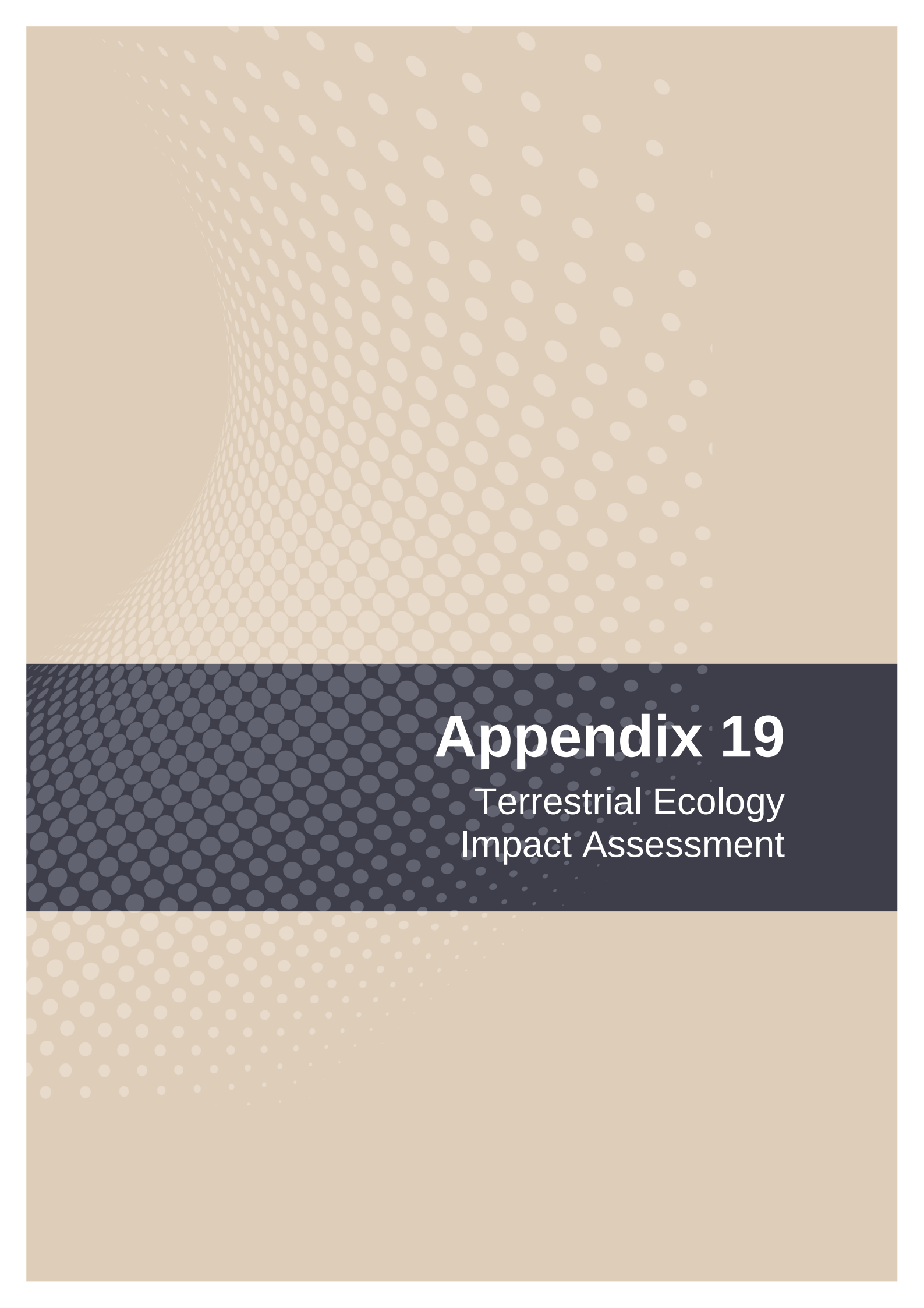


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Appendix 19

Terrestrial Ecology Impact Assessment

Byerwen Coal Pty Ltd

Byerwen Coal Project

Terrestrial Ecology Impact Assessment

Document No. BYC002-ENV-RPT-0001

3 May 2013

[illegible]

130313 – FINAL – TERRESTRIAL ECOLOGY IMPACT ASSESSMENT (REV 0)

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DEFINITIONS AND ABBREVIATIONS

Abbreviations

Abbreviation	Meaning
BAMM	Biodiversity Assessment and Mapping Methodology
BPA	Biodiversity Planning Assessment
CAMBA	China Australia Migratory Bird Agreement
CE	Critically Endangered
CORVEG	Queensland Herbarium's site-based floristic dataset
CSIRO	Commonwealth Scientific and Industrial Research Organisation
CHPP	Coal Handling and Preparation Plant
CQU	Central Queensland University
DBH	Diameter at breast height
DEHP	The Department of Environment and Heritage Protection
DSEWPaC	The Department of Sustainability, Environment, Water, Population and Communities
E	Endangered
EIS	Environmental Impact Statement
EP Act	<i>Environmental Protection Act 1994</i>
EPA	Environmental Protection Agency
EPBC Act	<i>Commonwealth Environment Protection and Biodiversity Conservation Act 1999</i>
ERA	Environmentally Relevant Activity
ESA	Environmentally Sensitive Area
et al.	Latin for 'et alii' (masculine plural) or 'et aliae' (feminine plural) or 'et alia' (neuter plural) (and others)
GPS	Global Positioning System
HVR	High Value Regrowth
i.e.	Latin for id est (that is)
JAMBA	Japan Australia Migratory Bird Agreement
Lat.	Latitude
LC	Least Concern
Long.	Longitude
LP Act	<i>Land Protection (Pest and Stock Route Management) Act 2002</i>
M	Migratory
MIA	Mine Infrastructure Area
ML	Mining Lease
MLA	Mining Lease Application

Abbreviation	Meaning
MNES	Matters of National Environmental Significance
N/A	Not applicable or not available
NC Act	<i>Nature Conservation Act 1992</i>
NC	No Concern at Present
NT	Near Threatened
OC	Of Concern
RE	Regional Ecosystem
REDD	Regional Ecosystem Description Database
RM Act	<i>Regrowth Moratorium Act 2009</i>
ROKAMBA	Republic of Korea–Australia Migratory Bird Agreement
ROM	Run of Mine
SEVT	Semi-evergreen vine thicket
sp	Species (singular)
spp	Species (plural)
subsp	Subspecies
V	Vulnerable
TEC	Threatened Ecological Community
ToR	Terms of Reference
VM Act	<i>Vegetation Management Act 1999</i>
WONS	Weeds of National Significance
WMA	Wetland Management Areas
WPA	Wetland Protection Areas

Definitions

Term	Definition
Biodiversity Status	The Biodiversity Status refers to DEHP's Biodiversity Planning Assessment Status for Regional Ecosystems.
Brigalow Belt Reptile Guidelines	Refers to <i>Draft Referral guidelines for the nationally listed Brigalow Belt reptiles</i> (DSEWPaC 2011b).
Communities of Conservation Significance	For the purposes of this report, communities of conservation significance are those listed as critically endangered or endangered under the EPBC Act.
Core Habitat	Habitat that typifies preferred habitat for a species (if known) and/or from which they have been previously recorded.
Critically endangered	A listing category for individual native species and ecological communities as defined under the EPBC Act. Refer to definition of 'EPBC Act conservation status' for meaning of critically endangered under the Act.
Ecological Community	An assemblage of species occupying a particular area.
Endangered	A listing category as defined 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, 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 are as follows: Extinct in the wild - It is known only to survive in cultivation, in captivity or as a naturalized population well outside its past range. - 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. - 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. - It is facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with the prescribed criteria.
Essential Habitat	Essential habitat is an area of remnant vegetation where species listed as endangered, vulnerable, or near threatened under the NC Act have been recorded and are mapped by DEHP.

