Wandoan Coal Project

MLA Areas and Gas Supply Pipeline

Supplementary Terrestrial Ecology Impact Assessment

September, 2009

Wandoan Joint Venture

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Acronyms

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

Executive summary

This report presents the findings of the supplementary terrestrial ecology survey of the gas supply pipeline and a reassessment of impacts associated with the MLA areas and gas supply pipeline for the Wandoan Coal Project (the Project).

As part of the Environmental Impact Statement (EIS) for the Project, a terrestrial ecological assessment was completed (EIS Volume 1, Chapter 17A Terrestrial Ecology technical report). The assessment was based on two seasonal periods of survey for the MLA areas, but only a single survey period for the gas supply pipeline corridor. The Terms of Reference (ToR) for the Project indicated that seasonal surveys should be completed for the Project. A commitment was made in the EIS that seasonal surveys would be completed for the gas supply pipeline and the results presented in a supplementary report.

Subsequent to the ecological assessment, the arrangement of the pits and infrastructure within the MLA areas has been refined and therefore the extent of vegetation clearing and the likely impacts of the Project on biodiversity have been reassessed.

This report presents the findings of the supplementary terrestrial ecology survey and assessment completed for the gas supply pipeline, plus the amendments to the MLA areas due to changes in Project scope. The report builds upon information already provided in the EIS Volume 1, Chapter 17A Terrestrial Ecology technical report and in particular to highlight any differences in species, communities, habitats or impacts that have become apparent as a result of these surveys.

For the gas pipeline, the vegetation types, habitat types and species present were the same as those recorded during the earlier August 2008 surveys. No additional threatened species to those recorded in August 2008 were recorded in the February 2009 surveys in the gas supply pipeline study area. This indicates that the assessment of impacts presented in the Environmental Impact Assessment remain the same for this component of the Project.

With the rearrangement of the pits and infrastructure within the MLA areas, clearing within the MLA areas and the gas supply pipeline alignment is likely to result in removal of 319.1 hectares of remnant vegetation, of which 27.6 hectares are listed as remnant endangered (DERM Biodiversity Status), and 471.7 hectares of non remnant vegetation. The non remnant vegetation includes 13.1 hectares of EPBC-listed endangered vegetation (RE 11.9.4). Overall this is a reduction in the extent of vegetation that was proposed to be cleared in the EIS terrestrial ecology technical report (790.8 hectares as opposed to an original estimate of 1,170 hectares) – a decrease of 379.2 hectares. Within the MLA areas, 82% of remnant vegetation and 53% of non remnant vegetation will be retained, compared with 63% of remnant and 51% of non remnant vegetation stated in the original technical report. Other impacts and the proposed mitigation measures remain the same as the original technical assessment.

1. Introduction

This report presents the findings of the February 2009 summer terrestrial ecology surveys and assessment completed for the gas supply pipeline and results of any amendments to the MLA areas due to changes to the Project scope, as part of the Supplementary Environmental Impact Statement process. The report is intended to build upon information already provided in the EIS Volume 1, Chapter 17A Terrestrial Ecology technical report and is to be read as an addendum to that report.

1.1 Background

The Wandoan Coal Project comprises the development of thermal coal resources immediately west of Wandoan, a rural town situated approximately 350 km northwest of Brisbane and 60 km south of Taroom. The coal reserves for this Project exist within three mining lease application areas (MLA areas 50229, 50230 and 50231) to be developed as an open cut mine with related infrastructure. The Project is being developed by the Wandoan Joint Venture (WJV), a partnership which includes Xstrata Coal Queensland Pty Ltd (XCQ), ICRA Wandoan Pty Ltd and Sumisho Coal Australia Pty Ltd.

1.2 Context and scope of this assessment

As part of the environmental impact statement (EIS) for the Project, a terrestrial ecological assessment was completed along the route of the gas supply pipeline (see Section 1.2.1). The Terms of Reference (ToR) for the Project indicated that seasonal surveys would need to be completed. A commitment was made in the environmental assessment that seasonal surveys would be completed for the gas supply pipeline and the results presented in a supplementary report.

This report presents the findings of the supplementary terrestrial ecology survey and assessment completed for the gas supply pipeline in February 2009, plus the amendments to the MLA areas due to changes in Project scope. The report is intended to build upon information already provided in the terrestrial ecology assessment and in particular to highlight any differences in species, communities, habitats or impacts that have become apparent as a result of these surveys.

1.2.1 Gas supply pipeline details and study area

For the purpose of the current assessment the following terms are used:

- **Footprint** – the extent of direct impacts of the Project. This was taken to be the lands within a 20 m wide corridor around the gas supply pipeline alignment
- **Study area** – the study site and any additional areas that could potentially be affected by the proposal either directly or indirectly, such as ancillary construction areas. In this case it is taken to be lands within 500 m of the proposed gas supply pipeline route
- **Bioregion** – 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 proposed gas supply pipeline extends to the east of the MLA areas (Figure 1-1) and spans approximately 25.5 kilometres from the Leichhardt Highway, running in a meandering easterly direction adjacent to the eastern boundary of the proposed SBR corridor (Figure 1-1). Much of this area comprises a mosaic of cleared cropping and grazing land interspersed with small patches of regrowth and remnant vegetation with the latter more prevalent along the major drainage lines of Juandah and Roche Creeks.

1.2.2 MLA areas details and study area

The operation of the Wandoan Coal Project is as generally described within the EIS. However, some specific elements of the Project within the MLA areas have been modified since the release of the EIS. Project modifications that influence the terrestrial ecology assessment include:

- the scheduling of mining has been modified for Frank Creek Pit due to its proximity to Wandoan township
- removal of Woleebee South Pit to be beyond Year 30 of mine operations
- addition of Wubugal Pit to the south of Wandoan township, adjacent to the Leichhardt Highway to off-set the scheduling changes to Frank Creek Pit
- changes to the coarse and fine (tailings) rejects disposal strategy, particularly associated with Austinvale Pit North.

The MLA areas including revised pit outlines are shown in Figure 1-1.

As a result of these changes the extent of vegetation clearing and the likely impacts of the Project on biodiversity have been reassessed in this report.

Barakula
HORSE CREEK
SPRING CREEK
LAGGERS GULLY
ROCHE CREEK
STAKEYARD CREEK
DUCK CREEK
JUANDAH CREEK
RYALLS RD
MUD CREEK
LOG HUT GULLY
BOORAL RD
ROCHE CREEK
BACK CREEK
GROSMONT RD
WOLLEEBEE CREEK
NATHAN RD
Taroom Downs
MT ORGAN CREEK
BUNDI RD
JUANDAH CREEK
ROCHE CREEK RD
WANDOAN
MUD CREEK
JACKSON WANDOAN RD
LEICHHARDT HWY
Southern Downs
RANGE GULLY
WANDOAN CREEK
HALWAY CREEK
FRANK CREEK
Town
Road
Gas supply pipeline
Watercourse
Revised proposed MLA boundary
Existing MLA Boundary
Mining pits
Future mining pits
Infrastructure
IBRA Subregions
Remnant Vegetation
0 1 2 3 4 5
Kilometres

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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 1-1 : Study Area

2. Relevant legislation and guidelines

Generally the legislation relevant to biodiversity remains the same as in the EIS technical report. A new piece of legislation and a proposed policy are, however, relevant.

2.1 Vegetation Management (Regrowth Clearing Moratorium) Act 2009

On 7 April 2009, the Queensland Government announced a three-month moratorium on clearing high-value regrowth vegetation. The moratorium took legal effect on 8 April 2009 under the *Vegetation Management (Regrowth Clearing Moratorium) Act 2009*, and has recently been extended until 7 October 2009.

Under the moratorium all native regrowth vegetation within 50 metres of a watercourse in the priority reef catchments of the Wet Tropics, Burdekin and Mackay/Whitsunday regions, and endangered regrowth vegetation in rural areas across the State on freehold and agricultural and grazing State leasehold land is protected for a period of at least three months. Remnant vegetation is dealt with in the same manner as before under the *Vegetation Management Act 1999*.

The Moratorium does not affect the exemption for “specified activities” (which includes mining activities within mine tenements) under the *Integrated Planning Act*.

Some small areas of regrowth vegetation within the study area outside of the MLA areas will fall under this moratorium (refer Figures 2-1). The watercourse provisions of the moratorium do not apply to this Project as it does not fall within a priority reef catchment.

2.2 Consultation draft Policy for Biodiversity Offsets

A biodiversity offset is an environmental offset that addresses environmental conditions and features that are important for biodiversity. A biodiversity offset is an action undertaken to counterbalance an impact that causes a loss of biodiversity values. The Queensland Government has developed a consultation draft policy on biodiversity offsets. A final policy will be prepared following consultation from December 2008 and consideration of written submissions from individuals and organisations. At the time of writing this technical report, a final policy has not been released.

The aim of a policy on biodiversity offsets is to provide a consistent and transparent approach to the use of environmental offsets for impacts on biodiversity.

The policy applies to biodiversity values of state interest, but does not apply to biodiversity offsets for impacts to the same biodiversity values already captured under specific-issue offset policies such as the Policy for Vegetation Management Offsets.

The draft policy is not intended to replace offset programs already in place, such as those required under the Vegetation Management Act (Department of Natural Resources and Water 2007). This proposed policy is designed to sit under the existing Queensland Government Policy for Environmental Offsets, which consider a number of subpolicies including vegetation offsets and biodiversity offsets.

Offsets have been considered in Section 7.1.

Barakula
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SPRING CREEK
LAGGERS GULLY
ROCHE CREEK
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DUCK CREEK
JUANDAH CREEK
RYALLS RD
MUD CREEK
LOG HUT GULLY
BOORAL RD
ROCHE CREEK
BACK CREEK
GROSMONT RD
WOLLEEBEE CREEK
NATHAN RD
Taroom Downs
MT ORGAN CREEK
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WANDOAN
JACKSON WANDOAN RD
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RANGE GULLY
MUD CREEK
LEICHHARDT HWY
WANDOAN CREEK
HALFWAY CREEK
FRANK CREEK
Town
Road
Gas supply pipeline
Watercourse
Moratorium regrowth
Revised proposed MLA boundary
Existing MLA Boundary
Mining pits
Future mining pits
Infrastructure
IBRA Subregions
Remnant Vegetation
0 1 2 3 4 5
Kilometres

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Source: Roads, QLD State Digital Road Network (2004); Towns, creeks 1:250K Topo, Geoscience Australia (2006); Moratorium regrowth vegetation, Department of Environment and Resource Management, QLD (2009)

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Figure 2-1 : Moratorium regrowth vegetation

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 focus here is on the supplementary field survey for the gas supply pipeline. No additional desk-based assessment was completed for the gas supply pipeline or the MLA areas, and no additional field surveys were undertaken for the MLA areas.

3.1 Contributors and qualifications

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

Table 3-1 Contributors and their roles

Name	Association	Qualification	Role
Martin Predavec	PB	BSc(Hons), PhD	Ecology lead
Chris Hanson	Hansen Botanical Advice	BMedSc, BSc (Hons)	Botanist – field surveys and reporting
Ben Lewis	Lewis Ecological Services	BAppSci(Hons)	Zoologist – field surveys and reporting
Lukas Clews	PB	BSc, Grad Cert AppSci	Botanist – field surveys
Sean Niemeijer	PB	BSc	Zoologist – field surveys and reporting
Greg Ford	Consultant Ecologist	BAppSci	Bat call analysis

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

- Animal Ethics Permit from the Department of Primary Industries and Fisheries Animal Ethics Committee. Permit number CA 2007/10/223. Expires 31 October 2010
- Queensland Parks and Wildlife Service Scientific Purposes Permit issued under the Nature Conservation Regulation 1994. Permit Number WISP02443404. Expires 4 October 2009
- Department of Primary Industries and Fisheries Scientific Use Registration. Registration No: 064. Expires 13 March 2010.

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 (2008) and Census of Australian Vertebrates (CAVS) database (Department of the Environment Water heritage and the Arts 2008).

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 Survey weather conditions

Weather conditions during the 4 day survey of the gas supply pipeline were best described as hot and humid with daytime temperatures exceeding 30^{o}C up to a maximum of 35^{o}C, followed by mild overnight minimums of between 20-23^{o}C (See Attachment A). Substantial rainfall occurred on the night of the 20th and 21st February with falls generally exceeding 25-50 mm in the study area with heavier falls recorded elsewhere in the district. Overall, the surveys conditions were considered conducive for most vertebrates including herpetofauna and microchiropteran bats.

3.4 Terrestrial flora surveys

Survey of terrestrial flora in the gas supply pipeline study area 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 Department of Environment and Resource Management (Environmental Protection Agency 2007).

The gas supply pipeline corridor was surveyed through the attendance of previous tertiary and secondary level vegetation assessment sites and vegetated areas that had not been previously surveyed. These new areas were assessed in detail using the methodologies described by Neldner (2005), while the previously surveyed sites were assessed for changes in floristic composition as determined during the winter survey effort and presence of threatened and regionally significant taxa.

