC	—	Non-EVR Priority Taxa	BBS WO
mammals	*Canis lupus dingo*	Dingo	*			WO
mammals	*Capra hircus*	Goat	*			WO
Mammals	*Chalinolobus dweryi*	Large-Eared Pied Bat	R	V	EVR Priority Taxa	BBS DEWHA
Mammals	*Chalinolobus nigrogriseus*	Hoary Wattled Bat	LC	—	Non-EVR Priority Taxa	BBS
Mammals	*Chalinolobus picatus*	Little Pied Bat	R	—	EVR Priority Taxa	BBS
Mammals	*Dasyurus hallucatus*	Northern Quoll	LC	—	Non-EVR Priority Taxa	BBS
Mammals	*Dasyurus maculatus maculatus*	Spotted-Tail Quoll	V	E	EVR Priority Taxa	BBS
Mammals	*Equus caballus*	Brumby	*			QM
mammals	*Hydromys chrysogaster*	Water Rat	LC			WO
Mammals	*Isoodon macrourus*	Northern Brown Bandicoot	LC	—	Non-EVR Priority Taxa	BBS
Mammals	*Kerivoula papuensis*	Golden-Tipped Bat	LC	—	Non-EVR Priority Taxa	BBS
mammals	*Lepus capensis*	Brown Hare	*			WO
Mammals	*Macropus dorsalis*	Black-Striped Wallaby	LC	—	Non-EVR Priority Taxa	BBS WO
mammals	*Macropus giganteus*	Eastern Grey Kangaroo	LC			WO
mammals	*Macropus parryi*	Whiptail Wallaby	LC			WO
mammals	*Macropus robustus*	Common Wallaroo	LC			WO
mammals	*Macropus rufogriseus*	Red-Necked Wallaby	LC			WO

Class	Scientific name	Common name	NC Act[1]	EPBC Act[2]	Priority Taxa rating	Source[3]
Mammals	*Miniopterus australis*	Little Bent-Wing Bat	LC	—	Non-EVR Priority Taxa	BBS
Mammals	*Miniopterus schreibersii oceanenis*	Eastern Bent-Wing Bat	LC	—	Non-EVR Priority Taxa	BBS
mammals	*Mormopterus planiceps*	Southern Freetail Bat	LC			WO
mammals	*Mus musculus*	House Mouse	*			WO
Mammals	*Nyctophilus timoriensis*	Greater Long-Eared Bat	V	V	EVR Priority Taxa	BBS DEWHA
Mammals	*Ornithorhynchus anatinus*	Platypus	CS	—	Non-EVR Priority Taxa	BBS
mammals	*Oryctolagus cuniculus*	Rabbit	*			WO
Mammals	*Perameles nasuta*	Long-Nosed Bandicoot	LC	—	Non-EVR Priority Taxa	BBS
Mammals	*Petauroides volans*	Greater Glider	LC		Non-EVR Priority Taxa	BBS WO
Mammals	*Petaurus australis australis*	Yellow-Bellied Glider (Sth Sp)	LC	—	EVR Priority Taxa	BBS
Mammals	*Petaurus norfolcensis*	Squirrel Glider	LC	—	Non-EVR Priority Taxa	BBS
Mammals	*Phascogale tapoatafa*	Brush-Tailed Phascogale	LC	—	Non-EVR Priority Taxa	BBS
Mammals	*Phascolarctos cinereus*	Koala	CS		Non-EVR Priority Taxa	BBS WO
Mammals	*Planigale tenuirostris*	Narrow-Nosed Planigale	LC	—	Non-EVR Priority Taxa	BBS
Mammals	*Pseudocheirus peregrinus*	Common Ringtail Possum	LC	—	Non-EVR Priority Taxa	BBS
Mammals	*Pseudomys patrius*	Eastern Pebble Mound Mouse	LC	—	Non-EVR Priority Taxa	BBS WO
Mammals	*Pteropus poliocephalus*	Grey-Headed Flying Fox	LC	V	Non-EVR Priority Taxa	BBS DEWHA
mammals	*Pteropus scapulatus*	Little Red Flying-Fox	LC			WO

Class	Scientific name	Common name	NC Act[1]	EPBC Act[2]	Priority Taxa rating	Source[3]
mammals	*Rattus rattus*	Black Rat	*			WO
mammals	*Saccolaimus flaviventris*	Yellow-Bellied Sheathtail Bat	LC			QM WO
Mammals	*Scotorepens sp.*	Central Eastern Broad-Nosed Bat	LC	—	Non-EVR Priority Taxa	BBS
mammals	*Sus scrofa*	Pig	*			WO
mammals	*Tachyglossus aculeatus*	Short-Beaked Echidna	LC			WO
Mammals	*Trichosurus vulpecula*	Common Brushtail Possum	LC	—	Non-EVR Priority Taxa	BBS WO
Mammals	*Vespadelus baverstocki*	Inland Forest Bat	LC	—	Non-EVR Priority Taxa	BBS
Mammals	*Vespadelus regulus*	Southern Forest Bat	LC	—	Non-EVR Priority Taxa	BBS
Mammals	*Wallabia bicolor*	Swamp Wallaby	LC			WO
Reptiles	*Acanthophis antarcticus*	Common Death Adder	R	—	EVR Priority Taxa	BBS
Reptiles	*Amphibolurus muricatus*	Jacky Lizard	LC	—	Non-EVR Priority Taxa	BBS
Reptiles	*Anomalopus brevicollis*	Slider Skink	R	—	Non-EVR Priority Taxa	BBS
Reptiles	*Anomalopus leuckartii*	Two-Clawed Worm-Skink	LC			QM WO
Reptiles	*Anomalopus mackayi*	Five-Clawed Worm-Skink	E	V	EVR Priority Taxa	BBS
Reptiles	*Aspidites melanocephalus*	Black-Headed Python	LC			WO
Reptiles	*Aspidites ramsayi*	Woma	R	—	EVR Priority Taxa	BBS
Reptiles	*Boiga irregularis*	Brown Tree Snake	LC			WO
Reptiles	*Brachyurophis australis*	Australian Coral Snake	LC			QM
Reptiles	*Carlia foliorum*		LC			WO
Reptiles	*Carlia pectoralis*	Open-Litter Rainbow-Skin				QM
Reptiles	*Carlia pectoralis*		LC			WO
Reptiles	*Carlia schmeltzii*		LC			WO

Class	Scientific name	Common name	NC Act[1]	EPBC Act[2]	Priority Taxa rating	Source[3]
Reptiles	*Chelodina expansa*	Broad Shelled River Turtle	LC	—	Non-EVR Priority Taxa	BBS WO
Reptiles	*Chelodina longicollis*	Eastern Snake-Necked Turtle	LC			WO
Reptiles	*Chlamydosaurus kingii*	Frilled Necked Lizard	LC	—	Non-EVR Priority Taxa	BBS
Reptiles	*Cryptoblepharus metallicus*	Metallic Snake-Eyed Skink	LC			WO
Reptiles	*Cryptoblepharus pulcher pulcher*	Elegant Snake-Eyed Skink	LC			WO
Reptiles	*Ctenotus ingrami*	Ctenotus Skink	LC	—	Non-EVR Priority Taxa	BBS
Reptiles	*Ctenotus robustus*		LC			WO
Reptiles	*Cyclodomorphus gerrardii*	Pink Tongued Lizard	LC	—	Non-EVR Priority Taxa	BBS
Reptiles	*Delma inornata*	Legless Lizard	LC	—	Non-EVR Priority Taxa	BBS
Reptiles	*Delma plebeia*	Leaden Delma	LC	—	Non-EVR Priority Taxa	BBS
Reptiles	*Delma torquata*	Collared Delma	V	V	EVR Priority Taxa	BBS
Reptiles	*Demansia psammophis*	Yellow-Faced Whip Snake				QM
Reptiles	*Dendrelaphis punctulata*	Common Tree Snake	LC			WO
Reptiles	*Denisonia maculata*	Ornamental Snake	V	—	EVR Priority Taxa	BBS
Reptiles	*Diplodactylus steindachneri*	Box-Patterned Gecko				QM
Reptiles	*Diplodactylus stenodactylus*	Crowned Gecko	LC	—	Non-EVR Priority Taxa	BBS
Reptiles	*Diplodactylus vittatus*	Wood Gecko	LC			WO
Reptiles	*Diporiphora australis*		LC			WO
Reptiles	*Egernia rugosa*	Yakka Skink	V	V	EVR Priority Taxa	BBS DEWHA
Reptiles	*Elseya albagula*	Southern Snapping Turtle	LC			WO
Reptiles	*Emydura macquarii*	Krefft's Turtle	LC	—	Non-EVR Priority Taxa	BBS WO

Class	Scientific name	Common name	NC Act[1]	EPBC Act[2]	Priority Taxa rating	Source[3]
Reptiles	*Eulamprus brachysoma*		LC			WO
Reptiles	*Eulamprus tenuis*		LC			WO
Reptiles	*Furina diadema*	Red-Naped Snake				QM WO
Reptiles	*Furina dunmalli*	Dunmall's Snake	V	V	EVR Priority Taxa	BBS DEWHA
Reptiles	*Gehyra dubia*	Dubious Dtella	LC			QM WO
Reptiles	*Hemiaspis damelii*	Grey Snake	E	—	EVR Priority Taxa	BBS
Reptiles	*Heteronotia binoei*	Bynoe's Gecko	LC			WO
Reptiles	*Hoplocephalus bitorquatus*	Pale-Headed Snake	LC	—	Non-EVR Priority Taxa	BBS QM WO
Reptiles	*Lerista fragilis*	Eastern Mulch-Slider	LC			QM
Reptiles	*Lerista fragilis*		LC			WO
Reptiles	*Lerista punctatovittata*		LC			WO
Reptiles	*Lialis burtonis*	Burton's Legless Lizard	LC			WO QM
Reptiles	*Menetia timlowi*		LC			WO
Reptiles	*Morelia spilota*	Carpet Python	LC			WO
Reptiles	*Morethia boulengeri*		LC			WO
Reptiles	*Morethia taeniopleura*	Fire-Tailed Skink	LC			WO
Reptiles	*Nephrurus milii*	Thick-Tailed Gecko				QM
Reptiles	*Paradelma orientalis*	Brigalow Scaly-Foot	V	V	EVR Priority Taxa	BBS QM DEWHA
Reptiles	*Parasuta dwyeri*	Dwyer's Snake				QM
Reptiles	*Physignathus lesueurii*	Eastern Water Dragon	LC	—	Non-EVR Priority Taxa	BBS WO
Reptiles	*Pogona barbata*	Common Bearded Dragon	LC			QM WO
Reptiles	*Pseudechis australis*	Mulga Snake				QM
Reptiles	*Pseudechis guttatus*	Spotted Black Snake	LC	—	Non-EVR Priority Taxa	BBS
Reptiles	*Pseudonaja textilis*	Eastern Brown Snake				QM

Class	Scientific name	Common name	NC Act[1]	EPBC Act[2]	Priority Taxa rating	Source[3]
Reptiles	*Ramphotyphlop proximus*	Proximus Blind Snake				QM WO
Reptiles	*Ramphotyphlop wiedii*	Brown-Snouted Blind Snake	LC			QM
Reptiles	*Rheodytes leukops*	Fitzroy Tortoise	V	V	EVR Priority Taxa	BBS WO DEWHA
Reptiles	*Rhinoplocephalus boschmai*	Carpentaria Whip Snake	LC		Non-EVR Priority Taxa	BBS
Reptiles	*Rhinoplocephalus nigrescens*	Eastern Small-Eyed Snake	LC			WO
Reptiles	*Simoselaps australis*	Coral Snake	LC			WO
Reptiles	*Strophurus taenicauda*	Golden-Tailed Gecko	R	—	EVR Priority Taxa	BBS QM
Reptiles	*Suta suta*	Myall Snake	LC			QM
Reptiles	*Tiliqua rugosa aspera*	Shingle-Back (Eastern Subspecies)	LC		Non-EVR Priority Taxa	BBS
Reptiles	*Tropidonophis mairii*	Freshwater Snake	LC			QM WO
Reptiles	*Tympanocryptis lineata pinguicolla*	Grassland Earless Dragon	E	E	EVR Priority Taxa	BBS
Reptiles	*Varanus tristis*	Black-Headed Monitor	LC			QM
Reptiles	*Varanus varius*	Lace Monitor	LC			WO
Reptiles	*Wollumbinia latisternum*	Saw-Shelled Turtle	LC			WO

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 locations

Site No	Easting	Northing	Broad habitat type
Spring 2007			
1	786330	7104980	Brigalow Remnant (Belah and Brigalow)
2	785300	7107900	Mixed Woodland/Brigalow Remnant (Brigalow, Poplar Box, Silver-leaved Ironbark)
3	772300	7120170	Woodland Riparian Remnant (Silver-leaved Ironbark, Poplar Box)
4	790600	7106900	Regrowth Brigalow Roadside Remnant (Brigalow)
Autumn 2008			
1	789770	7104785	Brigalow Remnant (Belah and Brigalow) - Ward Brigalow Road Reserve
2	793250	7100890	Brigalow Remnant (Belah and Brigalow) - Monks on Peakes Road
2	788850	7110590	Silver-leaved Ironbark Callitris Woodland - Woodland Nth A Road
4	788330	7102970	Poplar Box Regrowth with Roadside Remnant - Bundi Road Poplar Box Flats
5	789235	7116080	Brigalow Remnant (Belah and Brigalow) - South Booral Road
6	790510	7114290	Poplar Box Woodland - Proposed Administration Area
7	783700	7114730	Mixed Brigalow-Box-Ironbark - Nth Mount Organ Creek
8	786000	7118960	Queensland Blue Gum Riparian - Mud Creek adjacent E Road
Winter 2008			
1	735654	7122117	Poplar Box Regrowth with Roadside Remnant – Linear Connected
2	729315	7117195	Brigalow Roadside Remnant (Brigalow) - Linear Connected
3	724442	7117275	Brigalow Roadside Remnant *Casuarina cristata* – linear fragmented
4	728342	7116873	Brigalow Roadside Remnant (Brigalow) - Linear Connected

Standard trapping sites comprised Elliott (10), Pitfalls (5), Funnel Traps (4), Spotlight (60 min), Anabat (1 night), Harp Trapping (2 nights), Call Broadcast (1) and a Fauna Features Traverse.

Table D-2: Location and survey effort for Anabat surveys

Site No	Easting	Northing	Sample date	Effort
Spring 2007				
SA1	785168	7104163	2.10.07	1 night
SA2	786703	7111269	2.10.07	1 night
1	787950	7105760	3.10.07	1 night
SA3	792626	7106972	3.10.07	1 night
2	785711	7106114	4.10.07	1 night
4	788905	7110547	4.10.07	1 night
SA4	795498	7107460	5.10.07	1 night
SA5	794196	7101994	5.10.07	1 night
3	772100	7122100	6.10.07	1 night

Site No	Easting	Northing	Sample date	Effort
Autumn 2008				
A1	784650	7116850	4.4.08	1 night
A2	792625	7112300	3.4.08	1 night
A3	779300	7116880	5.4.08	1 night
A4	788420	7114690	6.4.08	1 night
A5	786200	7110610	4.4.08	1 night
A6	781650	7120715	5.4.08	1 night
Winter 2008				
A1	738707	7122594	7.8.08	1 night
A2	743020	7123539	8.8.08	1 night
A3	745403	7123811	8.8.08	1 night
A4	747374	7124285	8.8.08	1 night
A5	752372	7124082	9.8.08	1 night
A6	757170	7123555	9.8.08	1 night
A7	764222	7122249	9.8.08	1 night

Table D-3: Location and survey effort for Harp traps

Site No	Easting	Northing	Date out	Date in
Spring 2007				
H1	784259	7105176	2.10.07	4.10.07
H2	782577	7102621	2.10.07	4.10.07
H3	788244	7105993	3.10.07	5.10.07
H4	785935	7104526	3.10.07	5.10.07
H5	793663	7102689	5.10.07	7.10.07
H6	794163	7103314	5.10.07	7.10.07
H7	789778	7110484	8.10.07	10.10.07
H8	788815	7110738	8.10.07	10.10.07
H9	778258	7119027	8.10.07	10.10.07
H10	780900	7120800	9.10.07	11.10.07
H11	777400	7119000	9.10.07	11.10.07
Autumn 2008				
H1	788180	7102520	29.3.08	1.4.08
H2	788975	7104685	29.3.08	1.4.08
H3	789250	7110090	4.4.08	6.4.08
H4	789625	7114480	4.4.08	6.4.08
H5	792600	7112450	2.4.08	4.4.08
Winter 2008				
H1	737830	7122548	6.8.08	8.8.08
H2	718504	7116984	6.8.08	8.8.08
H3	734258	7120975	6.8.08	8.8.08

Table D-4: **Herpetofauna active search effort at supplementary sites**

Site No	Easting	Northing	Date
Spring 2007			
WH1	787200	7110800	2.10.07
WH2	784200	7104800	2.10.07
WH3	783000	7103100	2.10.07
WH4	786279	7105025	2.10.07
WH5	786251	7105243	3.10.07
WH6	786051	7105256	3.10.07
WH7	787463	7106127	3.10.07
WH8	788168	7105997	3.10.07
WH9	785476	7108231	4.10.07
WH10	785505	7108043	5.10.07
WH11	786193	7108741	5.10.07
WH12	786482	7109046	5.10.07
WH13	794196	7101994	5.10.07
WH14	771344	7123729	6.10.07
WH15	789406	7111241	7.10.07
WH16	788967	7106281	7.10.07
WH17	789743	7106633	7.10.07
WH18	790559	7106875	7.10.07
WH19	791263	7107098	7.10.07
WH20	792448	7106972	8.10.07
WH21	794737	7107320	8.10.07
WH22	790000	7110300	9.10.07
Autumn 2008			
WH1	784200	7120410	2.4.08
WH2	792500	7106350	5.4.08
WH3	792675	7112400	5.4.08
WH4	781650	7120715	5.4.08
Winter 2008			
WH1	717433	7116965	8.8.08
WH2	730774	7118352	8.8.08
WH3	733944	7120819	8.8.08
WH4	736880	7122705	8.8.08
WH5	741799	7123812	8.8.08
WH6	743837	7123540	9.8.08
WH7	752372	7124082	10.8.08
WH8	764445	7121530	10.8.08

Table D-5: **Summary of drive transect survey effort**

Date	Distance (km)	MLA	Habitat	Time (hrs)	Effort (hrs)
Spring 2007					
2.10.07	29	50230 50231	B,W,C,R	1800-2000	2
3.10.07	50	50230 50231	B,W,C,R	1800-2000	2
4.10.07	78	50230 50231	B,W,C,R	2000-2300	3
5.10.07	53	50230 50231	B,W,C,R	2000-0000	4
6.10.07	101	50229 50230 50231	B,W,C,R	2000-0100	5
7.10.07	106	50229 50230 50231	B,W,C,R	1900-0100	5
8.10.07	98	50229 50230 50231	B,W,C,R	2100-0000	3
9.10.07	65	50229 50230 50231	B,W,C,R	2100-0000	3
10.10.07	58	50230 50231	B,W,C,R	2000-2200	2
Autumn 2008					
26.3.08	21	50230, 50231	B,W,C,R	1945-2100	1.25
27.3.08	14	50230, 50231	B,W,C,R	2030-2150	1.3
28.3.08	15	50229	B,W,C,R	2000-2130	1.5
30.3.08	18	50229.50230,50231	B,W,C,R	1940-2100	1.3
31.3.08	30	50229.50230,50231	B,W,C,R	1815-2100	2.75
1.4.08	18	50229.50230,50231	B,W,C,R	1830-2000	1.5
2.4.08	18	50229	B,W,C,R	1920-2030	1.25
3.4.08	41	50229.50230,50231	B,W,C,R	1830-2030	2
4.4.08	27	50229.50230,50231	B,W,C,R	1815-2000	1.75
5.4.08	32	50229.50230,50231	B,W,C,R	1815-2030	1.75
6.4.08	20	50229.50230,50231	B,W,C,R	1830-2100	2.5
Winter 2008					
5.8.08	45	—	B,W,C,R	1745-1845	1
6.8.08	50	—	B	1745-1845	1
7.8.08	55	—	B	1745-1845	1
8.8.08	20	—	B,W,C	1745-1815	0.5

B= Brigalow, W = Woodland, C = Cleared Lands, R = Riparian.

Table D-6: **Summary of spotlighting surveys**

Site No	Reference	Easting	Northing	Sample date
Spring 2007				
SS1	Brigalow Remnant (Belah and Brigalow)	786330	7104980	3.10.07
SS2	Mixed Woodland/Brigalow Remnant (Brigalow, Poplar Box, Silver-leaved Ironbark)	785300	7107900	4.10.07
SS3	Woodland Riparian Remnant (Silver-leaved Ironbark, Poplar Box)	772300	7120170	4.10.07
SS4	Regrowth Brigalow Roadside Remnant (Brigalow)	790600	7106900	6.10.07
Autumn 2008				
SS1	Woleebee Creek Upper	788700	7102725	5.4.08
SS2	Woleebee Creek Westman	789270	7110290	5.4.08
SS3	Sand/Gadsby/James Dam	788420	7114690	6.4.08
Winter 2008				
SS1	Poplar Box Regrowth with Roadside Remnant	735654	7122117	5.8.08
SS2	Brigalow Roadside Remnant (Brigalow)	729315	7117195	5.8.08
SS3	Brigalow Roadside Remnant *Casuarina cristata*	724442	7117275	6.8.08
SS4	Brigalow Roadside Remnant (Brigalow)	728342	7116873	6.8.08

Attachment E

Flora survey results

E1. Attachment E – Introduction

Appendix E provides the results of the flora surveys done in the MLA and surrounding areas. 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.