Term	Definition
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.
High value regrowth	High value regrowth is mature native vegetation that has not been cleared since 31 December 1989, is not currently recognised as remnant vegetation and appears on a map certified by the Chief Executive of DNRM.
Least Concern	Listing category as defined under the VM Act. Refer to definition of 'VM Act Status' for meaning of 'least concern' under the Act.
Migratory Species	Species listed as 'Migratory' under the EPBC Act. Migratory species are those animals that migrate to Australia and its external territories, or pass through or over Australian waters during their annual migrations. All species on the list of migratory species are matters of national environmental significance under the EPBC Act.
NC Act Conservation Status	Under the NC Act (and the subordinate <i>Nature Conservation (Wildlife) Regulation 2006</i> (Qld), protected species are assigned a conservation status of 'extinct in the wild', 'endangered', 'vulnerable', 'near threatened', or 'least concern'. Definitions of these terms under the NC Act are as follows: Extinct in the wild • There have been thorough searches conducted for the wildlife; and • It has not been seen in the wild over a period that is appropriate for the life cycle or form of the wildlife. Endangered • There have not been thorough searches conducted for the wildlife and the wildlife has not been seen in the wild over a period that is appropriate for the life cycle or form of the wildlife; or • The habitat or distribution of the wildlife has been reduced to an extent that the wildlife may be in danger of extinction; or • The population size of the wildlife has declined, or is likely to decline, to an extent that the wildlife may be in danger of extinction; or • The survival of the wildlife in the wild is unlikely if a threatening process continues. Vulnerable • Its population is decreasing because of threatening processes; or • Its population has been seriously depleted and its protection is not secured; or • Its population, while abundant, is at risk because of threatening processes; or • Its population is low or localised or depends on limited habitat that is at risk because of threatening processes. Near Threatened • The population size or distribution of the wildlife is small and may become smaller; or • The population size of the wildlife has declined, or is likely to decline, at a 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.

Term	Definition
	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.
Near threatened	Listing category as defined under the NC Act. Refer to definition of 'NC Act conservation status' for meaning of near threatened under the NC Act.
The Project	Byerwen Coal Project
Non-Remnant Vegetation	Vegetation that is not mapped as remnant vegetation in the certified Regional Ecosystem mapping for Queensland and/ or which fails to meet the criteria for 'remnant vegetation' (see definition of 'remnant vegetation' below). This includes regrowth, heavily thinned or logged vegetation and significantly disturbed vegetation that fails to meet the structural and/or floristic characteristics of remnant vegetation. It also includes urban and cropping land. Non-remnant vegetation may retain significant biodiversity values (Neldner <i>et al</i> 2005).
Regional Ecosystem	A vegetation community, within a bioregion, that is consistently associated with a particular combination of geology, landform and soil. Regional Ecosystems may be classified under the Vegetation Management Regulation 2012 as endangered, of concern or least Concern. Refer to 'VM Act conservation status' for meaning of endangered, of concern or least concern as defined under the VM Act.
Regionally Significant	Refer to taxa not listed as threatened or near threatened species under the EPBC Act and/or NC Act, but have been listed as non-threatened priority taxa for the Brigalow Belt North Bioregion.
Remnant Vegetation	Vegetation where the dominant canopy has >70% of the height and >50% of the cover relative to the undisturbed height and cover of that stratum and is dominated by species characteristic of the vegetation's undisturbed canopy (Neldner <i>et al</i> 2005).
Project area	The project area is defined by the boundaries of the following mining lease areas: MLA 10355; MLA 10356; MLA 10357; MLA 70434; MLA 70435; and MLA 70436.
Significant Natural Vegetation Community	For the purposes of this report, significant natural vegetation communities are taken to include: - Threatened ecological communities listed under the EPBC Act. - Endangered and of concern Regional Ecosystems listed under the VM Act.
Species of Conservation Significance	For the purposes of this report, species of conservation significance are taken to include: - Flora and fauna species which have been designated as extinct in the wild, endangered or vulnerable under the NC Act - Flora and fauna species which have been designated as critically endangered, endangered, vulnerable or migratory under the EPBC Act.

Term	Definition
Threatened	A term used for: - Flora and fauna species which have been designated as extinct in the wild, endangered or vulnerable under the NC Act - Flora and fauna species which have been designated as critically Endangered, endangered or vulnerable under the EPBC Act.
Threatened Ecological Community	An ecological community listed as a critically endangered or endangered under the EPBC Act.
VM Act Conservation Status	Under the VM Act, REs may be classified as either 'endangered', 'of concern' or 'least 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 10–30 % of pre-clearing extent remains and the remnant vegetation is less than 10 000 ha. In addition, for biodiversity planning purposes DEHP 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 ha; or it is a rare regional ecosystem subject to a threatening process. Of Concern 10–30% 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 ha. In addition, for biodiversity planning purposes DEHP 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. Least Concern - More than 30% of pre-clearing extent of remnant vegetation exists in the bioregion, and it is greater than 10 000 ha. In addition, for biodiversity planning purposes DEHP also classifies a regional ecosystem as least concern if the degradation criteria listed above for endangered or of concern regional ecosystems are not met.
Vulnerable	Listing category as defined 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.

EXECUTIVE SUMMARY

AMEC Environment & Infrastructure Pty Ltd was commissioned by Byerwen Coal Pty Ltd to undertake a terrestrial flora and fauna (ecological) impact assessment for the proposed Byerwen Coal project. The Byerwen Coal project (the project) involves the development of an integrated project, with a multiple pit open-cut coal mine and associated infrastructure. This terrestrial flora and fauna ecological impact assessment was based on desktop and field survey information of terrestrial vegetation, flora and fauna values in which the project is located. Eight field surveys were undertaken to assess terrestrial vegetation community and flora values of the project area during four consecutive years from 2009 to 2012. Fauna field assessments were undertaken during three separate field surveys between 2009 and 2012.

Terrestrial vegetation community and flora surveys comprised general surveys to verify RE mapping and to identify and prioritise terrestrial flora values within the project area, a targeted survey of potential Threatened Ecological Communities (TECs) and targeted surveys to assess populations of the previously undescribed species, *Kelita uncinella*. Baseline fauna field assessments involving fauna trapping were undertaken over 13 sites, with fauna habitat assessments undertaken at 22 sites.

The project area is located within the Brigalow Belt North Bioregion, on the boundary of two subregions Wyarra Hills to the east and Northern Bowen Basin to the west and has a sub-humid to semi-arid climate. A diverse range of geological features within the project area provide a complex array of habitats for flora and fauna species.

No protected area estates are located within the project area. The proposed Redcliffe Vale National Park is located to the east of Newlands coal mine but is remote from the project area and is not relevant to the project. The Newlands Nature Refuge abuts the eastern boundary of the project area and is separated from the project area by the Collinsville-Elphinstone Road. Blackjack Mountain Nature Reserve is located approximately 7 km from the project area.

The project area supports approximately 1 172 ha of the brigalow TEC (comprising 1 112 ha of remnant and 60 ha of regrowth), 345 ha of semi-evergreen vine thicket (SEVT) TEC and 117 ha of natural grasslands TEC.

There are no Category A Environmentally Sensitive Areas (ESAs) in the project area. Category B ESAs are restricted to regional ecosystem (RE) types where the biodiversity status is endangered. The project area supports approximately 1 457 ha of endangered REs (biodiversity status) and 1 766 ha of concern REs (biodiversity status).

The project area supports approximately 71 ha of high value regrowth vegetation representative of endangered REs 11.3.1, 11.4.9, 11.8.13 and 11.9.5 and RE 11.8.5 which has a no concern at present biodiversity status.

The vast majority of REs ground truthed within the project area had a low or medium representation in protected areas.

The project area contains mapped essential habitat areas (EHAs) for the near threatened flora species *Cerbera dumicola* and vulnerable ornamental snake (*Denisonia maculata*). Both species are known to occur in the project area.

Areas providing important habitat for threatened or near threatened flora and fauna species that are likely to be impacted by the project were identified within the project area.

The major creeks within the project area include Suttor River, Plum Creek, Kangaroo Creek and their respective tributaries. These areas can provide important habitat for a range of species and riparian vegetation along drainage features can facilitate fauna movement across a landscape.