3.5 Terrestrial fauna

The occurrence of fauna species in the in the gas supply pipeline study area was investigated by assessing the suitability of available habitat for fauna, as well extensive opportunistic and systematic targeted surveys. Fauna habitat assessment and surveys were focused predominantly on threatened species, migratory birds and priority taxa for the southern Brigalow Belt bioregion.

3.5.1 Fauna survey techniques

The supplementary field surveys of the gas supply pipeline were undertaken over 4 days from the 19-22 February 2009. Field surveys occurred as per the EIS terrestrial fauna methodologies with the exception of the exclusion of standard trapping from the summer surveys. No trapping sites were established during the summer field survey, instead survey effort focused on drive transects and the survey of supplementary sites. Supplementary sites were chosen to provide a comprehensive survey of fauna assemblages and to ensure discreet habitats such as roadside Brigalow, degraded riparian zones and depression areas were surveyed. These surveys comprised of 21 supplementary sites and 120 km of nocturnal drive transect. At each of the supplementary sites at least some of the techniques used at the standard sites were employed, and these largely revolved around:

- harp trapping
- ultrasonic bat detection
- herpetofauna active searches
- spotlighting
- call broadcast
- general bird surveys
- nocturnal vehicle traverses.

Full details of the survey methods employed are provided in the EIS Volume 1, Chapter 17A Terrestrial Ecology technical report. Survey effort is described in Table 3-2 and Figure 3-1. Results of the fauna surveys are shown in Attachments B and C.

Table 3-2 Survey techniques and effort employed along Gas Supply Pipeline route

Technique	Sites surveyed	Effort
Anabat	6	50 hours
Active Searches – Herpetofauna	10	6 hours 40 minutes
Spotlighting	5	5 hours
Harp Trapping	4	10 trap nights
Call Broadcast	1	1 location
General bird surveys	Throughout	Incidental over 4 days
Nocturnal Drive Transects	Throughout	120 km

Barakula
Taroom Downs
Southern Downs
WANDOAN
A3
S5
Ha4
H1
H2
A4
H3
H4
S1
Ha3
A1
S3
Ha2
H5
H6
H8
H7
A6
A2
S4
Ha1
S2
H9
A5
H10
HORSE CREEK
DUCK CREEK
SPRING CREEK
LAGGERS GULLY
ROCHE CREEK
STAKEYARD CREEK
JUANDAH CREEK
RYALLS RD
MUD CREEK
LOG HUT GULLY
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FRANK CREEK
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Herpetofauna survey
Harp trap
Spotlighting
Anabat
Town
Road
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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 : Fauna survey locations

4. Existing environment

This section describing the existing environment focuses on the gas supply pipeline, which builds on the previous surveys presented in the EIS Volume 1 Chapter 17A Terrestrial Ecology technical report. Note that the existing description of the terrestrial ecology environment for the MLA areas is as given in the EIS Volume 1 Chapter 17A Terrestrial Ecology technical report, and has not been updated in this addendum to the technical report. The combined graphical results of the field surveys in terms of regional ecosystems and threatened species are shown in Attachment D.

4.1 Regional ecosystems

The vegetation assessment and subsequent RE determinations remained unchanged from those established during the dry season survey effort for the gas supply pipeline.

4.2 Species of plant

Detailed floristic inventories did not identify further species that had not been recorded during the dry season survey effort along the gas supply pipeline.

4.3 Fauna habitats

No new fauna habitats were identified in the summer surveys compared to those described in the EIS Volume 1 terrestrial ecology report.

4.4 Species of animal

Combined field surveys (Winter and Summer) identified 144 species in the Project area (gas supply pipeline), comprised of 12 frogs, 21 reptiles, 27 mammals and 84 species of bird (see Attachment A).

The summer survey recorded substantially more herpetofauna than the earlier winter survey. This is attributed to increased reptile and amphibian activity as a result of warmer weather and rainfall during the summer survey (See Table 4-1).

Table 4-1 Summer and total fauna survey results for the gas supply pipeline study area

Fauna	Species recorded in summer survey, not recorded in winter	Total summer Records	Total of both surveys (Summer and Winter)
Amphibians	7	12	12
Reptiles	10	20	21
Mammals	4	17	27
Birds	9	72	84
Total	**30**	**121**	**144**

During summer field surveys, Brigalow Scaly-foot (*Paradelma orientalis*) was the only rare or threatened species recorded in the gas supply pipeline study area. Brigalow Scaly-foot is described in detail in the EIS terrestrial ecology technical report. In addition, five regionally significant species (Salmon Striped Frog *Limnodynastes salmini*, Carpentaria Snake *Cryptophis boschmai*, Common Brushtail Possum *Trichosurus vulpecula*, Red-necked Wallaby *Macropus rufogriseus*, Rufous Bettong *Aepyprymnus rufescens*) were recorded in the gas supply pipeline study area. No migratory species were recorded within the study area during summer field surveys.

5. Threatened biodiversity and other significant matters

This section summarises the biodiversity matters of national, state and regional significance identified from the summer field survey. The biodiversity matters of national, state and regional significance identified from the desk based and previous field surveys is described in the EIS Volume 1 terrestrial ecology technical report.

5.1 Matters of National Environmental Significance

5.1.1 Threatened ecological communities

No threatened ecological communities additional to those discussed in the EIS were identified during the summer flora surveys.

5.1.2 Threatened species

Seasonal floral surveys, as reported here, did not identify additional threatened plant species listed under the EPBC Act.

Brigalow Scaly-foot (*Paradelma orientalis*) was the only EPBC Act-listed threatened species of animal recorded during the summer surveys. This species was recorded twice during the earlier surveys and re-recorded twice during the summer surveys. Both summer recordings were made at two new locations within the gas supply pipeline study area in association with non-remnant *Acacia harpophylla* and/or *Casuarina cristata* open forest, within road side vegetation along Nathan Road. Brigalow Scaly-foot is currently listed as a vulnerable species pursuant to the EPBC Act and Nature Conversation (NC) Regulation.

Threatened species of plant and animal identified from the desk based and previous field surveys are described in the EIS Volume 1 terrestrial ecology technical report.

5.1.3 Migratory species

Summer surveys did not identify any additional migratory species listed under the EPBC Act to those in the EIS.

5.1.4 World heritage properties

No world heritage properties are located near the Project area.

5.1.5 Ramsar wetlands

No Ramsar sites are located near the Project area.

5.2 Matters of state significance

5.2.1 Endangered and Of Concern Regional Ecosystems

Summer floral surveys performed in February 2009 failed to identify additional endangered or of-concern regional ecosystems along the gas supply pipeline to those described in the EIS.

5.2.2 Threatened flora of State significance

Summer floral surveys failed to identify additional threatened plant species listed under the NC Act to those described in the EIS.

5.2.3 Threatened fauna of state significance

Summer floral surveys failed to identify additional rare or threatened species of animal listed under the NC Act to those described in the EIS.

5.3 Matters of regional significance

5.3.1 Biodiversity Planning Assessment

No additional biodiversity planning areas (BPA) were identified during the summer survey to those described in the EIS.

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.

Priority taxa of plant

The summer flora survey of the gas supply pipeline performed in February 2009 failed to identify any additional priority taxa.

Priority taxa of animal

Summer fauna surveys of the gas supply pipeline identified two additional priority taxa (Carpentaria Snake *Rhinoplocephalus boschmai* and Rufous Bettong *Aepyprymnus rufescens*) and re-recorded four priority taxa (See Table 5-1). Rufous Bettong and Carpentaria Snake have been infrequently recorded in the Wandoan and Grosmont areas, however, it is likely they inhabit most of the riparian habitats and associated vegetated creek flats in the area.

Table 5-1 Brigalow Belt South priority taxa fauna recorded during the summer fauna survey in association with the gas supply pipeline

Name	Conservation status[1]		Survey Season
	State	Priority Taxa	
Salmon-striped Frog (*Limnodynastes salmini*)	—	Yes	S W
Carpentaria Snake (*Rhinoplocephalus boschmai*)	**—**	**Yes**	**S**
Speckled Warbler (*Chthonicola sagittata*)	—	Yes	S W
Grey-crowned Babbler (*Pomatostomus temporalis*)	—	Yes	S W
Rufous Bettong (*Aepyprymnus rufescens*)	**—**	**Yes**	**S**
Greater Glider (*Petauroides volans*)	—	Yes	S W
Common Brushtail Possum (*Trichosurus vulpecula*)	—	Yes	S W
Brigalow Scaly-foot (*Paradelma orientalis*)	V	Yes	S W

Rows in Bold = priority taxa recoded only during the summer survey
Survey Season: W = winter, S = Summer

5.3.3 Essential habitat and state wildlife corridors

There were no changes to the EIS for the mapped essential habitat or wildlife corridors as a result of the summer surveys.

6. Potential impacts

Impacts associated with the Project, including the mine pits and infrastructure and gas supply pipeline, are the same as those described in the EIS Volume 1, Chapter 17A Terrestrial Ecology chapter and technical report. However due to modifications of the pits and infrastructure within the MLA areas, the extent of clearing has been recalculated and is presented in Table 6-1. Other potential impacts are described in the EIS technical report (EIS Volume 1, Chapter 17A Terrestrial Ecology technical report 17A-1-V1.5).

Clearing within the MLA areas and the gas supply pipeline alignment is likely to result in removal of 319.1 hectares of remnant vegetation, of which 27.6 hectares are listed as remnant endangered (DERM Biodiversity Status), and 471.7 hectares of non remnant vegetation. The non remnant vegetation includes 13.1 hectares of EPBC-listed endangered vegetation (RE 11.9.4). Overall this is a reduction in the extent of vegetation that was proposed to be cleared in the EIS terrestrial ecology technical report (790.8 hectares now as opposed to an original estimate of 1,170 hectares) – a decrease of 379.2 hectares. Within the MLA areas, 82% of remnant vegetation and 53% of non remnant vegetation will be retained, compared with 63% of remnant and 51% of non remnant vegetation stated the EIS.

6.1 Regional Vegetation Management Code associated with the gas supply pipeline

In response to the former Department of Natural Water and Resources submission on the EIS, a more detailed assessment of the Project's impact on vegetation relative to the Vegetation Management Act is detailed here.

Clearing of vegetation for mining activities on a mining lease is not an assessable development under the *Integrated Planning Act 1997* and therefore the Regional Vegetation Management Code and the Policy for Vegetation Management Offsets do not apply to vegetation clearing on the MLA areas. However, vegetation clearing associated with the gas pipeline is assessable for the section outside the MLA areas.

Clearing of vegetation for the purpose of a significant project under the *State Development and Public Works Act 1971* (section 26) is allowable provided that the clearing follows the performance requirements outlined in the Regional Vegetation Management Code. In this case the code is that for the Brigalow Belt and New England Tablelands bioregions and the specific performance requirements for significant projects (Part S) are discussed below. Where an acceptable solution includes different solutions depending on the bioregion or the subregion, only those relevant to the Project area are mentioned.

For performance requirements that include maintaining the current extent of assessable vegetation, offsets are an acceptable solution (see Section 7).

Table 6-1 Extent of proposed vegetation clearing

Mine component	Remnant status	Extent of each RE type directly affected (ha)								
		11.3.2 N/OC/NL	**11.3.25 N/OC/NL**	**11.9.4 E/E/E**	**11.9.5 E/E/E**	**11.9.7 OC/OC/NL**	**11.9.10 OC/E/NL**	**11.10.9 N/N/NL**	**Other non-remnant vegetation**	**Total**
Mining pits	Remnant	0	209.8	0	16.2	0	3.0	0		**229**
	Non-remnant	6.0	0	8.1	191.6	0.1	141.4	0	18.2	**365.4**
Infrastructure on MLA	Remnant	0	80.6	0	6.4	0	2.0	0		**89**
	Non-remnant	0	0.1	5.0	22.8	23.4	52.7	1.0	1.1	**106.1**
Gas pipeline (not on MLA)	Remnant	0	1.1	0	0	0	0	0		**1.1**
	Non-remnant	0	0.2	0	0	0	0	0	0.0	**0.2**
Total proposed clearing	**Remnant**	**0**	**291.5**	**0**	**22.6**	**0**	**5.0**	**0**	**0**	**319.1**
	Non-remnant	**6.0**	**0.3**	**13.1**	**214.4**	**23.5**	**194.1**	**1.0**	**19.3**	**471.7**
Change from EIS	Remnant	—	—	0	—	0	—	0		—
	Non-remnant	0	0	0	—	+	—	0	0	—

Notes: heterogeneous polygons are included above as the dominant

* RE. N = Not of concern/No Concern, OC = Of Concern, E = Endangered, NL = Not Listed

** change: 0 = within 10 hectares of original mine layout, - = reduction of greater than 10 hectares from original layout, + = increase greater than 10 hectares from original layout.

6.1.1 PR S.1: Limits to clearing

Performance requirement

To regulate the clearing of vegetation in a way that conserves remnant regional ecosystems, does not cause land degradation, prevents the loss of biodiversity and maintains ecological processes—subject to the limitations required to meet PR S.2 to PR S.10—clearing is limited to the extent that is necessary for the project, any associated ancillary works, and the operation of works that comprise a project declared to be a significant project under the *State Development and Public Works Organisation Act 1971*, section 26.