Table E-1: Species of plant recorded in the study area

FAMILY	Botanical name	Common name	Native	NCA	EPBC	11.3.2	11.3.25	11.9.4	11.9.5	11.9.6	11.9.7	11.9.10	11.10.9	Cleared
ACANTHACEAE	*Brunoniella australis*	Blue Trumpet	Y			●	●	●	●			●		●
	Rostellularia adscendens		Y			●	●	●						●
ADIANTACEAE	*Cheilanthes sieberi ssp. sieberi*	Mulga Fern	Y			●	●		●			●	●	●
AIZOACEAE	*Tetragonia tetragonioides*	New Zealand Spinach	Y			●	●	●	●	●	●	●	●	●
ALISMATACEAE	*Damasonium minus*	Starfruit	Y				●*							
AMARANTHACEAE	*Achyranthes aspera*	chaff flower	Y						●			●		
	Alternanthera denticulata	Lesser Joyweed	Y				●							
	Alternanthera nana	Hairy Joyweed	Y											●
	Alternanthera nodiflora	(a) joyweed	Y			●	●							●
	Alternanthera pungens	Khaki Weed	N											●
	Amaranthus viridis	Green Amaranth	N				●							
	Gomphrena celosioides	Gomphrena Weed	N											●
	Ptilotus exaltatus var. semilanatus		Y			●								●
	Ptilotus macrocephalus	Green Pussytails	Y											●
AMARYLLIDACEAE	*Crinum flaccidum*	Darling Lily	Y			●								●
APIACEAE	*Centella asiatica*	Pennywort	Y				●							
	Ciclospermum leptophyllum	Slender Celery	N			●	●							●
	Daucus glochidiatus	Native Carrot	Y			●	●							●
	Hydrocotyle laxiflora	Stinking Pennywort	Y				●							
APOCYNACEAE	*Alstonia constricta*	Quinine Bush	Y			●		●	●			●		
	Carissa ovata	Currant Bush	Y					●	●		●		●	●

FAMILY	Botanical name	Common name	Native	NCA	EPBC	11.3.2	11.3.25	11.9.4	11.9.5	11.9.6	11.9.7	11.9.10	11.10.9	Cleared
APOCYNACEAE continued	*Parsonsia eucalyptophylla*	Gargaloo	Y				●					●		
	Parsonsia lanceolata		Y			●	●	●	●			●	●	
	Parsonsia plaesiophylla		Y					●						
ASCLEPIADACEAE	*Gomphocarpus physocarpus*	Balloon Cotton Bush	N											●
	Marsdenia leptophylla		Y					●	●					
	Marsdenia pleiadenia		Y					●						
	Marsdenia viridiflora ssp. viridiflora	Native Pear	Y			●		●						
	Sarcostemma viminale ssp.brunonianum		Y						●					
	Secamone elliptica	Corky Milk Vine	Y					●						
ASPHODELACEAE	*Bulbine bulbosa*		Y			●	●							
	Bulbine semibarbata	Wild Onion	Y			●	●							●
ASTERACEAE	*Aster subulatus*	Wild Aster	N				●*							
	Argemone ochroleuca	Mexican Poppy	N				●							
	Bidens bipinnata		N				●							
	Brachysome microcarpa		Y			●					●	●		●
	Brachysome trachycarpa		Y											●
	Calotis cuneata	White Burr Daisy	Y			●	●		●	●	●	●	●	●
	Calotis cuneifolia	Purple Burr-Daisy	Y			●	●							●
	Calotis hispidula	Bogan Flea	Y			●								●
	Calotis lappulacea	Yellow Burr-daisy	Y			●	●				●	●		●
	Calotis scabiosifolia var. scabiosifolia		Y			●								●

FAMILY	Botanical name	Common name	Native	NCA	EPBC	11.3.2	11.3.25	11.9.4	11.9.5	11.9.6	11.9.7	11.9.10	11.10.9	Cleared
ASTERACEAE continued	*Campactra barbarta*		Y									●		
	Centaurea melitensis	Maltese Cockspur	N											●
	Centipeda minima	Spreading Sneezeweed	Y				●							
	Chrysocephalum apiculatum	Common Everlasting	Y			●						●		●
	Cirsium vulgare	Spear Thistle	N											●
	Conyza canadensis		N				●							●
	Flaveria australasica	speedy weed	Y				●							●
	Gamochaeta coarctata		N			●	●							●
	Gamochaeta pensylvanica		N			●	●		●					●
	Helichrysum bracteatum		Y											●
	Hypochoeris microcephala var. albiflora		Y			●	●							●
	Lactuca serriola	Prickly Lettuce	N											●
	Leucochrysum molle	hoary sunray	Y									●		●
	Peripleura hispidula		Y				●		●			●		●
	Psuedognaphalium luteo-album		Y			●								●
	Pterocaulon redolens		Y				●					●		●
	Pterocaulon sphacelatum	apple bush	Y				●					●		●
	Pyncosorus chrysanthes	golden billybuttons	Y									●		●
	Rhodanthe polyphylla		Y			●	●							●
	Rutidosis murchisonii		Y			●								●
	Senecio lautus ssp. dissectifolius		Y			●	●	●	●	●	●	●		●

FAMILY	Botanical name	Common name	Native	NCA	EPBC	11.3.2	11.3.25	11.9.4	11.9.5	11.9.6	11.9.7	11.9.10	11.10.9	Cleared
ASTERACEAE continued	*Sigesbeckia orientalis*		N				●							●
	Solvia anthemifolia	Soft bindy-eye	N				●							
	Sonchus oleraceus	Common Sowthistle	N			●	●					●		●
	Verbesina encelioides		Y			●	●						●	●
	Vittadinia cuneata	Fuzzweed	Y			●	●		●			●		●
	Vittadinia dissecta var. hirta		Y			●	●	●	●	●	●	●	●	●
	Vittadinia pterochaeta	Rough Fuzzweed	Y			●	●							
	Vittadinia sulcata		Y			●	●		●			●		●
	Vittadinia tenuissima		Y			●	●					●		●
	Xanthium occidentale	Noogoora Burr, Cockle Burr	N				●							
	Xanthium spinosum	Bathurst Burr	N				●							
	Zinnia peruviana		N			●	●							●
AZOIACEAE	*Trianthema triquerta*		Y						●					●
BIGNONIACEAE	*Pandorea jasminoides*	Bower Vine	Y					●	●					
	Pandorea pandorana	Wonga Wonga Vine	Y				●	●	●					
BORAGINACEAE	*Ehretia membranifolia*	Peach Bush	Y				●	●						
	Heliotropium amplexicaule	Blue Heliotrope	N											●
BRASSICACEAE	*Brassica rapa*		N				●							●
	Cardamine paucijuga		Y				●							
	Conringia orientalis	Treacle Mustard	N				●							●
	Lepedium africans	peppercress	N				●							
	Lepidium bonariense		N			●	●	●	●	●	●	●	●	●

FAMILY	Botanical name	Common name	Native	NCA	EPBC	11.3.2	11.3.25	11.9.4	11.9.5	11.9.6	11.9.7	11.9.10	11.10.9	Cleared
BRASSICACEAE continued	*Rapistrum rugosum*	Turnip Weed	N			●	●							●
	Sisymbrium irio	London Rocket	Y			●	●							●
	Sisymbrium thellungii	African Turnip Weed	N											●
CACTACEAE	*Opuntia stricta*	Prickly Pear	N				●		●			●		●
	Opuntia tomentosa	Velvet Tree Pear	N			●	●	●	●			●		●
CAMPANULACEAE	*Wahlenbergia communis*	Tufted Bluebell	Y			●	●		●			●	●	●
	Wahlenbergia gracilis	(a) Bluebell	Y				●							
CAPPARACEAE	*Apophyllum anomalum*	Warrior Bush	Y					●	●					
	Capparis lasiantha	Nipan	Y			●	●	●	●	●		●		●
	Capparis loranthifolia		Y					●						
	Capparis mitchellii	Native Orange	Y			●	●	●	●			●		●
CASUARINACEAE	*Casuarina cristata*	Belah	Y			●	●	●	●	●	●	●	●	●
	Casuarina cunninghamiana	River Oak	Y				●							
CELASTRACEAE	*Elaeodendron australe var. integrifolium*	Red-fruited Olive Plum	Y					●	●					
	Maytenus cunninghamii	Yellow-berry Bush	Y					●						
	Maytenus silvestris	Narrow-leaved Orangebark	Y					●						
CHENOPODIACEAE	*Atriplex muelleri*		Y			●	●	●	●	●	●	●	●	●
	Atriplex semibaccata	Creeping Saltbush	Y				●							●
	Chenopodium album	Fat Hen	N			●	●					●		●
	Chenopodium carinatum	Keeled Goosefoot	Y				●							●
	Chenopodium murale	Nettle-leaf Goosefoot	N				●							●
	Chenopodium pumilio	Small Crumbweed	Y			●	●					●		●

FAMILY	Botanical name	Common name	Native	NCA	EPBC	11.3.2	11.3.25	11.9.4	11.9.5	11.9.6	11.9.7	11.9.10	11.10.9	Cleared
CHENOPODIACEAE continued	*Dysphania littoralis*		Y				●							
	Einadia hastata	Berry Saltbush	Y			●	●	●	●			●		●
	Einadia nutans	Climbing Saltbush	Y			●	●	●	●	●	●	●	●	●
	Einadia polygonoides		Y			●		●						
	Einadia trigonos	Fishweed	Y					●						
	Enchylaena tomentosa	Ruby Saltbush	Y			●	●	●	●	●	●	●	●	●
	Maireana enchylaenoides		Y			●	●	●	●			●		●
	Maireana microphylla		Y			●		●						
	Maireana villosa		Y											●
	Rhagodia gaudichaudiana		Y				●	●	●			●		●
	Rhagodia spinescens		Y					●						
	Salsola kali		Y			●	●	●	●	●	●	●	●	●
	Sclerolaena anisacanthoides	Yellow Burr	Y			●	●							●
	Sclerolaena birchii	Galvinized Burr	Y											●
	Sclerolaena muricata var. muricata	Black Rolypoly	Y			●	●		●			●		●
	Sclerolaena tetracuspis	Brigalow Burr	Y						●			●		●
	Sclerolaena tricuspis		Y						●					
CHLOANTHACEAE	*Spartothamnella juncea*		Y					●						
COMMELINACEAE	*Commelina cyanea*	Native Wandering Jew	Y			●	●					●		
	Commelina ensifolia		Y				●							
CONVOLVULACEAE	*Convolvulus arvensis*		Y				●							
	Convolvulus erubescens	Australian bindweed	Y				●					●		●

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CONVOLVULACEAE continued	*Cuscuta campestris*	Golden Dodder	N											●
	Dichondra repens	Kidney Weed	Y				●							
	Evolvulus alsinoides		Y			●	●					●		●
	Ipomoea calobra	weir vine	Y				●							
CRASSULACEAE	*Bryophyllum delagoense*	mother-of-millions	N						●					
	Bryophyllum delagoense x B.diagremontianum	Hybrid Mother of millions	N				●		●					
	Crassula colorata		Y			●	●		●			●		●
	Crassula purpurata		Y									●		
	Crassula sieberiana	Australian Stonecrop	Y			●	●							●
CUCURBITACEAE	*Citrullus lanatus*	Camel Melon	N											●
	Cucumis melo ssp. agrestis	Ulcardo Melon	Y											●
CUPRESSACEAE	*Callitris endlicheri*	Black Cypress Pine	Y									●		
	Callitris glaucophylla	White Cypress Pine	Y						●			●	●	●
CYPERACEAE	*Carex appressa*	Tussock Sedge	Y				●*							
	Carex inversa	Knob Sedge	Y				●							
	Cyperus aggregatus		Y				●							
	Cyperus betchei ssp. betchei		Y				●							
	Cyperus bifax		Y				●							
	Cyperus castaneus		Y				●							
	Cyperus concinnus		Y				●*							
	Cyperus difformis		Y				●							
	Cyperus exaltatus		Y				●							

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CYPERACEAE continued	*Cyperus gracilis*		Y			●	●	●	●					●
	Cyperus gymnocaulos		Y				●							
	Cyperus lucidus		Y				●*							
	Eleocharis blakeana		Y				●*				3			
	Eleocharis cylindrostachys		Y				●*							
	Fimbristylis bisumbellata		Y				●							
	Scleria mackaviensis		Y				●					●		
EBENACEAE	*Diospyros humilis*	small-leaved ebony	Y					●		●		●		
EUPHORBIACEAE	*Acalypha eremorum*	Acalypha	Y					●						
	Adriana urticoides ssp. urticoides		Y				●							
	Chamaesyce drummondii	Caustic Weed	Y			●	●					●		●
	Croton insularis	Silver Croton	Y					●						
	Croton phebalioides		Y					●						
	Phyllanthus virgatus		Y			●	●					●		●
FABACEAE (CAESALPINIOIDEAE)	*Lysiphyllum carronii*		Y			●	●	●	●		●	●	●	●
	Lysiphyllum hookeri		Y									●		
	Senna coronilloides	Brigalow senna	Y						●					
	Senna barclayana		N			●	●							
	Senna artemisioides ssp. coriacea	Smooth Senna	Y						●			●		
FABACEAE (FABOIDEAE)	*Chorizema parviflorum*		Y				●							
	Clitoria terneata	butterfly pea	N				●							

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FABACEAE (FABOIDEAE) continued	*Crotalaria grahamiana*		N				●							
	Crotalaria mitchellii ssp. laevis		Y						●					
	Indigofera linnaei	Birdsville indigo	Y									●		●
	Macroptilium lathyroides	phasey bean	N				●							●
	Sesbania cannabina	sesbania pea	Y				●							●
	Stylostanthes scabra	shrubby stylo	N			●	●							●
	Zornia muriculata		Y											●
	Aeschynomene indica	Budda Pea	Y				●							
	Crotalaria incana ssp. incana		Y				●							
	Crotalaria linifolia		Y											●
	Cullen tenax	Emu-foot	Y			●	●							●
	Desmodium brachypodum	Large Tick-trefoil	Y				●							
	Desmodium varians	Slender Tick-trefoil	Y			●	●		●			●		●
	Glycine clandestina		Y			●	●							
	Glycine tabacina		Y			●	●	●	●			●		●
	Glycine tomentella	Woolly Glycine	Y			●	●					●		
	Hovea longipes		Y					●						
	Indigofera brevidens		Y					●				●		
	Kennedia procurrens	Purple Running Pea	Y									●		
	Lotus cruentus	Red-flowered Lotus	Y											●
	Medicago laciniata	Cut-leaved Medic	N				●							●
	Medicago polymorpha	Burr Medic	N			●	●					●		●

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FABACEAE (FABOIDEAE) continued	*Melilotus albus*		N											●
	Melilotus indicus	Hexham Scent	Y											●
	Rhynchosia minima var. australis	Ryncho	Y			●	●					●		●
	Swainsona galegifolia	Smooth Darling Pea	Y				●							
	Swainsona swainsonoides		Y				●							
	Trifolium campastre		N				●							
FABACEAE (MIMOSOIDEAE)	*Acacia decora*	Western Golden Wattle	Y			●	●	●	●	●	●	●		●
	Acacia excelsa	Ironwood	Y			●	●	●	●	●	●	●	●	●
	Acacia farnesiana	Prickly Acacia	N				●							
	Acacia harpophylla	Brigalow	Y			●	●		●	●	●	●	●	●
	Acacia julifera		Y						●					
	Acacia melvillei	Yarran	Y						●	●				●
	Acacia oswaldii	Miljee	Y			●	●		●			●		●
	Acacia salicina	Cooba	Y			●	●	●	●	●	●	●		●
	Neptunia gracilis	Sensitive Plant	Y											●
	Acacia farnesiana	prickly acacia	N				●							●
GERANIACEAE	*Erodium crinitum*	Blue Storksbill	Y											●
	Geranium solanderi var. solanderi		Y			●	●							●
GOODENIACEAE	*Goodenia fascicularis*		Y			●	●							
	Goodenia glabra		Y			●	●		●			●		
	Goodenia gracilis		Y			●								

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GOODENIACEAE continued	*Scaevola spinescens*	prickly fan flower	Y						●					
HALORAGACEAE	*Haloragis heterophylla*		Y				●							
	Myriophyllum verrucosum	Red Water-milfoil	Y				●*							
HYDROCHARITACEAE	*Ottelia ovalifolia*	Swamp Lily	Y				●*							
HYPOXIDACEAE	*Hypoxis hygrometrica var. villosisepala*	Golden Weather-grass	Y				●							
JUNCACEAE	*Juncus aridicola*		Y				●*							
	Juncus continuus		Y				●*							
JUNCAGINACEAE	*Triglochin procera*		Y				●							
LAMIACEAE	*Ajuga australis*	Austral Bugle	Y			●	●							
	Lycopus australis	Australian Gipsywort	Y				●							
	Salvia plebeia	common sage	Y				●							●
LOBELIACEAE	*Pratia concolor*	Poison Pratia	Y				●							
LAXMANNIACEAE	*Lomandra leucocephala*	woollt mat-rush	Y			●	●							
	Lomandra longifolia	Spiny-headed Mat-rush	Y			●	●							
	Lomandra multiflora		Y			●						●		
LORANTHACEAE	*Amyema bifurcata*		Y				●					●		
	Amyema cambagei		Y				●		●					
	Amyema congener ssp. congener		Y			●	●					●		
	Amyema congener ssp. rotundifolium		Y					●	●					
	Amyema linophylla	bull oak mistletoe	Y				●				●	●		
	Amyema maidenii		Y					●						

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LORANTHACEAE continued	*Amyema miquelii*		Y				●							
	Amyema quandang var. bancroftii	grey mistletoe	Y				●	●		●	●	●		●
	Amyema quandang var. quandang		Y											
	Dendrophtoe glabrescens		Y					●						
	Lysiana subfalcata		Y			●	●	●	●			●		
LUZURIAGACEAE	*Eustrephus latifolius*	Wombat Berry	Y				●	●						
LYTHRACEAE	*Ammannia multiflora*		Y				●							
	Lythrum paradoxum		Y				●*							
MALVACEAE	*Abutilon leucopetalum*		Y					●						
	Abutilon malvifolium		Y						●					
	Abutilon otocarpum		Y			●	●					●		●
	Abutilon oxycarpum var. oxycarpum	Flannel Weed	Y			●	●	●	●			●		●
	Hibiscus trionum	Bladder Ketmia	Y			●	●		●			●		●
	Malva parviflora	Small-flowered Mallow	N				●							
	Malvastrum americanum		N			●	●							●
	Malvastrum coromandelianum	Prickly Malvastrum	N				●							
	Sida corrugata	Vaiable Sida	Y			●	●		●			●		●
	Sida cunninghamii		Y			●	●					●		●
	Sida fibulifera	pin sida	Y									●		●
	Sida filiformis		Y				●							

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MALVACEAE continued	*Sida platycalyx*	Lifesaver Burr	Y			●						●		●
	Sida rhombifolia	Paddy's Lucerne	N				●							●
	Sida rohlenae		Y					●	●					
	Sida subspicata		Y											
	Sida trichopoda		Y			●								
MARSILEACEAE	*Marsilea drummondii*	Common Nardoo	Y				●							
	Marsilea hirsuta		Y				●							
MELIACEAE	*Owenia acidula*	Gruie	Y					●	●			●		●
MYOPORACEAE	*Eremophila debilis*	Amulla	Y			●						●		●
	Eremophila deserti	Turkeybush	Y					●	●					
	Eremophila longifolia		Y									●		
	Eremophila mitchellii	Budda	Y			●	●	●	●			●	●	●
	Myoporum acuminatum		Y					●						
	Myoporum montanum	Western Boobialla	Y						●					
MYRTACEAE	*Angophora floribunda*	Rough-barked Apple	Y				●							
	Corymbia bloxsomei	Yellow Jacket	Y										●	
	Corymbia tessellaris	Carbeen	Y				●							
	Eucalyptus melanophloia	Silver-leaved Ironbark	Y			●	●		●		●	●	●	●
	Eucalyptus orgadophila	Mountain coolibah	Y					●						
	Eucalyptus populnea	Bimble Box	Y			●	●		●	●		●	●	●
	Eucalyptus tereticornis	Forest Red Gum	Y			●	●							
NYCTAGINACEAE	*Boerhavia dominii*	Tarvine	Y			●	●					●		●
OLEACEAE	*Jasminum didymum ssp. didymum*		Y					●						

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OLEACEAE continued	*Jasminum didymum ssp. racemosum*		Y					●						
	Jasminum lineare	Desert Jasmine	Y			●	●	●				●		●
	Jasminum volubile		Y				●	●						
	Notelaea microcarpa var. microcarpa	Native Olive	Y					●						
ONAGRACEAE	*Ludwigia octovalvis*	native willow primrose	Y				●*							●*
	Ludwigia peploides ssp. montevidensis	Water Primrose	Y				●*							
OPHIOGLOSSACEAE	*Ophioglossum lusitanicum*	Adder's Tongue	Y			●								
ORCHIDACEAE	*Cymbidium canaliculatum*	Tiger Orchid	Y			●	●					●		●
OXALIDACEAE	*Oxalis chnoodes*		Y									●		●
	Oxalis corniculata var. corniculata	Creeping Oxalis	N			●	●							●
PAPAVERACEAE	*Argemone ochroleuca*	Mexican poppy	N				●							●
PHORMIACEAE	*Dianella longifolia*		Y			●								
	Dianella revoluta var. vinosa		Y											
PITTOSPORACEAE	*Auranticarpa rhombifolia*	Diamond-leaved Pittosporum	Y					●						
	Bursaria incana		Y					●						
	Bursaria spinosa	Native Blackthorn	Y					●						
	Pittosporum angustifolium	Butterbush	Y			●	●	●				●		●
	Pittosporum spinescens	Wallaby Apple	Y					●						●
	Pittosporum viscidum		Y					●						

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PLANTAGINACEAE	*Plantago cunninghamii*		Y			●	●		●			●		●
	Plantago lanceolata	Common Plantain	N				●							●
POACEAE	*Alloteropsis semialata*	Cockatoo Grass	Y			●								
	Ancistrachne uncinulata	Hooked-hairy Panic Grass	Y					●	●				●	●
	Aristida benthamii var. benthamii		Y									●		
	Aristida calycina var. praealta		Y			●	●		●			●		●
	Aristida caput-medusae	many-headed wiregrass	Y			●								
	Aristida helicophylla		Y				●					●		
	Aristida holanthera	(a) three-awn grass	Y				●		●			●		●
	Aristida jerichoensis	Jericho Wiregrass	Y									●		
	Aristida latifolia	Featherop Wiregrass	Y						●			●		
	Aristida leptopoda	White Speargrass	Y						●			●		●
	Aristida personata		Y				●		●			●		●
	Aristida queenslandica var. queenslandica		Y			●								
	Aristida ramosa		Y			●	●							
	Arundinella nepalensis	Reedgrass	Y				●							
	Astrebla squarrosa	Bull Mitchell Grass	Y											●
	Austrodanthonia tenuior		Y								●	●		
	Austrostipa ramosissima	Stout Bamboo Grass	Y					●						
	Austrostipa scaber	rough speargrass	Y								●			
	Austrostipa verticillata		Y			●	●	●	●					●
	Avena sativa	Oats	N											●

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POACEAE continued	*Bothriochloa bladhii*		Y				●							
	Bothriochloa decipiens var. cloncurrensis	Clocurrey pitted bluegrass	Y				●							●
	Bothriochloa decipiens var. decipiens	Pitted Bluegrass	Y									●		●
	Bothriochloa ewartiana	Desert Bluegrass	Y			●	●					●		●
	Bothriochloa macra	Red Grass	Y											●
	Bothriochloa pertusa	Indian bluegrass	N				●					●		●
	Brachyachne ciliaris	Hairy Native Couch	Y				●							
	Brachyachne convergens	native couch grass	Y				●							
	Cenchrus ciliaris	Buffel Grass	N			●	●	●	●	●	●	●	●	●
	Chionachne cyathopoda	river grass	Y				●							
	Chloris divaricata		Y			●	●	●	●	●	●	●		●
	Chloris gayana	Rhodes Grass	N				●							●
	Chloris truncata	Windmill Grass	Y			●						●		●
	Chloris ventricosa	tall chloris	Y						●			●		●
	Chloris virgata	feathertop rhodes grass	N					●						●
	Chrysopogon fallax	golden beard grass	Y				●	●				●		●
	Chrysopogon slyvaticus		Y				●							
	Cymbopogon refractus	Barbed Wire Grass	Y			●	●							
	Cynodon dactylon	Common Couch	Y				●							
	Dichanthium annulatum		Y											●
	Dichanthium aristatum	Angleton grass	Y				●					●		●
	Dichanthium sericeum	Queensland Bluegrass	Y			●	●					●		●

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POACEAE continued	*Digitaria ammophila*	Silky Umbrella Grass	Y						●			●		
	Digitaria coenicola	finger panic grass	Y									●		
	Diplachne parviflora	Small-flowered Beetle Grass	Y				●							
	Echinochloa colona	Awnless Barnyard Grass	Y				●							●
	Echinochloa crus-galli	barnyard grass	N				●							
	Elymus scaber	Wheatgrass	Y				●							
	Ennaeopogon lindleyanus	(a) nineawn grass	Y									●		
	Ennaeopogon oblongus	(a) nineawn grass	Y									●		
	Enneapogon intermedius		Y			●						●		●
	Enteropogon acicularis		Y			●	●	●	●	●		●		●
	Enteropogon dolichostachyus		Y					●				●		
	Enteropogon ramosus	Curly Windmill Grass	Y			●								
	Eragrostis brownii	Brown's Lovegrass	Y			●								
	Eragrostis cilianenesis	stinkgrass	N				●							●
	Eragrostis elongata	Clustered Lovegrass	Y			●						●		
	Eragrostis lacunaria		Y			●	●		●			●		●
	Eragrostis leptostachya	paddock lovegrass	Y				●					●		●
	Eragrostis longipedicellata		Y				●				●	●		●
	Eragrostis megalosperma		Y									●		
	Eragrostis microcarpa		Y				●							
	Eragrostis setifolia	neverfail	Y						●					
	Eragrostis sororia		Y			●								