No Ramsar or Nationally Important Wetlands occur within, or immediately downstream of the project area. Freshwater wetlands (palustrine, lacustrine (farm dams) and riverine) were observed within the project area. These areas were found to provide habitat for a range of wetland birds including those listed as migratory under the *Environment Protection and Biodiversity Conservation (EPBC) Act 1999*.

The Biodiversity Planning Assessment (BPA) expert panel report identifies terrestrial corridors of State Significance to the north and the south of the project area. Another corridor of regional significance is mapped to the west of the project area along the Suttor River.

The project will have both direct and indirect impacts on the flora and fauna values of the project area. Over a 50 year period, approximately 2391.1 ha of remnant native vegetation and 21.4 ha of advanced regrowth will be cleared. Direct impacts will primarily result from the removal of remnant vegetation and include the loss of fauna habitat (and subsequent reduction in abundance and biodiversity), habitat fragmentation, loss of connectivity, increased erosion risk, edge effects and impacts on surface water. Additional potential impacts include impacts on groundwater, impacts caused by dust, noise, light and traffic, increased fire risk, risk of weed spread and impacts caused by an increase in pest species.

Provided appropriate mitigation measures are implemented, impacts caused from project works will be managed.

1. INTRODUCTION

AMEC Environment & Infrastructure Australia Pty Ltd (AMEC) was commissioned by Byerwen Coal Pty Ltd (Byerwen Coal) to undertake a terrestrial ecology impact assessment for the proposed Byerwen Coal Project (the project). The project involves the development of an open cut mine and associated infrastructure. The project is located in the Brigalow Belt North Bioregion, approximately 20 km west of Glenden and 140 km west of Mackay (**Figure 1.1**).

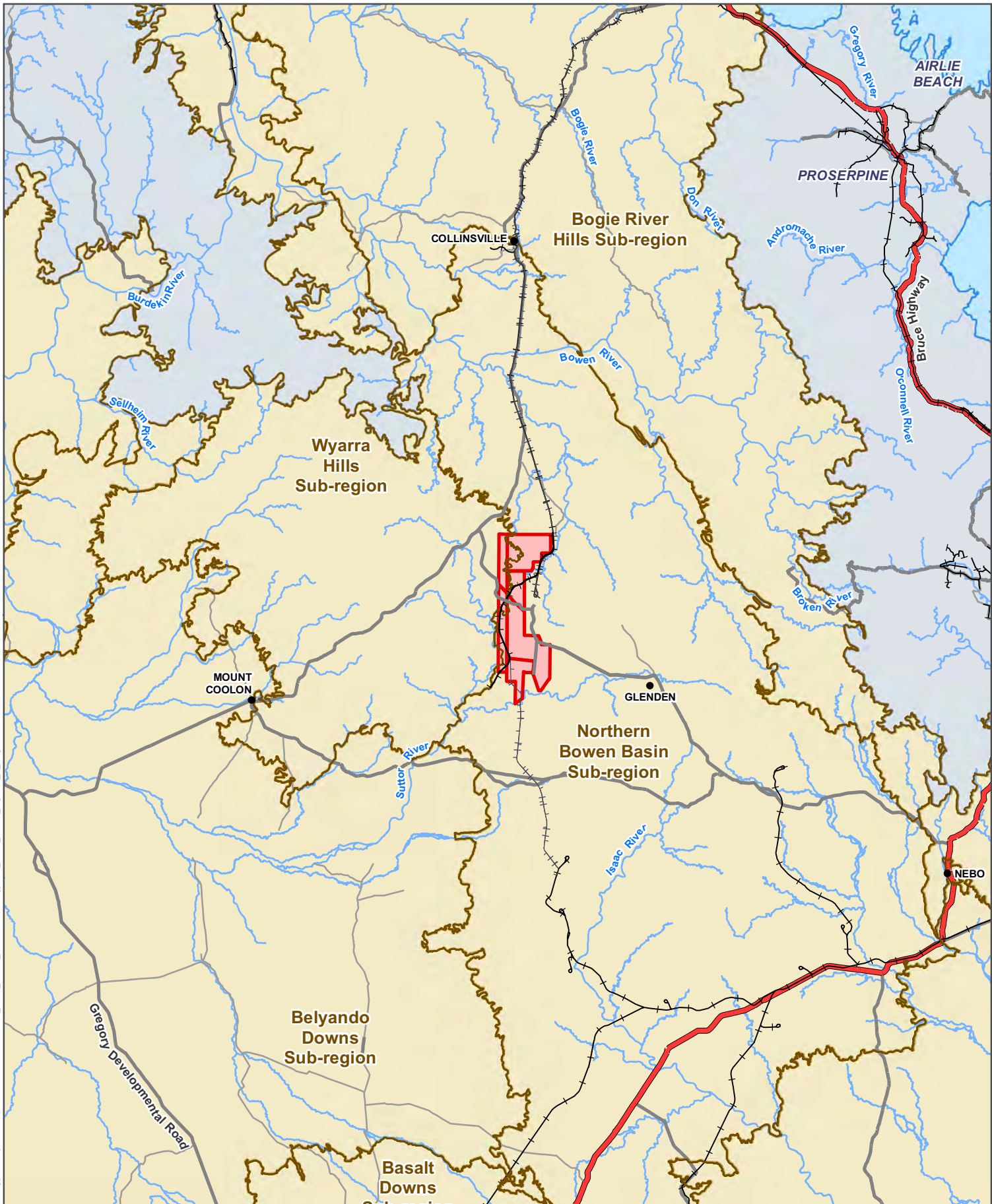
1.1 PURPOSE

This technical report has been prepared to address the Terms of Reference (ToR) Section 3.3 (Nature conservation) for the project relevant to terrestrial ecology, and provides information for input into the Byerwen Coal Project Environmental Impact Statement (EIS). The objective of this report is to describe the ecological features of the region in which the mine is proposed; assess the potential impacts that may arise from the construction, operation and decommissioning of the project; and recommend management strategies to minimise potential impacts on terrestrial flora and fauna values of the site and the region. In particular the report summarises the results of desktop and field studies undertaken to define the terrestrial flora and fauna values of the project area.

1.2 SCOPE OF WORKS

AMEC was engaged by Byerwen Coal to undertake baseline desktop and field studies to describe the nature conservation values of the project area and assess the potential impacts of the project on those values. This report addresses those aspects of the ToR concerned with terrestrial flora and fauna values and assesses the impacts of the project on those values. Aquatic flora and fauna values are addressed in a separate Aquatic Ecology Impact Assessment Report (AMEC 2012). In particular, the scope of the impact assessment includes:

- Description of sensitive environmental areas within the project area as defined by the ToR.
- Description of terrestrial flora values in the project area in terms of:
 - Seasonal variation
 - The distribution and extent of endangered, of concern and no concern at present Regional Ecosystems (REs) mapped by the Department of Environment and Heritage Protection (DEHP) and described in the Regional Ecosystem Description Database (REDD)
 - The distribution and extent of high value regrowth (HVR) vegetation as defined by the *Vegetation Management Act 1999* (VM Act)
 - The distribution and extent of threatened ecological communities (TECs) protected under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)



BYERWEN COAL - BYC002-Ecology Surveys and Impact Assessment

Figure 1.1 - Regional Location

WORK REQUEST NUMBER: WR_2012_00295

DATA SOURCES:
Physical Road Network © State of Queensland 2010
Mining Leases © State of Queensland 2011
Remnant Watercourses © State of Queensland 2011
StreetPro Australia © Pitney Bowes Business Insight (PSMA Australia Ltd and Department of Health and Ageing) 2009

LEGEND

Town

Highway

Main Road

Secondary Road

Railway

Proposed Alpha Coal Project Rail Line

Gooniyella to Abbot Point Railway

GAP Railway

Stream Order

Byerwen Mining Lease

Brigalow Belt North Bioregion

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28/09/2012	AB	JC	Issued for Review	A
16/11/2012	SN	JC	Issued for Review	B
04/12/2012	CM	JC	Issued for Review	C
08/03/2013	SG	JC	Issued for Use	0