Project response

The clearing values presented in this report are based on the extent necessary to construct and operate the gas supply pipeline.

6.1.2 PR S.2: Wetlands

Performance requirement

To regulate the clearing of vegetation in a way that prevents the loss of biodiversity and maintains ecological processes—maintains the current extent of assessable vegetation associated with any natural significant wetland and/or natural wetland to provide—

a) Water quality by filtering sediments, nutrients and other pollutants; and

b) Aquatic habitat; and

c) Terrestrial habitat.

Acceptable solution

Clearing does not occur—

a) In any natural wetland; and

b) Within 100 metres from any natural wetland; and

c) In any natural significant wetland; and

d) Within 200 metres from any natural significant wetland.

Project response

No natural or natural significant wetlands occur in association with the gas supply pipeline or will be affected by the construction, operation and maintenance of the gas supply pipeline. Therefore the project meets this requirement.

6.1.3 PR S.3: Watercourses

Performance requirement

To regulate the clearing of vegetation in a way that does not cause land degradation, prevents the loss of biodiversity and maintains ecological processes—maintain the current extent of assessable vegetation associated with any watercourse to provide—

a) Bank stability by protecting against bank erosion; and

b) Water quality by filtering sediments, nutrients and other pollutants; and

c) Aquatic habitat; and

d) Terrestrial habitat.

Acceptable solution

Clearing does not occur—

a) In any watercourse; and

b) Within the relevant distance stipulated in Table 2 of the code, of each high bank of each watercourse.

Project response

Creeks within the gas supply pipeline area (e.g. Roche and Juandah Creeks) are all first or second order non-coastal streams, and therefore Table 2 of the Vegetation Management Code indicates that a distance of 50 m from each high bank should be protected. A total of 0.2 hectares of remnant vegetation lies within the 20 m corridor within 50 m of each mapped watercourse (Table 6-2). While the final design will aim to reduce impacts on these ecosystems and on watercourses, offsets may be used to meet the performance requirement

Table 6-2 Remnant regional ecosystems that may be cleared within 50m of each mapped watercourse

Regional ecosystem	Potential clearing within 50 m of a mapped watercourse (ha)
11.3.25	0.2
Total	**0.2**

In these areas the final design will be modified to avoid impacts on this vegetation where possible, and offsets may be used as an alternative to meet the performance requirement.

6.1.4 PR S.4: Connectivity

Performance requirement

To regulate the clearing of vegetation in a way that prevents the loss of biodiversity and maintains ecological processes—areas of remnant vegetation are:

a) Of sufficient size and configured in a way to maintain ecosystem functioning; and

b) Of sufficient size and configured in a way to remain in the landscape in spite of any threatening processes; and

c) Located on the lot(s) that are the subject of the application to maintain connectivity to remnant vegetation on adjacent properties.

Acceptable solution

Where clearing is less than:

a) 25 metres wide in the non-coastal subregions of the Brigalow Belt and the New England Tableland Bioregion; or

b) Is less than 5 hectares in the non-coastal subregions of the Brigalow Belt and the New England Tableland Bioregion

clearing does not:

i) reduce the width of remnant vegetation to less than 200 metres

ii) occur where the width of remnant vegetation is less than 200 metres.

OR

Clearing does not:

c) rReduce areas of contiguous remnant vegetation to less than 50 hectares, in the non-coastal subregions of the Brigalow Belt and the New England Tableland Bioregion; and

d) Occur in areas of contiguous remnant vegetation that are less than 50 hectares, in the non-coastal subregions of the Brigalow Belt and the New England Tableland Bioregion; and

e) Reduce the width of remnant vegetation to less than than 200 metres; and

f) Occur where the width of remnant vegetation is less than 200 metres; and

g) Reduce the total extent of remnant vegetation to less than 30%; and

h) Occur where the total extent of remnant vegetation is less than 30%.

Project response

The proposed clearing width for the pipeline is 20 metres and therefore the project will meet this requirement provided that it does not reduce the width of remnant vegetation to less than 200 metres or occurs where the width of existing remnant vegetation is less than 200 metres. The gas supply pipeline alignment crosses four patches of existing remnant vegetation, each of which is less than 200 metres (Table 6-3).

Table 6-3 Areas of remnant vegetation with a reduced width along the pipeline corridor

Location	Width of remnant vegetation (m)
Branch of Juandah Creek	170 m
Branch of Juandah Creek	150 m
Branch of Roche creek	130 m
Branch of Roche creek	80 m

In these areas the final design will be modified to avoid impacts on this vegetation where possible.

6.1.5 PR S.5: Soil erosion

Performance requirement

To regulate the clearing of vegetation in a way that does not cause land degradation and maintains ecological processes – the effect of clearing does not result in:

a) Mass movement, gully erosion, rill erosion, sheet erosion, tunnel erosion, stream bank erosion, wind erosion, or scalding

b) Any associated loss of chemical, physical or biological fertility – including, but not limited to water holding capacity, soil structure, organic matter, soil biology, and nutrients, within and/or outside the lot(s) that are the subject of the application.

Acceptable solution

Mechanical clearing only occurs on:

a) very stable soils on a slope less than 15%; and

b) stable soils on a slope less than 12%; and

c) unstable soils on a slope less than 8%; and

d) very unstable soils on a slope less than 5%.

Project response

Soils within the gas supply pipeline alignment are considered unstable as per Table 15 of the Vegetation Management Code. In this case mechanical clearing would only take place where the slope is less than 8%, and appropriate erosion sediment control would apply throughout project related works.

6.1.6 PR S.6: Salinity

Performance requirement

To regulate the clearing of vegetation in a way that does not cause land degradation and maintains ecological processes – clearing does not contribute to:

a) Water logging; or

b) The salinisation of groundwater, surface water or soil.

Acceptable solution

Where clearing is less than:

a) 5 hectares; or

b) 50 metres wide:

clearing does not occur:

i) in any discharge area

ii) within 200 metres of any discharge area.

Project response

Clearing for the gas supply pipeline is proposed to be 20 metres wide and therefore clearing should not occur in or within 200 metres of any discharge area. There are no known discharge areas within the gas supply pipeline alignment, therefore the Project meets this performance requirement.

6.1.7 PR S.7: Conserving remnant *endangered* regional ecosystems and *of concern* regional ecosystems

Performance requirement

To regulate the clearing of vegetation in a way that conserves remnant endangered regional ecosystems and remnant of concern regional ecosystems—maintain the current extent of endangered regional ecosystems and of concern regional ecosystems.

Acceptable solution

Clearing only occurs in endangered regional ecosystems or of concern regional ecosystems that are not listed in Table 4 (of the Vegetation Management Code) and where the clearing within those regional ecosystems is less than—

a) 10 metres wide; or

b) 0.5 hectares.

Project response

No endangered or of-concern regional ecosystems were identified within the gas supply pipeline easement. Clearing for the Project gas supply pipeline involves only RE11.3.25, which is not an endangered or of concern regional ecosystem. Therefore the construction, maintenance and operation of the gas supply pipeline will not result in the clearing of endangered or of-concern regional ecosystems.

6.1.8 PR S.8: Essential habitat

Performance requirement

To regulate the clearing of vegetation in a way that prevents the loss of biodiversity—maintain the current extent of essential habitat.

Acceptable solution

Clearing does not occur in an area shown as essential habitat on the essential habitat map.

Project response

No essential habitat has been mapped in the gas supply pipeline alignment, therefore the Project meets this performance requirement.

6.1.9 PR S.9: Conservation status thresholds

To regulate the clearing of vegetation in a way that prevents the loss of biodiversity and conserves remnant regional ecosystems – maintain the current extent of regional ecosystems listed in Table 5 (of the Vegetation Management Code).

Acceptable solution

Clearing in a regional ecosystem listed in Table 5 (of the Vegetation Management Code) does not occur unless the clearing is less than:

a) 10 metres wide; or

b) 2 hectares.

Project response

Table 5 of the Vegetation Management Code includes regional ecosystems that are at risk of the remnant extent falling below 30% of its pre-clearing extent, or having a remnant extent of less than 10,000 hectares. None of the REs within the study area are listed within Table 5 of the Vegetation Management Code. Therefore the Project meets this performance requirement.

6.1.10 PR S.10: Acid sulphate soils

This performance requirement relates to the coastal areas of the Brigalow Belt bioregion and therefore does not apply to the project area.

6.1.11 Summary of the regional vegetation management codes

The gas supply pipeline will meet the performance requirements of the regional vegetation management codes, provided the design is modified to avoid clearing remnant vegetation within 50 m of each mapped watercourse and to avoid clearing remnant vegetation in the four areas where the remnant vegetation is less than 200 metres in width (see Sections 6.1.3 and 6.1.4), and with the provision of suitable offsets to maintain the current extent of vegetation (see below).

Biodiversity offsets for the project are considered in Section 7 below under the Policy for Vegetation Management Offsets (Department of Natural Resources and Water 2007), the draft policy for Biodiversity Offsets (Queensland Government 2009) and the Draft Policy Statement: Use of environmental offsets under the *Environment Protection and Biodiversity Conservation Act 1999* (Department of Environment and Water Resources 2007).

7. Mitigation measures

Mitigation measures are the same as those described in the EIS Volume 1 Chapter 17A Terrestrial Ecology chapter and technical report. The modifications to the mine have not modified the mitigation measures required; however the reduction in amount of vegetation clearing within the MLA areas and potential government policy changes will result in variation in the offset requirements.

7.1 Biodiversity offsets for impacts on the MLA areas

Clearing of vegetation for mining activities on a mining lease is not an assessable development under the *Integrated Planning Act 1997* and therefore the Regional Vegetation Management Code and the Policy for Vegetation Management Offsets do not apply to vegetation clearing on the MLA areas, although the activities outside the mining lease are assessable as discussed in Section 6.

7.1.1 Draft Queensland Government Policy on Biodiversity Offsets

As noted in Section 2.2, the Queensland Government has released a draft Policy for Biodiversity Offsets. Under this draft policy, the Coordinator-General, in consultation with DERM, may consider the appropriate offset requirements for 'significant projects', which may comprise an offset package and/or financial contribution. The draft policy considers offsets for endangered, vulnerable and rare species; endangered and of concern regional ecosystems; and remnant vegetation in subregions with less than 30% of remnant vegetation remaining. It is understood that this policy is currently being revised following consultation and submissions.

7.2 Biodiversity offsets for impacts on the gas supply pipeline

7.2.1 Offsets under the *Vegetation Management Act 1999*

Offsets are an acceptable mechanism to meet the performance requirement of the Regional Vegetation Management Code (Department of Natural Resources and Water 2006) where the performance requirement includes maintaining the current extent of assessable vegetation. Offsets provided to meet the performance requirements should follow the Policy for Vegetation Management Offsets (Department of Natural Resources and Water 2007). One of the performance requirements (see Section 6) potentially requires offsets (Table 7-1).

Table 7-1 Proposed clearing requiring offsets to meet the performance requirements

Performance requirement	Regional ecosystem(s)	Listed in Table 3*	Extent of clearing (ha)
PRS.3 Watercourses	11.3.25	No	0.2

* Table 3 of the Policy for Vegetation Management Offsets lists regional ecosystems that have a remnant extent below 5% of their preclearing extent and that are less than 500 hectares in total extent, or that have a remnant extent less than 200 hectares, or that are at risk of the remnant extent falling below 200 hectares. Different offsetting requirements apply to ecosystems listed in Table 3.

Clearing of remnant regional ecosystems as detailed in Table 7-2 would require offsets that meet the following criteria:

- limitations on offset vegetation
- selection and location of appropriate regional ecosystem
- remnant mapping
- obtaining ecological equivalence
- ensuring ongoing management
- ensuring the offset is legally secured
- other requirements including ownership of land and financial contributions (Department of Natural Resources and Water 2007).

Details of the criteria are presented in the Policy for Vegetation Management Offsets (Department of Natural Resources and Water 2007). The minimum area of clearing to offset ratio will need to be determined following Table 2 of the Policy for Vegetation Management Offsets (Department of Natural Resources and Water 2007), up to a ratio of 1:3 depending on the location, habitat quality and ecosystem type of the offsets. Each performance requirement will need to be addressed completely, but a single offset may address more than one performance requirement.

7.3 Offsets under the EPBC Act

Offsets under the EPBC Act may be required for impacts to matters of national environmental significance, including endangered ecological communities (Brigalow (*Acacia harpophylla* dominant and co-dominant)), semi evergreen vine thicket, and threatened species (e.g. *Homopholis belsonii* and Brigalow Scaly-foot). The offsets should follow the principles outlined in the Draft Policy Statement: Use of environmental offsets under the *Environment Protection and Biodiversity Conservation Act 1999* (Department of Environment and Water 2007), namely:

1. Environmental offsets should be targeted to 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.

Offsets required under the EPBC Act can generally overlap with those required to address state policies (i.e. the one offset site may address multiple offsetting requirements).

7.4 WJV's Biodiversity Offset Strategy

As part of its Biodiversity Offset Strategy, the WJV commits to ensuring a biodiversity offset to meet a 3:1 ratio for Project-related disturbance of remnant endangered regional ecosystem vegetation (using biodiversity status) as well as endangered ecosystems listed under the EPBC Act. For the MLA areas, these unavoidable impacts include no more than the clearing of 40.7 ha of remnant endangered regional ecosystem vegetation, resulting in a biodiversity offset of approximately 122.1 ha. These figures will be refined as part of the Biodiversity Offset Strategy during the detailed design phase.