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POACEAE continued	*Eriochloa crebra*	Cup Grass	Y				●							
	Glyceria maxima	Reed Canegrass	N				●							
	Heteropogon contortus	Bunch Speargrass	Y			●	●							
	Homopholis belsonii		Y	**E**	**V**				●					
	Imperata cylindrica	Blady Grass	Y				●							
	Iseilema vaginiflorum	red flinders grass	Y				●							●
	Leptochloa digitata	Umbrella Canegrass	Y				●							
	Melinis repens	Red Natal Grass	N									●		●
	Ottochloa gracillima		Y				●							
	Panicum decompositum	Native Millet	Y			●						●		●
	Panicum effusum var. effusum	hairy panic	Y				●					●		●
	Panicum maximum var. trichoglume	Green Panic	N				●							
	Panicum queenslandicum	Yadbil Grass	Y									●		●
	Paspalidium caespitosum	Brigalow Grass	Y						●			●		
	Paspalidium constrictum	Knottybutt Grass	Y			●		●	●			●		●
	Paspalidium distans	Shot Grass	Y									●		
	Paspalidium globoideum		Y				●							
	Paspalidium gracile	Slender Panic	Y				●							
	Paspalidium rarum		Y				●							
	Paspalum dilatatum	paspalum	N				●							●
	Paspalum distichum	Water Couch	Y				●*							
	Perotis rara	comet grass	Y				●							

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POACEAE continued	*Phragmites australis*	Common Reed	Y				●							
	Pseudoraphis spinescens	Spiny Mudgrass	Y				●*							
	Setaria gracilis	pale pigeon grass	Y				●							
	Setaria sphacelata	South African pigeon grass	N				●							●
	Sorghum alum	Columbus grass	N				●							●
	Sorghum bicolor	Forage sorghum	N				●					●		●
	Sorghum halepense	Johnson Grass	N				●							
	Sorghum leiocladum	Wild Sorghum	Y				●							
	Sporobolus actinocladus	Katoora Grass	Y			●	●					●		●
	Sporobolus africanus	Parramatta grass	N											●
	Sporobolus caroli	Fairy Grass	Y			●	●							
	Sporobolus creber	Slender Rat's Tail Grass	Y			●	●		●			●		●
	Sporobolus diander		Y				●							
	Sporobolus elongatus	Slender Rat's Tail Grass	Y			●						●		●
	Themeda avenacea	native oat grass	Y				●							●
	Themeda triandra		Y				●							
	Tragus australianus	Small Burrgrass	Y				●							●
	Tripogon loliiformis	Fiveminute Grass	Y			●								
	Triticum aestivum	Wheat	N											●
	Urochloa mosambicensis	sabi grass	N				●		●			●		●
	Urochloa panicoides	Urochloa Grass	N			●	●					●		●
	Urochloa rhodesiensis		N				●		●			●		●
	Vetiveria filipes	Australian Vetiver	Y				●							●

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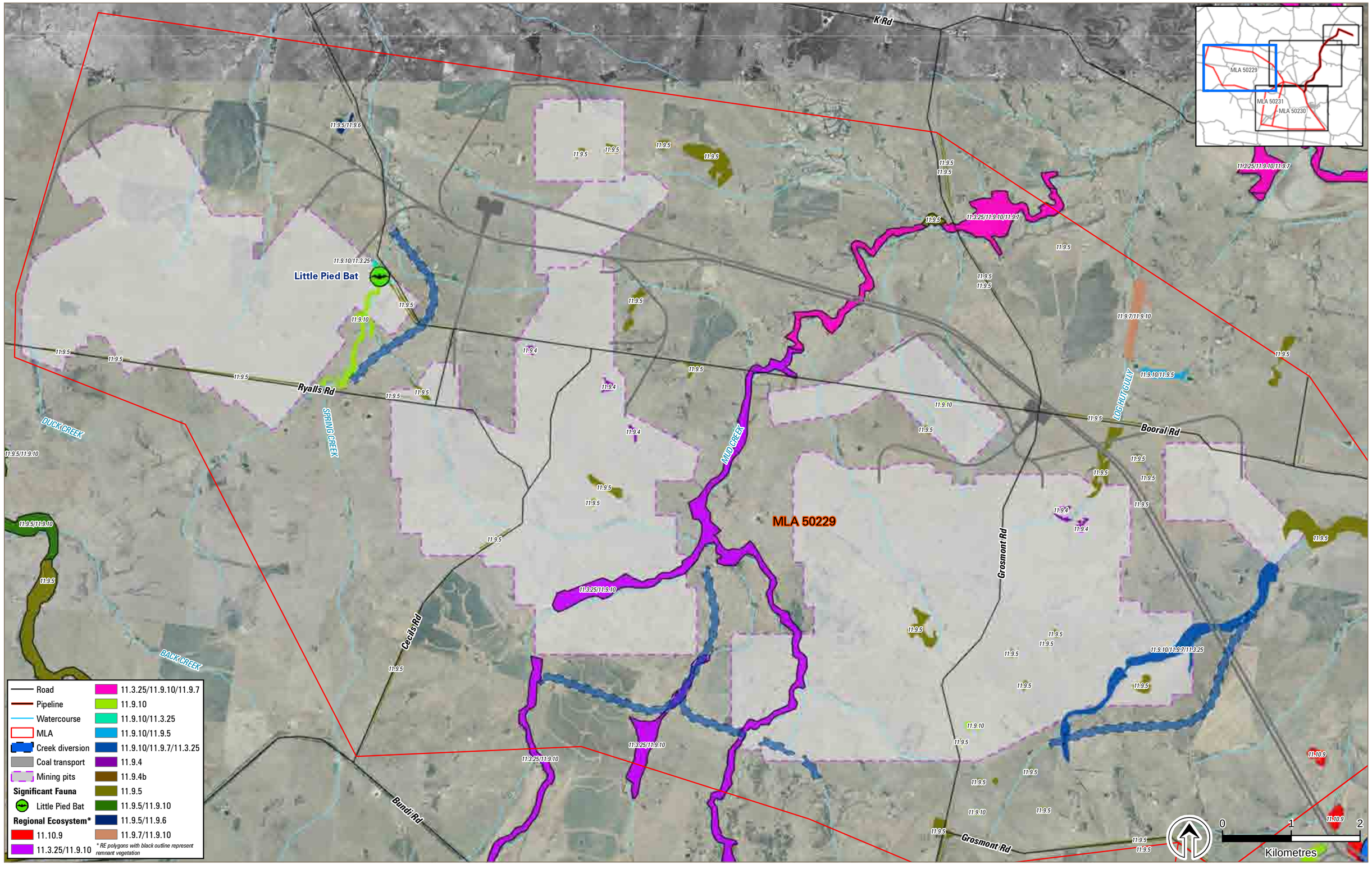
POACEAE continued	*Vulpia myuros*	rat's tail fescue	Y								●			
POLYGONACEAE	*Emex australis*	Spiny Emex	N			●	●		●					
	Persicaria lapathifolia	Pale Knotweed	Y				●*							
	Persicaria orientalis	Princes Feathers	Y				●*							
	Polygonum plebium		Y				●*							
	Rumex brownii	Swamp Dock	Y				●*							
PONTIDERIACEAE	*Monochoria cyanea*	monocharia	Y				●*							●*
PORTULACACEAE	*Portulaca oleracea*	Pigweed	Y			●	●		●			●		●
	Portulaca pilosa		N											●
	Portulacca australis	(a) pigweed	Y				●*		●			●	●	●*
POTAMOGETONACEAE	*Potamogeton crispus*	Curly Pondweed	Y				●*							
	Potamogeton tricarinatus	Floating Pondweed	Y				●*							
PROTEACEAE	*Grevillea striata*	beefwood	Y								●	●		●
RANUNCULACEAE	*Clematis microphylla*	Small-leaved Clematis	Y											
	Ranunculus pentandrus	(a) Buttercup	Y				●							
RHAMNACEAE	*Ventilago viminalis*	Supple Jack	Y					●	●			●		
ROSACEAE	*Prunus persea*	peach	N				●							
RUBIACEAE	*Asperula conferta var. conferta*	common woodruff	Y				●							●
	Asperula cunninghamii	Twining Woodruff	Y			●								●
	Psydrax johnsonii		Y			●	●	●	●			●	●	
	Psydrax odorata forma australiana	Shiny-leaved Canthium	Y					●						
	Psydrax odorata forma buxifolia	Stiff Canthium	Y					●						

FAMILY	Botanical name	Common name	Native	NCA	EPBC	11.3.2	11.3.25	11.9.4	11.9.5	11.9.6	11.9.7	11.9.10	11.10.9	Cleared
RUBIACEAE continued	*Psydrax odorata forma spathulata*		Y						●			●		
	Psydrax oleifolium	Wild Lemon	Y			●	●	●	●				●	●
RUTACEAE	*Citrus glauca*	Desert Lime	Y			●	●	●	●		●	●		●
	Flindersia collina	Broad-leaved Leopard Tree	Y					●						
	Geijera parviflora	Wilga	Y			●	●	●	●	●	●	●	●	●
SANTALACEAE	*Santalum lanceolatum*	Northern Sandalwood	Y			●	●	●	●			●		●
SAPINDACEAE	*Alectryon diversifolius*		Y			●	●	●	●	●	●	●		●
	Alectryon oleifolius ssp. elongatus		Y			●	●	●	●					●
	Atalaya hemiglauca	Whitewood	Y			●	●	●	●			●		●
	Dodonea viscosa var. arborescens		Y							●				●
SAPOTACEAE	*Planchonella cotinifolia var. pubescens*		Y					●						
SCROPHULARIACEAE	*Euphrasia collina*		Y			●								
SOLANACEAE	*Nicotiana megalosiphon*		Y				●							●
	Physalis virginianum	ground cherry	Y											●
	Solanum coracinum		Y						●					●
	Solanum ellipticum	Velvet Potato Bush	Y						●					
	Solanum nemophilum		Y						●					
	Solanum nigrum	Blackberry Nightshade	N				●							●
	Solanum parvifolium ssp. parvifolium		Y					●						
	Solanum semiarmatum	prickly nightshade	Y						●					

FAMILY	Botanical name	Common name	Native	NCA	EPBC	11.3.2	11.3.25	11.9.4	11.9.5	11.9.6	11.9.7	11.9.10	11.10.9	Cleared
STACKHOUSIACEAE	*Stackhousia viminea*	Slender Stackhousia	Y			●	●							●
STERCULIACEAE	*Brachychiton australis*	broad-leaved bottle tree	Y									●		
	Brachychiton populneus	Kurrajong	Y			●	●							●
	Brachychiton rupestris	Queensland Bottle Tree	Y			●	●	●	●		●	●	●	●
THYMELAEACEAE	*Pimelea neo-anglica*	yellow rice flower	Y						●			●		
TILIACEAE	*Grewia latifolia*		Y					●						
TYPHACEAE	*Typha domingensis*	Narrow-leaved Cumbungi	Y				●*							
URTICACEAE	*Urtica incisa*	Stinging Nettle	Y				●							
VERBENACEAE	*Phyla nodiflora var. nodiflora*	Lippia	N				●*							●*
	Verbena africana		Y			●	●							●
	Verbena bonariensis	Purpletop	N				●							
	Verbena officinalis	Common Verbena	N				●							
	Verbena tenuisecta	Mayne's Pest	N			●	●	●	●	●	●	●	●	●
VISCACEAE	*Notothixos cornifolius*	Kurrajong Mistletoe	Y											●
	Notothixos incanus	grey-leaved mistletoe	Y									●		
	Visicum articulatum	Flat Mistletoe	Y					●						
VITACEAE	*Clematocissus opaca*	Small-leaved Water Vine	Y			●	●	●				●		
ZYGOPHYLLACEAE	*Tribulus eichlerianus*	(a) caltrop	Y											●
	Tribulus micrococcus	Spineless Caltrop	Y			●						●		●
	Zygophyllum apiculatum	Gallweed	Y			●		●	●					
	Zygophyllum glaucum	Pale Twinleaf	Y											

Note: * denotes those species which were identified within oxbows, gilgais and dams



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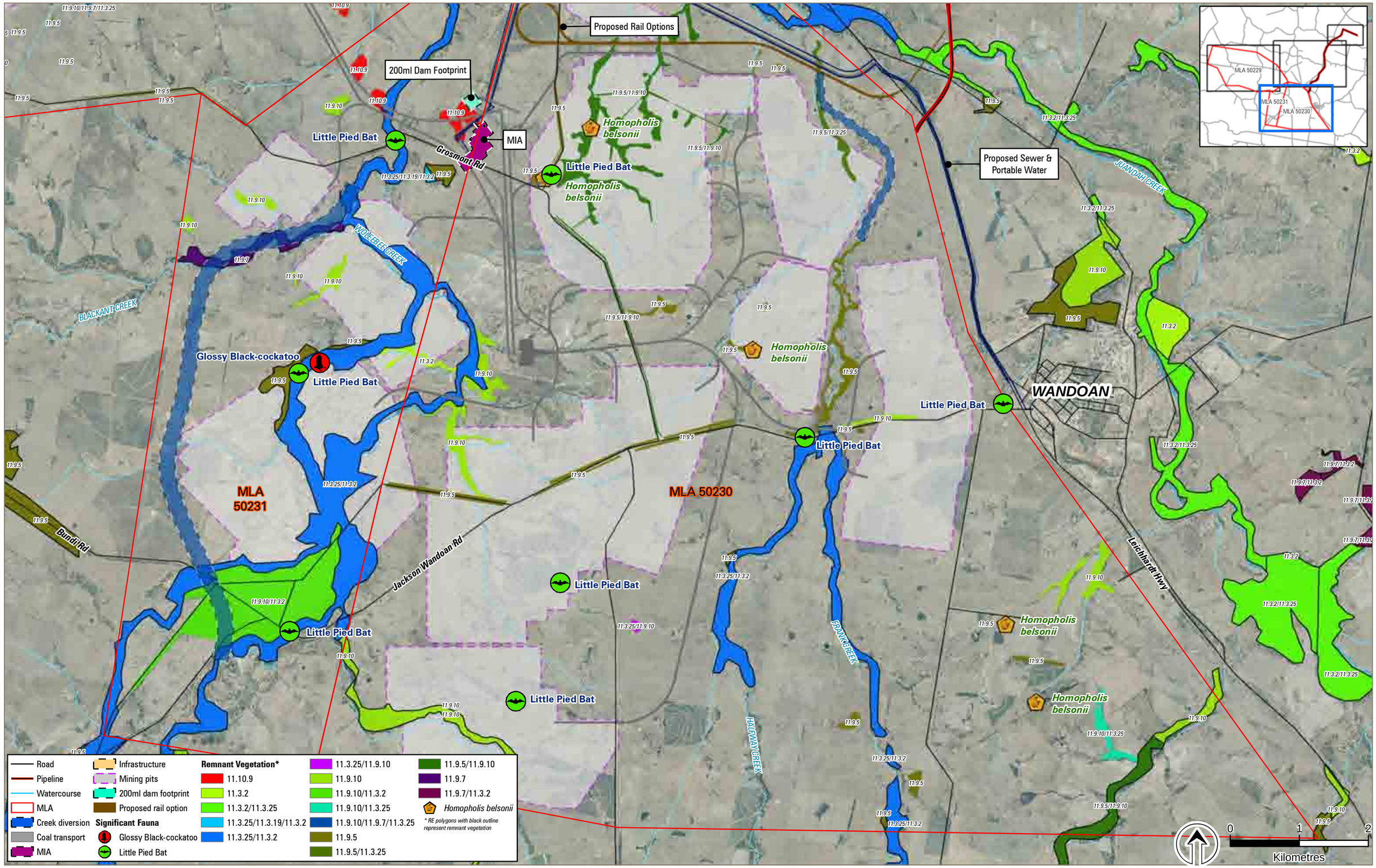
Source: Roads, QLD State Digital Road Network (2004); Towns, creeks 1:250K Topo, Geoscience Australia (2006)

PARSONS BRINCKERHOFF

Map A

1:50,000 Regional Ecosystems, non-remnant vegetation map and other significant biodiversity



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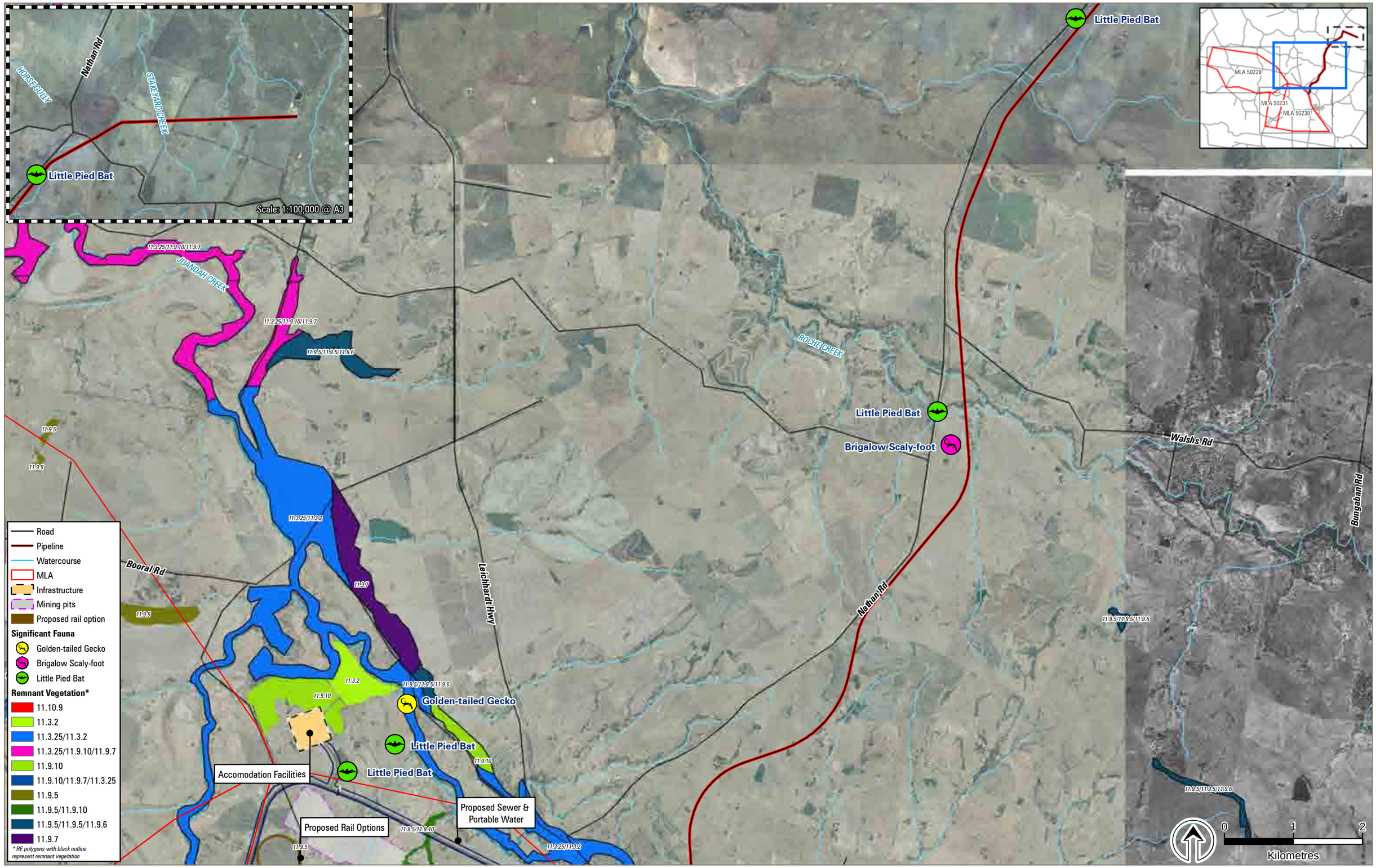
PB PARSONS BRINCKERHOFF

Map B

1:50,000 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)

PB PARSONS BRINCKERHOFF

Map C

1:50,000 Regional Ecosystems, non-remnant vegetation map and other significant biodiversity

Attachment F

Fauna habitat results

Table F-1: Summary of fauna habitat assessment

Habitat characteristic	Non-eucalypt woodlands (including Brigalow)	Eucalypt woodland (ironbark woodland)	Eucalypt woodland (box woodland)	Riparian	Cleared land	Aquatic/wetland
Standard Trapping Site	1,2,4	2 (partly within this habitat)	2	3	—	—
Supplementary Sites	yes	yes	yes	yes	yes	yes
Topography	Low Hills	Alluvial Flats Rising onto Lower Slopes	Alluvial Flats	Alluvial Flats and Riparian Zones Major Creeks	Variable	Alluvial and variable (farm dams)
Landuse	Private and Roadside Reserve	Private	Private and Roadside Reserve	Private and Roadside Reserve	Private and Roadside Reserve	Private
Age Class	Remnant and Non Remnant	Remnant & Non Remnant	Remnant and Non Remnant	Remnant & Non Remnant	Not applicable	Not applicable
Dominant Vegetation	Description from Site 1					
Overstorey	Brigalow (*Acacia harpophylla*) 10% Belah (*Casuarina cristata*) 80% – (12-15 m height, FPC 30%)	Silver-leaved Ironbark (*Eucalyptus melanophloia*) 70% Poplar Box (*Eucalyptus populnea*) 10% Brigalow (*Acacia harpophylla*) 10% - (12-16 m height, FPC 25%)	Poplar Box (*Eucalyptus populnea*) - (14-18 m, FPC 25%)	Poplar Box (*Eucalyptus populnea*) Queensland Blue Gum (*Eucalyptus tereticornis*) Occasionally River Red Gum (*Eucalyptus camaldulensis*) - (18-22 m, FPC 30%)	Generally scatted trees of remnant vegetation	absent
Mid Storey	Belah (*Casuarina cristata*) 80% Brigalow (*Acacia harpophylla*) 10% – (Height 7-10, FPC 10%)	Callitris (*Callitris glaucophylla*) – 30% Brigalow (*Acacia harpophylla*) 30% Cactus 5% - (Height 6-10 m, FPC 15%)	Poplar Box (*Eucalyptus populnea*) - (8-10 m, FPC 10%)	Poplar Box (*Eucalyptus populnea*) Rough-barked Apple (*Angophora floribunda*) 20% Queensland Blue Gum (*Eucalyptus tereticornis*)- (10-14 m, FPC 15%)	Generally scatted trees of remnant vegetation	absent
Understorey	Wilga (*Geijera parviflora*) 55% Belah (*Casuarina cristata*) 20% Red-fruited Plum	Currant Bush (*Apophyllum anomalum*) – 50% Acacia (*Acacia sp*) – 20% (Height 1-3 m,	Poplar Box (*Eucalyptus populnea*) - (2-4 m, FPC 10%)	Wilga (*Geijera parviflora*) 30% Occasionally Boree (*Acacia pendula*) 20% Poplar Box	Generally scatted shrubs of remnant vegetation	absent

Habitat characteristic	Non-eucalypt woodlands (including Brigalow)	Eucalypt woodland (ironbark woodland)	Eucalypt woodland (box woodland)	Riparian	Cleared land	Aquatic/wetland
	Olive 10% - (Height 2-4 m, FPC 20%)	FPC 25%)		(*Eucalyptus populnea*) 20% - (3-8 m, FPC 15%)		
Soil Type	Deep Clay	Sandy Loam with underlying chocolate clays	Heavy Clays	Range from sandy loam through dark cracking clays	Highly variable from cracking clays to sandy loams	Generally heavy clays
Fire History	>30 yrs	>30 yrs	15-20 yrs	>20 yrs	Unknown	>30 yrs
Waterbodies	Absent	Absent	Yes	Yes	Yes	Yes
Waterbody type	na	na	Semi Permanent Creeks	Semi Permanent Creeks	Stock Dams	Ephemeral Wetlands
Stream Substrate	na	na	Clay	Clay	Clay	Clay
Fringing Ground Vegetation	na	na	Occasional *Cyperus* and *Sporobolous*)	Occasional *Cyperus* and *Sporobolous*)	Nil	Mainly sedges (*Cyperus*) and tussock grasses (*Sporobolous*)
Riparian Vegetation	na	na	Grasses (*Aristida spp*)	Grasses (*Aristida spp*)	Nil	Blue Gum and Red Gums
Water Quality	na	na	Turbid	Turbid	Turbid	Turbid
Approximate Depth	na	na	Up to 1.5m	Up to 1.5m	Up to several metres	<0.5m
Terrestrial Component						
Litter Depth	5-15 cm	<5 cm	2-5 cm	2-5 cm	<5 cm	nil
Humus	5-10 cm	<5 cm	0-5 cm	0-5 cm	<2 cm	nil
Groundcover Composition	15% vegetation (herbs, forbs, grasses) 58% litter 25% log 2% bare soil 0% rock 0% rubbish-rubbish **Comments** – extensive litter and log cover make this habitat suitable for fossorial reptiles	25% vegetation 40% litter 10% log 17% bare soil 8% rock 0% rubbish **Comments** – rock mainly confined to areas adjacent to Wandoan Creek	40% vegetation 25% litter 15% log 20% bare soil 0% rock 0% rubbish **Comments** – habitat quality highly variable through study area	35% vegetation 35% litter 15% log 15% bare soil 0 % rock 0% rubbish **Comments** – moderate habitat quality but variable throughout the study area	<55% vegetation >10% litter <5% log 25% bare soil <5% rock <5% rubbish-rubbish **Comments** – provides limited habitat to fauna	10% vegetation 5% litter 15% log 70% bare soil 0% rock 0%-rubbish **Comments** – provides habitat for nomadic and migratory wetland species