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CAIRNS

TOWNSVILLE

MACKAY

LONGREACH

GLADSTONE

ROMA

BRISBANE

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- The presence and distribution of threatened (ie critically endangered, endangered or vulnerable) or near threatened flora species protected under the EPBC Act and/or *Nature Conservation Act 1992* (NC Act)
- The location and abundance of bio-regionally significant flora species
- Location and abundance of exotic or weed species
- The location of any horticultural crops and/or plant communities of cultural, commercial or recreational significance.
- Description of terrestrial fauna values in the project area in terms of:
 - Terrestrial fauna assemblages present, or likely to be present in habitats in the project area
 - Species diversity and abundance of animals of recognised significance
 - Habitat requirements and sensitivity to change, including movement corridors and barriers to movement
 - The presence and abundance of threatened (ie critically endangered, endangered or vulnerable) or near threatened fauna species protected under the EPBC Act and/or NC Act
 - The presence of species listed by the DEHP's 'Back on Track' species prioritisation methodology
 - The existence of feral or introduced animals, including those of economic or conservation significance
 - Use of the project area by migratory fauna
 - Use of breeding places in the project area.
- Assessment of potential direct and indirect impacts on nature conservation values that may occur as a result of the construction, operation and decommissioning of the project and evaluation of the scope and nature of those impacts.
- Identification of appropriate mitigation measures to be implemented for the project to avoid, minimise and mitigate impacts on these values.

2. BACKGROUND

2.1 PROJECT AREA

The area for this impact assessment is the project area and is defined by six mining lease application (MLA) areas which cover a total area of approximately 22 697 hectares (ha) adjacent to the existing Newlands coal mine. The six MLs comprising the project area are shown in **Figure 2.1** and are:

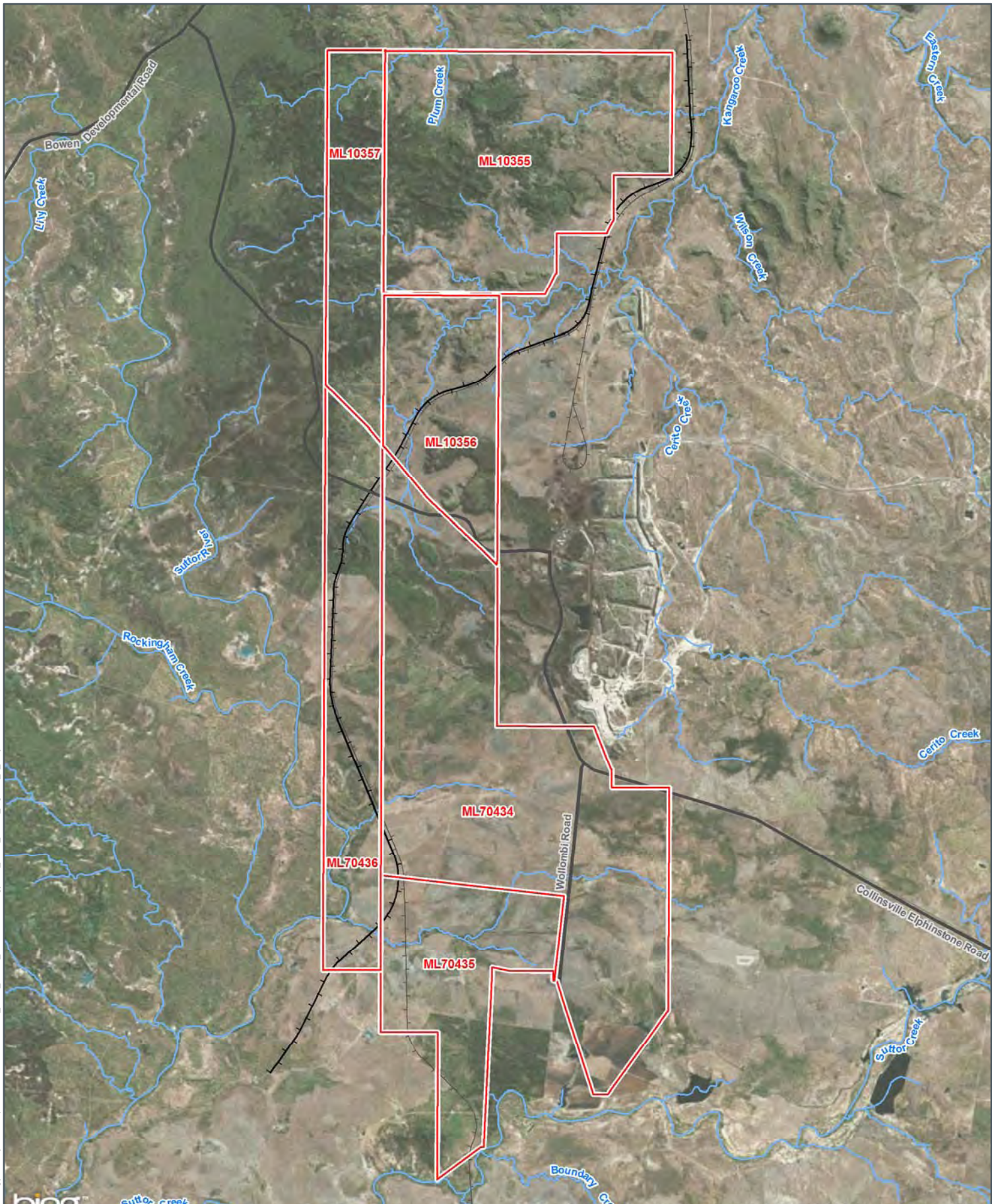
- MLA 10355
- MLA 10356
- MLA 10357
- MLA 70434
- MLA 70435
- MLA 70436.

Previous flora and fauna assessments undertaken by Central Queensland University (Wormington *et al* 2009) and Unidel (2010) were carried out for the exploration tenures (EPC 614, EPC 739) which overlap the project area (**Figure 2.2**). The results of studies undertaken for both the project area and the previous exploration tenures have been combined to form the basis for the description of terrestrial flora and fauna values presented in this report (**Section 6** and **Section 7**).

2.2 PROJECT DESCRIPTION

The project involves the development of a proposed new open cut coal mine, located in the Northern Bowen Basin, approximately 20 km west of Glenden and 140 km west of Mackay. The project proponent is Byerwen Coal Pty Ltd (Byerwen Coal) a joint venture between QCoal Pty Ltd and JFE Steel.

The proposed life of the project is 50 years, including the construction, operation and decommissioning phases. Coal will be extracted from the open cut mine using conventional large excavators and trucks in combination with electric rope shovels and dragline. Mining activities will be carried out on a full time basis (ie 24 hours, 7 days per week, 52 weeks per year).



BYERWEN COAL - BYC002-Ecology Surveys and Impact Assessment

Figure 2.1 - Project Area

WORK REQUEST NUMBER: WR_2012_00295

DATA SOURCES:
Physical Road Network © State of Queensland 2010
Mining Leases © State of Queensland 2011
Remnant Watercourses © State of Queensland 2011

LEGEND

- Main Road
- Proposed Alpha Coal Project Rail Line
- GAP Railway
- Stream Order (2 and Above)
- Byerwen Mining Lease