8. Significance of impacts

A number of Threatened RE's, communities, species of plant and species of animal have been recorded in the MLA areas and gas supply pipeline study areas or are considered likely to occur (moderate or high likelihood), and may be affected by the Project.

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

The results of the summer (February 2009) surveys of the gas supply pipeline or the modifications to the MLA areas did not significantly change the significance assessments for these communities and species as detailed in Volume 1 terrestrial ecology technical report TR17A-1-V1.5.

Overall, and consistent with the EIS, the impact assessments conclude that the Project us not likely to have a significant impact on any threatened species or community, assuming suitable mitigation measures are put in place as outlined in Section 17A.5 of the EIS.

9. Conclusions

The summer (February 2009) ecological surveys of the gas supply pipeline aimed to address the TOR for the Project by completing seasonal surveys. Additionally, the modification to some of the mining pits and infrastructure within the MLA areas has required reassessment of the extent of vegetate clearing and the associated impacts.

For the gas pipeline, the vegetation types, habitat types and species present were the same as those recorded during the earlier survey.

The clearing within the MLA areas and the gas supply pipeline alignment is likely to result in removal of 319.1 hectares of remnant vegetation, of which 27.6 hectares are listed as remnant endangered (DERM Biodiversity Status), and 471.7 hectares of non remnant vegetation. The non remnant vegetation includes 13.1 hectares of EPBC-listed endangered ecological community (11.9.4). Overall this is a reduction in the extent of vegetation that was proposed to be cleared in the EIS terrestrial ecology technical report. Other impacts and the proposed mitigation measures remain the same from the EIS Volume 1 technical report.

10. References

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Attachment A

Weather conditions

Attachment A – Weather conditions

Weather variables recorded throughout the survey. Weather data collected from Taroom Weather Station (Taroom Post Office) Ref No – 035070 (Bureau of Metrology 2008). Shaded lines represent the period of survey (18-21 February 2009).

Date	Minimum temp (°C)	Maximum temp (°C)	Rainfall (mm)	3 pm relative humidity (%)	3 pm temp (°C)	3 pm wind speed (km/h)	3 pm cloud cover (oktas)	3 pm MSL pressure (hPa)
12/02/2009	17.9	35.1	0	38	35	17	7	1005.3
13/02/2009	21.8	26.2	13.2	81	23.7	28	8	1009.2
14/02/2009	19.8	32	26.4	55	30.2	13	3	1004.8
15/02/2009	18.2	31	0	43	29	13	3	1005.1
16/02/2009	17.7	32.8	0	38	31.2	9	8	1004.5
17/02/2009	20.6	33	0	45	31.9	9	5	1002.4
18/02/2009	19.7	33	0	55	31.4	9	5	1002.4
19/02/2009	21.4	35	0	44	33.2	9	6	1005.1
20/02/2009	23.3	34.6	0	79	26	9	7	1007.3
21/02/2009	20.4	30.8	45.8	56	30	4	7	1007.3

Attachment B

Fauna survey results

Attachment B – Fauna survey results

Common name: * = indicates the species was recorded during summer fauna survey only

Conservation Status: Species in bold denotes a species of state or federal significance. NCR: E = Endangered, V = Vulnerable or R = Rare as listed under the Queensland Nature Conservation (Wildlife) Regulation 2006; EPBC: E = Endangered, V = Vulnerable, M = Migratory under the Commonwealth *Environment Protection and Biodiversity Conservation Act 199*9 I = Introduced species. RSF= Regionally Significant Fauna, NRL = Northern Range Limit. Regional significance – SigBBs = Significant in the Brigalow Belt South.

Detection Method: O = Observed, W= Heard, H: Harp Trap, E=Elliott Trap, P=Pitfall, A= Anabat detection, S=Spotlight, HS = Herpetofauna Survey, S = Spotlight, Re= Remains, D: Diggings, Sc: Scats, Tk = Tracks.

Abundance Rating (ABUN): Reflects data collected for the MLA's, Accommodation Village and Eastern Gas Pipeline. Species only recorded during eastern gas pipeline presented here. R= Rare fauna <5 site records, U = Uncommon fauna 5-10 site records, C = Common fauna 11-20 site records, A=Abundant fauna >20 site records

Table B-1: Species of animal recorded during the field survey for the proposed gas supply pipeline (both summer and winter surveys)

Family	Scientific name	Common name	Conservation status			Abundance	Detection method
			NCR	EPBC	RSF		
FROGS							
Myobatrachidae	*Limnodynastes fletcheri*	Barking Marsh Frog	C	—	—	R	W
Hylidae	*Litoria latopalmata*	Broad Palmed Rocket Frog	C	—	—	C	HS,S,DT,W
Bufonidae	*Bufo marinus*	Cane Toad	I	—	—	A	HS,S,DT,Re,W
Hylidae	*Litoria caerulea*	Common Green Tree Frog	C	—	—	A	HS,S,DT,Re,W
Hylidae	*Litoria rubella*	Desert Tree Frog	C	—	—	C	HS,S,DT,W
Myobatrachidae	*Uperoleia rugosa*	Dusky Toadlet	C	—	—	R	HS,S,DT,W
Hylidae	*Litoria fallax*	Eastern Dwarf Frog	C	—	—	R	W
Myobatrachidae	*Pseudophryne major*	Majors Toadlet	C	—	—	R	W
Myobatrachidae	*Limnodynastes ornatus*	Ornate Burrowing Frog	C	—	—	A	HS,S,DT,W
Hylidae	*Litoria peronii*	Peron's Tree Frog	C	—	—	U	W
Myobatrachidae	*Limnodynastes salmini*	Salmon Striped Frog	C	—	SigSBB	U	HS,S,DT
Myobatrachidae	*Limnodynastes tasmaniensis*	Spotted Grassfrog	C	—	—	U	HS,S,DT,W
REPTILES							
Scincidae	*Morethia boulengeri*	A skink	C	—	—	C	HS
Agamidae	*Pogona barbata*	Bearded Dragon	C	—	—	C	HS, O
Typhlopidae	*Ramphotyphlops ligatus*	Blind Snake	C	—	—	R	DT
Pygopodidae	***Paradelma orientalis***	**Brigalow Scaly-foot**	**V**	**V**	**SigSBB**	R	HS
Gekkonidae	*Heteronotia binoei*	Bynoe's Gecko	C	—	—	A	HS,S
Elapidae	*Cryptophis boschmai*	Carpentaria Snake	C	—	SigSBB	R	DT,HS,S
Boidae	*Morelia spilota*	Carpet Python	C	—	—	R	DT

Family	Scientific name	Common name	Conservation status			Abundance	Detection method
			NCR	EPBC	RSF		
Elapidae	*Parasuta dwyeri*	Dwyers Snake	C	—	—	R	HS
Colubridae	*Dendrelaphis punctulata*	Green Tree Snake	C	—	—	R	Re
Colubridae	*Tropidonophis mairii*	Keelback	C	—	—	R	DT
Scincidae	*Carlia foliorum*	Rainbow Skink	C	—	—	R	HS
Scincidae	*Carlia pectoralis pectoralis*	Rainbow Skink	C	—	—	U	HS
Scincidae	*Carlia vivax*	Rainbow Skink	C	—	—	R	HS
Scincidae	*Lerista fragilis*	Sand Sliding Skink	C	—	—	C	HS
Scincidae	*Lerista punctatovittata*	Sand Sliding Skink	C	—	—	R	HS
Pythonidae	*Antaresia maculosa*	Spotted Python	C	—	—	R	HS,S,DT
Gekkonidae	*Gehyra dubia*	Tree Dtella	C	—	—	A	HS,S
Scincidae	*Egernia striolata*	Tree Skink	C	—	—	R	HS
Scincidae	*Cryptoblepharus virgatus*	Wall Skink	C	—	—	U	HS
Elapidae	*Demansia psammophis*	Yellow-faced Whipsnake	C	—	—	R	HS
MAMMALS							
Vespertilionidae	*Chalinolobus gouldii*	Goulds Wattled Bat	C	—	—		HS,
Vespertilionidae	*Nyctophilus geoffroyi*	Lesser Long-eared Bat	C	—	—		H
Emballonuridae	*Saccolaimus flaviventris*	Yellow-bellied Sheath-tail Bat	C	—	—	A	S,W
Phalangeridae	*Trichosurus vulpecula*	Common Brushtail Possum	C	—	SigSBB	U	S,Sc
Dasyuridae	*Sminthopsis murina*	Common Dunnart	C	—	—	R	HS
Macropodidae	*Macropus giganteus*	Eastern Grey Kangaroo	C	—	—	U	O,S
Petauroidea	Petauroides volans	Greater Glider	C	—	SigSBB	R	S
Macropodidae	*Macropus rufogriseus*	Red-necked Wallaby	C	—	—	U	O
Potoroidae	*Aepyprymnus rufescens*	Rufous Bettong	C	—	SigSBB	R	DT
Macropodidae	*Wallabia bicolor*	Swamp Wallaby	C	—	—	R	O,S

Family	Scientific name	Common name	Conservation status			Abundance	Detection method
			NCR	EPBC	RSF		
Tachyglossidae	*Tachyglossus aculeatus*	Short-beaked Echidna	C	—	—	R	Sc,O,DT
Leporidae	*Lepus capensis*	Brown Hare	I	—	—	R	O,Re
Felidae	*Felis catus*	Feral Cat	I	—	—	R	O,Re
Suidae	*Sus scrofa*	Feral Pig	I	—	—	R	FS
Muridae	*Mus musculus*	House Mouse	I	—	—	C	HS,DT
Leporidae	*Oryctolagus cuniculus*	Rabbit	I	—	—	U	O,Sc,S,Re
BIRDS							
Corcoracidae	*Struthidea cinerea*	Apostlebird	C	—	—	A	O
Otididae	*Ardeotis australis*	Australian Bustard	C	—	—	R	O
Artamidae	*Gymnorhina tibicen*	Australian Magpie	C	—	—	A	O
Aegothelidae	*Aegotheles cristatus*	Australian Owlet Nightjar	C	—	—	R	W
Anatidae	*Chenonetta jubata*	Australian Wood Duck	C	—	—	U	O
Podicipedidae	*Tachybaptus novaehollandiae*	Australiasian Grebe	C	—	—	R	O
Tytonidae	*Tyto alba*	Barn Owl	C	—	—	R	O,W
Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckoo Shrike	C	—	—	U	O
Falconidae	*Elanus axillaris*	Black-shouldered Kite	C	—	—	R	O
Meliphagidae	*Entomyzon cyanotis*	Blue-faced Honeyeater	C	—	—	U	O
Falconidae	*Falco berigora*	Brown Falcon	C	—	—	R	O
Accipitridae	*Accipiter fasciatus*	Brown Goshawk	C	—	—	R	O
Meliphagidae	*Lichmera indistincta*	Brown Honeyeater	C	—	—	R	O
Phasianidae	*Coturnix ypsilophora*	Brown Quail	C	—	—	C	O
Pardalotidae	*Acanthiza uropygialis*	Chestnut-rumped Thornbill	C	—	—	R	O
Cacatuidae	*Nymphicus hollandicus*	Cockatiel	C	—	—	U	O
Sturnidae	*Sturnus vulgaris*	Common Starling	I	—	—	R	O

Family	Scientific name	Common name	Conservation status			Abundance	Detection method
			NCR	EPBC	RSF		
Columbidae	*Ocyphaps lophotes*	Crested Pigeon	C	—	—	A	O
Anhingidae	*Anhinga melanogaster*	Darter	C	—	—	R	O
Passeridae	*Taeniopygia bichenovii*	Double Barred Finch	C	—	—	R	O
Cacatuidae	*Cacatua roseicapilla*	Galah	C	—	—	C	O
Artamidae	*Cracticus torquatus*	Grey Butcherbird	C	—	—	U	O
Pachycephalidae	*Colluricincla harmonica*	Grey Shrike-thrush	C	—	—	R	O
Anatidae	*Anas gracilis*	Grey Teal	C	—	—	R	O
Pomatostomidae	*Pomatostomus temporalis temporalis*	Grey-crowned Babbler (eastern)	C	—	SigSBB	U	O
Halcyonidae	*Dacelo novaeguineae*	Laughing Kookaburra	C	—	—	U	O
Turnicidae	*Turnix velox*	Little Button Quail	C	—	—	R	O
Corvidae	*Corvus bennetti*	Little Crow	C	—	—	R	O
Meliphagidae	*Philemon citreogularis*	Little Friarbird	C	—	—	C	O
Phalacrocoracidae	*Phalacrocorax melanoleucos*	Little Pied Cormorant	C	—	—	R	O
Dicruridae	*Grallina cyanoleuca*	Magpie-lark	C	—	—	C	O
Charadriidae	*Vanellus miles miles*	Masked Lapwing	C	—	—	C	O
Dicaeidae	*Dicaeum hirundinaceum*	Mistletoebird	C	—	—	U	O
Falconidae	*Falco cenchroides*	Nankeen Kestrel	C	—	—	U	O
Meliphagidae	*Philemon corniculatus*	Noisy Friarbird	C	—	—	R	O
Meliphagidae	*Manorina melanocephala*	Noisy Miner	C	—	—	R	O
Anatidae	*Anas superciliosa*	Pacific Black Duck	C	—	—	R	O
Psittacidae	*Platycercus adscitus palliceps*	Pale-headed Rosella	C	—	—	C	O
Centropodidae	*Centropus phasianinus*	Pheasant Coucal	C	—	—	U	O
Artamidae	*Cracticus nigrogularis*	Pied Butcherbird	C	—	—	U	O
Artamidae	*Strepera graculina graculina*	Pied Currawong	C	—	—	R	W