Habitat characteristic	Non-eucalypt woodlands (including Brigalow)	Eucalypt woodland (ironbark woodland)	Eucalypt woodland (box woodland)	Riparian	Cleared land	Aquatic/wetland
Tree Hollow Density (tree per ha)	5 per ha	7 per ha	0-10 per ha	~10 per ha	Variable 0-2 per ha	Nil
Hollow type	**Trunk** – small to medium crevices and fissures **Limb** – small and medium crevices and fissures **Suitability** – bats, small gliders, arboreal snakes	**Trunk** – small, medium and large **Limb** – small, medium and large **Suitability** – bats, gliders, possum, large birds, arboreal snakes	**Trunk** – small, medium and large **Limb** – small, medium and large **Suitability** – bats, gliders, possum, large birds, arboreal snakes	**Trunk** – small, medium and large **Limb** – small, medium and large **Suitability** – bats, gliders, possum, large birds, arboreal snakes	**Trunk** – small, medium and large **Limb** – small, medium and large **Suitability** – bats, some birds and occasionally possums	Not applicable
Flowering and Fruiting Trees	Belah (25% cones)	Mistletoe (10%)	Mistletoe (20%)	Nil	Nil	Nil
Landscape/Corridor Value	Moderate (provides part of larger tract of woodland). This veg community typically provides one of the few corridors through the study area	High as its generally associated with uncleared drainage lines	Moderate as generally associated with broader alluvial plains of main drainage lines	High as its generally associated with uncleared drainage lines	Nil	Limited from a migratory perspective (no RAMSAR sites nearby)
Disturbance History	Clearing – moderate Logging – low Roads – nil Fire – nil Weeds – low Refuse – low Recreation – nil Grazing – moderate	Clearing – moderate Logging – moderate Roads – low Fire – low Weeds – mod Refuse – low Recreation – nil Grazing – moderate	Clearing – moderate Logging – moderate Roads – low Fire – nil Weeds – low Refuse – nil Recreation – nil Grazing – moderate	Clearing – low Logging – moderate Roads – low Fire – nil Weeds – low Refuse – nil Recreation – nil Grazing – high	Clearing – high Logging – nil Roads – high Fire – nil 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	Provides abundant tree hollow resources for fauna	Appears to provide important Koala habitat and roosting resources for micro bats	Appears to provide important Koala habitat and roosting resources for micro bats	Used by some open country specialists such as the Bustard	Provide habitat for waterfowl, egret, frogs and some species of snake

Family	Scientific Name	Common name	Conservation Status			Abundance	Spring 2007 survey						Autumn 2008 survey										Eastern Gas Winter 2008			Habitat type associations					
			NCR	EPBC	RSF		Spring Detection Method	Standard sites 1	2	3	4	Supple-mentary sites / opportu-nistic	Autumn Detection Method	Autumn Standard Trapping Site Number 5	6	7	8	9	10	11	12	Supple-mentary sites / opportu-nistic	Winter Detection Method	Stnadard Trap Site 1	Supplemen tary Sites / opportunisti c	Non-Eucalypt woodland (Brigalow)	Ironbark +-Callitris Woodland	Poplar Box Woodland	Riparian	Cleared	Wetland/ Dam
	Frogs																														
Bufonidae	*Rhinellus marinus*	Cane Toad	I	-	-	A	O,W,RT,P	●			●	●	O,RT,P,AS,S		●		●	●			●	●	HS Re	●	●	●	●	●	●	●	●
Hylidae	*Litoria alboguttatus*	Striped Burrowing Frog	C	-	-	U	RT					●	O,RT,S				●	●			●	●					●	●	●	●	●
Hylidae	*Litoria caerulea*	Common Green Tree Frog	C	-	-	A	O,W,RT	●	●	●	●	●	O,RT,S		●		●	●			●	●	HS		●	●	●	●	●	●	●
Hylidae	*Litoria latopalmata*	Broad Palmed Rocket Frog	C	-	-	C	O,W			●		●	O,RT,S				●				●	●	HS		●			●	●	●	●
Hylidae	*Litoria peronii*	Peron's Tree Frog	C	-	-	U	O,W,RT			●		●	O,W,S								●	●				●			●	●	●
Hylidae	*Litoria rubella*	Desert Tree Frog	C	-	-	C	O,W,RT					●	O,S				●	●			●	●	HS		●	●	●	●	●	●	●
Myobatrachidae	*Cyclorana brevipes*	Short Footed Frog	C	-	-	U	O,W,RT	●	●	●	●	●	O,S,RT					●			●	●				●	●	●	●	●	●
Myobatrachidae	*Cyclorana novaehollandiae*	New Holland Frog	C	-	-	U	O,W,RT,P			●		●	O,S,RT				●				●	●					●	●	●	●	●
Hylidae	*Litoria fallax*	Eastern Sedge Frog	C	-	-	R	O,W			●		●	-													●	●	●	●	●	●
Myobatrachidae	*Limnodynastes fletcheri*	Barking Marsh Frog	C	-	-	C	O,W			●		●	O,S								●	●							●	●	●
Myobatrachidae	*Limnodynastes ornatus*	Ornate Burrowing Frog	C	-	-	U	O,W,RT,P			●	●	●	O,S,P		●			●			●	●				●	●	●	●	●	●
Myobatrachidae	*Limnodynastes peroni*	Striped Marsh Frog	C	-	-	U	O,W					●	O,W																	●	●
Myobatrachidae	*Limnodynastes salmani*	Salmon Striped Frog	C	-	SigSBB	C	O,RT					●	O,S,P					●			●	●				●		●	●	●	●
Myobatrachidae	*Limnodynastes tasmaniensis*	Spotted Grassfrog	C	-	-	C	O,RT					●	O,S									●				●			●	●	●
Myobatrachidae	*Limnodynastes terraereginae*	Scarlet-sided Pobblebonk	C	-	-	R	O,RT					●	O,RT																●	●	●
Myobatrachidae	*Uperoleia rugosa*	Dusky Toadlet	C	-	-	C	W,P			●		●	W									●				●	●		●	●	●
						Site Totals		**3**	**2**	**9**	**4**	**16**		**0**	**3**	**0**	**6**	**7**	**0**	**0**	**11**	**13**		**1**	**4**	**10**	**8**	**10**	**15**	**13**	**16**
	Reptiles																														
Agamidae	*Pogona barbata*	Bearded Dragon	C	-	-	A	O,HS	●			●	●	AS. Opp	●	●	●	●	●	●		●	●	HS, O			●	●	●	●	●	
Boidae	*Morelia spilota*	Carpet Python	C	-	-	U	O,S,RT	●		●		●	-													●	●	●	●	●	
Cheluidae	*Chelodina longicollis*	Eastern Snake-necked Turtle	C	-	-	R	RT					●	-																	●	●
Cheluidae	*Emydura macquarii*	Krefft's Turtle	C	-	SigSBB	R	-						Opp									●									●
Colubridae	*Dendrelaphis punctulata*	Green Tree Snake	C	-	-	R	-						Opp									●	HS		●				●		
Colubridae	*Tropidonophis mairii*	Keelback	C	-	-	R	O					●	-									●							●		
Elapidae	*Brachyurophis australis*	Coral Snake	C	-	-	U	RT,S,P	●				●	-													●	●				
Elapidae	*Crptophis boschmai*	Carpentaria Snake	C	-	SigSBB	R	RT					●	-																●	●	
Elapidae	*Demansia psammophis*	Yellow-faced Whipsnake	C	-	-	R	-						AS						●									●			
Elapidae	*Furina diadema*	Red-naped Snake	C	-	-	R	RT	●				●	-										HS		●	●				●	
Elapidae	*Pseudonaja textilis*	Eastern Brown Snake	C	-	-	C	RT,O				●	●	RK									●				●		●		●	
Elapidae	*Suta suta*	Curl Snake	C	-	-	U	RT					●	S													●				●	
Elapidae	*Vermicella annulata*	Bandy Bandy	C	-	-	R	RT					●	-															●			
Gekkonidae	*Diplodactylus steindachneri*	Box-patterned Gecko	C	-	-	U	RT		●			●	AS, P, FT						●							●	●	●			
Gekkonidae	*Diplodactylus tessellatus*	Tessellated Gecko	C	-	-	R	RT				●	●	-													●				●	
Gekkonidae	*Diplodactylus vittatus*	Wood Gecko	C	-	-	R	RT,S,P	●	●			●	AS, S, P						●			●				●		●	●	●	
Gekkonidae	*Gehyra catenata*	Tree Dtella	C	-	-	R	-						AS						●									●			
Gekkonidae	*Gehyra dubia*	Tree Dtella	C	-	-	A	RT,O,HS,S	●	●	●	●	●	AS, FT, P	●	●	●	●	●	●	●	●	●	HS	●	●	●	●	●	●	●	●
Gekkonidae	*Hemidactylus frenatus*	Asian House Gecko	I	-	-	R	O					●	-																	●	
Gekkonidae	*Heteronotia binoei*	Bynoe's Gecko	C	-	-	A	O,RT,P,HS,S	●	●	●	●	●	AS, FT, P	●	●	●		●		●		●	HS	●	●	●	●	●	●	●	●
Gekkonidae	***Strophurus taenicauda***	**Golden-tailed Gecko**	**R**	-	**SigSBB**	**R**	-						**P**						●									●			
Gekkonidae	*Underwoodasaurus milli*	Barking Gecko	C	-	-	R	RT					●	-													●					
Pygopodidae	*Lialis burtonii*	Burton's Legless lizard	C	-	-	R	RT,HS					●	-													●					
Pygopodidae	*Pygopus schraderi*	Eastern Hooded Scaly-foot	C	-	-	R	RT					●	-													●				●	
Pygopodidae	***Paradelma orientalis***	**Brigalow Scaly-foot**	**V**	**V**	**SigSBB**	R	-						-										HS		●	●					
Pythonidae	*Antaresia maculosa*	Spotted Python	C	-	-	U	HS,RT					●	RT													●			●		
Scincidae	*Anomalopus leuckartii*	A legless skink	C	-	-	R	HS			●		●	AS							●		●				●	●		●		
Scincidae	*Anomalopus verrauxii*	A legless skink	C	-	-	R	-						AS									●				●					
Scincidae	*Carlia foliorum*	Rainbow Skink	C	-	-	C	HS,P	●	●	●		●	AS, P, FT			●				●	●	●				●	●	●	●			
Scincidae	*Carlia pectoralis pectoralis*	Rainbow Skink	C	-	-	U																	HS			●						
Scincidae	*Cryptoblepharus plagiocephalu*	Tree Skink	C	-	-	R	-						AS						●			●						●			
Scincidae	*Cryptoblepharus virgatus*	Wall Skink	C	-	-	C	HS,P	●	●	●	●	●	AS, P				●	●		●		●	HS	●	●	●	●	●	●		
Scincidae	*Ctenotus robusta*	Eastern Striped Skink	C	-	-	R	HS	●		●		●	AS									●						●			
Scincidae	*Egernia striolata*	Tree Skink	C	-	-	R	-						AS									●				●					
Scincidae	*Lerista fragilis*	Sand Sliding Skink	C	-	-	C	HS	●	●	●	●	●	AS, P			●		●		●		●	HS	●	●	●	●	●			
Scincidae	*Lerista punctatovittata*	Sand Sliding Skink	C	-	-	U	HS	●	●	●		●	AS, P		●				●	●		●				●	●	●	●		
Scincidae	*Mentia greyii*	Skink	C	-	-	R	-						P	●												●			●		
Scincidae	*Morethia adelaidensis*	A skink	C	-	RE	R	HS					●	-													●					
Scincidae	*Morethia boulengeri*	A skink	C	-	-	A	HS,P	●	●	●	●	●	AS, P, FT		●	●	●	●		●	●	●	HS	●	●	●	●	●	●	●	
Scincidae	*Tiliqua rugosa*	Shingleback	C	-	SigSBB	U	O, R			●		●	-													●	●			●	
Scincidae	*Tiliqua scincoides*	Eastern Blue Tongue	C	-	-	R	HS					●	-															●			
Typhlopidae	*Ramphotyphlops ligatus*	Blind Snake	C	-	-	R	RT					●	-													●					
Typhlopidae	*Ramphotyphlops proximus*	Blind Snake	C	-	-	U	RT					●	-													●		●	●	●	
Typhlopidae	*Ramphotyphlops wiedii*	Blind Snake	C	-	-	R	HS					●	-															●			
Varanidae	*Varanus panoptes*	Yellow-spotted Monitor	C	-	-	U	O					●	Opp									●				●		●			
Varanidae	*Varanus tristis*	Freckled Monitor	C	-	-	R	HS, E	●	●			●	-													●	●				
Varanidae	*Varanus varius*	Lace Monitor	C	-	-	C	O	●	●		●	●	-														●		●	●	
						Site Totals		**15**	**11**	**11**	**9**	**36**		**4**	**5**	**6**	**4**	**6**	**9**	**8**	**4**	**19**		**6**	**11**	**30**	**15**	**22**	**18**	**17**	**4**

Family	Scientific Name	Common name	Conservation Status			Abundance	Spring 2007 survey						Autumn 2008 survey										Eastern Gas Winter 2008			Habitat type associations					
			NCR	EPBC	RSF		Spring Detection Method	Standard sites 1	2	3	4	Supplementary sites / opportunistic	Autumn Detection Method	Autumn Standard Trapping Site Number 5	6	7	8	9	10	11	12	Supplementary sites / opportunistic	Winter Detection Method	Stnadard Trap Site 1	Supplementary Sites / opportunistic	Non-Eucalypt woodland (Brigalow)	Ironbark +-Callitris Woodland	Poplar Box Woodland	Riparian	Cleared	Wetland/ Dam
	Mammals																														
Canidae	*Canis lupus dingo*	Dingo/Wild Dog	I	-	-	R	O,S,T					•	Sc, O, W					•				•				•			•	•	•
Canidae	*Vulpes vulpes*	Red Fox	I	-	-	U	O,S,T					•	Sc, O						•			•	Sc	•	•			•	•	•	•
Dasyuridae	*Sminthopsis macroura*	Striped Faced Dunnart	C	-	-	R	RT					•	-									•				•			•	•	
Emballonuridae	*Saccolaimus flaviventris*	Yellow-bellied Sheathtail Bat	C	-	-	C	A	•	•	•	•	•	O, W, A-D	•	•	•	•	•	•	•	•	•				•	•	•	•	•	•
Emballonuridae	*Taphozous georgianus*	Common Sheathtail Bat	C	-	SRL	R	A	•		•		•	A-D				•					•				•	•	•		•	•
Felidae	*Felis catus*	Feral Cat	I	-	-	U	O,T					•	O									•				•				•	
Leporidae	*Lepus capensis*	Brown Hare	I	-	-	U	O,RT					•	-									•	O		•	•			•	•	•
Leporidae	*Oryctolagus cuniculus*	Rabbit	I	-	-	C	O,RT		•	•		•	O, RK, Sc, S	•	•					•	•		O, Sc	•	•	•	•	•	•	•	
Macropodidae	*Macropus giganteus*	Eastern Grey Kangaroo	C	-	-	A	O,S,RT	•	•		•	•	O, RK, S	•	•	•	•	•	•	•		•	O, S	•	•	•	•	•	•	•	•
Macropodidae	*Macropus robustus*	Wallaroo	C	-	-	R	O		•				-									•				•	•				
Macropodidae	*Macropus rufogriseus*	Red-necked Wallaby	C	-	-	U	O,S,RT	•	•		•	•	O, S				•		•			•	O		•	•	•	•	•	•	
Macropodidae	*Wallabia bicolor*	Swamp Wallaby	C	-	-	C	O,RT	•	•			•	O, S				•				•	•	O, S	•	•	•	•	•	•			
Molossidae	*Chaerephon jobensis*	Northern Freetail Bat	C	-	-	R	A			•			-													•		•			•
Molossidae	*Mormopterus beccarii*	Beccari's Freetail Bat	C	-	-	U	A	•	•	•		•	A-D			•	•	•		•		•				•	•	•	•		•
Molossidae	*Mormopterus* species 2	Eastern Freetail Bat	C	-	-	C	A	•	•	•	•	•	A-C	•	•		•			•		•	A	•	•	•	•	•	•	•	
Molossidae	*Mormopterus* species 3	Inland Free-tail Bat	C	-	-	C	A		•			•	A-C	•	•		•			•		•	A	•	•	•	•	•	•		
Molossidae	*Tadarida australis*	White-striped Freetail Bat	C	-	-	A	A,W	•	•	•	•	•	S, A-D	•	•	•	•	•	•		•	•				•	•	•	•	•	•
Muridae	*Mus musculus*	House Mouse	I	-	-	A	RT					•	O, AS, P, E	•		•	•	•	•	•	•	•	O, HS, S, T, P		•	•	•	•	•	•	•
Petauroidea	*Petauroides volans*	Greater Glider	C		WRL + SigSBB	R	-						S										S	•	•			•			
Phalangeridae	*Trichosurus vulpecula*	Common Brushtail Possum	C	-	SigSBB	C	S,Sc	•	•	•		•	S, Sc			•	•		•		•	•	S, Sc	•	•	•	•	•	•		
Phascolarctidae	*Phascolarctos cinereus*	Koala	C	-	SigSBB	R	Sc		•	•		•	-															•			•
Potoroidae	*Aepyprymnus rufescens*	Rufous Bettong	C	-	SigSBB	R	RT					•	-															•			
Suidae	*Sus scrofa*	Feral Pig	I	-	-	U	D					•	O, Sc, D									•	Re, FS	•	•			•	•	•	•
Tachyglossidae	*Tachyglossus aculeatus*	Short-beaked Echidna	C	-	-	A	O,S,RT,Sc	•	•	•	•	•	O, S, D, Sc	•			•					•	Sc, O, Re	•	•	•	•	•	•		
Vespertilionidae	*Chalinolobus gouldii*	Goulds Wattled Bat	C	-	-	A	A	•	•	•	•	•	H, A-D	•	•		•	•	•	•	•	•	A, H	•	•	•	•	•	•	•	•
Vespertilionidae	*Chalinolobus morio*	Chocolate Wattled Bat	C	-	-	C	-						H, A-D			•						•					•		•		
Vespertilionidae	***Chalinolobus picatus***	**Little Pied Bat**	**R**	**-**	**SigSBB**	U	H,A			•	•	•	H, A-D			•	•		•			•	**A**		•	•	•	•	•		
Vespertilionidae	*Miniopterus schreibersii oceanr*	Eastern Bent-wing Bat	C	-	SigSBB	U	A			•		•	A										A		•	•	•	•	•		
Vespertilionidae	*Nyctophilus geoffroyi*	Lesser Long-eared Bat	C	-	-	C	H	•				•	H									•	HS	•	•	•			•		
Vespertilionidae	*Nyctophilus gouldi*	Gould's Long-eared Bat	C	-	-	R	H	•					H									•				•			•		
Vespertilionidae	*Scotorepens balstoni*	Inland Broad-nosed Bat	C	-	-	U	A			•	•		-									•				•	•	•			•
Vespertilionidae	*Scotorepens greyii*	Little Broad-nosed Bat	C	-	-	C	A			•	•	•	H, A-C	•			•		•			•	H	•	•	•	•	•	•		
Vespertilionidae	*Vespadelus darlingtoni*	Large Forest Bat	C	-	RE	R	-						A-D	•		•	•				•	•				•	•	•	•		
Vespertilionidae	*Vespadelus vulturnus*	Little Forest Bat	C	-	NRL	U	H,A			•	•		•				•					•	A		•	•	•	•	•		
						Site Totals		**13**	**19**	**15**	**7**	**28**		**11**	**7**	**9**	**17**	**7**	**10**	**8**	**8**	**28**		**13**	**19**	**28**	**25**	**25**	**27**	**16**	**14**
	Birds																														
Corcoracidae	*Struthidea cinerea*	Apostlebird	C	-	-	A	O	•	•	•	•	•	O	•	•	•	•	•	•	•	•	•	O	•	•	•	•	•	•	•	
Otididae	*Ardeotis australis*	Australian Bustard	C	-	-	C	O					•	O									•	O		•					•	
Falconidae	*Falco longipennis*	Australian Hobby	C	-	-	U	O		•			•	O									•	O	•	•	•			•	•	•
Psittacidae	*Alisterus scapularis*	Australian King Parrot	C	-	-	R	O		•			•															•	•	•		
Artamidae	*Gymnorhina tibicen*	Australian Magpie	C	-	-	A	O	•	•	•	•	•	O		•		•	•		•	•	•	O	•	•	•	•	•	•	•	•
Aegothelidae	*Aegotheles cristatus*	Australian Owlet Nightjar	C	-	-	U	W	•				•	O,W		•							•	W	•	•	•	•	•			
Corvidae	*Corvus coronoides*	Australian Raven	C	-	-	C							W				•					•						•	•		
Anatidae	*Chenonetta jubata*	Australian Wood Duck	C	-	-	U	O					•	O									•	O		•			•	•	•	•
Podicipedidae	*Tachybaptus novaehollandiae*	Australiasian Grebe	C	-	-	R	O					•	O									•	O		•						•
Charadriidae	*Vanellus tricolor*	Banded Lapwing	C	-	-	R	O			•		•																	•	•	•
Tytonidae	*Tyto alba*	Barn Owl	C	-	-	C	O		•	•		•	O,W								•	•	O,W	•	•			•	•	•	•
Columbidae	*Geopelia humeralis*	Bar-shouldered Dove	C	-	-	U	O	•	•	•	•	•	O,W						•			•				•	•	•	•	•	
Accipitridae	*Milvus migrans*	Black Kite	C	-	-	U							O									•	O		•	•				•	
Anatidae	*Cygnus atratus*	Black Swan	C	-	-	R	O					•	O									•									•
Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckoo Shrike	C	-	-	C	O	•	•	•	•	•	O,W				•	•	•		•	•	O	•	•	•	•	•	•	•	•
Artamidae	*Artamus cinereus*	Black-faced Woodswallow	C	-	-	C	O	•	•	•		•														•	•			•	
Charadriidae	*Elseyornis melanops*	Black-fronted Dotterel	C	-	-	U							O									•									•
Falconidae	*Elanus axillaris*	Black-shouldered Kite	C	-	-	C							O									•	O		•					•	
Psittacidae	*Northiella haematogaster*	Blue Bonnett	C	-	-	U	O	•	•	•		•	O,W					•		•		•				•	•	•	•	•	
Meliphagidae	*Entomyzon cyanotis*	Blue-faced Honeyeater	C	-	-	C	O	•	•	•	•	•	O,W	•			•	•	•	•	•	•	O	•	•	•	•	•	•		•
Gruidae	*Grus rubicundus*	Brolga	C	-	-	R	O					•											W		•				•	•	•
Falconidae	*Falco berigora*	Brown Falcon	C	-	-	C	O	•	•		•	•	O,W								•	•	O		•				•	•	
Accipitridae	*Accipiter fasciatus*	Brown Goshawk	C	-	-	R							O									•	O	•	•			•	•		
Meliphagidae	*Lichmera indistincta*	Brown Honeyeater	C	-	-	U	O	•	•	•		•	O,W					•	•			•	O	•	•	•		•	•		
Phasianidae	*Coturnix ypsilophora*	Brown Quail	C	-	-	U							O,W								•	•	O		•				•	•	•
Sylviidae	*Cinclorhamphus cruralis*	Brown Songlark	C	-	-	R	O					•																	•	•	•
Meliphagidae	*Melithreptus brevirostris*	Brown-headed Honeyeater	C	-	-	R							O				•											•			
Pardalotidae	*Acanthiza reguloides*	Buff-rumped Thornbill	C	-	-	U	O	•	•		•	•										•	O		•	•		•	•		
Cuculidae	*Scythrops novaehollandiae*	Channel-billed Cuckoo	C	-	-	U	O	•	•	•	•	•														•	•	•	•	•	
Anatidae	*Anas castanea*	Chestnut Teal	C	-	-	U	O					•	O									•									•
Pardalotidae	*Acanthiza uropygialis*	Chestnut-rumped Thornbill	C	-	-	A							O						•			•	O	•	•			•	•		
Sylviidae	*Acrocephalus stentoreus*	Clamerous Reed Warbler	C	-	-	R	W					•																	•	•	•
Cacatuidae	*Nymphicus hollandicus*	Cockatiel	C	-	-	C	O	•	•	•	•	•	O		•	•		•		•	•	•	O	•	•	•		•	•	•	
Columbidae	*Phaps chalcoptera*	Common Bronzewing	C	-	-	R	O	•	•			•	O,W									•				•			•	•	
Cuculidae	*Eudynamys scolopacea*	Common Koel	C	-	-	C	O	•	•	•	•	•														•	•	•	•	•	