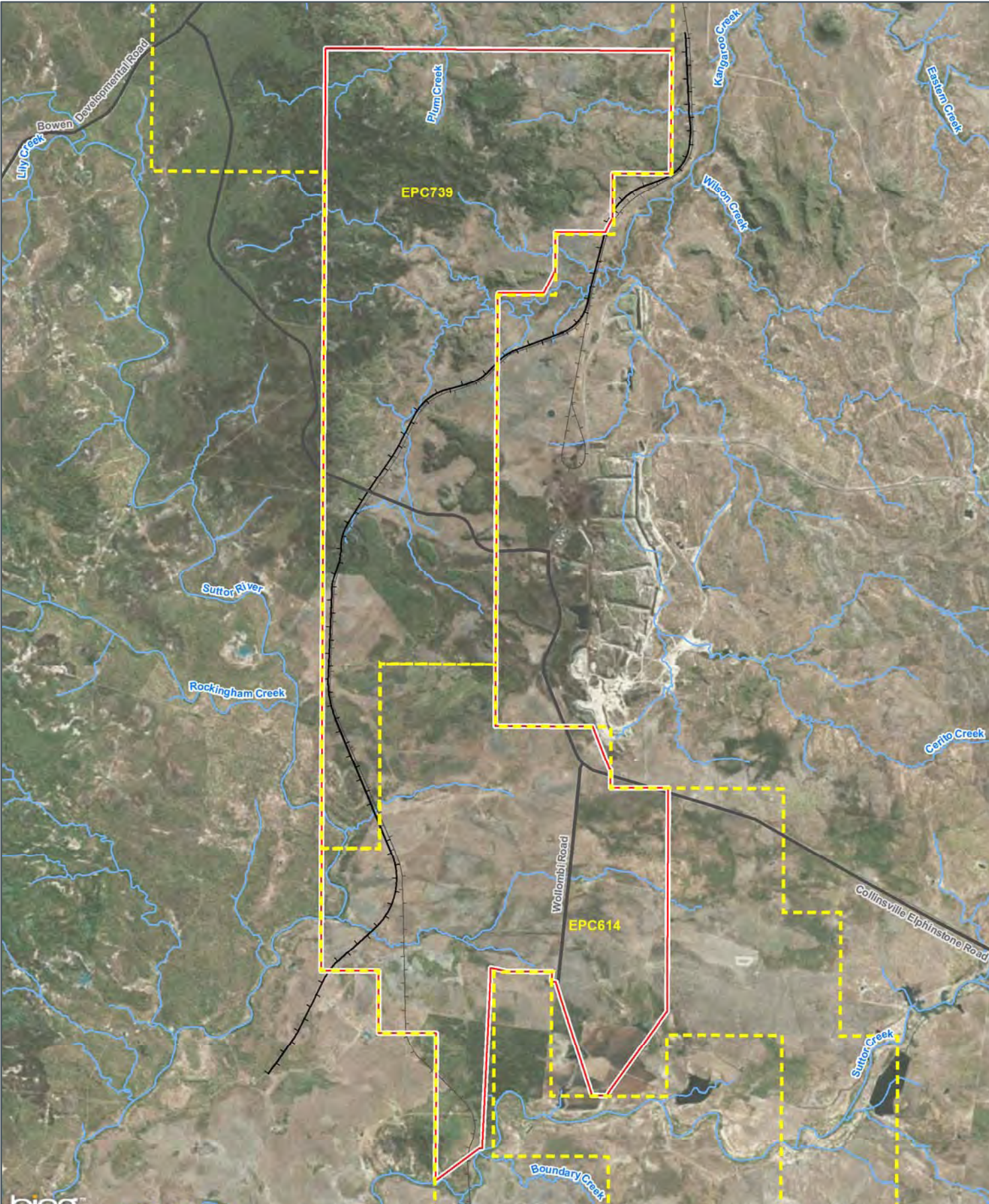
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14/11/2012	SN	JC	Issued for Review	B
04/12/2012	CM	JC	Issued for Review	C
08/03/2013	SG	JC	Issued for Use	0

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TOWNVILLE
BOWEN
MACKAY
LLANARTH

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Figure 2.2 - Exploration Tenures

WORK REQUEST NUMBER: WR_2012_00295

DATA SOURCES:
Remnant Watercourses © State of Queensland 2011
Exploration Tenures © State of Queensland 2012

LEGEND

- Main Road
- Proposed Alpha Coal Project Rail Line
- GAP Railway
- Stream Order (2 and Above)
- Project Area
- EPC Boundary

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28/09/2012	AB	JC	Issued for Review	A
16/11/2012	SN	JC	Issued for Review	B
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TOWNSVILLE
BOWEN
LLANARTH
MACKAY

QC Check List: Completed

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The proposed mine layout and associated infrastructure is shown in **Figure 2.3**. The project as assessed in this report includes:

- Progressive development of several open cut pits. The North and West Pits form single footprints while the South and East Pits are split. For the purposes of this impact assessment, six separate pit footprints are discussed – the North Pit, West Pit (comprising West Pit 1, West Pit 2 and West Pit 3), South Pit 1, South Pit 2, East Pit 1 and East Pit 2.
- Spoil placement areas external to the pits will be used for placement of overburden material from initial box cuts.
- A Northern Infrastructure Area servicing the North Pit, comprising a coal handling and processing plant (CHPP) and mine infrastructure area (MIA), associated run-of-mine (ROM) and product coal stockpiles, raw water storage, tailings and reject co-disposal areas, various roads and conveyors. This area also includes rail load out facilities and a rail loop connecting to the Goonyella to Abbott Point (GAP) rail line.
- A Southern Infrastructure Area servicing the remaining open cut pits, comprising a separate CHPP and MIA, associated ROM and product coal stockpiles, raw water storage, co-disposal areas, roads, conveyors, a separate rail load out facility and rail loop connecting to the GAP rail line.
- A proposed 60 m wide central infrastructure corridor connecting the Northern and Southern Infrastructure Areas, including road, water supply pipeline, power supply and crossings across tributaries of Kangaroo Creek.
- Access roads and internal haul roads connecting the pits and MIA.
- Diversions of existing creek lines (two tributaries of the Suttor River and a tributary of Kangaroo Creek).
- Diversions of existing power infrastructure.
- Mine water management infrastructure, including environmental dams and associated pipelines.

The direct footprint of all mining and infrastructure areas as provided by Byerwen Coal and described in Chapter 7 totals approximately 7000 ha. For the purpose of the terrestrial ecology impact assessment this footprint area has been buffered so that any additional areas that will be isolated or cleared as a result of mining and/or associated infrastructure (eg non-viable linear corridors between haul roads and pits) are included within the impact footprint. The total impact footprint considered for the terrestrial ecology impact assessment is approximately 7480 ha. The breakdown of difference between the direct footprint area provided by the client and the buffered footprint area adopted for the terrestrial ecology impact assessment in terms of REs, RE category and TECs is provided in **Table 2.1**, **Table 2.2** and **Table 2.3** respectively.

Table 2.1 Project Footprint RE Breakdown

RE	Byerwen Coal provided footprint (a)	Footprint adopted for Terrestrial Ecology Impact Assessment (b)	Difference (b-a)
11.3.1	8	9	1
11.3.25	9	9	0
11.3.4	1	2	1
11.4.2	126	156	30
11.4.8	33	35	2
11.4.9	61	62	1
11.5.1	20	20	0
11.5.16	186	190	4
11.5.3	31	31	0
11.7.1	20	20	0
11.7.1x1	194	194	0
11.7.2	217	241	24
11.7.3	40	40	0
11.7.4	172	175	3
11.7.6	791	842	51
11.8.11	79	84	5
11.8.13	15	18	3
11.8.4	59	75	16
11.8.5	177	188	11
HVR 11.3.1	11	11	0
HVR 11.4.9	6	7	1
HVR 11.8.13	0	0	0
HVR 11.8.5	1	1	0
HVR 11.9.5	2	2	0
Non-remnant	4751	5069	318
TOTAL	7010*	7481	471

Note *: This is comparable to the total footprint area described in Chapter 7 (7000 ha) with the discrepancy an artefact of GIS mapping.