Family	Scientific name	Common name	Conservation status			Abundance	Detection method
			NCR	EPBC	RSF		
Anatidae	*Dendrocygna eytoni*	Plumed Whistling Duck	C	—	—	R	O
Psittacidae	*Trichoglossus haematodus haematodus*	Rainbow Lorikeet	C	—	—	R	O
Maluridae	*Malurus leucopterus*	Red-backed Wren	C	—	—	R	O
Psittacidae	*Psephotus haematonotus*	Red-rumped Parrot	C	—	—	U	O
Psittacidae	*Aprosmictus erythropterus*	Red-winged Parrot	C	—	—	C	O
Dicruridae	*Myiagra inquieta*	Restless Flycatcher	C	—	—	R	O
Motocillidae	*Anthus novaeseelandiae*	Richards Pipit	C	—	—	C	O
Halcyonidae	*Todiramphus sanctus*	Sacred Kingfisher	C	—	—	R	O
Psittacidae	*Trichoglossus chlorolepidotus*	Scaly-breasted Lorikeet	C	—	—	R	O
Strigidae	*Ninox novaeseelandiae*	Southern Boobook	C	—	—	R	W
Meliphagidae	*Acanthagenys rufogularis*	Spiny-checked Honeyeater	C	—	—	R	O
Maluridae	*Malurus splendens*	Splendid Fairy Wren	C	—	—	R	O
Ptilonorhynchidae	*Chlamydera maculata*	Spotted Bowerbird	C	—	—	R	O
Pardalotidae	*Pardalotus striatus*	Striated Pardalote	C	—	—	C	O
Meliphagidae	*Plectorhyncha lanceolata*	Striped Honeyeater	C	—	—	A	O
Turnicidae	*Coturnix pectoralis*	Stubble Quail		—	—	R	O
Cacatuidae	*Cacatua galerita*	Sulphur-crested Cockatoo	C	—	—	C	O
Podargidae	*Podargus strigoides*	Tawny Frogmouth	C	—	—	U	O
Corvidae	*Corvus orru*	Torresian Crow	C	—	—	C	W
Neosittidae	*Daphoenositta chrysoptera*	Varied Sitella	C	—	—	R	W
Maluridae	*Malurus lamberti*	Variegated Fairywren	C	—	—	R	O
Accipitridae	*Aquila audax*	Wedge-tailed Eagle	C	—	—	U	O
Pardalotidae	*Smicrornis brevirostris*	Weebill	C	—	—	C	O
Hirundinidae	*Hirundo neoxena*	Welcome Swallow	C	—	—	R	O

Family	Scientific name	Common name	Conservation status			Abundance	Detection method
			NCR	EPBC	RSF		
Accipitridae	*Haliastur sphenurus*	Whistling Kite	C	—	—	R	O
Ardeidae	*Egretta novaehollandiae*	White-faced Heron	C	—	—	U	O
Pardalotidae	*Gerygone olivacea*	White-throated Gerygone	C	—	—	R	O
Dicruridae	*Rhipidura leucophrys leucophrys*	Willie Wagtail	C	—	—	C	O
Pardalotidae	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill	C	—	—	C	O
Meliphagidae	*Manorina melanotis*	Yellow-throated Miner	C	—	—	A	O
Fringillidae	*Taeniopygia guttata*	Zebra Finch	C	—	—	R	O

Attachment C

Anabat survey results

Attachment C – Anabat survey results

Data analysed

Approximately 1,100 Anabat sequence files recorded in the Wandoan area of southern inland Queensland. Details of detection sessions are shown in Table D1.

Table C-1 Summary of Anabat data analysed (see Figure 3-1 for survey locations)

Site code	Site/date	Number of sequence files	Proportion of files with calls
E1	Adjacent Annabi Dam 21.2.09	83	>90%
E2	Brigalow on Barlows 19.2.09	158	>95%
E3	Juandah Creek 19.2.09	367	>95%
E4	No 4 Road Herp Site 1 20.2.09	134	>95%
E5	Roche Creek 20.2.09	304	>95%
E6	Leichhardt Hwy 21.2.09	27	>90%

Call identification standard

Call identification for this analysis was based on bat call keys for south-eastern Queensland (Reinhold *et al.* 2001) and New South Wales (Pennay *et al.* 2004); and an extensive library of reference calls collected from bats in southern inland Queensland.

Analysis results

Recording quality was very good, with a high proportion of files containing recognisable bat calls. Most call sequences included clearly defined call features, thereby affording reliable identification.

Twelve microbat species were positively identified from the call data. At least three, and probably four other species may also have been present but reliability of identification was lower for those species.

Note on reliability of call identification

In the tables below, a species presence during each recording session is coded according to highest level of confidence achieved in call identification. Identification confidence is coded as follows:

a) Definite one or more calls where absolutely no doubt about identification of bat

b) Probable most likely the species named; low probability of confusion with species that use similar calls

c) Possible call is comparable with the listed species, but moderate to high probability of confusion with species with similar calls.

Detailed discussion of the reliability of call identification and likely presence of particular species where several species use similar calls is provided in the 'Species Notes' section, following the tables.

Sample calls that were identified to each species are provided below.

Taxonomy and nomenclature

Scientific names for species used throughout this report follow Churchill (2008), except for *Mormopterus* species, which follow van Dyck & Strahan (2008) and Reardon et al. (2008) (*M. eleryi*). Common names used in the report are those used in van Dyck & Strahan (2008).

Table C-2 Bats recorded in February 2009 for the Gas Supply Pipeline

SPECIES	E1	E2	E3	E4	E5	E6
Saccolaimus flaviventris		A	A	A	A	A
Austronomus australis		A				
Mormopterus beccarii	A	A	B	A	A	B
Mormopterus eleryi			C			
Mormopterus species 2 / 3	A	A	B	C	C	B
Chalinolobus gouldii	A	A	A	A	A	A
Chalinolobus picatus		A	B	A	C	
Nyctophilus species	A		A	A		
Scotorepens balstoni	A		A		A	A
Scotorepens greyii	A	A	A	B	A	B
Vespadelus baverstocki / V. vulturnus	A	A	A	A	A	

Species notes

***Saccolaimus flaviventris* – yellow-bellied sheath-tailed bat**

Easily recognised calls at 18-22 kHz. Some frequency overlap with *T. troughtoni, C. jobens*is and *M. beccarii* but pulse shape is diagnostic in good quality calls. S. flaviventris was one of the most frequently recorded species for this survey and was present at all sites except Annabi Dam.

***Mormopterus beccarii* – Beccari's free-tailed bat**

Usually has distinctive pulse shape at around 23-26 kHz. Some calls at lower frequency (19-22 kHz) overlap with those of S. flaviventris, T. troughtoni and C. jobensis, but can usually be recognised by different pulse shape. Numerous calls obviously from M. beccarii were recorded at most sites.

***Mormopterus eleryi* – bristle-faced free-tailed bat**

Formerly referred to as *Mormopterus* species 6 (Adams *et al.* 1988), this species has now been formally described and named (Reardon et al. 2008). Its echolocation call is very similar to that produced by S. greyii (see below) and likely to be difficult to differentiate from that species. A number of calls from some sites were thought to perhaps be from *M. eleryi* based on consistently down-curved pulse tails, a characteristic evident in some other Mormopterus spp. but atypical of *S. greyii*.

***Chalinolobus gouldii* – Gould's wattled bat**

Generally emits highly distinctive calls with steeply-curved pulses that alternate in frequency; however, when flying in open space, calls tend to have more gently curved ('flatter') pulse shape and alternation may

become indistinct, making them similar to calls from the small *Mormopterus* species (see above). Some calls may also be confused with those of *S. balstoni* (see below). *C. gouldii* one of the most frequently recorded species for this survey and was present at every site. A few poorer quality calls at some sites could not be reliably split between this species and Mormopterus spp.

***Chalinolobus picatus* – little pied bat**
This species produces calls around 38-42 kHz, often with distinctive frequency alternation; however, some calls lack frequency alternation and can be confused with those of *S. greyii* and, occasionally, with calls from *V. baverstocki* (see below). Large numbers of good quality calls were recorded from *C. picatus*, with the species being present at most sites.

***Nyctophilus species* – unknown long-eared bat**
Nyctophilus calls are readily identifiable from those of other bats, but it is virtually impossible to differentiate species within the genus using call data. *Nyctophilus* calls were positively identified from ten sites. At least two species are likely to occur in the survey area - *N. geoffroyi* (lesser long-eared bat) and *N. gouldii* (Gould's Long-eared bat) (Churchill 2008). The Vulnerable south-eastern long-eared bat (N. species) may also occur in larger remnant forest and woodland patches in this region (e.g. see Turbill et al. 2008).

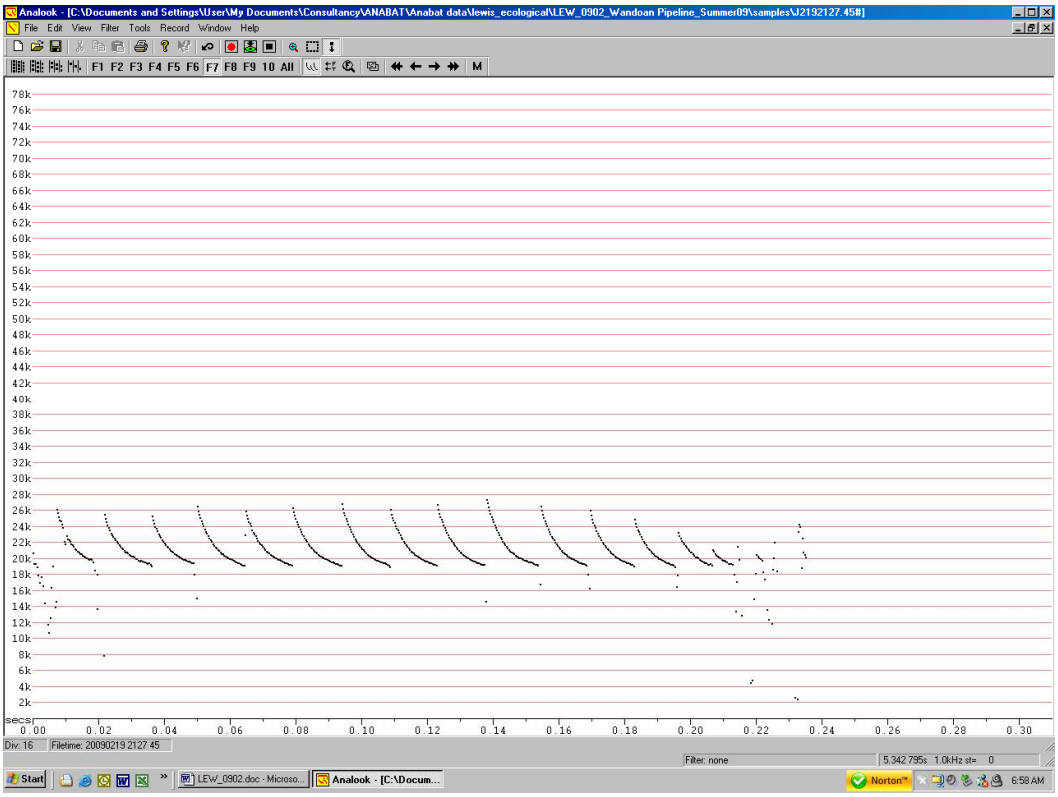
***Scotorepens balstoni* – inland broad-nosed bat**
Produces calls that overlap in frequency with those of *C. gouldii* and *Mormopterus* sp. 2/3 (see above); however, pulse shape is generally diagnostic and *S. balstoni* lacks frequency alternation evident in most C. gouldii. *S. balstoni* was present at most sites.

***Scotorepens greyii* – little broad-nosed bat**
Call frequency overlaps with that of *C. picatus* and differentiation can be difficult for some sequences; however, *S. greyii* lacks the alternating pulse frequency seen in good calls of *C. picatus*. Some calls of *Vespadelus baverstocki* (see below) may also overlap with *S greyii* and would be impossible to differentiate. *S. greyii* was one of the most frequently recorded species for this survey and was present at most sites.