Family	Scientific Name	Common name	Conservation Status			Abundance	Spring 2007 survey						Autumn 2008 survey										Eastern Gas Winter 2008			Habitat type associations					
			NCR	EPBC	RSF		Spring Detection Method	Standard sites 1	2	3	4	Supple-mentary sites / opportu-nistic	Autumn Detection Method	Autumn Standard Trapping Site Number 5	6	7	8	9	10	11	12	Supple-mentary sites / opportu-nistic	Winter Detection Method	Stnadard Trap Site 1	Supplementary Sites / opportunistic	Non-Eucalypt woodland (Brigalow)	Ironbark +-Callitris Woodland	Poplar Box Woodland	Riparian	Cleared	Wetland/ Dam
Sturnidae	*Sturnus vulgaris*	Common Starling	I	-	-	U	O					•										•				•				•	
Columbidae	*Ocyphaps lophotes*	Crested Pigeon	C	-	-	A	O	•	•	•	•	•	O	•	•	•			•	•	•	•	O			•	•		•	•	•	•
Meliphagidae	*Epthianura tricolor*	Crimson Chat	C	-	-	R	O					•																		•	
Anhingidae	*Anhinga melanogaster*	Darter	C	-	-	U							O									•	O			•					•
Columbidae	*Geopelia cuneata*	Diamond Dove	C	-	-	R	O				•		O									•					•					
Coraciidae	*Eurystomus orientalis*	Dollarbird	C	-	-	U	O	•	•	•		•	O									•				•	•	•	•	•	
Passeridae	*Taeniopygia bichenovii*	Double Barred Finch	C	-	-	A	O	•	•	•	•	•	O					•	•			•	O	•	•	•	•	•	•	•	•
Rallidae	*Callinula tenebrosa*	Dusky Moorhen	C	-	-	U							O									•									•
Rallidae	*Fulica atra*	Eurasian Coot	C	-	-	R							O									•									•
Hirundinidae	*Hirundo ariel*	Fairy Martin	C	-	-	U							O									•								•	•
Cuculidae	*Cacomantis flabelliformis*	Fan-tailed Cuckoo	C	-	-	U	O	•	•			•														•		•			
Columbidae	*Columba livia*	Feral Pigeon	I	-	-	R	O					•	O									•								•	
Oriolidae	*Sphecotheres viridis*	Figbird	C	-	-	U	O	•	•			•														•		•			
Cacatuidae	*Cacatua roseicapilla*	Galah	C	-	-	A	O	•	•	•	•	•	O,W				•	•		•	•	•	O	•	•	•	•	•	•	•	
Cacatuidae	***Calyptorhynchus lathami***	**Glossy Black Cockatoo**	**V**	-	**SigSBB**	**R**	**O**		•																	•	•				
Pachycephalidae	*Pachycephala pectoralis pectc*	Golden Whistler	C	-	-	U	O		•			•														•	•		•		
Ardeidae	*Ardea alba*	Great Egret	C	M	-	U							O									•	O			•					•
Artamidae	*Cracticus torquatus*	Grey Butcherbird	C	-	-	U	O		•	•		•	O				•			•			O			•	•		•	•	•
Dicruridae	*Rhipidura fuliginosa*	Grey Fantail	C	-	-	C							O,W	•					•		•	•	O	•	•	•	•	•	•		
Pachycephalidae	*Colluricincla harmonica*	Grey Shrike-thrush	C	-	-	U	O	•	•		•	•	O,W				•					•	O	•	•	•	•	•	•		
Anatidae	*Anas gracilis*	Grey Teal	C	-	-	C	O			•		•	O									•	O			•			•		•
Pomatostomidae	*Pomatostomus temporalis tem*	Grey-crowned Babbler (eastern)	C	-	SigSBB	C	O	•	•			•	O,W,N	•	•	•		•	•	•		•	O			•	•	•	•		
Campephagidae	*Coracina maxima*	Ground Cuckoo Shrike	C	-	-	U	O					•	O,W					•				•				•				•	
Anatidae	*Aythya australis*	Hardhead	C	-	-	R	O					•	O									•	O			•					•
Cuculidae	*Chrysococcyx basalis*	Horsefields Bronze Cuckoo	C	-	-	U	W		•		•	•	O,W						•			•					•	•	•	•		
Passeridae	*Passer domesticus*	House Sparrow	I	-	-	R	O					•																	•	•	
Halcyonidae	*Dacelo novaeguineae*	Laughing Kookaburra	C	-	-	C	O	•	•		•	•	O,W	•					•			•	O	•	•	•	•	•	•	•	
Dicruridae	*Myiagra rubecula*	Leaden Flycatcher	C	-	-	U	O	•	•		•	•	O,W				•					•				•	•	•	•		
Turnicidae	*Turnix velox*	Little Button Quail	C	-	-	R							O					•				•					•				•
Cacatuidae	*Cacatua sanguinea*	Little Corella	C	-	-	C	O			•		•															•		•		•
Ardeidae	*Egretta garzetta*	Little Egret	C	-	-	R							O									•									•
Meliphagidae	*Philemon citreogularis*	Little Friarbird	C	-	-	A	O	•	•	•	•	•	O,W	•	•		•		•		•	•	O	•	•	•	•	•	•	•	•
Phalacrocoracidae	*Phalacrocorax melanoleucos*	Little Pied Cormorant	C	-	-	U	O					•	O									•	O			•					•
Dicruridae	*Grallina cyanoleuca*	Magpie-lark	C	-	-	A	O			•	•	•	O,W		•		•			•	•	•	O	•	•	•			•	•	•
Charadriidae	*Vanellus miles miles*	Masked Lapwing	C	-	-	C	O			•		•	O,W									•	O			•			•	•	•
Artamidae	*Artamus personatus*	Masked Woodswallow	C	-	-	U	O	•			•	•																	•	•	•
Dicaeidae	*Dicaeum hirundinaceum*	Mistletoebird	C	-	-	A	W	•	•	•	•	•	O,W	•		•	•		•	•	•	•	O	•	•	•	•	•	•	•	•
Falconidae	*Falco cenchroides*	Nankeen Kestrel	C	-	-	A	O		•	•	•	•	O	•	•			•		•		•	O			•	•	•	•	•	•
Ardeidae	*Nycticorax caledonicus*	Nankeen Night Heron	C	-	-	R	O,W			•																	•			•	•
Meliphagidae	*Philemon corniculatus*	Noisy Friarbird	C	-	-	U	O	•				•	O,W	•			•					•	O	•	•	•	•		•		
Meliphagidae	*Manorina melanocephala*	Noisy Miner	C	-	-	C							O							•		•	O			•	•		•		
Oriolidae	*Oriolus sagittatus*	Olive-backed Oriole	C	-	-	C	O	•	•	•	•	•														•	•	•	•		
Anatidae	*Anas superciliosa*	Pacific Black Duck	C	-	-	U	O			•		•	O									•	O	•	•				•		•
Psittacidae	*Platycercus adscitus palliceps*	Pale-headed Rosella	C	-	-	A	O	•	•			•	O,W	•		•	•	•	•	•		•	O	•	•	•	•	•	•	•	
Cuculidae	*Cuculus pallidus*	Pallid Cuckoo	C	-	-	R	O	•	•	•	•	•	O		•				•			•				•	•	•	•	•	
Columbidae	*Geopelia striata*	Peaceful Dove	C	-	-	A	O	•	•	•	•	•	O,W			•					•	•				•	•	•	•	•	
Centropodidae	*Centropus phasianinus*	Pheasant Coucal	C	-	-	U	O	•	•		•	•	O									•	O			•	•		•	•	
Artamidae	*Cracticus nigrogularis*	Pied Butcherbird	C	-	-	A	O	•			•	•	O	•	•	•				•	•	•	O	•	•	•	•	•	•	•	•
Artamidae	*Strepera graculina graculina*	Pied Currawong	C	-	-	U							O,W								•	•	W			•				•	•
Anatidae	*Malacorhynchus membranace*	Pink-eared Duck	C	-	-	R							O									•									•
Anatidae	*Dendrocygna eytoni*	Plumed Whistling Duck	C	-	-	U	O,W					•	O,W									•									•
Passeridae	*Neochmia modesta*	Plum-headed Finch	C	-	-	U	O				•		O									•					•			•	•
Meropidae	*Merops ornatus*	Rainbow Bee-eater	C	M	-	U	O	•	•		•	•	O	•													•	•		•	•	
Psittacidae	*Trichoglossus haematodus ha*	Rainbow Lorikeet	C	-	-	U	O	•	•	•		•	O,W			•	•	•	•	•	•	•	O			•	•	•	•		
Maluridae	*Malurus leucopterus*	Red-backed Wren	C	-	-	R																	O	•	•				•		
Petroicidae	*Petroica goodenovii*	Red-capped Robin	C	-	-	R							O				•												•		
Psittacidae	*Psephotus haematonotus*	Red-rumped Parrot	C	-	-	U	O			•	•	•	O,W			•	•	•					O			•	•	•	•	•	
Psittacidae	*Aprosmictus erythropterus*	Red-winged Parrot	C	-	-	A	O	•	•	•	•	•	O,W			•	•	•		•	•	•	O	•	•	•	•	•	•	•	
Dicruridae	*Myiagra inquieta*	Restless Flycatcher	C	-	-	C	O					•	O,W									•	O	•	•			•	•		•
Motocillidae	*Anthus novaeseelandiae*	Richards Pipit	C	-	-	A	O					•	O									•	O	•	•				•	•	•
Sylviidae	*Cinclorhamphus mathewsi*	Rufous Songlark	C	-	-	U	O				•	•															•			•	
Pachycephalidae	*Pachycephala rufiventris*	Rufous Whistler	C	-	-	C	O	•	•		•	•	O,W						•		•	•	O	•	•	•	•		•		
Halcyonidae	*Todiramphus sanctus*	Sacred Kingfisher	C	-	-	U	O	•	•	•		•														•			•	•	•
Ptilonorhynchidae	*Ptilonorhynchus violaceus*	Satin Bowerbird	C	-	-	R	O					•																	•		
Psittacidae	*Trichoglossus chlorolepidotus*	Scaly-breasted Lorikeet	C	-	-	C	O			•	•		O,W				•	•			•	•	O	•	•				•		
Cuculidae	*Chrysococcyx lucidus*	Shining Bronze Cuckoo	C	-	-	U	O	•	•			•														•	•	•	•		
Zosteropidae	*Zosterops lateralis cornwalli*	Silvereye	C	-	-	U							O,W	•				•			•	•				•			•		
Meliphagidae	*Lichenostomus virescens*	Singing Honeyeater	C	-	-	R	O				•		O									•				•					
Strigidae	*Ninox novaeseelandiae*	Southern Boobook	C	-	-	U							O,W	•		•					•	•	W	•	•	•	•	•	•		
Pardalotidae	*Chthonicola sagittata*	Speckled Warbler	C	-	-	R	O			•																•	•				
Meliphagidae	*Acanthagenys rufogularis*	Spiny-checked Honeyeater	C	-	-	C	O	•	•		•	•	O,W	•	•		•	•	•			•	O	•	•	•		•			
Ptilonorhynchidae	*Chlamydera maculata*	Spotted Bowerbird	C	-	-	R	O	•	•				O									•	O			•	•	•			

Family	Scientific Name	Common name	Conservation Status			Abundance	Spring 2007 survey						Autumn 2008 survey												Eastern Gas Winter 2008			Habitat type associations					
			NCR	EPBC	RSF		Spring Detection Method	Standard sites 1	2	3	4	Supple-mentary sites / opportu-nistic	Autumn Detection Method	Autumn Standard Trapping Site Number 5	6	7	8	9	10	11	12	Supple-mentary sites / opportu-nistic	Winter Detection Method	Stnadard Trap Site 1	Supplementary Sites / opportunistic	Non-Eucalypt woodland (Brigalow)	Ironbark +-Callitris Woodland	Poplar Box Woodland	Riparian	Cleared	Wetland/ Dam
Accipitridae	*Circus assimilis*	Spotted Harrier	C	-	-	U	O			●		●	O									●	O		●					●	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis	C	-	-	U							O									●	O		●					●	●
Pardalotidae	*Pardalotus striatus*	Striated Pardalote	C	-	-	A	W	●	●			●	O,W				●	●	●	●	●	●	O	●	●		●	●	●		
Meliphagidae	*Plectorhyncha lanceolata*	Striped Honeyeater	C	-	-	A	O	●	●	●	●	●	O,W		●		●		●	●		●	O	●	●	●	●	●	●		
Cacatuidae	*Cacatua galerita*	Sulphur-crested Cockatoo	C	-	-	A	O	●	●	●		●	O,W	●		●	●	●	●		●	●	O	●	●	●	●	●	●	●	
Maluridae	*Malurus cyaneus*	Superb Fairywren	C	-	-	C	O	●	●			●	O	●					●			●	O	●	●	●	●	●	●		
Podargidae	*Podargus strigoides*	Tawny Frogmouth	C	-	-	C	O	●	●			●	O					●		●		●	O	●	●	●	●	●	●		
Corvidae	*Corvus orru*	Torresian Crow	C	-	-	A	O	●	●	●	●	●	O,W	●	●		●		●	●	●	●	W	●	●	●	●	●	●	●	●
Hirundinidae	*Hirundo nigricans*	Tree Martin	C	-	-	R	O			●		●	O									●							●	●
Neosittidae	*Daphoenositta chrysoptera*	Varied Sittella	C	-	-	U	O	●	●			●	O,W									●	W	●	●		●	●	●		
Maluridae	*Malurus lamberti*	Variegated Fairywren	C	-	-	U	O					●											O		●	●				●	
Accipitridae	*Aquila audax*	Wedge-tailed Eagle	C	-	-	A	O	●	●	●	●	●	O	●	●		●	●			●	●	O	●	●	●	●	●	●	●	
Pardalotidae	*Smicrornis brevirostris*	Weebill	C	-	-	A	O	●	●	●		●	O,W	●	●	●	●	●	●		●	●	O	●	●	●	●	●	●	●	
Hirundinidae	*Hirundo neoxena*	Welcome Swallow	C	-	-	U	O					●	O					●					O		●				●	●	
Pardalotidae	*Gerygone fusca*	Western Gerygone	C	-	-	U	W					●	O,W			●	●				●	●				●	●	●	●		
Laridae	*Chlidonias bybrida*	Whiskered Tern	C	-	-	R							O									●									●
Campephagidae	*Coracina papuensis*	White-bellied Cuckoo Shrike	C	-	-	C							W					●								●	●	●	●		
Pardalotidae	*Sericornis frontalis*	White-browed Scrubwren	C	-	-	U	O	●	●			●														●	●				
Artamidae	*Artamus superciliosus*	White-browed Woodswallow	C	-	-	R	O		●		●	●														●	●	●			
Ardeidae	*Egretta novaehollandiae*	White-faced Heron	C	-	-	U	O			●		●	O				●				●	●	O		●			●	●	●	●
Ardeidae	*Ardea pacifica*	White-necked Heron	C	-	-	U	O			●		●	O				●				●	●	O	●	●				●	●	●
Pardalotidae	*Gerygone olivacea*	White-throated Gerygone	C	-	-	A	W	●	●	●		●											O	●	●	●	●	●	●		
Campephagidae	*Lalage sueurii*	White-winged Triller	C	-	-	A	O	●	●	●	●	●														●	●	●	●	●	
Dicruridae	*Rhipidura leucophrys leucophr*	Willie Wagtail	C	-	-	A	O	●	●	●	●	●	O	●	●	●	●	●	●	●		●	O	●	●	●	●	●	●	●	●
Pardalotidae	*Acanthiza nana*	Yellow Thornbill	C	-	-	R							O				●					●						●			
Pardalotidae	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill	C	-	-	C	O		●	●	●	●	O,W	●	●	●	●	●	●	●		●	O	●	●	●	●	●	●		
Meliphagidae	*Manorina melanotis*	Yellow-throated Miner	C	-	-	A	O	●	●	●		●	O	●	●	●	●	●	●		●	●	O	●	●	●	●	●	●		
Fringillidae	*Taeniopygia guttata*	Zebra Finch	C	-	-	C							O	●				●	●			●				●	●	●		●		
						Site Totals		**57**	**69**	**49**	**43**	**99**		**25**	**19**	**18**	**34**	**32**	**29**	**23**	**32**	**97**		**45**	**75**	**79**	**67**	**79**	**86**	**71**	**51**

Attachment G

Likelihood-of-occurrence assessments for Rare and Threatened flora

Table G-1: Likelihood of occurrence assessment for Rare and Threatened species of plant identified from the database and literature review

Family name	Latin name	Common name	Conservation status[1]				Records from desktop assessment Study Area[2]	Preferred habitat	Likelihood of occurrence
			NC Act	EPBC Act	ROTAP	BPA			
Asteraceae	*Rutidosis crispata*		R	—	2K	—	Yd	Occurs on protected slopes in hilly sandstone country within open forest dominated by narrow-leaved red ironbark, silver-leaved ironbark, white cypress pine and/or lancewood. Local occurrences have been recorded in the southern extent of the central Queensland sandstone tablelands. Potential REs in which this species may occur include 11.10.7, 11.10.9 and 11.10.3	Low – the only potential RE that occurs in the study area is RE 11.10.9 which is restricted to very small and modified occurrences of non-remnant vegetation.
Eriocaulaceae	*Eriocaulon carsonii*		E	E	3E	Priority taxa	—	Restricted to flowing mound springs (NSW National Parks and Wildlife Service 2002)	Low – no mound springs are present in the study area.
Fabaceae (Mimosoideae)	*Acacia curranii*	Curly-bark Wattle	—	V	3V	Priority taxa	—	Grows most often on rocky outcrops of isolated hills and ranges, often in groves (Pickard 1995)	Low – no jump-up's or raised hilly areas on site
Myrtaceae	*Calytrix gurulmundensis*		—	V	2V	Priority taxa	—	Gravely soil at Waaje and Gurulmundi.	Low – no jump-up's or raised hilly areas on site

Family name	Latin name	Common name	Conservation status[1]				Records from desktop assessment Study Area[2]	Preferred habitat	Likelihood of occurrence
			NC Act	EPBC Act	ROTAP	BPA			
Orchidaceae	*Diuris tricolor (*Syn. *D. sheaffiana)*		—	V	3K	Priority taxa	—	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)
Poaceae	*Arthraxon hispidus*	Hairy Joint Grass	V	V	3V	Priority taxa	Yd	Boggomoss species (Environmental Protection Agency and Environmental Planning Southwest Queensland 2002). Moisture and shade-loving grass, found in or on the edges of rainforest and in wet eucalypt forest, often near creeks or swamps (Department of Environment and Climate Change 2007)	Low - requires moister vegetation types than those found in the study area
Poaceae	*Dichanthium queenslandicum*	King Blue Grass	V	V	3V	—	—	Occurs mostly on black clay soils around Emerald and more rarely on the Darling Downs (Sharp & Simon 2002).	Low – Moderate. Requires cracking clay loams and grassland communities, but not recorded.
Poaceae	*Digitaria porrecta*		R	E	3E	Priority taxa	—	Heavy black soils in Darling Downs district. Tropical and sub-tropical rainforests and sub-humid woodlands (Sharp & Simon 2002)	Low – suitable habitat not present

Family name	Latin name	Common name	Conservation status[1]				Records from desktop assessment Study Area[2]	Preferred habitat	Likelihood of occurrence
			NC Act	EPBC Act	ROTAP	BPA			
Poaceae	*Homopholis belsonii*		E	V	3R	Priority taxa	Ys	Grows in dry woodland (e.g. Belah) on poor soils (Department of Environment and Climate Change 2007).	Recorded in Brigalow regrowth (non-remnant vegetation) analogous with RE 11.9.5.
Sterculiaceae	*Commersonia sp. Cadarga*			V	3V	Priority taxa	—	Recorded from north of Chinchilla on stony ridges in eucalypt forest (Stanley & Ross 1986).	Low – stony ridges not present in study area.
Surianaceae	*Cadellia pentastylis*		V	V	3Ra	Priority taxa	—	Emergent in SEVT; pure stands on residual sandstone ranges and scarps assoc. 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	Low – not recorded in surveys on site.

1. Conservation Status NC Act = *Nature Conservation Act 1992*:, E = Endangered, V = Vulnerable R = Rare.
EPBC Act = *Environment Protection and Biodiversity Conservation Act 1999*: E = Endangered, V = Vulnerable.
ROTAP Brigalow ROTAP (Rare or Threatened Australian Plants (Briggs & Leigh 1996) is a conservation rating for Australian plants. Codes are:

1 Species only known from one collection
2 Species with a geographic range of less than 100 km in Australia
3 Species with a geographic range of more than 100 km in Australia
X Species presumed extinct; no new collections for at least 50 years
E Endangered species at risk of disappearing from the wild state if present land use and other causal factors continue to operate
V Vulnerable species at risk of long-term disappearance through continued depletion.
R Rare, but not currently considered to be endangered.
K Poorly known species that are suspected to be threatened
C Known to be represented within a conserved area
a At least 1,000 plants are known to occur within a conservation reserve(s).
i Less than 1,000 plants are known to occur within a conservation reserve(s).

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).

2. Yd= record from desktop assessment, Ys= recorded during field survey, Yds= record from desktop assessment *and* recorded during field survey

Attachment G: References

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Attachment H

Likelihood-of-occurrence assessments for conservation significant fauna

Table H-1: Likelihood of occurrence assessment for Threatened species of animal identified from the database and literature review

lass 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 species in Queensland	Ys	**Present** Species recorded throughout the study area during field surveys.

lass 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
						(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.
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	**Present** Recorded in the study area during field surveys.
Reptile	*Rheodytes leukops*	Fitzroy River 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 Australia (Cogger, 2000). Known from shrublands on sandy and	—	**Low** The study area lies outside the known distribution of this

lass 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
						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).		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 *Acacia harpophylla*, *Eucalytpus populnea* 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 *Acacia harpophylla* communities) in the far south-	—	**Moderate** Suitable habitat for this species occurs within *Acacia harpophylla*, Ironbark and *Eucalytpus populnea* woodland habitats

lass 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
						east of the state (Wilson, 2005).		
Reptile	*Delma torquata*	Collared Delma	V	V	Y	Known from south-east Queensland, from Brisbane, north to Blackdown 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 *Acacia harpophylla* communities on alluvial soils with no significant rock cover (Department of Environment, Water, Heritage and Arts, 2008e; Environmental Protection Agency, 2008e; Wilson, 2005).	—	**Low** The study area contains only 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 *Acacia harpophylla* and quite possibly non remnant stands that support abundant log and litter cover. Less likely to occur in *Eucalytpus populnea* and Riparian communities.
Reptile	*Anomalopus brevicollis*	Slider Skink	—	R	Y	Endemic to Queensland (Wilson, 2005). Known from a variety of habitats including	—	**Low** There is no suitable habitat

lass 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
						rainforest, vine thickets and dry sclerophylly forest, from Cracow district north to MacKay and inland to Clermont (Wilson, 2005a).		within the study area for this species. There are also no known records of this species from the desktop assessment 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	—	**Moderate** This species has a moderate likelihood of occurring on MLA 50230 and 50231, and on the slopes associated

lass 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
						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 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, *Acacia harpophylla* 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).		with Wandoan Creek north of Bundi Road and adjacent to Wandoan-Jackson Road where remnant habitat is more intact. However, extensive targeted surveys in neighbouring areas under more favourable conditions have not detected this species. There are no known records of this species from the desktop assessment.
Reptile	*Trachydosaurus rugosus asper*	Shingleback Lizard	—	—	Y	Associated with dry woodlands, shrublands and dunefields of south-eastern Australia. (Wilson, 2008).	Yd	**Present** This species was recorded in the study area during field surveys. It is likely to inhabit most other vegetated communities in the 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).	—	**Moderate** This species has a low-moderate likelihood of occurring within in roadside remnants particularly *Acacia harpophylla*, *Eucalytpus populnea* associations.

lass 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
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 (Environmental Protection Agency, 2002).	—	**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 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	—	**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

lass 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
						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 Cecil Plains Road (Environmental Protection Agency, 2007).		assessment study area.
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 *Acacia harpophylla* (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 potential habitat within the study area for this species.
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,	—	**Low** There is no suitable habitat within the study area for this

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						south to Rockhampton and inland to Blackwater (Wilson, 2005).		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 *Acacia harpophylla* forest and woodland on cracking clay and clay loam soils (Environmental Protection Agency, 2008c)	—	**Moderate** There is limited potential habitat within the study area for this species. It has moderate likelihood of occurring within stands of *Acacia harpophylla* and Ironbark/Callitris associations found on MLA 50230 and 50231. There are also no known records of this species from the desktop assessment study area.
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.