Table 2.2 Project Footprint Breakdown by RE Category

RE	Byerwen Coal provided footprint (a)	Footprint adopted for Terrestrial Ecology Impact Assessment (b)	Difference (b-a)
Endangered RE	303	314	11
Of concern RE	429	465	36
No concern at present RE	1507	1612	105
HVR	20	21	1
Non-remnant	4751	5069	318
TOTAL	7010*	7481	471

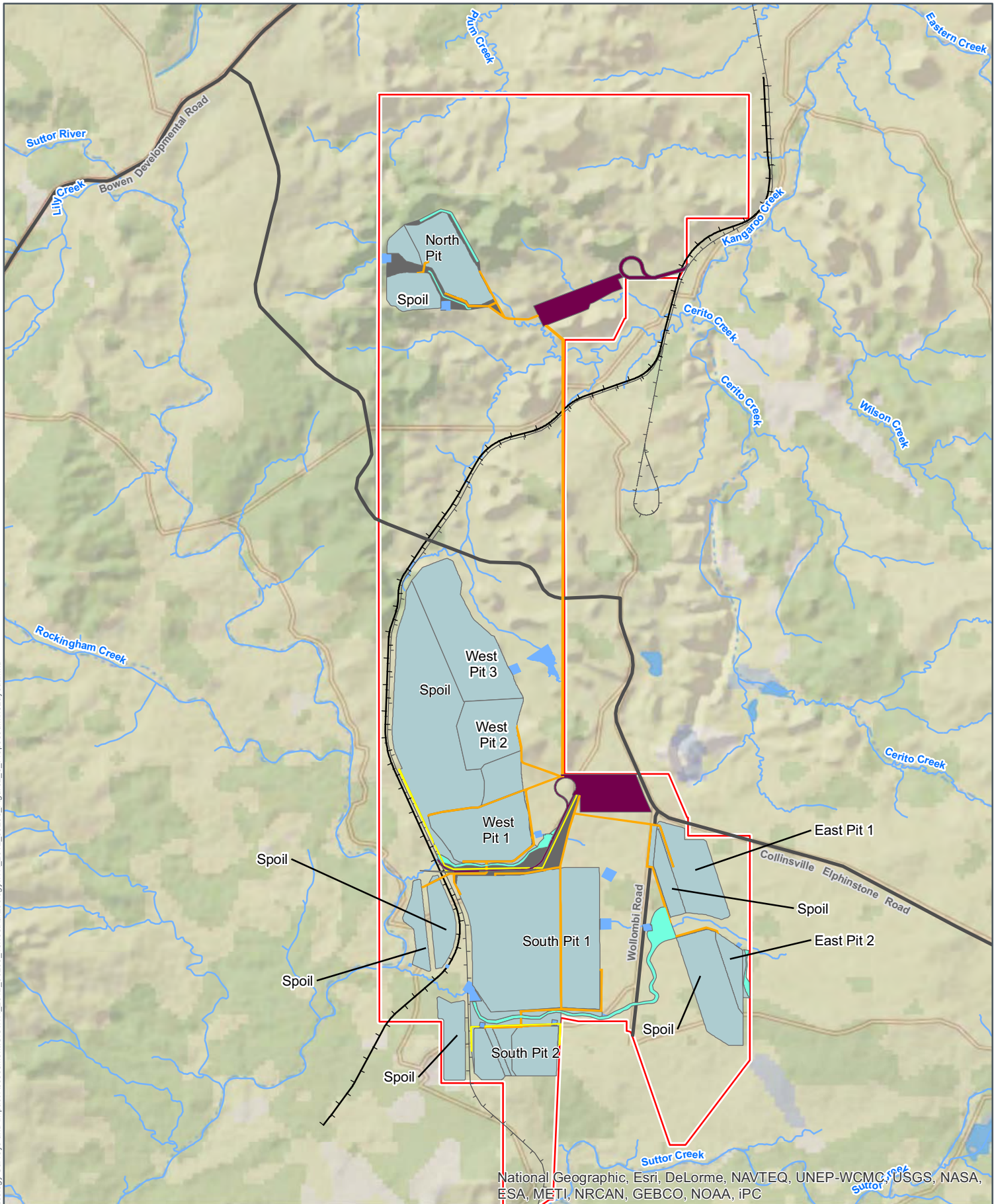
Note *: This is comparable to the total footprint area described in Chapter 7 (7000 ha) with the discrepancy an artefact of GIS mapping.

Table 2.3 Project Footprint TEC Breakdown

RE	Byerwen Coal provided footprint (a)	Footprint adopted for Terrestrial Ecology Impact Assessment (b)	Difference (b-a)
TEC Brigalow	307	316	9
TEC SEVT	15	18	3
TEC Natural Grasslands	79	84	5
Not TEC	6609	7063	454
TOTAL	7010*	7481	471

Note *: This is comparable to the total footprint area described in Chapter 7 (7000 ha) with the discrepancy an artefact of GIS mapping.

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National Geographic, Esri, DeLorme, NAVTEQ, UNEP-WCMC, USGS, NASA, ESA, METI, NRCAN, GEBCO, NOAA, IPC

BYERWEN COAL - BYC002-Ecology Surveys and Impact Assessment

LEGEND

LOCATION DIAGRAM

Figure 2.3 - Proposed Mine Layout

WORK REQUEST NUMBER: WR_2012_00295

DATA SOURCES:

Physical Road Network © State of Queensland 2010
Remnant Watercourses © State of Queensland 2011

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28/09/2012	AB	JC	Issued for Review	A
14/11/2012	SN	JC	Issued for Review	B
06/12/2012	SH	JC	Issued for Review	C
08/03/2013	SG	JC	Issued for Use	D



3. LEGISLATIVE FRAMEWORK

The following section provides an outline of statutory frameworks relevant to the identification and management of terrestrial ecological values within the project area.

3.1 INTERNATIONAL AGREEMENTS

The Japan – Australia Migratory Bird Agreement (JAMBA), China – Australia Migratory Bird Agreement (CAMBA) and Republic of Korea – Australia Migratory Bird Agreement (ROKAMBA) list bird species that migrate between Australia and other countries party to the agreements. These agreements impose an obligation on each signatory to regulate for the protection of the listed migratory bird species. In accordance with Section 20 and 20A of the EPBC Act, it is an offence to carry out an action that will have, or is likely to have, a significant impact on a migratory species without prior approval.

3.2 COMMONWEALTH

3.2.1 Environment Protection and Biodiversity Conservation Act 1999

Under the EPBC Act, an action requires approval (ie it is a ‘controlled action’) if it has, will have or is likely to have a significant impact on a matter of national environmental significance (MNES). MNES prescribed under the EPBC Act are:

- World heritage places
- National heritage places
- Wetlands of international significance (Ramsar wetlands)
- Threatened ecological communities and species
- Commonwealth marine areas
- The Great Barrier Reef Marine Park
- Nuclear actions.

The EPBC Act Policy Statement 1.1 - Significant Impact Guidelines, define a significant impact as an impact which is important, notable or of consequence, having regard to its context or intensity. The likelihood of an action having a significant impact depends upon the intensity, duration, magnitude and geographic extent of the impacts. A significant impact on the environment is a real or not remote chance or possibility (DEWHA 2009a).

On 13 January 2010, the project was determined to be a controlled action by DSEWPaC (reference EPBC 2010/5778). The controlling provisions are sections 18 and 18A (listed threatened species and communities) and sections 20 and 20A (listed migratory species). The project is to be assessed under the bilateral agreement between the Queensland and Commonwealth Governments.

Significant impact assessments for MNES potentially impacted by the project are addressed separately in a standalone MNES report.

3.2.2 EPBC Act Environmental Offsets Policy

The EPBC Act Environmental Offsets Policy (EPBC Offsets Policy) (2012) outlines the position of the Commonwealth Government with respect to the use of environmental offsets under the EPBC Act. Offsets are viewed by the Commonwealth as the third strategy to reduce potential impacts to MNES after measures to avoid, minimise and mitigate impacts have been implemented. Offsets are required to counterbalance any vegetation clearing that would impact a MNES. The policy sets out principles for the provision of offsets to compensate for impacts on MNES. These principles include:

- Offsets must deliver an overall conservation outcome that improves or maintains the viability of the protected matter.
- Offsets must be built around direct (ie land-based) offsets but may include other compensatory measures (eg research or educational programs).
- Offsets must be in proportion to the level of statutory protection that applies to the protected matter.
- Offsets must be of a size and scale proportionate to the residual impacts on the protected matter.
- Offsets must effectively account for and manage the risks of the offset not succeeding.
- Offsets must be additional to what is already required, determined by law or planning regulations or agreed to under other schemes and programs.
- Offsets must be efficient, effective, timely, transparent, scientifically robust and reasonable.
- Offsets must have transparent governance arrangements including being able to be readily measured, monitored, audited and enforced.