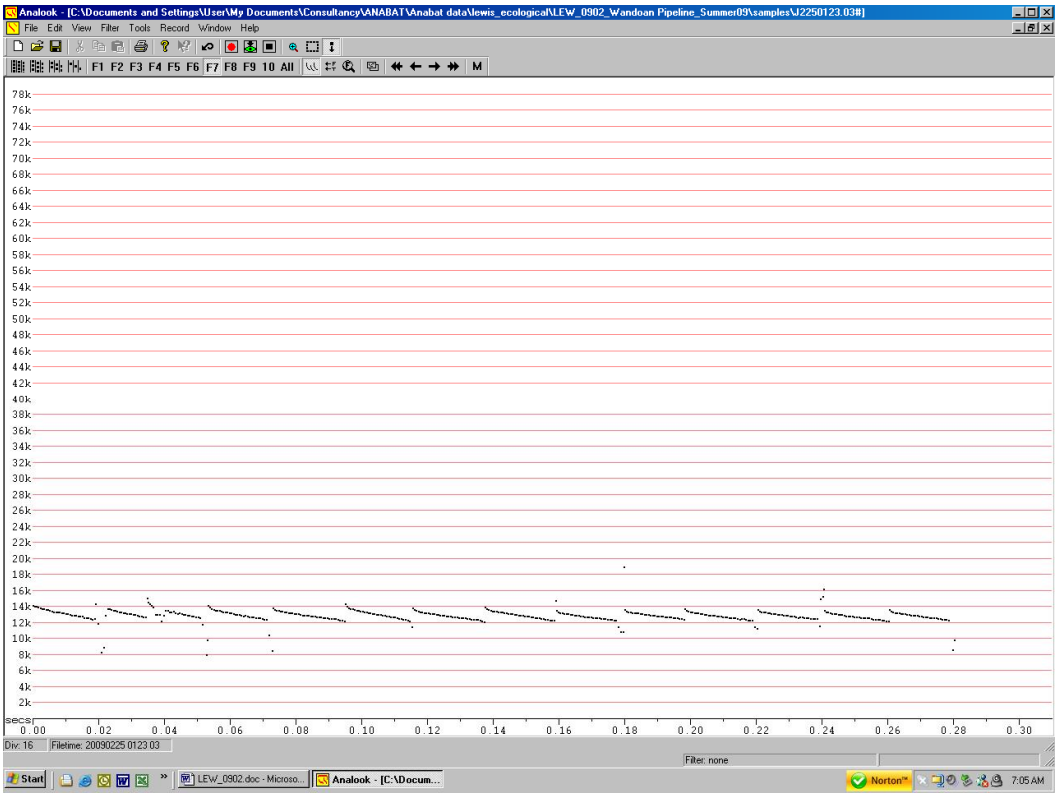
***Vespadelus baverstocki and/or V. vulturnus* – inland and/or little forest bats**
It is highly probable that both species occur in the survey area (Churchill 2008; Reardon et al. 2008; Tidemann et al. 2008). The two species emit calls with very similar pulse shape and frequency, and are difficult to differentiate. Frequency overlaps also with M. o. oceanensis (see above), but pulse shape is generally diagnostic. One or both of these Vespadelus species were present at most sites.
Sydney.