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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).	—	**High** 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).	Yds	**Present** This species was recorded in the study area in association with riparian zones and cleared areas.
Birds	*Stictonetta naevosa*	Freckled Duck	—	R	Y	Known from south-eastern and far 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).	—	**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.

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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	**Moderate** 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	**Moderate** 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, sewerage ponds, irrigation areas and farm dams (Pizzey and Knight, 2008)	Yds	**Present** This species was recorded in the study area in association with wetlands and farm dams.

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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	**Present** This species was recorded in the study area in association with wetlands and farm dams.
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	**Moderate** 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	*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	—	**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.

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						(Environmental Protection Agency, 2002).		
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).	—	**Moderate** 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).	—	**Moderate** 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 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).	—	**Moderate** 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 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	Yd	**High** There is limited habitat

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						freshwater and estuarine habitats including wetlands, lagoons, farm dam, mudflats and flooded pastures (Pizzey and Knight, 2008).		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 and 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).	—	**Moderate** 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.
Birds	*Burhinus grallarius*	Bush Stone-curlew	—	—	Y	Found across much of Australia, except for arid western and southern parts (Pizzey and Knight, 2008). Associated with a variety of habitats including open woodland, sandplains with spinifex and mallee; coastal scrubs, mangrove fringes and golf-courses (Pizzey and Knight, 2008).	—	**Moderate** There is some potential habitat within the study area for this species; however it is generally unlikely to occur in small woodland remnants.
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-	Yd	**Low** The study area contains no suitable habitat for this

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						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, *Acacia harpophylla* and *Casuarina cristada* (Mathieson and & Smith, 2006).		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, open woodland from sea level to upland areas of Great Dividing Range (Pizzey and Knight, 2008)	—	**Moderate** 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.
Birds	*Numenius minutus*	Little Curlew	M	—	—	Known mainly from coastal eastern and northern Australia, with scattered records	—	**Low** There is limited potential

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						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).		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 associated with riverine woodlands (Pizzey and Knight, 2008).	—	**Moderate** 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 opportunities within riparian habitats that support senescent *Eucalyptus*

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								tereticornis. 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).	—	**Present** This species was recorded foraging within the study area in association with *Casuarina cristata* bordering Wandoan Creek.
Birds	*Lathamus discolor*	Swift Parrot	E and 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	—	**Low** There is no suitable habitat within the study area due to the heavily modified state of

lass 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
						areas, near permanent water and forested hills (Pizzey and Knight, 2008).		native grassland and 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).	—	**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 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.

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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 cultivated sorghum, sugar cane and grain stubble, as well as coastal heath (Pizzey and Knight, 2008).	—	**Moderate** There is limited potential habitat within the study area for this species and its occurrence would be influenced by seasonal conditions and prey availability. There are no known records of this species from the desktop assessment 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	M	—	—	Occurs along entire eastern seaboard including Tasmania (Pizzey and Knight,	Yd	**Moderate** This species has a moderate

lass 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
		Needletail				2008). Forages aerially over all manner of habitats (Pizzey and Knight, 2008).		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, beach dunes, cliffs and sand ridges across a range of vegetation types from mangroves to rainforests, sclerophyll forest and woodlands (Pizzey and Knight, 2008)	Yds	**Present** This species was recorded within the study area in association with *Acacia harpophylla* remnants, Ironbark and/or *Callitris* woodlands and cleared areas.
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 little or no suitable habitat within the study area for this species and its occurrence would only be influenced by seasonal migrations.

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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 *Acacia harpophylla* communities (Pizzey and Knight, 2008). Also known from areas of vine scrub (Pizzey and Knight, 2008).	Yds	**Present** This species was recorded within the study area in association with roadside *Acacia harpophylla* remnants and Ironbark and/or *Callitris* woodlands.
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).	—	**Low** 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	Yds	**Present** This species was recorded within the study area in association with roadside *Acacia harpophylla* remnants, *Eucalyptus populnea* woodland,

lass 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
						Agency, 2002).		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 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)	—	**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 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	Yd	**Moderate** There is limited habitat within the study area but it

lass 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
						dry eucalypt woodland, particularly ironbark and box communities (Garnett and Crowley, 2000; Higgins et al., 2001).		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.
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	Yd	**Moderate** There is limited habitat within the study area for this species, but it may occasionally move along riparian habitats. The study

lass 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
						habitats (Pizzey and Knight, 2008).		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 this species from

lass 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
								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	—	**Low** The study area is beyond the known distribution limit for this species. Habitat within the study area is generally too fragmented

lass 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
						Strahan, 2008). Prefers rocky scarps, but also found in eucalypt woodland, and forest, generally within 200 km 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).		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	*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 during field surveys for the Western CSM Pipeline in association with Riparian habitat (Parsons Brinckerhoff 2008b). There is potential habitat for this species, and it may occasionally move through the study area. There are no known records of this species from the desktop assessment study area.
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).	—	**Low** There is little potential habitat for this species. 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	Ys	**Present** This species was recorded

lass 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
						eucalypt woodland and forest (Van Dyck and Strahan, 2008). Generally absent from areas subject to heavy grazing (Environmental Protection Agency, 2002). Common north of Warrego Highway; no records south of Warrego Highway (Environmental Protection Agency, 2002).		within the study area during field surveys for the Southern CSN Pipeline in association with *Eucalyptus populnea* woodland, Ironbark and/or *Callitris* woodlands and Riparian areas (Parsons Brinckerhoff 2008a).
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 *Acacia harpophylla* scrub with dense shrubby understorey (Menkhorst and Knight, 2004). Generally scarce in eastern part of southern Brigalow Belt (Environmental Protection Agency, 2002).	—	**High** This species was recorded during field surveys for the Western CSM Pipeline in association with Riparian habitat (Parsons Brinckerhoff 2008b). There is potential habitat for this species, and it may occasionally move through the study area. There are no known records of this species from the desktop assessment 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.

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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 (Environmental Protection Agency, 2002).	Ys	**Present** This species was recorded along a drainage line within the study area. It would most likely occur throughout the study area in association with Riparian habitats where Queensland Blue Gum communities would provide a principal foraging resource.
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).	Yds	**Present** This species was recorded within the study area at Juandah Creek during field surveys.
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).	—	**Moderate** There is suitable habitat across the study area particularly within riparian habitats and this species has a moderate likelihood of occurring. However 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 Victoria and far east South Australia (Menkhorst and Knight, 2004). Found in eucalypt-dominated	—	**Moderate** There is suitable habitat across the study area particularly within riparian habitats and this species has

lass 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
						forest and woodlands; reliant on large hollow-bearing trees (Van Dyck and Strahan, 2008).		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 some suitable habitat across the study area and this species has a low likelihood of occurring within floodplain areas. 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 and this species has a moderate likelihood of

lass 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
								occurring within these areas.
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).	Yds	**Present** This species was recorded within the study area in association with *Acacia harpophylla* remnants, *Eucalyptus populnea* woodland, Ironbark and/or *Callitris* woodlands and Riparian habitats. There are known records of this species from the desktop assessment study area.
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 bioregion limited largely to riparian	—	**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

lass 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
						eucalypt forest/ woodland (Environmental Protection Agency, 2002).		were scarce). There are also no known records of this 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 *Acacia harpophylla* remnants, *Eucalytpus populnea* woodland, Ironbark and/or Callitris woodlands and Riparian habitats. Considered locally common.

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Mammal	*Chalinolobus nigrogriseus*	Hoary wattled Bat	—	—	Y	Known from coastal and inland northern 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).	—	**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	*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).	—	**Low** This species may only occasionally forage over the study area or occur as part of broader seasonal movements. 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).	Ys	**Present** This species was recorded from numerous locations within the study area in association with *Acacia harpophylla* remnants, *Eucalyptus populnea*

lass 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
								woodland, Ironbark and/or *Callitris* woodlands and Riparian habitats. However, no obvious breeding or roosting habitat 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 red gum, mallee, bulloke, box and *Acacia harpophylla*/*Casuarina cristada*-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 *Acacia harpophylla* scrub, smooth-barked apple and narrow-leaved ironbark forest as well as bulloak/ cypress woodland/ forest on sandy soil. Also recorded from *Eucalytpus populnea* woodland on alluvial flats (Environmental Protection Agency, 2002).	—	**Moderate** This species has a moderate likelihood of occurring along main drainage lines associated with Roche, Juandah, Wandoan, Woleebee and Black Ant creeks. May also use peripheral habitats bordering this area. There are no known records of this species from the desktop assessment study area, only predicted habitat.
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 *Acacia harpophylla-Casuarina cristada* 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.

lass 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
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).	—	**Low** This species has a low likelihood of occurring within the study area. There are also 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 and mallee (Van Dyck and Strahan, 2008).	—	**Low** This species has a low likelihood of occurring within the study area. There are also no known records of this species from the desktop assessment study area.

Notes: NC Act = *Nature Conservation Act 1992*: V = Vulnerable, E = Endangered, R = Rare, C = of concern, 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

Contents

I1. Introduction

One threatened plant, eight threatened animals, two migratory birds and three 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 or codominant)	E	E	No significant impact	No significant impact
RE 11.9.6 *Acacia melvillei* ± *A. harpophylla* open forest on fine-grained sedimentary rocks (sub-unit of Brigalow dominant or codominant)	E	E	No significant impact	No significant impact
RE 11.9.4 Semi-evergreen vine thicket on fine grained sedimentary rocks (Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions ecological community)	E	E	No significant impact	No significant impact
Homopholis belsonii (Belsons Panic)	E	V	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
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
Pink Cockatoo (*Cacatua leadbeateri)*	V	—	No significant impact	—
Glossy Black-cockatoo (*Calyptorhynchus lathami)*	V	—	No significant impact	—
Eastern Long-eared Bat *(Nyctophilus sp cf timoriensis) (eastern form)*	V	V	No significant impact	No significant impact

Name	Conservation status[1]		Outcome of assessment	
	State	National	State	National
Australian Painted Snipe *(Rostratula australis)*	V	V&M	No significant impact	No significant impact
Satin Flycatcher *(Myiagra cyanoleuca)*	—	M	—	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 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 VM Act and NC Act do not outline factors for consideration in the impact assessments. As such, the following factors were used:

- 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.

I2. Vegetation communities

I2.1 Brigalow (*Acacia harpophylla* dominant and co-dominant) (RE 11.9.5 and RE 11.9.6)

Description

RE 11.9.5 is characterised by an open-forest dominated by *Acacia harpophylla* (Brigalow) and/or *Casuarina cristata* (Belah) (10-20m) 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.

RE 11.9.6 *Acacia melvillei* +/- *Acacia harpophylla* open forest on fine-grained sedimentary rocks that occurred in the Study Area entirely as non-remnant, fragmented regrowth within road reserves in association with monotypic stands of regrowth *Acacia harpophylla* (non-remnant RE 11.9.5). Generally occurring as small, isolated groves, this vegetation type was not large enough to be mapped by the EPA (2005) or qualify as remnant vegetation.

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 two of these REs was recorded in the Study Area, RE 11.9.5 and RE 11.9.6.

Status under state (Qld) and Commonwealth legislation

Remnant RE 11.9.5 and RE 11.9.6 area listed as Endangered under the VM Act. This status only applies to vegetation identified as remnant by the EPA.

RE 11.9.5 and RE 11.9.6 are listed as REs 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 the 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). Only 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.

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 RE 11.9.5 / Brigalow (*Acacia harpophylla* dominant and co-dominant) occurred as in several remnant patches in the southern half of the MLA areas (MLA 50231 and MLA 50230) adjoining larger areas of riparian and floodplain vegetation (RE 11.3.25 and RE 11.3.2). Within the MLA areas, 92.7 ha of remnant RE 11.9.5 has been mapped by the EPA (2007) and an additional 386.1 ha of Brigalow regrowth (non-remnant vegetation) analogous with RE 11.9.5 was identified through aerial photograph interpretation and ground truthing done for this assessment.

No remnant RE 11.9.6 has been mapped in the Study Area by the EPA (2007), however a small patch of non-remnant roadside vegetation (0.6 ha) was identified that was analogous with RE 11.9.6.

Remnant RE 11.9.5 and RE 11.9.6 is consistent with the Brigalow (*Acacia harpophylla* dominant and co-dominant), an ecological community listed as Endangered under the EPBC Act. The EPBC Act does not automatically dismiss non-remnant vegetation, rather age, structure and conditions are determining factors. Brigalow regrowth (non-remnant vegetation) in the Study Area characteristic of RE 11.9.5 and RE 11.9.6 was however of poor quality and generally lacked the species composition and structural elements typical of that found in undisturbed areas of the listed Brigalow and is therefore not considered part of the Brigalow ecological community that is listed under the EPBC Act (Threatened Species Scientific Committee 2001). These patches are generally less than 15 years old. Within paddocks, Brigalow regrowth has been retained in small ‘cattle camps’ (shade trees for stock) that are modified by cattle access. Within road corridors, the Brigalow regrowth is young and routinely cleared.

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). RE 11.9.6 occurs on undulating landscapes on more or less horizontally bedded fine grained sedimentary rocks, however also includes some areas occurring on clay plains (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 (dominant and co-dominant) has significantly decreased the extent of the community. Of an estimated original extent of 7,324,560 ha (7,020,360 ha in Queensland and 304,200 ha in New South Wales) approximately 804,264 ha (661,314 ha in Queensland and 142,950 ha in New South Wales) remains. 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 and RE 11.9.6 remained.

Specific Project impacts

The Project will result in loss of 35.4 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.

I2.1.1 State impact assessment

Will areas of high conservation value 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 conservation value as they have not been identified as comprising any essential habitat (Environmental Protection Agency 2003). They are generally small, fragmented and of low to moderate species diversity. Remnant patches of this RE in the Study Area are also all located within paddocks that are subject ongoing grazing, as such the ground cover is highly modified.

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 does not play an important role in maintaining long term viability of the ecological community. They are generally small, fragmented and of low to moderate species diversity. Remnant patches of this RE in the Study Area are also all located within paddocks that are subject ongoing grazing, as such the ground cover is highly modified.

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 RE11.9.5 in the 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 mining activates and associated infrastructure will be long-term.

Are the impacts permanent and irreversible?

The impact of impacts of the mining activates and associated infrastructure 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 provided, offsets will be required to maintain the current extent.

I2.1.2 Commonwealth impact assessment

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 conservation value as they have not been identified as comprising any essential habitat (Environmental Protection Agency 2003). They are generally small, fragmented and of low to moderate species diversity. Remnant patches of this RE in the Study Area are also all located within paddocks that are subject ongoing grazing, as such the ground cover is highly modified.

Reduce the extent of an ecological community

The Project will result in a reduction of the extent of Brigalow (*Acacia harpophylla* dominant and co-dominant) of 35.4 ha. This represents 38% of the extent of similar habitat with the Study Area.

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 extensive clearing of the surrounding landscape and is already subject to effects of fragmentation such as edge effects.

Brigalow (*Acacia harpophylla* dominant and co-dominant) in the Study Area occurs however in heterogeneous polygons that form linear strips adjacent to creeks and which are dominated by REs 11.3.25 RE 11.3.2. These linear patches of woodland form part a wider regional corridor network that are important in maintaining local scale wildlife connectivity and are recognised by State Wildlife Corridor mapping (Environmental Protection Agency 2004).

The proposed mine pit layout and creek diversions will significantly modify the linear strips of remnant vegetation that include Brigalow (*Acacia harpophylla* dominant and co-dominant) along Woleebee Creek and Wandoan Creek (and other drainage lines in the Study Area that do not include remnant RE 11.9.5). The removal of these wildlife corridors will reduce connectivity between remaining patches of Brigalow (*Acacia harpophylla* dominant and co-dominant) in the Study Area and 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 2006).

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 (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 requires clearing of vegetation such as within the construction footprint and associated ancillary areas (35.4 ha across the Study Area). The Project is also likely to modify abiotic factors in the in areas of Brigalow (*Acacia harpophylla* dominant and co-dominant) that are not directly affected by the Project through local changes to surface and ground water regime as a result of drainage line diversion and groundwater extraction. The effect of these changes to Brigalow (*Acacia harpophylla* dominant and co-dominant) can not be accurately predicted or quantified, however it is unlikely to affect any Brigalow (*Acacia harpophylla* dominant and co-dominant) outside of 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

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 and ongoing land management practices in the Study Area (dryland agriculture). 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 has potential to result in further changes to the species composition in Brigalow (*Acacia harpophylla* dominant and co-dominant) and Brigalow regrowth through changes to the existing disturbance regime. Changes to grazing activates will reduce the grazing pressure however may also result in proliferation of pasture species including **Cenchrus ciliaris* (Buffel Grass). Light grazing is known to suppress weeds within Brigalow communities as well as suppressing dominance by *Acacia harpophylla*.

Change to the surface and ground water regime as a result of drainage line diversion and groundwater extraction may result in changes to the species composition within Brigalow (*Acacia harpophylla* dominant and co-dominant), however these changes are difficult to predict.

Brigalow (*Acacia harpophylla* dominant and co-dominant) is known to provide habitat for important species including *Homopholis belsonii*. *Homopholis belsonii* was recorded at four locations in the Study Area in Brigalow regrowth (non-remnant vegetation that was not consistent with the Threatened ecological community). The effects of the Project on this species have been assessed separately (see following assessment).

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 and ongoing land management practices in the Study Area (dryland agriculture). As a result of these pressures, Brigalow (*Acacia harpophylla* dominant and co-dominant) in the Study Area and surrounds is generally in poor to moderate condition.

The Project has potential to result in further changes to the disturbance regime of Brigalow (*Acacia harpophylla* dominant and co-dominant) in the Study Area and surrounds and therefore cause a further reduction in the quality and integrity of ecological community. This may include:

- increased fragmentation and decreased connectivity between the remaining patches of Brigalow (*Acacia harpophylla* dominant and co-dominant) (and Brigalow regrowth) in the Study Area and surrounds
- changes to surface and ground water regime as a result of drainage line diversion and groundwater extraction
- changes in grazing activates will reduce the grazing pressure however may also result in proliferation of pasture species including **Cenchrus ciliaris* (Buffel Grass)
- changes to routine clearing.

Interfere with the recovery of an ecological community

A recovery plan has not been prepared for Brigalow (*Acacia harpophylla* dominant and co-dominant).

Conclusion

The Project will result in the loss of 35.4 ha Brigalow (*Acacia harpophylla* dominant and co-dominant). In addition to direct impacts, the Project is also likely to result in indirect effects to the remaining extent of Brigalow (*Acacia harpophylla* dominant and co-dominant) in the Study Area (57.3 ha). These impacts include increased fragmentation, decreased connectivity, changes to surface and ground water regime and changes to the existing disturbance regime. The extent and severity of these indirect effects is difficult to predict.

The Project will retain 57.3 ha of the ecological community (62% of the extent with the MLA areas) and a further 155 ha of Brigalow regrowth that, given suitable management, would be likely to be consistent with the ecological community in time. It is recognised that the remaining Brigalow in the study area is already highly modified, fragmented and subject to a modified disturbance regime as a result of extensive landscape scale vegetation clearing and ongoing land management practices in the study area (dryland agriculture). It is recommended that the remaining 57.3 ha of Brigalow in the study area is managed under a biodiversity management plan, to avoid or minimise any risk of indirect impacts to the remaining 57.3 ha of Brigalow in the study area during construction and operation of the Project.

As such, the Project is not considered likely to result in a significant impact to Brigalow (*Acacia harpophylla* dominant and co-dominant). It is also recommended that an Offsets Strategy for the Project be considered by the WJV to ensure that any residual impacts to Brigalow are adequately offset. This may include active management of the Brigalow regrowth in the study area.

I2.2 Semi-evergreen vine thicket (RE 11.9.4)

Description

RE 11.9.4 Semi-evergreen vine thicket (SEVT) may occur on crests, mid-slopes, undulating plains and rises formed from fine-grained sediments. The RE 11.9.4 also includes *Acacia harpophylla* (Brigalow) with a semi-evergreen vine thicket understorey.

SEVT ecosystems are floristically diverse and variable, however typically have an uneven canopy (4–9 m high) and contain a mixture of evergreen, semi-evergreen and deciduous emergent tree species (9–18 m high). Emergents (16-25 m high) are usually present including species such as *Cadellia pentastylis* and *Brachychiton* spp. usually on better sites, and *Eucalyptus orgadophila* and *Casuarina cristata* on drier, poorer sites.

SEVT ecosystems are also characterised by a prominence of tree species with microphyll-sized leaves (2.5–7.5 cm long) and the presence of swollen-stemmed bottle trees (i.e. *Brachychiton* spp.). Vines, twining or scrambling plants are also prominent. There is commonly a tall and low shrub layer (2-6 m high) and, as the name suggests, vines are frequent.

RE 11.9.4 (and regrowth vegetation analogous with this RE) is a sub-unit of the Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions ecological community listed under the EPBC Act.

Status under state (Qld) and Commonwealth legislation

Remnant RE 11.9.4 is listed as Endangered under the VM Act. This status only applies to vegetation identified as remnant by the EPA. As no remnant RE 11.9.4 was identified in the Study Area, the significance of the Project to this RE has not been considered further at the state level.

RE 11.9.4 aligns with the Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions ecological community which are listed as Endangered under the EPBC Act. Vegetation does not have to be of remnant status under the VM Act to be considered as the ecological community.

Distribution

SEVT is widely scattered with a common structure but considerable regional variation in floristic associations. SEVT occur within Queensland, New South Wales, the Northern Territory and Western Australia. Within the Brigalow Belt Bioregions, semi-evergreen vine thickets have been fragmented, reduced in area and degraded through land clearing and agricultural/grazing practices.

No remnant RE 11.9.4 was mapped within the Study Area (Environmental Protection Agency 2005), however some small fragmented non-remnant patches of this RE were identified and mapped during field verification of RE mapping (23.2 ha). These patches occurred within the north-western extent of MLA 50229 in the vicinity of Booral Road, a small grove associated with riparian vegetation along Wandoan Creek in the south-western extent of MLA 50231 and an isolated copse in the vicinity of Paradise Downs Road.

Habitat

RE 11.9.4 occurs on crests, mid-slopes, undulating plains and rises formed from fine-grained sediments.

Threats

RE 11.9.4 has been extensively cleared historically for cropping and pasture. As a result of clearing, SEVT (including other REs consistent with the commonwealth listing) generally occurs as fragmented patch sizes of <100 hectares. The small and fragmented occurrence of the ecological community suggests that remnant patches are subject to further degradation and decline from such threatening processes as clearing, inappropriate fire regimes, grazing and weed invasion.