This report sets out how impacts on MNES in the project area have been avoided or minimised and proposed mitigation strategies. Offsets for unavoidable impacts on MNES will be detailed in the offset strategy being prepared for the project. Impacts on MNES are discussed in detail in **Section 8** of this report.

3.3 STATE

3.3.1 *Environmental Protection Act 1994 (EP Act)*

Queensland's *Environmental Protection Regulation 2008* defines Category A and Category B environmentally sensitive areas (ESAs). Category A ESAs include national parks, marine parks, the Great Barrier Reef region and the wet tropics area. Category B ESAs include some classes of protected areas, endangered RE types, declared fish habitat areas and areas subject to international conventions.

3.3.2 *Nature Conservation Act 1992 (NC Act)*

The *Nature Conservation Act 1992* and subordinate legislation provide for the protection and conservation of nature, including the declaration and management of protected areas, the protection of wildlife and habitat, and the sustainable use of native wildlife areas. The *Nature Conservation (Wildlife) Regulation 2006* lists plants and

animals as extinct, endangered, vulnerable, near threatened, least concern, international and prohibited. The *Nature Conservation (Protected Areas Management) Regulation 2006* identifies protected areas, including forest reserves, resource reserves, conservation parks, national parks and nature refuges.

Under the NC Act and subordinate legislation any person taking, using or interfering with protected fauna is required to have a Wildlife Rehabilitation Permit (spotter-catcher) and to possess the training and skills required to undertake this activity. Such a permit will allow a person to rescue and release a sick, injured or orphaned protected animal, or a protected animal whose habitat has been, or will be, destroyed by human activity or a natural disaster.

No permits are required for taking protected plants in the project area pursuant to section 41(b) of the NC Act as clearing will occur in the course of an activity under a mining lease. Impacts on plants and animals listed under the NC (Wildlife) Regulation 2006, including endangered, vulnerable, near threatened species are considered through this EIS.

3.3.3 Vegetation Management Act 1999 (VM Act)

The VM Act establishes Queensland's vegetation management framework and classifies remnant vegetation in Queensland as endangered, Of Concern or least concern REs. REs are vegetation communities that are consistently associated with a combination of geology, land form and soil in a bioregion. RE descriptions from the REDD and classifications assigned under the VM Act have been used as the basis for assessment of remnant vegetation communities in the project area. However, it should be noted that mining activities approved by the grant of an Environmental Authority (EA) under the EP Act are exempt from vegetation clearing regulations under the VM Act and *Sustainable Planning Act 2009*. Impacts on remnant vegetation are assessed through the EIS process under the *State Development and Public Works Organisation Act 1971* and regulated through conditions imposed by the Coordinator-General and the grant of an Environmental Authority under the EP Act.

3.3.4 Land Protection (Pest and Stock Route Management) Act 2002 (LP Act)

The LP Act provides for the declaration of Class 1, Class 2 or Class 3 pest plant and animal species. Under section 77 of the LP Act, a landowner must take reasonable steps to keep land under their control free of Class 1 and Class 2 pests. The definition of landowner under the LP Act includes the lessee for a mining lease granted under the *Mineral Resources Act 1989*. Under the LP Act it is an offence to introduce, keep or supply a declared pest, feed a declared pest animal or take a declared pest for commercial use. It is also an offence to:

- Supply anything containing reproductive material of a Class 1 or Class 2 pest prescribed under the *Land Protection (Pest and Stock Route Management) Regulation 2003*.
- Transport a vehicle or thing containing soil or other organic material, which contains the reproductive material of a declared pest plant.

3.3.5 Queensland Biodiversity Offset Policy

The application of this policy to declared significant projects approved under the *State Development and Public Works Organisation Act 1971* is at the discretion of the Coordinator General. Potential offset requirements of this project are addressed separate to this report (refer to the EIS chapter: Environmental Offsets).

4. METHODOLOGY

The description of terrestrial flora and fauna values presented in this report is based on ecological studies completed in the project area (and exploration tenures EPC 614, EPC 739) between 2009 and 2012. The following sections provide a description of desktop and field assessments completed in the project area.

4.1 TAXONOMIC NOMENCLATURE

Scientific and common names used in this report are consistent with those used in the following sources:

- Bostock and Holland (2007) and botanical binomials presently accepted by the Queensland Herbarium for flora
- Cogger (2000) for amphibians and reptiles
- Morcombe (2000) for birds
- Van Dyck and Strahan (2008) for mammals.

4.2 DESKTOP ASSESSMENT

The most recent desktop assessment was undertaken in March 2012 and included a review of the Commonwealth and State databases listed below:

- The DSEWPAC Protected Matters Search Tool to identify MNES within approximately 20 km of the project area using the coordinates listed in **Table 4.1**
- DSEWPAC Species Profiles and Threats Database (SPRAT)
- The DEHP Wildlife Online database to identify flora and fauna species potentially occurring within approximately 20 km of the project area. The search was defined by the coordinates listed in **Table 4.1**
- The Queensland Herbarium HERBRECS search defined by the coordinates in Table 4.1
- Queensland Museum Records within the project area as defined by the coordinates listed in **Table 4.1**
- DEHP RE mapping (Version 6.1), HVR Mapping (Version 2), Essential Habitat Mapping (Version 2)
- DEHP REDD
- DEHP ESA mapping
- DEHP Biodiversity Planning Assessment (BPA) for the Brigalow Belt Version 1.3 (DEHP 2008)
- Birds Australia Bird Atlas search for a degree square centred on the coordinates listed in **Table 4.1**
- DEHP Wetland Mapping to determine the classification, extent and significance of wetlands within the project area
- Directory of Nationally Important Wetlands (Environment Australia 2001)

- Protected Area Estate Mapping
- DEHP watercourse mapping
- Published ecological information on threatened flora and fauna species and vegetation communities.

Table 4.1 Search Areas applied to Desktop Searches

Search Type	Search Area	
	Latitude	Longitude
DSEWPac Protected Matters Search Tool	-20.90156	147.62248
	-20.89912	148.10683
	-21.56741	148.11183
	-21.56994	147.62529
DEHP Wildlife Online	-20.899	147.625
	-20.899	148.111
	-21.569	147.625
	-21.569	148.111
Queensland Herbarium (HERBRECS)	-21.0576	147.8264
	-21.6559	147.9770
Queensland Museum Records	-20.98333	147.716667
	-20.98333	147.916667
	-21.38333	147.916667
	-21.38333	147.716667
Birds Australia Bird Atlas	21.187	147.4821

Previous studies and reports prepared for the project and for other nearby mines were also reviewed including:

- Flora and Fauna Assessment of the Exploration Permit Coal (EPC) 614 project area near Glenden, Central Queensland, a report to QCoal Pty Ltd by the Centre for Environmental Management, Central Queensland University (2009)
- Byerwen Coal Baseline Flora and Fauna Study, a report to QCoal Pty Ltd by Unidel (Report Number BYC001-ENV-RPT-0002, Rev C July 2011)
- Environmental Impact Statements for the Ellensfield, Caval Ridge and Daunia coal mine projects.

4.3 VEGETATION AND FLORA FIELD ASSESSMENTS

Terrestrial vegetation and flora values of the project area described in this report have been derived from desktop and field surveys. Eight separate field surveys have been undertaken in the project area comprising:

- General surveys to verify 1:100 000 scale RE mapping and to identify and prioritise terrestrial flora values in the project area
- A targeted survey to assess whether native grasslands in the eastern part of the project area met the criteria for the 'Natural grasslands of the Queensland Central Highlands and northern Fitzroy Basin' threatened ecological community (Natural grasslands TEC)
- Targeted surveys to assess populations of the previously undescribed *Kelita uncinella* recorded in the initial surveys by CQU (2009).

Terrestrial flora field surveys and the timing for each are summarised in **Table 4.2**. Detailed survey methodologies are included in **Attachment A**.