Example calls

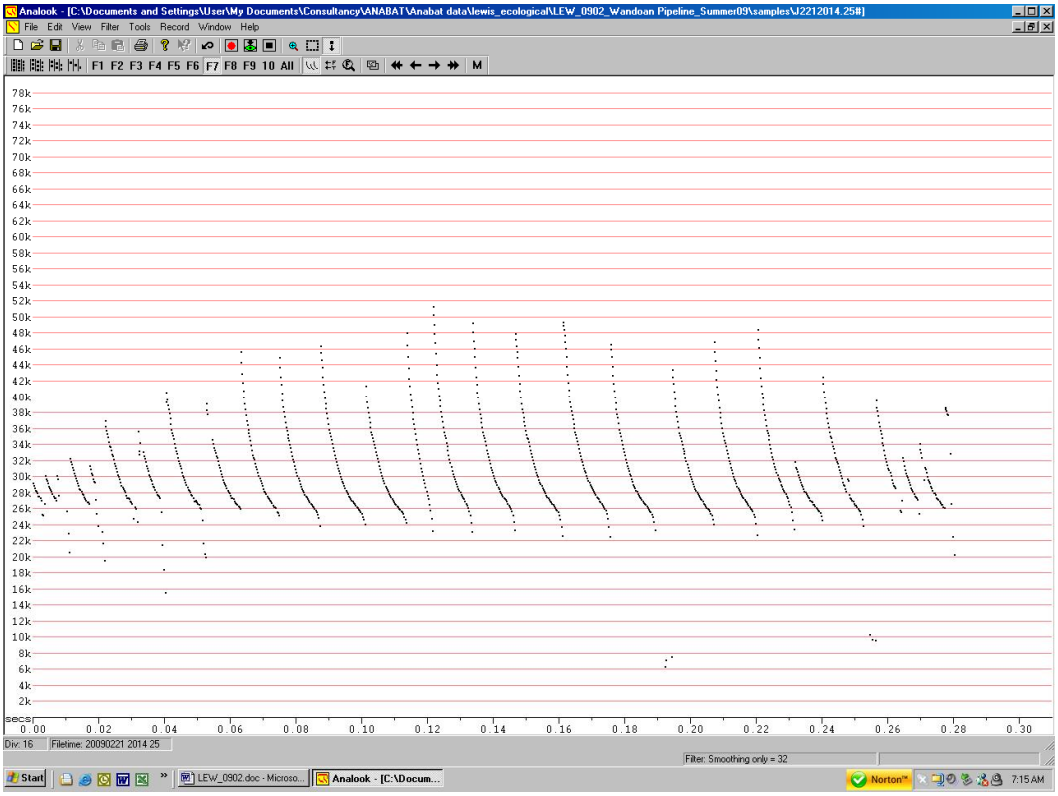
Saccolaimus flaviventris



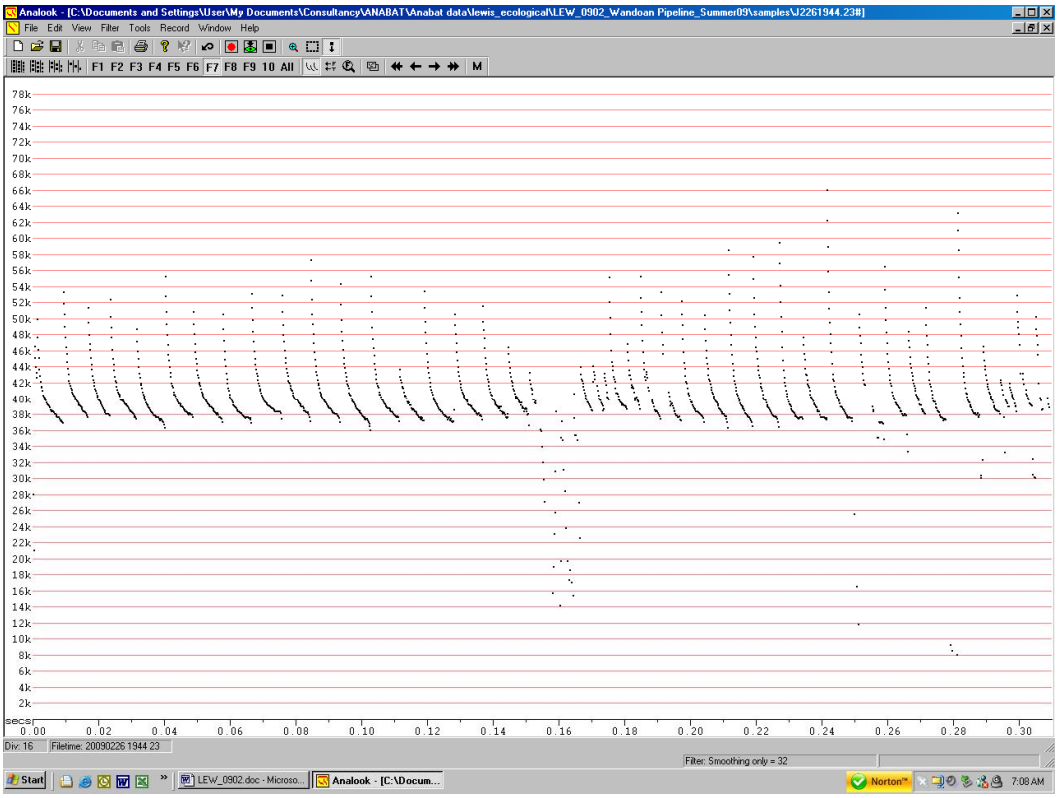
Austronomus australis



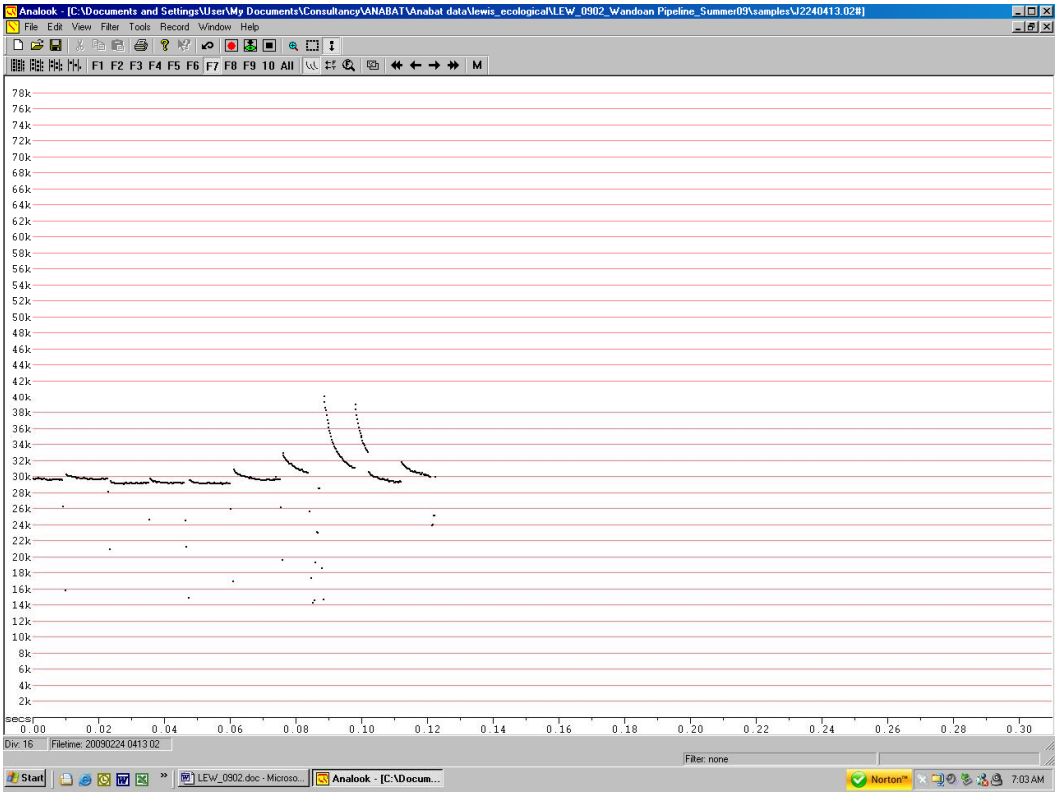
Mormopterus beccarii



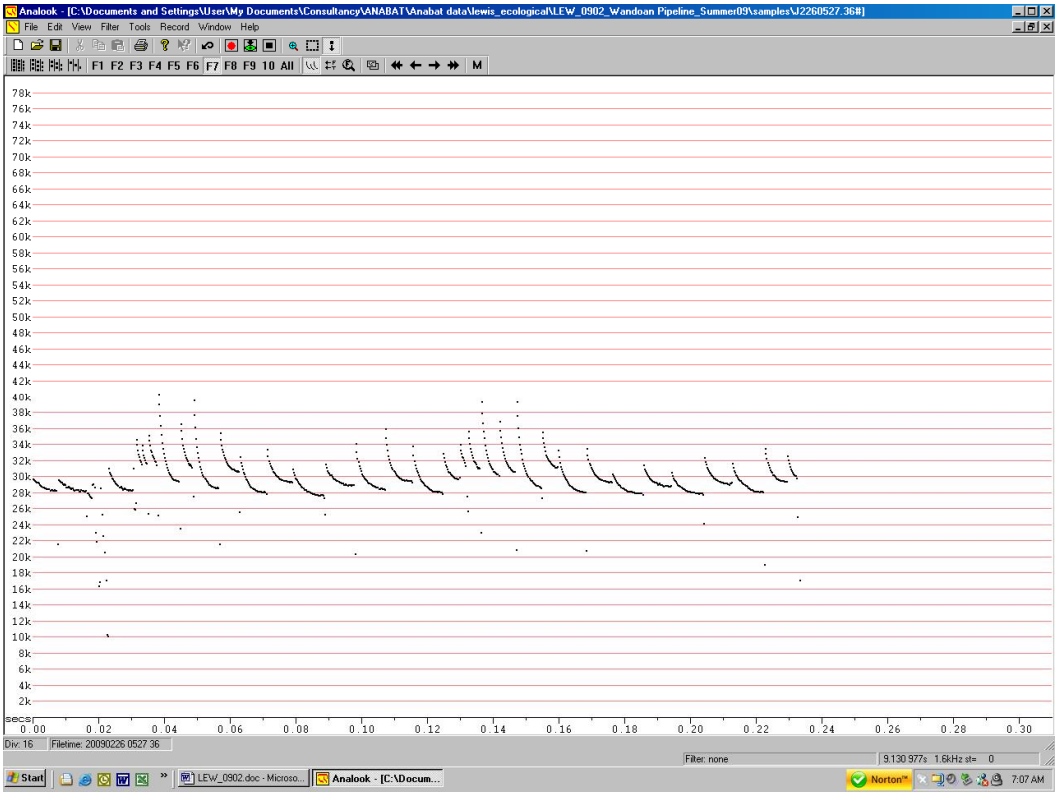
Probably *Mormopterus eleryi*



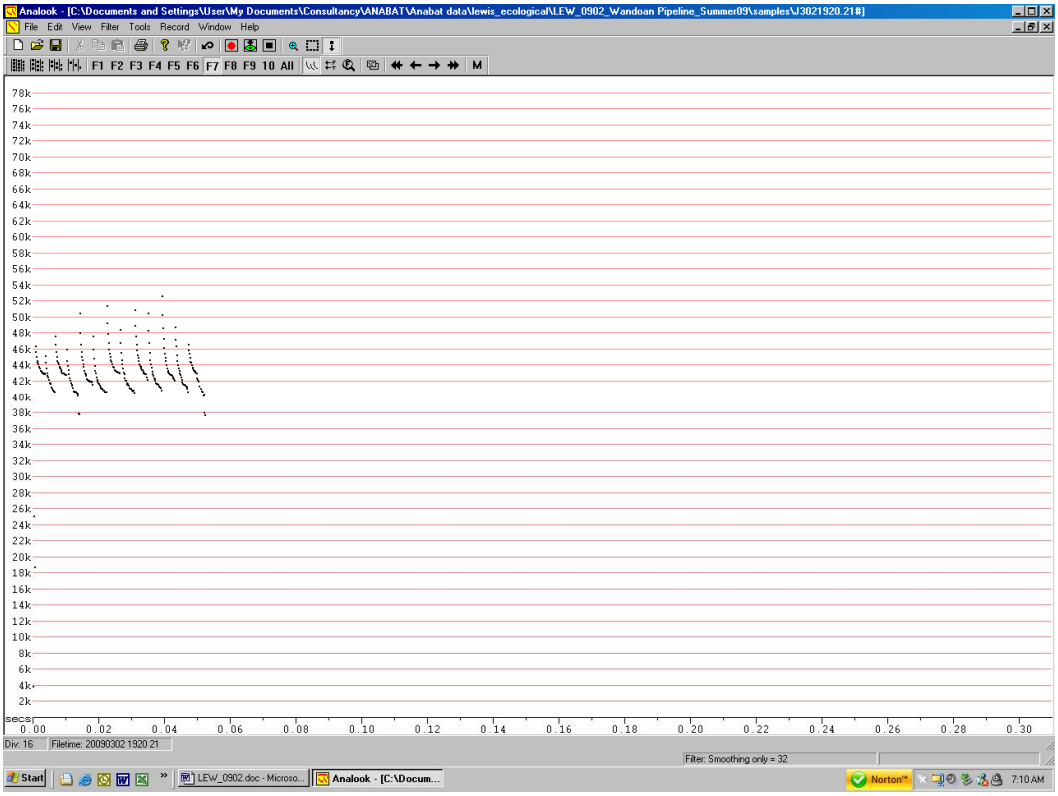
Mormopterus species 2 or *M.* species 3



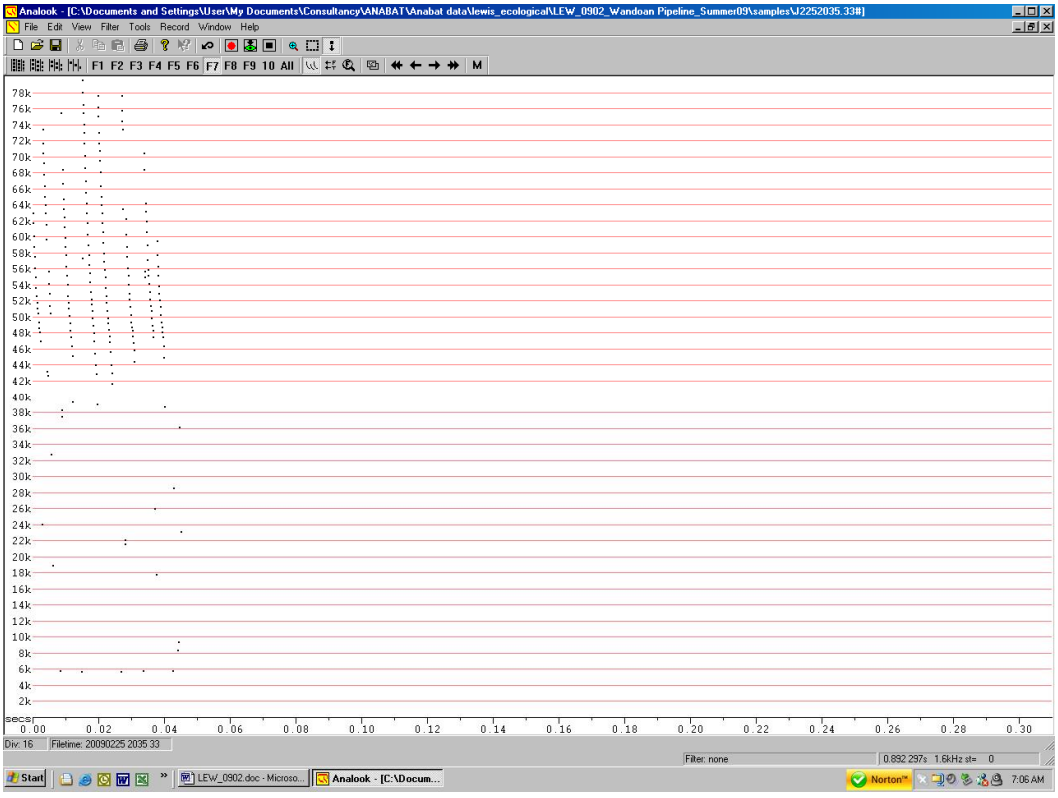
Chalinolobus gouldii



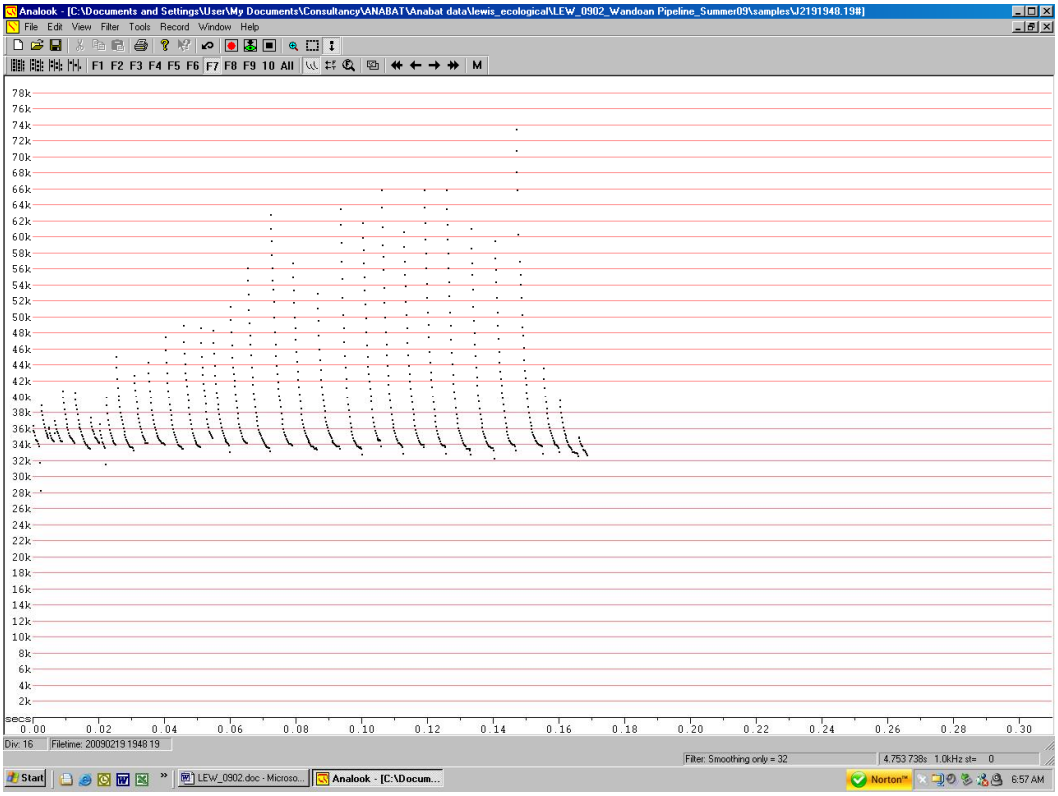
Chalinolobus picatus



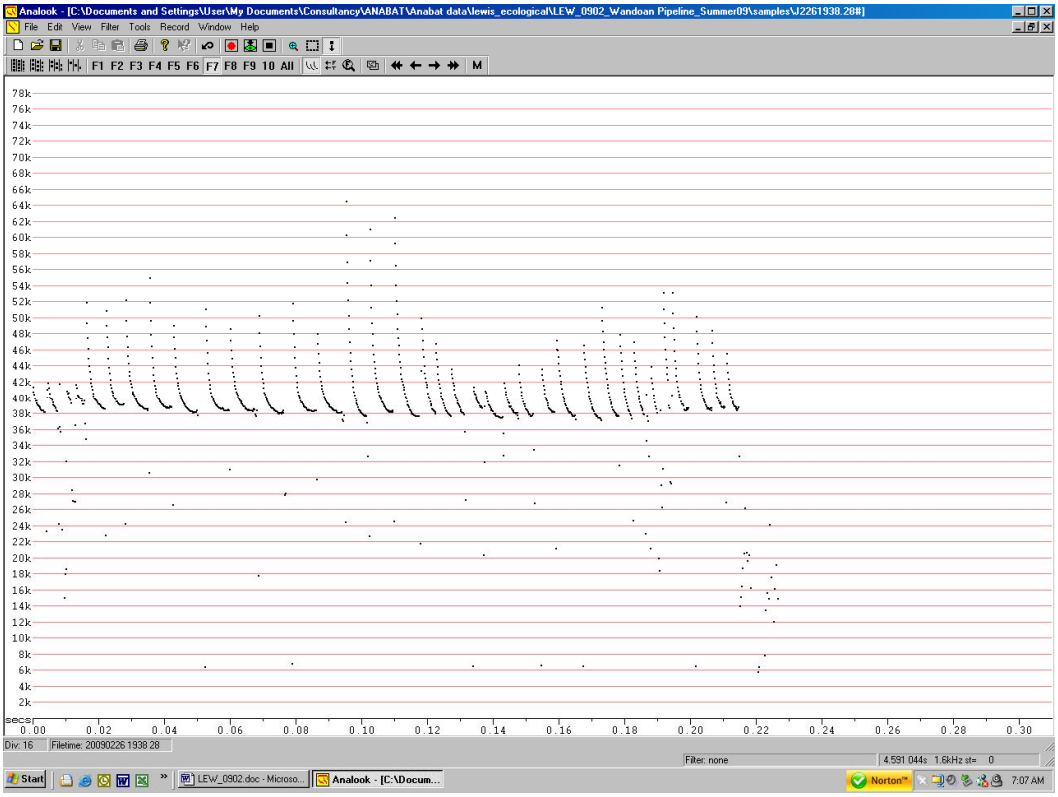
Nyctophilus species



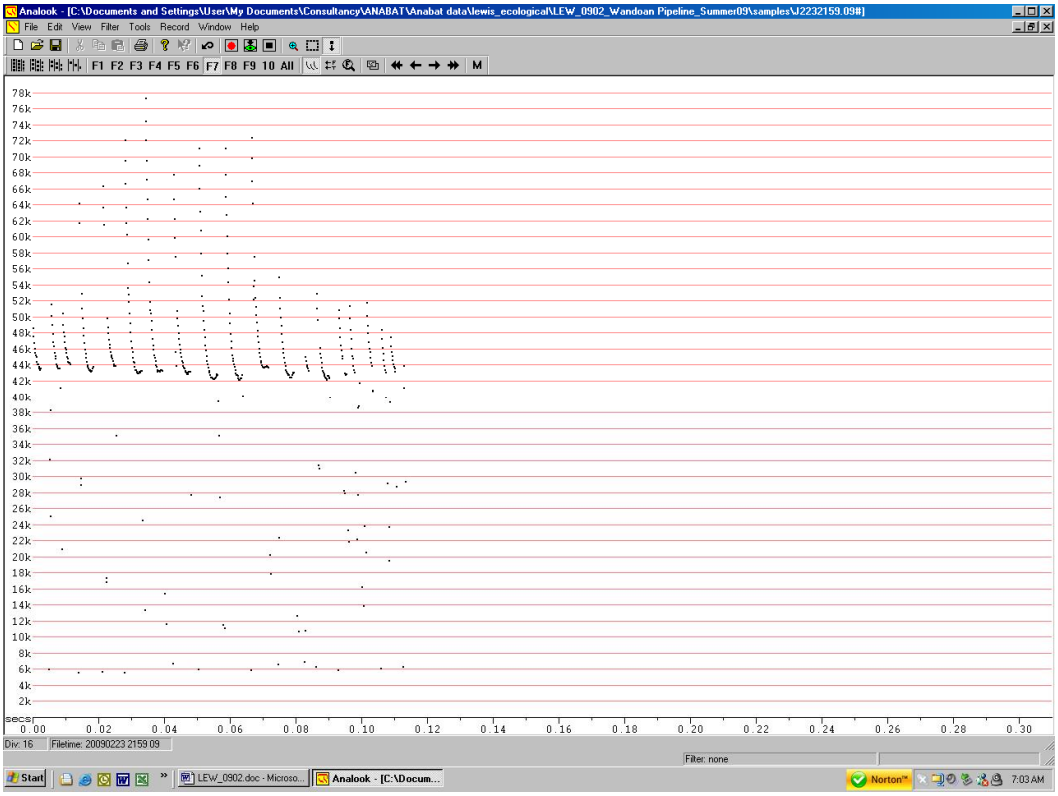
Scotorepens balstoni



Scotorepens greyii

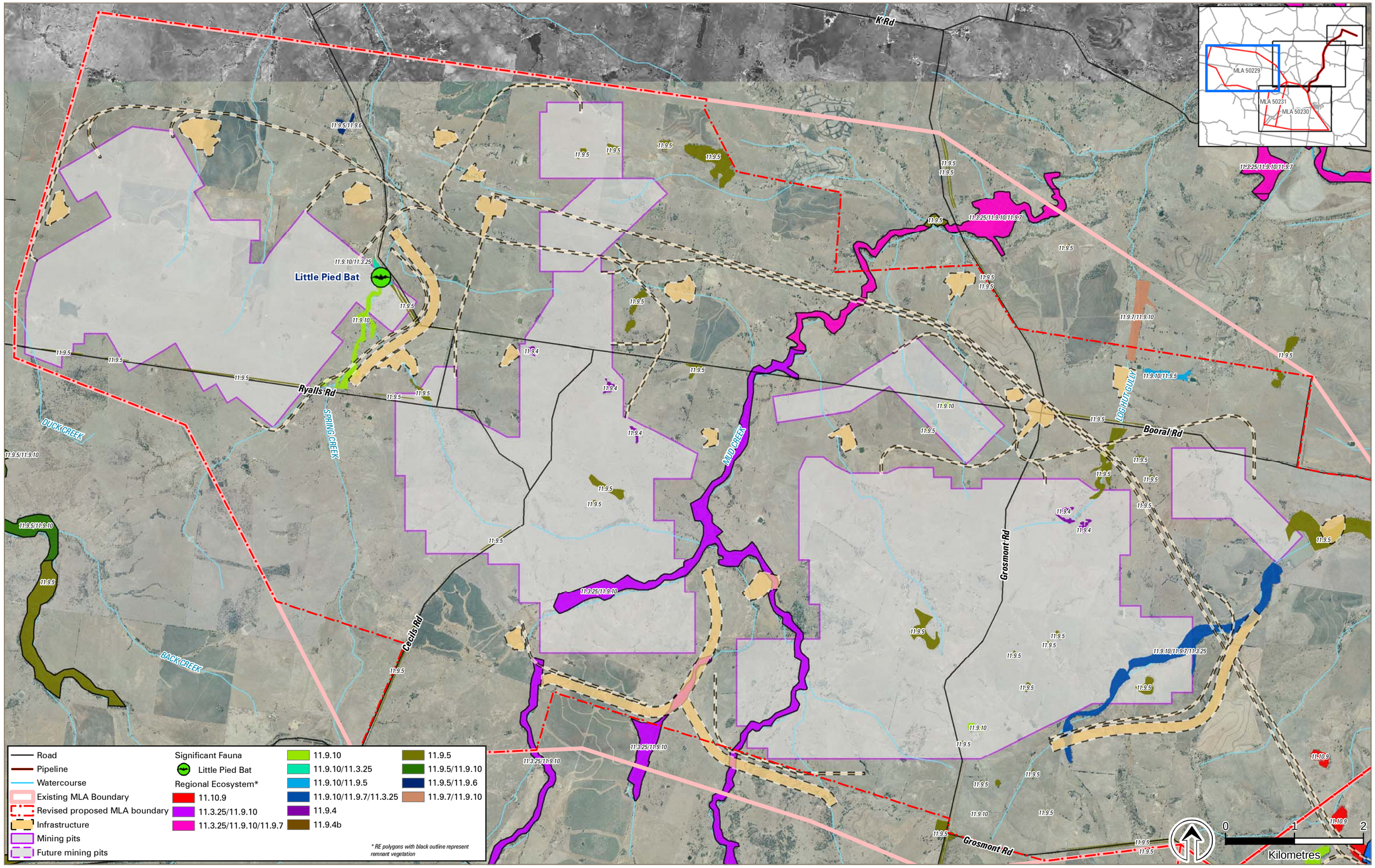