Other threatening processes to SEVT include:

- fire
- weed and pasture species
- grazing
- feral animals

- overgrazing by native animals
- salinity
- climate change (Environmental Protection Agency and Queensland Parks and Wildlife Service 2007).

Specific Project impacts

The Project will result in loss of 16.7 ha of highly modified SEVT (non-remnant 11.9.4) which represents 72% of the extent within the Study Area.

I2.2.1 State impact assessment

As no RE 11.9.4 was identified in the Study Area, the significance of the Project to this RE has not been considered further at the state level.

I2.2.2 Commonwealth impact 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 loss of 16.7 ha of highly modified SEVT (non-remnant 11.9.4) which represents 72% of the extent within the Study Area.

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

SEVT in the Study Area is already fragmented by extensive clearing of the surrounding landscape and is already subject to consequential effects of fragmentation such as edge effects. The small patches within the Study Area are also not connected to larger areas by other vegetation that would contribute to maintaining local scale wildlife connectivity such as the linear strips of vegetation adjacent to creeks which are dominated by REs 11.3.25 and RE 11.3.2 that are recognised by State Wildlife Corridor mapping (Environmental Protection Agency 2004). 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 includes 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 2006).

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 SEVT vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions under the EPBC Act. The habitat within the Study Area is not considered to be critical to the survival of the community.

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 SEVT that require clearing of vegetation such as within the construction footprint and associated ancillary areas (16.7 ha across the Study Area).

The Project is also likely to modify abiotic factors in the in areas Study Area through local changes to surface and ground water regime as a result of drainage line diversion and groundwater extraction. As SEVT generally occurs on crests, mid-slopes, undulating plains and rises formed from fine-grained sediments, it is unlikely to be adversely affected changes to the surface and ground water regime.

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 SEVT in the Study Area or surrounds. SEVT in the Study Area is already subject to a modified disturbance regime as a result of extensive landscape scale vegetation clearing and ongoing land management practices in the Study Area (dryland agriculture). As a result of these pressures, SEVT 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 has potential to result in changes to the existing disturbance regime including changing the grazing pressure and change to the surface and ground water regime. The ground cover in the SEVT is already dominated generally dominated by **Cenchrus ciliaris* (Buffel Grass) and other exotic species.

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

SEVT in the Study Area is already subject to a modified disturbance regime as a result of extensive landscape scale vegetation clearing and ongoing land management practices in

the Study Area (dryland agriculture). As a result of these pressures, SEVT in the Study Area and surrounds has is generally in poor to moderate condition. As such, the Project is unlikely substantial reduction in the quality or integrity of an SEVT that is not directly affected by the Project.

Interfere with the recovery of an ecological community

A recovery plan has not been prepared for SEVT vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions ecological community. The impacts of the Project (both direct and indirect) are unlikely to interfere with any future recovery plans for this community.

Conclusion

The Project will result in the loss of 16.7 ha of SEVT vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions. The remaining patches of this ecological community identified in the Study Area were in highly modified and in poor condition and subject a modified disturbance regime as a result of extensive landscape scale vegetation clearing and ongoing land management practices in the Study Area (dryland agriculture).

Given the poor 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 SEVT vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions. 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 SEVT regrowth in the Study Area.

I3. Plants

I3.1 *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).

Four small patches of *Homopholis belsonii* was identified in this non-remnant vegetation analogous with RE 11.9.5 in the Study Area. At each location, *Homopholis belsonii* occurred as a few sparsely as scattered plants (clumps) within a 1-2 m^2 area. Two or more clumps were recorded at each site, however overall density was very low (i.e. the species was rare within the Study Area).

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). Within the Study Area, *Homopholis belsonii* was recorded in non-remnant vegetation analogous with RE 11.9.5.

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 265.8 ha of suitable habitat for *Homopholis belsonii* consisting of 35.4 ha of remnant RE 11.9.5 and 230.4 ha of non-remnant RE 11.9.5. *Homopholis belsonii* was however distributed sparsely within the Study Area.

I3.1.1 State impact assessment

Will areas of high conservation value for this species be affected?

Areas of high conservation for this species will not be affected.

Homopholis belsonii was recorded at four locations in the Study Area in Brigalow regrowth (non-remnant vegetation analogous with RE 11.9.5). Three of these locations were within freehold properties being actively used for grazing of livestock and the Brigalow regrowth had either been retained as a small cattle camp or was regrowth that would be routinely cleared. The fourth locations where *Homopholis belsonii* was recorded in the Study Area was in a utility easement. Remnant and regrowth (non-remnant) RE 11.9.5 are likely to provide potential habitat for *Homopholis belsonii* in the Study Area. However, based on the surveys completed for this assessment, the species was rare within the Study Area.

The patches of non-remnant vegetation in which the species was recorded are not identified as being of local, regional or state conservation value under the Biodiversity Planning Assessment (Environmental Protection Agency 2003). Remnant RE 11.9.5 in the Study Area is identified as being of state significance due to the status of the RE as Endangered under the VM Act and EMPC Act (Environmental Protection Agency 2003).

The Study Area does not contain any core habitat for priority taxa or any other conservation reserves.

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 small patches of *Homopholis belsonii* recorded in the Study Area are unlikely to play an important role in maintaining the long-term viability of the species. At each location a few sparsely scattered plants were recorded and not large or dense patches of the species were recorded.

Similar to other species of Panic grass (*Panicum* spp.), 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. The records in

the Study Area would therefore not constitute an important source of propagules for maintaining the local population.

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?

Homopholis belsonii was recorded in Brigalow regrowth (non-remnant vegetation analogous with RE 11.9.5). Remnant and regrowth (non-remnant) RE 11.9.5 are likely to provide potential habitat for *Homopholis belsonii* in the Study Area. Although Endangered under the VM Act, Brigalow regrowth is common in the Study Area and the Project will maintain 62% of remnant RE 11.9.5 and 40% of non-remnant RE 11.9.5 in the Study Area. The areas that will be affected by the Project are therefore are not considered to possess habitat features that are a limiting factor for *Homopholis belsonii.*

Are the duration of impacts for the species long-term?

The impact of the mining activates and associated infrastructure will be long-term, particularly clearing/loss of vegetation and habitat.

Are the impacts permanent and irreversible?

The impact of impacts of the mining activates and associated infrastructure 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.

I3.1.2 Commonwealth impact 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.

The population of *Homopholis belsonii* identified 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

The population of *Homopholis belsonii* identified in the Study Area is not an important population.

The Project will lead to a local decrease in the size of this population by direct impacts. However, given suitable management including seed collection and translocation of *Homopholis belsonii* that are being affected by the Project, the decrease in the population size may be avoidable.

Reduce the area of occupancy of an important population

The population of *Homopholis belsonii* identified in the Study Area is not an important population. The extent of vegetation currently occupied by *Homopholis belsonii* in the study area is less than 1 ha, with the four small patches of *Homopholis belsonii* each occurring sparsely. The total extent of suitable habitat for *Homopholis belsonii* that will be affected by the proposal is however 266 ha.

Fragment an existing important population into two or more populations

The population of *Homopholis belsonii* identified in the Study Area is not 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 2006).

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

The population of *Homopholis belsonii* identified in the Study Area is not 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 recorded at four locations in Brigalow regrowth in the Study Area. Three of these locations were within freehold properties being actively used for grazing of livestock and the fourth was in a utility easement. Remnant and regrowth (non-remnant) Brigalow (RE 11.9.5) are likely to provide potential habitat for *Homopholis belsonii* in the Study Area and the Project will result in the loss of 266 ha of this habitat type. However, based on the surveys completed for this assessment, the species was rare within throughout this habitat type in the Study Area.

The patches of non-remnant vegetation in which the species was recorded are fragmented and modified by current land use practices (predominantly agriculture). Although Endangered under the VM Act, Brigalow regrowth is common in the Study Area and the Project will maintain 62% of remnant RE 11.9.5 and 40% of non-remnant RE 11.9.5 in the MLA areas. The areas that will be affected by the Project are therefore are not considered to possess habitat features that are a limiting factor for *Homopholis belsonii.*

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) Brigalow (RE 11.9.5) through changes to the existing disturbance regime including changes to grazing activates that will reduce the grazing pressure and result in proliferation of pasture species including **Cenchrus ciliaris* (Buffel Grass). This grass was recorded at all sites where *Homopholis belsonii* was recorded in the Study Area and was common in remnant and regrowth (non-remnant) Brigalow (RE 11.9.5).

Monitoring and active management of **Cenchrus ciliaris* and other invasive species at known *Homopholis belsonii* sites would be required to prevent invasive species affecting *Homopholis belsonii* 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

Given the low density at which *Homopholis belsonii* occurs in the Study Area, its likely dispersal strategy and the availability of suitable habitat that will remain in the Study Area, the Project is considered unlikely to result in a significant impact to this species. Nonetheless, the Offsets Strategy that will be developed for the Project should ensure that

the residual impacts to Homopholis belsonii are adequately offset. This may include seed collection, propagation and use in revegetation, translocation of individuals to be affected and active management of known *Homopholis belsonii* sites.

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 2008d; 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 2008d; 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 2008d).

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 2008d; 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 2008d; 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 2008d; 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 2008d; 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 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. The Brigalow Scaly-foot was recorded the during winter surveys within the Study Area, with two animals being detected during active diurnal herpetofauna searches (along the gas supply pipeline). One sub-adult was captured in association with a non-remnant *Casuarina cristata* fragment adjacent to Roche Creek. One adult was captured from a linear patch of roadside non-remnant *Acacia harpophylla/Casuarina cristata* in the far north east section of the Study Area. Both individuals were found beneath logs and loose bark, with both capture locations comprised abundant log cover (15-20%).

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 (>10%) and/or litter cover (>20%). This species is likely to occur sporadically within most of the remnant *Acacia harpophylla/Casuarina cristata* fauna habitat type.

Species specific Project impacts

Potential impacts on the Brigalow Scaly-foot include, but are not limited to:

- removal of 267 hectares of *Acacia harpophylla/Casuarina cristata* (RE 11.9.5) vegetation within the Study Area, which is considered to be potential Brigalow-scaly foot habitat
- direct mortality during construction and operations
- potential trapping of animals in deep steep-walled trenches which makes them vulnerable to predation, heat stress, dehydration, and/or drowning

- backfilling of these trenches may result in trapped animals being buried alive
- displacement of animals due to loss of foraging habitat and shelter
- displacement of animals in response to 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 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:

- outside of the mining areas, clearing of remnant and non-remnant (RE 11.9.5) vegetation within the Study Area should be avoided 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 gas 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
  - development of an adaptive monitoring program 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 (2 individuals) 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 267 hectares of remnant and non-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, 62% of remnant and 40% of non-remnant *Acacia harpophylla* scrub which is considered potential habitat for the Brigalow Scaly-foot is being retained within the Study Area.

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 267 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 mining areas 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 267 hectares of potential habitat for the Brigalow Scaly-foot, 213 hectares of similar habitat is being retained within the Study Area.

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 2008c; 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 2008c; 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.

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 *Callitris glaucophylla* associations found in the Study Area (in particular on MLA 50230 and 50231). There were no known records of this species from the desktop assessment and despite 420 person hours of targeted survey techniques, Dunmall's Snake was not recorded during field surveys undertaken for the current assessment.

Species specific Project impacts

Potential impacts on Dunmall's Snake include, but are not limited to:

- removal of 267 hectares of remnant and non-remnant *Acacia harpophylla/Casuarina cristata* (RE 11.9.5) and 8 hectares of non-remnant *Callitris glaucophylla* (RE 11.10.9) vegetation within the Study Area which is considered to be potential Dunmall's Snake habitat
- direct mortality during construction and operations
- 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 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 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 Dunmall's Snake include:

- outside of the mining areas, clearing of remnant and non-remnant (RE 11.9.5) vegetation within the Study Area should be avoided 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 proposed gas 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 (260 pit nights), 32 hours of active search and numerous other opportunistic surveys this species was not recorded. The Project will require the proposed clearing of 275 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 relatively large amount of potential habitat, it is relatively small in terms of the extent of similar habitat available in the local area. The 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. Additionally, 62% of remnant, 40% of non-remnant *Acacia harpophylla* scrub and 51% of non-remnant *Callitris glaucophylla* woodland, which is considered potential habitat for Dunmall's Snake is being retained within the Study Area.

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 275 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 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. 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 and operations 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 from within and immediately adjacent mining areas both 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 2008c). 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 275 hectares of potential habitat for Dunmall's Snake, 221 hectares of similar habitat is being retained within the Study Area. 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 2008b; Queensland Environmental Protection Agency 2008c) (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 2008b; Queensland Environmental Protection Agency 2008c).

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 2008b; Queensland Environmental Protection Agency 2008c; 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 2008c).

Ecology

The Yakka Skink is an essentially terrestrial species which seldom ventures far from cover (Department of the Environment Water Heritage and the Arts 2008b; Queensland Environmental Protection Agency 2008c; 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 2008b; Queensland Environmental Protection Agency 2008c; 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 2008c).

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 2008c).

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 2008c).

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. Potential habitat for the Yakka Skink within the Study Area is limited to intact remnants of *Acacia harpophylla* scrub, dry

forests, woodland fringing drainage lines and open shrubland. This species has a moderate chance of occurring within stands of *Acacia harpophylla* associations in the Study Area, and the slopes associated with Wandoan Creek. There were no known records of this species from the desktop assessment and despite 420 person hours of targeted survey techniques, the Yakka Skink was not recorded during field surveys undertaken for the current assessment.

Species specific Project impacts

Potential impacts on the Yakka Skink include, but are not limited to:

- removal of 267 hectares of remnant and non-remnant *Acacia harpophylla/Casuarina cristata* (RE 11.9.5) and 470 hectares of remnant and non-remnant *Eucalyptus tereticornis* or *E. camaldulensis* (RE 11.3.25) vegetation within the Study Area which is considered to be potential habitat for the Yakka Skink
- direct mortality during construction and operations
- 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 *Eucalyptus tereticornis* or *E. camaldulensis* vegetation 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:

- outside of the mining areas, clearing of remnant and non-remnant (REs 11.9.5 and 11.3.25) 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 gas 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 (260 pit nights), 32 hours of active search and numerous other opportunistic surveys this species was not recorded. The Project will require the proposed clearing of 738 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 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 woodland 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. However, 62% of remnant, 40% of non-remnant *Acacia harpophylla* scrub and 63% of remnant and 51% of non-remnant *Eucalyptus tereticornis* or *E. camaldulensis* vegetation, which is considered potential habitat for the Yakka Skink is being retained within the Study Area.

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 737 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 woodland and open 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 extensive targeted surveys, nor has it been previously recorded in 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 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 from within and immediately adjacent mining areas both 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 737 hectares of potential habitat for the Yakka Skink, 1,016 hectares of similar habitat is being retained within the Study Area. 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 which may provide habitat for the Squatter Pigeon. Preferred habitat (dry open woodland areas with sparse grass cover near permanent water) is very 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 farm 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. This species has been previously recorded 30 km to the north of the Study Area and there are historic records of this species from approximately 70 years ago in areas adjoining the Study Area. However, despite targeted surveys for this species, the Squatter Pigeon was not recorded during field surveys undertaken for the current assessment.

Species specific Project impacts

Potential impacts on the Squatter Pigeon include, but are not limited to:

- removal of 110 hectares of remnant and non-remnant *Eucalyptus populnea* woodland (RE 11.3.2) and 470 hectares of remnant and non-remnant *Eucalyptus tereticornis*

vegetation within the Study Area which is considered to be potential Squatter Pigeon habitat

- displacement of animals (particularly nesting birds) due to loss of foraging habitat and shelter
- displacement of animals (particularly nesting birds) in response to 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:

- outside of the mining areas, clearing of remnant and non-remnant vegetation (Res 11.3.2 and 11.3.25) within the Study Area should be avoided in areas of potential habitat for the Squatter Pigeon, especially those remnants close to permanent water sources. This will minimise the extent of potential woodland/ forest habitat cleared and minimise fragmentation of habitat
- where possible ancillary areas and infrastructure should be located so as to avoid impacts to areas of sensitive biodiversity
- 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 580 hectares of remnant and non-remnant vegetation which is considered to be potential habitat for the Squatter Pigeon. While this is a relatively large amount of habitat, given the availability of similar suitable habitat 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. However, 60% of remnant and 88% of non-remnant *Eucalyptus populnea* woodland and 63% of remnant and 51% of non-remnant *Eucalyptus tereticornis* woodland, which is considered potential habitat for the Squatter Pigeon, is being retained within the Study Area.

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 580 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 from within and immediately adjacent mining areas both 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 580 hectares of potential habitat for the Squatter Pigeon, 1,001 hectares of similar habitat is being retained within the Study Area. 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 significant amount of potential habitat for the Eastern Long-eared Bat including *Eucalyptus tereticornis* forest, *Acacia harpophylla/Casuarina cristata* woodland, *Eucalyptus populnea* woodland and *Callitris glaucophylla* woodland (the preferred habitat for the species in Queensland). This species has a moderate chance of occurring win association with remnant vegetation communities supporting senescent trees. However, there were no known records of this species from the desktop assessment and despite 28 survey nights and 67 trap nights of targeted survey techniques; the Eastern Long-eared Bat was not recorded during field surveys undertaken for the current 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 110 hectares of remnant and non-remnant *Eucalyptus populnea* woodland (RE 11.3.2), 470 hectares of remnant and non-remnant *Eucalyptus tereticornis* woodland (RE 11.3.25), 276 hectares of remnant and non-remnant *Acacia harpophylla/Casuarina cristata* woodland (RE 11.9.5) and 8 hectares of remnant and non-remnant *Callitris glaucophylla* woodland (RE 11.10.9) 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:

- outside of the mining areas, clearing of remnant and non-remnant vegetation (Res 11.3.2, 11.3.25, 11.9.5 and 11.10.9) within the Study Area should be avoided 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
- where possible ancillary areas and infrastructure should be located so as to avoid impacts to areas of sensitive biodiversity
- revegetation/rehabilitation of cleared areas not necessary for mining (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 855 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. Additionally, 60% of remnant and 88% of non-remnant *Eucalyptus populnea* woodland, 63% of remnant and 51% of non-remnant *Eucalyptus tereticornis* woodland, 62% of remnant and 40% of non-remnant *Acacia harpophylla/Casuarina cristata* woodland and 51% of non-remnant *Callitris glaucophylla* woodland which is considered potential habitat for the Eastern Long-eared Bat is being retained within the Study Area.

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. As such the Project is unlikely to further create a barrier for these 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. 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 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 and operations 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 from within and immediately adjacent mining areas both 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 855 hectares of potential habitat for the Eastern Long-eared Bat, 1,222 hectares of similar habitat is being retained within the Study Area. 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 Australian Painted Snipe (*Rostratula australis*)

Description

The Australian Painted Snipe is a stocky wading bird around 220-250 mm in length with a long pinkish bill. The adult female, more colourful than the male, has a chestnut-coloured head, with white around the eye and a white crown stripe, and metallic green back and wings, barred with black and chestnut. There is a pale stripe extending from the shoulder into a V down its upper back. The adult male is similar to the female, but smaller and duller with buff spots on the wings (Department of the Environment Water Heritage and the Arts 2008a).

Status

The Australian Painted Snipe is currently listed as Vulnerable under the *Nature Conservation Act 1992* and *Environment Protection and Biodiversity Conservation Act 1999*. It is also listed as a Migratory species under the EPBC Act, as it is listed in the China–Australia Migratory Bird Agreement (CAMBA).

Distribution

The Painted Snipe is patchily distributed across eastern and northern Australia. Most records of this species are from south-eastern states, though the species has also been recorded from South Australia, the Northern Territory and Western Australia (Marchant & Higgins 1993).

Habitat

The Painted Snipe is associated with ephemeral and permanent shallow freshwater wetlands and, occasionally, brackish water wetlands (Marchant & Higgins 1993). This includes natural wetlands as well as sewage farms, bore drains with rank emergent vegetation, dams and rice crops (Marchant & Higgins 1993).

Ecology

The Painted Snipe is a cryptic species usually encountered singly or in pairs. Birds forage amidst low vegetation (typically grasses and sedges) in or near shallow water, feeding on arthropods, worms and vegetable matter (Marchant & Higgins 1993).

Breeding occurs in spring and summer possibly in response to flooding of swamps (Marchant & Higgins 1993). Eggs are laid in a depression on the ground or bowl-shaped nest of dry grass, water-weed twigs, leaves or Casuarina cladodes (Marchant & Higgins 1993).

The movements of this species are poorly understood. Some individuals appear to be nomadic while others remain resident in the one area (Department of the Environment Water Heritage and the Arts 2003; Marchant & Higgins 1993).

Threats

The main threat to the Painted Snipe is habitat modification and loss, due to changes in flood patterns and wetland drainage (Department of the Environment Water Heritage and the Arts 2003; Garnett & Crowley 2000). In some areas salinization may also pose a threat to the species (Department of the Environment Water Heritage and the Arts 2003). Trampling and browsing of cattle, resulting in the loss of sedge/grass cover, is also considered a threat (Department of the Environment Water Heritage and the Arts 2003).

As a ground–nesting species, the Painted Snipe may also be vulnerable to predation by feral animals, particularly foxes (Department of the Environment Water Heritage and the Arts 2003). The loss of grass/sedge cover due to grazing and cultivation may serve to increase the vulnerability of Painted Snipe to predation.

Recovery actions

Recovery actions for the Australian Painted Snipe outlined in 'The Action Plan for Australian Birds 2000' (Garnett & Crowley 2000) include:

- protection and management of principal breeding wetlands and wintering grounds using recent records as a guide
- rehabilitation of former breeding areas through Landcare
- monitoring of abundance at landscape level
- development of techniques for maintaining a captive population.

Occurrence within Study Area

The Study Area provides limited potential habitat for this species in the form of scattered farm dams and ephemeral wetland areas, and its occurrence would be influenced by seasonal conditions. Though containing suitable habitat for the Painted Snipe, there are no records of this species from within the Study Area and the species was not identified during field surveys. This suggests that the species is either absent or scarce within the area.

Species specific Project impacts

Potential impacts on the Painted Snipe include, but are not limited to:

- displacement of animals (particularly nesting birds) in response to increased noise and vibration
- destruction of foraging, nesting and roosting habitat
- invasion of weeds
- further establishment of feral animals which could result in mortality of chicks and/or abandonment of nests.

Species specific Project mitigation

Mitigation measures for the Painted Snipe include:

- outside of the areas necessary for mining, construction should be avoided within close proximity to wetland areas and dams.

Commonwealth significance assessment

If present, the population of the Painted Snipe would not be considered an 'important population' because:

- the species was not recorded within the Study Area, despite active surveys
- the species is mobile and not restricted to habitat within the Study Area
- significant areas of habitat important for breeding are not present in 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 Painted Snipe 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 Painted Snipe would not be considered an important population. Although the Study Area and surrounds contain limited suitable habitat for the Painted Snipe in the form of 85 small farm dams and ephemeral wetland areas, the species was not identified during field surveys undertaken for this assessment. There are also no known records of this species from within the Study Area. The Project will impact on one relatively large farm dam (0.05 hectares) located south of Markwell's Road, and some of the smaller farm dams that may constitute potential habitat for the Painted Snipe. 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 Painted Snipe would not be considered an important population. The Painted Snipe was not recorded within the Study Area during the field surveys. 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 Painted Snipe. The indicative habitat for Painted Snipe within the Study Area is already highly fragmented and some of it is highly modified as a result of anthropogenic disturbance arising from agriculture, road infrastructure and residences. Given the species is highly mobile it is unlikely that the project will represent a barrier to this species.

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 Painted Snipe. It was not recorded during the field survey, despite targeted surveys. Habitat within the Study Area is not considered critical to the survival of the Painted Snipe as similar suitable habitat is widespread within the Study Area and surrounding landscape. No critical habitat has been listed for this species.

Disrupt the breeding cycle of an important population

Considering that the Painted Snipe 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 and operations within the Study Area will result in the loss of potential foraging, nesting and roosting habitat for the Painted Snipe. However this is not considered to be a limiting resource for this species in the Study Area or surrounding areas and is unlikely to result in a decline for this species. .

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 from within and immediately adjacent mining areas both 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 Painted Snipe.

Substantial interference with the recovery of the species

The Project is not considered to interfere substantially with the recovery of the species.

Conclusion

Although the Project will remove one relatively large farm dam (0.05 hectares) and some of the smaller farm dams which may constitute potential habitat for the Painted Snipe, there is suitable habitat available elsewhere within the Study Area and surrounds. It is unlikely that Project will have a significant impact on the Painted Snipe.

I4.1.7 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 extensive 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 110 hectares of remnant and non-remnant *Eucalyptus populnea* woodland (RE 11.3.2) and 470 hectares of remnant and non-remnant *Eucalyptus tereticornis* 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:

- outside of the mining areas, clearing of remnant and non-remnant vegetation (REs 11.3.2 and 11.3.25) within the Study Area should be avoided in areas of potential habitat for the Satin Flycatcher

Assessment of impacts

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 580 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 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 *Nature Conservation Act 1992* (NC Act) or *Vegetation Management Act 1999* (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.

Table I-1: 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 critical 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 long-term but the extent of habitat removal is small and of poor quality in relation to habitat available in the local area and region.	Potential impacts resulting from loss of habitat during construction are permanent and irreversible, but are not considered to be significant.

Species	Significance assessment question				
	a)	b)	c)	d)	e)
Yakka skink (*Egernia rugosa*)	-species not recorded during survey -no critical 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 long-term but the extent of habitat removal is small and of poor quality in relation to habitat available in the local area and region.	Potential impacts resulting from loss of habitat during construction are permanent and irreversible, but are not considered to be significant.
Brigalow Scaly-foot (*Paradelma orientalis*)	-species recorded during survey -no critical 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 long-term but the extent of habitat removal is small and of poor quality in relation to habitat available in the local area and region.	Potential impacts resulting from loss of habitat during construction are permanent and irreversible, but are not considered to be significant.
Australian painted snipe (*Rostratula australis*)	-species not recorded during survey -no critical 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 long-term but the extent of habitat removal is small and of poor quality in relation to habitat available in the local	Potential impacts resulting from loss of habitat during construction are permanent and irreversible, but are not considered to be

Species	Significance assessment question				
	a)	b)	c)	d)	e)
				area and region.	significant.
Squatter pigeon (southern race) (*Geophaps scripta scripta*)	-species not recorded during survey -no critical 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 long-term but the extent of habitat removal is small and of poor quality in relation to habitat available in the local area and region.	Potential impacts resulting from loss of habitat during construction are permanent and irreversible, but are not considered to be significant.
Pink Cockatoo (*Cacatua leadbeateri)*	-species not recorded during survey -no critical 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 long-term but the extent of habitat removal is small and of poor quality in relation to habitat available in the local area and region.	Potential impacts resulting from loss of habitat during construction are permanent and irreversible, but are not considered to be significant.
Glossy Black-cockatoo (*Calyptorhynchus lathami)*	-species recorded during survey, however were not recorded using tree hollows for breeding -no critical habitat present and *Casuarina/ Allocasuarina* feed trees are distributed throughout the Study	-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 long-term but the extent of habitat removal is small and of poor quality in relation to habitat available in the local area and region.	Potential impacts resulting from loss of habitat during construction are permanent and irreversible, but are not considered to be significant.

Species	Significance assessment question				
	a)	b)	c)	d)	e)
	Area and surrounds				
Greater long-eared bat (*Nyctophilus timoriensis*)	-species not recorded during survey -no critical 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 long-term but the extent of habitat removal is small and of poor quality in relation to habitat available in the local area and region.	Potential impacts resulting from loss of habitat during construction are permanent and irreversible, but are not considered to be significant.

I5. References

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Attachment J

Matters of National Environmental Significance - Summary

J1. Introduction

Matters of National Environmental Significance (MNES) are protected under the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act). Details of MNES and the potential impact of the Project are covered in detail in Volume 1 Chapter 17(a) and the Technical Report (in particular sections 5.1 and Appendix I), from hereon referred to as the Technical Report.

However for ease of reference, this attachment summarises the information relevant to MNES, exclusively addresses the MNES in the Project study area and the relevant controlling provisions, describes how the Project is likely to impact on those MNES and proposes relevant mitigation measures to manage those impacts.

On 17 June 2008, the WJV referred the Project to the Commonwealth Minister for the Environment and Water Resources 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 mine and infrastructure on relevant MNES (EPBC 2008/4284). The controlling provisions relevant to the CSM Water Supply South, CSM Water Supply West and Glebe Option are covered in Volumes 2, 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 Project are:

- Sections 18 and 18A (listed threatened species and ecological communities).

In particular, the DEWHR decision on referral letter indicated that the project was likely to have a significant impact because it involves the disturbance of approximately 11,000 ha in an area of Brigalow (*Acacia harpophylla* dominant and co-dominant) endangered ecological community, and potential habitat for the listed endangered Star Finch (southern) (*Neochimia ruficauda ruficaud*a); and listed vulnerable Squatter Pigeon *(Geophaps scripta scripta*).

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).

MNES relating to biodiversity are discussed below in relation to the Project 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 Section 3 of the Technical Report, while the detailed description of the ecological environment is presented in Section 4. Reference to specific figures and Sections are made throughout this attachment.

J2.1 Threatened ecological communities

Two 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.

J2.1.1 Brigalow (*Acacia harpophylla* dominant and co-dominant)

Brigalow (*Acacia harpophylla* dominant and co-dominant) corresponded with remnant RE 11.9.5, RE 11.9.6 in the study area (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 in several remnant patches and extensively as

non-remnant vegetation within the study area. Remnant patches of this RE generally occurred as heterogeneous polygons contiguous with larger areas of remnant vegetation dominated by 11.3.25. However, extensive areas of non-remnant RE 11.9.5 were identified during field surveys across much of the study area. The non-remnant polygons of the RE were predominantly fragmented patches of regrowth consisting of retained woodlots and/or 'cattle camps' as well as mid-dense regrowth within road reserves.

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 median height of canopy trees was highly variable ranging from 4 to 11 m).

Mid-stratum: Due to the broad canopy height range of this RE, the mid-stratum was dominated either by juvenile canopy species or *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 dominated by *G. parviflora, Capparis lasiantha* (Nipan)*, Enchylaena tomentosa* and/or *Carissa ovata.*

Ground layer: The sparse ground layer was limited by the presence of a mid-dense to dense layer of 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 *Acacia harpophylla*, with evidence of thinning and grazing by cattle. Small patches showed evidence of degradation from edge effects. Mature **Opuntia tomentosa* were encountered commonly within this vegetation type.

Remnant status: Only three polygons of RE 11.9.5 possessed the height, cover and population size characteristics which were favourable for consideration of remnant status. The remainder of RE 11.9.5 polygons consisted of regrowth that is either too low, lacks sufficient canopy cover to be considered as remnant status. Areas that have been mapped by the EPA as remnant vegetation were found to generally transition into RE 11.9.10, or have this RE as a co-dominant component.

RE 11.9.6 *Acacia melvillei +/- Acacia harpophylla* open forest on fine-grained sedimentary rocks

RE 11.9.6 *Acacia melvillei* +/- *Acacia harpophylla* open forest on fine-grained sedimentary rocks (Land Zone 9) occurred in the study area entirely as non-remnant, fragmented regrowth within road reserves in association with monotypic stands of regrowth *Acacia harpophylla* (non-remnant RE 11.9.5). Generally occurring as small, isolated groves*,* this vegetation type was not large enough to be mapped by the EPA (2005) or qualify as remnant vegetation.

Canopy: *Acacia melvillei* (Miligee) dominated the canopy, with associated *Acacia harpophylla* at median height of around 6 m.

Mid-stratum: The mid-stratum was moderately sparse and was dominated by *Eremophila mitchellii* and *Geijera parviflora*, with associated *Acacia salicina* occurring very infrequently.

Ground layer: The ground layer was dominated by **Cenchrus ciliaris, Atriplex muelleri, Tetragonia tetragonoides, Aristida* spp*. and Enteropogon acicularis*.

Condition: This vegetation type was generally sparsely distributed, subject to edge effects and modified through routine road maintenance.

Remnant status: This community does not satisfy the height, area and cover requirements to be considered as remnant vegetation by the EPA.

The listing of Brigalow (*Acacia harpophylla* dominant and co-dominant) under the EPBC Act includes both remnant and non-remnant vegetation, but excludes regrowth vegetation in poor condition (i.e., regrowth lacking structure and species composition typical of remnant Brigalow). Brigalow regrowth (non-remnant vegetation) in the study area characteristic of RE 11.9.5 and RE 11.9.6 was of poor quality and generally lacked the species composition and structural elements typical of that found in remnant Brigalow (RE 11.9.5 and 11.9.6) in the study area. Regrowth (non-remnant vegetation) within the study area was therefore not considered part of the Brigalow ecological community that is listed under the EPBC Act (Threatened Species Scientific Committee 2001).

Remnant RE 11.9.5 and RE 11.9.6 is consistent with Brigalow (*Acacia harpophylla* dominant and co-dominant) under the EPBC Act.

J2.1.2 Semi-evergreen vine thickets of the Brigalow Belt (north and south) and Nandewar Bioregions

Semi-evergreen vine thickets of the Brigalow Belt (north and south) and Nandewar Bioregions are considered likely to occur in the study area (Department of the Environment Water Heritage and the Arts 2008), however no remnant vegetation consistent with the ecological community is mapped within the study area (Environmental Protection Agency 2005). The patches of this RE (RE 11.9.4) in the study area were small, fragmented and highly modified in structure and composition. Nonetheless, these patches are still consistent with this ecological community (the definition of this endangered ecological community does not exclude patches on the basis of size or conditions) and require assessments of the significance of the impacts of the Project (refer Section 4.4, Figure 5.1 and Attachment E of the Technical Report).

RE 11.9.4 Semi-evergreen vine thicket on fine-grained sedimentary rocks

RE 11.9.4 semi-evergreen vine thicket on fine grained sedimentary rocks (Land Zone 9) characteristically occurred on crests, mid-slopes, undulating plains and rises. No remnant RE 11.9.4 was mapped within the study area (Environmental Protection Agency 2005), however some small fragmented non-remnant patches of this RE were identified and mapped during field verification of RE mapping. Within the study area, this RE occurs as isolated patches within the north-western extent of MLA 50229 in the vicinity of Booral Road, a small grove associated with riparian vegetation along Wandoan Creek in the south-

western extent of MLA 50231 and an isolated copse in the vicinity of Paradise Downs Road (see Figure 4-2 of the Technical Report).

Canopy: The sparse canopy of this RE was moderately variable but generally comprised of *Ventilago viminalis* (Vine Tree), *Lysiphyllum carronii, Brachychiton rupestris*, *Acacia fasciculifera* (Scrub Ironbark), *Casuarina cristata* and *Owenia acidula* (Emu Apple). Canopy trees within this RE attained a maximum height of 18 m, with a median height of 12 m. In several places *Eucalyptus orgadophila* (Mountain Coolibah) occurred as a dominant canopy species and/or emergent to approximately 23 m in height.

Mid-stratum: The mid-dense to dense sub-canopy/mid-stratum was comprised primarily of vine thicket species including *Geijera parviflora*, *Pouteria cotinifolia var. arborescens* (Yellow Lemon), *Ehretia membranifolia* (Peach Bush), *Alectryon oleifolius* ssp*. elongatus, Elaeodendron australe* var*. integrifolium* (Narrow-leaved Red Olive Plum), *Croton insularis* (Silver Croton) and *Flindersia collina* (Leopard Ash). The low shrub layer was dominated by *Carissa ovata* (Klunkerberry), *Capparis mitchellii*, *Alectryon diversifolius, Jasminum* spp*.* (Native Jasmine), *Parsonsia lanceolata* (Rough Silkpod), *Pittosporum spinescens* (Wallaby Apple)*, Bursaria incana* (Prickly Pine)*, Diospyros humilis* (Small-Leaved Ebony) and *Psydrax* spp*.* (Canthium). This stratum reached a median height of 6 m.

Ground layer: The ground layer was moderately to sparsely vegetated and was generally dominated by **Cenchrus ciliaris,* and associated *Einadia* spp*., Rhagodia gaudichaudiana* (no common name), *Tetragonia tetragonioides* and juvenile upper strata species. Ground layer specialists typical of semi-evergreen vine thicket were present although generally scarce such including *Austrostipa ramosissima* (Stout Bamboo Grass), *Ancistrachne uncinulata* (Hooky Grass) and *Spartothamnella juncea* (Native Broom).

Condition: Within the study area, RE 11.9.4 was highly fragmented and modified. All occurrences of this RE surveyed within the study area represented regrowth vegetation. Nowhere within the study area was this RE excluded from grazing and all had evidence of selective thinning and utilisation as refugia by livestock (‘cattle camps’). Weed incursion was limited generally to the dense cover of **Cenchrus ciliaris*, reflecting the open and fragmented nature of the canopy.

J2.2 Threatened species

Details of all species recorded in the study area are presented in Section 4 of the Technical Report. Species lists and habitat information are presented in Attachments B-H.

Four threatened species of plant and fourteen 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). *Homopholis bensonii* was not predicted to occur by the Protected Matters Search Tool, however was recorded in the study area.

Table J-1: EPBC Act listed threatened species predicted to occur in the study area

Name	Conservation status[1]	Likelihood of occurrence
Plants		
Eriocaulon carsonii	E	Low
Cadellia pentastylis	V	Low
Diuris tricolor (syn *Diuris sheaffiana*)	V	Moderate
Commersonia sp. Cadarga (G.P.Guymer 1642)	V	Low
*Homopholis belsonii**	V	High (recorded)
Mammals		
Large-eared Pied Bat (*Chalinolobus dwyeri*)	V	Low
Greater Long-eared Bat (*Nyctophilus timoriensis*)	V	Moderate
Birds		
Australian Painted Snipe (*Rostratula australis*)	V	Moderate
Black-breasted Button-quail(*Turnix melanogaster*)	V	Low
Squatter Pigeon (southern race) (*Geophaps scripta scripta*)	V	Moderate
Swift Parrot (*Lathamus discolor*)	E	Low
Red Goshawk (*Erythrotriorchis radiatus*)	V	Low
Star finch (*Neochimia ruficauda ruficauda*)	E	Low
Reptiles		
Fitzroy Tortoise (*Rheodytes leukops*)	V	Low
Collared Delma (*Delma torquata*)	V	Low
Brigalow Scaly-foot (*Paradelma orientalis*)	V	High (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)

* *Homopholis bensonii* was not predicted to occur in the study area by the Protected Matters Search Tool (Department of the Environment Water Heritage and the Arts 2008)

Homopholis bensonii was the only EPBC Act listed threatened species of plant recorded during the field surveys undertaken for this assessment (see Figure 5-1 in the Technical Report). This species was recorded at four locations within the study area within non-remnant vegetation analogous with RE 11.9.5 (*Acacia harpophylla* and/or *Casuarina cristata* open forest on fine-grained sedimentary rocks). No other threatened species of plant listed

under the EPBC Act were considered likely to occur in the study area based on likelihood-of-occurrence assessment (refer Attachment G).

Brigalow Scaly-foot (*Paradelma orientalis*) was the only EPBC Act-listed threatened species of animal recorded during the surveys undertaken for this assessment (see Figure 5-1 in the Technical Report). This species was recorded at one location within the study area in association with non-remnant vegetation analogous with RE 11.9.5 (*Acacia harpophylla* and/or *Casuarina cristata* open forest on fine-grained sedimentary rocks), adjacent to Roche Creek along the proposed gas pipeline route. Other remnant and non-remnant vegetation analogous with RE 11.9.5 in the study area could potentially provide suitable habitat for this species.

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*)
- Australian Painted Snipe (*Rostratula australis*)
- 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*.

Two species of bird, the Great Egret (*Ardea alba*) and Rainbow Bee-eater (*Merops ornatus*) recorded within the study area are recognised under the migratory provisions of the EPBC Act (see Attachment F). A further 10 migratory species were predicted to occur in the study area and surrounds based on the Department of the Environment, Water, Heritage and the Arts Protected Matters Search Tool (see Attachment D).

Although two migratory species of bird were recorded and other migratory birds may potentially utilise resources in the study area, the study area is not considered 'important habitat' for these species, 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 Project would significantly affect migratory species predicted to occur within the study area. As such, significance 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 (refer Attachment C). Subsequently an impact assessment was undertaken for this species.

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 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, either direct or indirect.

J2.4 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 Project 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 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, either direct or indirect.

J2.6 Commonwealth Marine Areas

The Project is not located near any Commonwealth marine area.

J2.7 Nuclear Actions

The project does not include any nuclear actions.

J3. Likely impacts of the Project on matters of national environmental significance

The relevant controlled action for the MNES 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 1). Details of the impacts of the project are described in Section 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
- Creek diversions, including loss of connectivity
- further habitat fragmentation
- new edge effects
- direct mortality of individuals
- increased noise and dust
- cumulative impacts.

The greatest impact will result from the loss of vegetation and habitat (refer Table J-2 – and Table 6-1 of the Technical Report for full details). This clearing will result in 35.4 ha of Brigalow endangered ecological community and 16.7 ha of semi-evergreen vine thicket being removed.

Table J-2: Extent of vegetation clearing relating to MNES

Mine component	Extent of each RE type directly affected (ha)				
	11.9.4	**11.9.5**	**11.9.6**	**All REs Non Remnant**	**All REs Remnant**
Mining pits (50 m buffer)	8.8	35.4		**398.3**	**653.7**
Coal transport	3.9			**88.3**	**12.4**
Water infrastructure	4.0			**11.2**	**0.4**
MIA (no vegetation clearing required)				**-**	**-**
Gas pipeline				**0.2**	**1.1**
Accommodation facility				**3.7**	**0.0**
Total proposed clearing	**16.7**	**35.4**	**0.0**	**501.7**	**667.7**
Total extent within MLA	23.2	92.7	0.6	1,009.5	1,793.1
Extent remaining in MLA following clearing	6.5	57.3	0.6	507.8	1125.4
Percent remaining in MLA	28%	62%	100%	51%	63%

J3.1 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 the Technical Report.

A summary of significance assessments undertaken for threatened biodiversity is provided below in Table J-3. The impact assessments conclude that the Project 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 Project

Name	EPBC Act Status	Likely to be significantly affected	Primary reason for the outcome
Ecological communities			
Brigalow (dominant co-dominant)	E	No	Small extent of fragmented and modified EEC to be removed, with 62% to be retained within MLA
SEVT	E	No	Small extent (16.7ha) of highly modified and poor condition EEC to be removed
Plants			
Homopholis belsonii	V	No	Low density of occurrence within study area and availability of habitat in the local area
Reptiles			
Brigalow Scaly-foot (*Paradelma orientalis*)	V	No	Low density of animals recorded (2) 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			
Australian Painted Snipe (*Rostratula australis*)	V & M	No	Not recorded within study area and no important habitat present
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

Name	EPBC Act Status	Likely to be significantly affected	Primary reason for the outcome
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 Section 7 of this Technical Report, and summarised below.

J4.1 Avoiding environmental impacts on MNES

Avoiding environmental impacts has been planned for where possible throughout the Project planning and preliminary design phases. There will also be ongoing opportunities to further avoid impacts at a local scale through the detailed design process.

The capacity of major components of the Project, such as the pit layout and creek diversions, to avoid environmental impacts while achieving the objectives of the Project (coal extraction) is limited. However, the design and layout of much of the remaining infrastructure, such as the coal transport infrastructure, water infrastructure, proposed gas supply pipeline and MIA have been positioned so as to avoid or limit impacts to remnant vegetation and regrowth and the associated flora and fauna habitats. As such, 63% of the remnant vegetation within the MLA area and 51% of regrowth (non-remnant) vegetation will be retained.

J4.2 Management of the mitigation process for MNES

The impacts and mitigation associated with the Project 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 both the construction and operation of the Project. The plan will include, where appropriate, procedures for:

- detailed design of mitigation measures such as fauna underpasses and fencing (as required associated with access tracks)
- general impact mitigation
- staff/contractor inductions and ongoing education
- pre-clearing surveys and fauna salvage/translocation where practical
- rehabilitation and restitution of adjoining habitat where possible
- weed control
- pest management
- rehabilitation protocols
- monitoring.

The biodiversity management plan will include clear objectives and actions for the Project including, where appropriate, including:

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

The biodiversity management plan will include mitigation measures as outlined in Table J-4.

Table J-4: Summary of mitigation measures

Mitigation measure	Design	Construction	Operation
▪ Identify locations and design of fauna underpasses, where appropriate, in the design of access tracks.	Y		
▪ Designated areas for stockpiles and equipment lay-down should be placed in cleared areas to avoid or minimise impact to vegetation and habitat.		Y	Y
▪ Staff/contractor inductions on site should be conducted by a suitably qualified staff/contractor (e.g. a trained ecologist or other qualified environmental specialist).		Y	Y
▪ Dust suppression should be implemented in order to reduce biodiversity impacts.		Y	Y
▪ Appropriate erosion and sediment control strategies should be implemented.		Y	Y
▪ Preferred seed mixes for revegetation works, ideally to be collected from the study area and surrounds, should be used.		Y	Y
▪ Procedures for specific targeted species searches for those threatened species and priority taxa considered to have potential to occur prior to any staged development should be implemented. 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
▪ A weed and feral animal management plan should be developed, including vehicle wash down procedures to limit edge effects such as the establishment of aggressive weeds, and the spread of annual and perennial exotic herbs. Methods to minimise the potential for the introduction and/or spread of weeds or plant disease should include, where appropriate, the following: ‣ Determination of the potential for the introduction of or facilitation of exotic, non-indigenous and noxious plants ‣ management process to identify origin of construction materials, machinery and equipment ‣ vehicle inspection points for weed free status on entering and exiting the Project area ‣ vehicle wash down protocols, in particular a protocol that all vehicles and equipment must be cleaned on entering the Project area, and the washdown water is managed to ensure it does not enter creek, other		Y	Y

Mitigation measure	Design	Construction	Operation
water ways or gullies.			
▪ Sensitive areas, such as those containing fauna habitat, should be cleared of fauna prior to construction and operational activities commencing by 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 or areas of significant fauna habitat) to avoid unnecessary vegetation and habitat removal ‣ collect native seed for use in the revegetation of disturbed areas ‣ 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	Y
▪ During the life of the mine, areas not required for operation of the mine should be revegetated following a revegetation/rehabilitation plan. This plan should include: ‣ 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 koalas and hollow dependent 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 areas rehabilitated for nature conservation objectives.		Y	Y
▪ A flora and fauna monitoring program for the Project should be developed and implemented aimed at achieving a better understanding of impacts and rehabilitation actions to flora and fauna throughout the study area. Monitoring should also include exotic weeds and feral animals. The plan should be adaptive.		Y	Y

J4.2.1 Further survey

Surveys of the proposed gas pipeline were undertaken in late winter, which is sub-optimal for detection of many species of plant and animal. As such, additional targeted survey for flora and fauna has been planned along this section of the study area. Fauna surveys will be best undertaken in late spring/early summer, while flora surveys will be best completed in late summer/early autumn.

Two seasonal surveys have been completed across the MLA areas. As such, further detailed survey of these habitats is not considered necessary for the EIS. It is anticipated

however that ongoing terrestrial ecology surveys will be undertaken as part of the biodiversity management plan throughout the life of the project.

J4.3 Residual impacts and offsets for MNES

Residual impacts are those that remain after implementation of the Project and all associated mitigation and other environmental management measures have been undertaken. Residual impacts for this Project include the removal of vegetation and associated habitat. Where there is residual loss or degradation of vegetation and habitat after detailed design and determination of the mine plan, infrastructure, and 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 Project 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 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 will be determined following detailed design of the Project 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 Project is located in a landscape that has been largely cleared of vegetation as a result of grazing and dryland agriculture. The remaining vegetation generally occurs in continuous linear patches along the main drainage lines traversing the study area or as patches that are highly fragmented. The area does however contain MNES including threatened ecological communities and species. The Project may have a range of impacts on these MNES, the greatest being the loss of habitat as a result of vegetation clearing. Impact assessments completed for threatened and migratory species and endangered ecological communities that may be affected by the project indicated that the Project is not likely to have a significant impact on these matters.

Recognising the nature of the impacts, a comprehensive mitigation and management program for the Project will be put in place, including providing green offsets for significant vegetation to be cleared.

J6. References

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