Vespadelus baverstocki or *V. vulturnus*



Attachment D

Regional ecosystems and threatened species recorded



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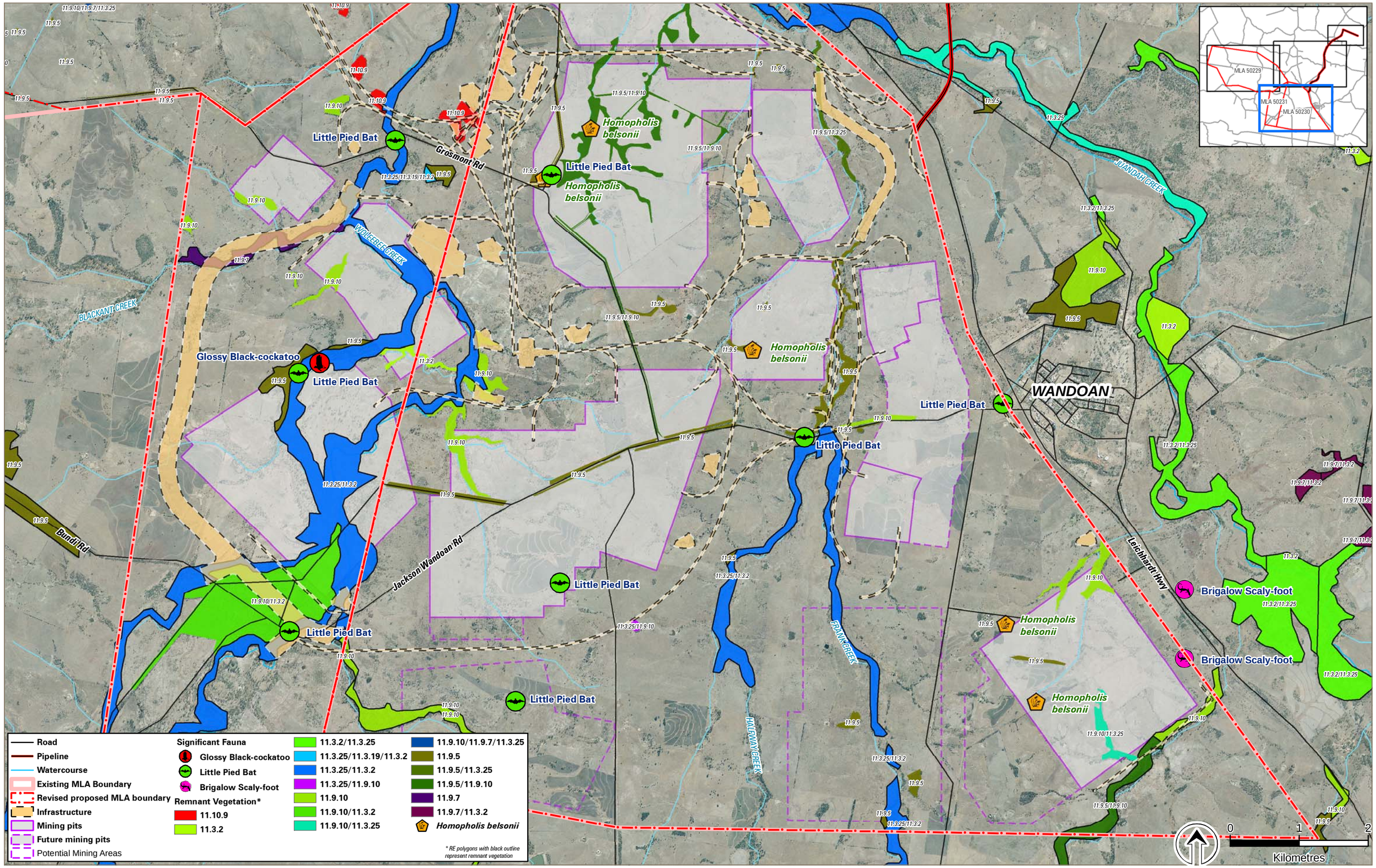
Source: Roads, QLD State Digital Road Network (2004); Towns, creeks 1:250K Topo, Geoscience Australia (2006)

PARSONS BRINCKERHOFF

Map A

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



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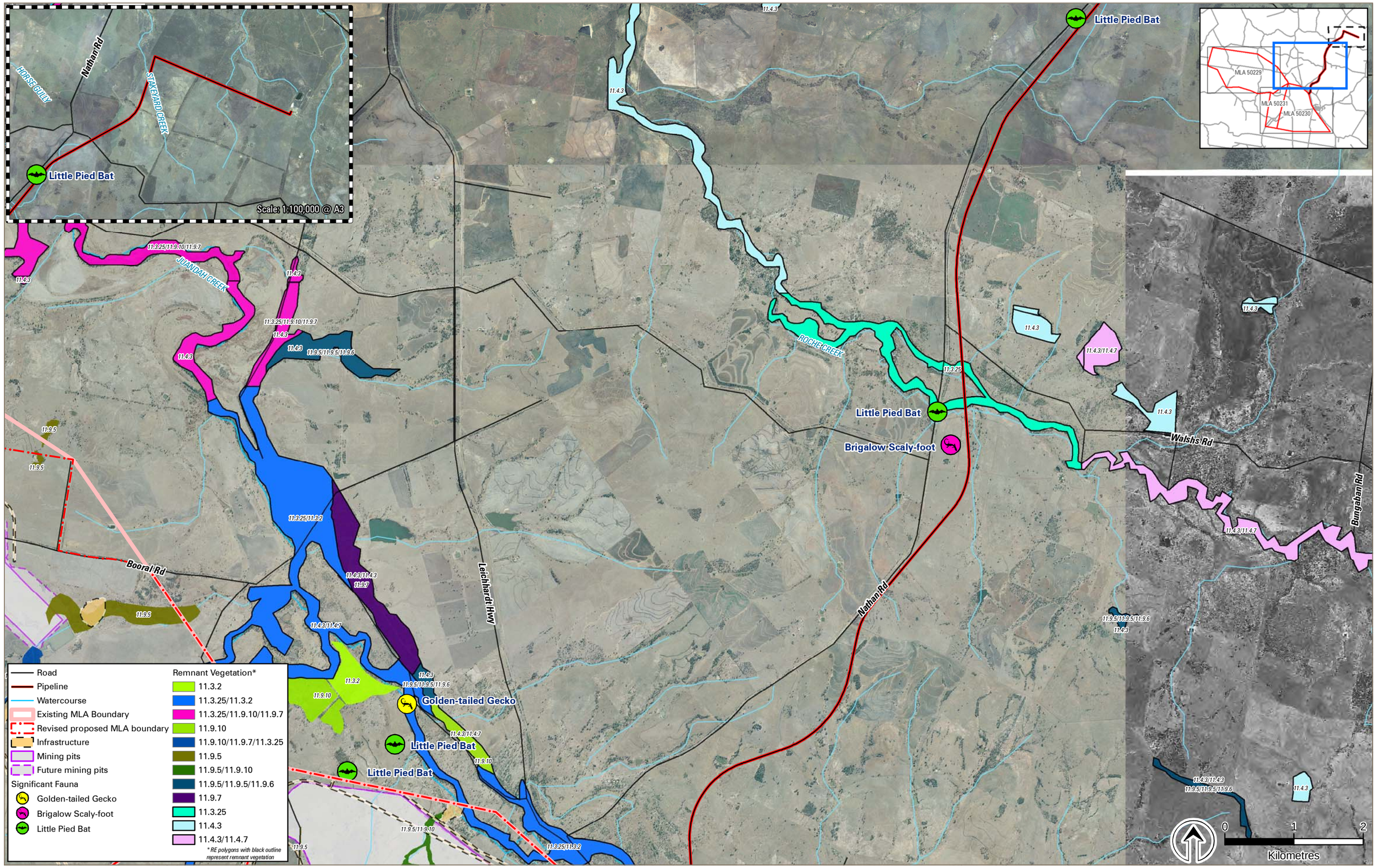
PB PARSONS BRINCKERHOFF

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)

PARSONS BRINCKERHOFF

Map C

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