Table 4.2 Summary of Terrestrial Flora Field Surveys

Purpose	Project area	Wet Season Survey	Dry Season Survey
General flora survey (CQU)	EPC 614	30 March–10 April 2009	3 August 2009
General flora survey	EPC 739	-	14–22 October 2010
Targeted grassland survey	EPC 739	-	2–3 June 2011
Targeted surveys for <i>Kelita uncinella</i>	EPC 739	–	5–30 June 2011 24–29 July 2011
General flora survey	EPC 739 and EPC 614	5–9 March 2012	-

4.3.1 General Flora Surveys and Vegetation Mapping

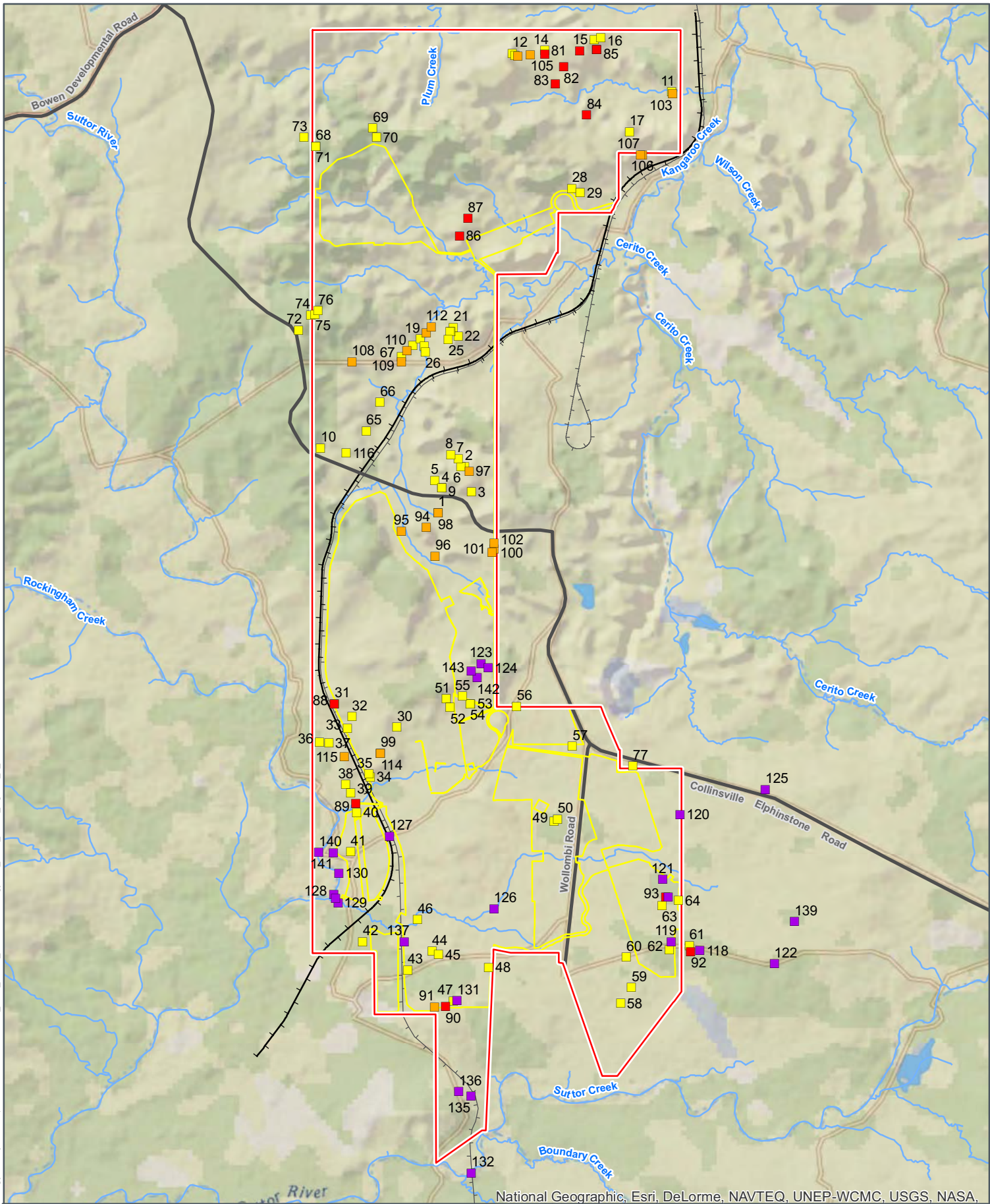
The primary objective of these surveys was to identify and describe vegetation communities and terrestrial flora values, and to ground-truth existing RE mapping for the project area. A total of 143 sites across the project area were assessed over four surveys (**Figure 4.1**). An overall summary of survey effort is provided in **Table 4.3**. An overview of survey effort from each of the four surveys is provided in points (i)–(iv) below:

- CQU (2009) assessed 27 sites¹ in EPC 614 during the wet and dry season. The surveys were used to ground truth RE mapping and describe general floristic values. While the CQU report notes that surveys were undertaken in accordance with the "DERM system" (refer p5), the report does not describe the level of survey

¹ Sites were 2500 m² in area, but configured to best sample the vegetation unit being assessed.

completed (secondary/tertiary/quaternary), nor provide the requisite data sheets. Further detail on the CQU flora survey method is provided in **Attachment A**

- (ii) In October 2010, Unidel (now AMEC) completed tertiary and quaternary assessment of 50 flora survey sites in EPC 739 during the dry season. Surveys were carried out in accordance with the Queensland Herbarium's 'Methodology for the Survey and Mapping of Regional Ecosystems and Vegetation Communities in Queensland' (Neldner *et al* 2005). Further detail is provided in **Attachment A**
- (iii) In June and July 2011, Unidel (now AMEC) completed targeted grassland surveys and surveys for *Kelita uncinella* during the dry season. During this period, a further nine flora survey sites were assessed to the secondary level. Further detail is provided in **Attachment A**
- (iv) In March 2012, Unidel (now AMEC) completed secondary, tertiary and quaternary assessment of a further 57 sites over EPC 614 and 739. Surveys were carried out in accordance with the Queensland Herbarium's 'Methodology for the Survey and Mapping of Regional Ecosystems and Vegetation Communities in Queensland' (Neldner *et al* 2005). Further detail is provided in **Attachment A**.



National Geographic, Esri, DeLorme, NAVTEQ, UNEP-WCMC, USGS, NASA,

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Figure 4.1 - Flora Survey Sites

- Main Road
- Proposed Alpha Coal Project Rail Line
- GAP Railway
- Stream Order (2 and above)
- Project Area
- Project Footprint

Flora Survey Type

- Secondary
- Tertiary
- Quarternary
- CQU (2009) 2500m² Plot

WORK REQUEST NUMBER: WR_2012_00295

DATA SOURCES:

Remnant Watercourses © State of Queensland 2011

DATE	AUTHOR	APPROVED	REVISION NOTE	REV.
14/11/2012	SN	JC	Issued for Review	B
05/12/2012	SH	JC	Issued for Review	C
08/01/2013	AB	JC	Issued for Review	D
08/03/2013	SG	JC	Issued for Use	0

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Table 4.3 Number of Sites and Information Collected by Site Type

Site Type	No. of Sites	Information Collected
Secondary	16	Complete species list for 10 x 50 m plot, species structure, assemblage, diversity and abundance, record of general vegetation condition and presence of weed species.
Tertiary	23	Species structure, assemblage, diversity and abundance, record of general vegetation condition and presence of weed species.
Quaternary	77	Species present.
Not Recorded	27	CQU (2009) notes that survey data was collected from 27 survey sites, but does not describe the level of assessment completed or provide the requisite data sheets. However, subsequent floristic survey by Unidel (now AMEC) overcomes this limitation by establishing supplementary sampling sites in the areas assessed by CQU.

The information collected during general flora surveys was used to refine DEHP 1:100 000 certified RE mapping (version 6.1). This layer was edited using hard copy stereo imagery sourced from the DEHP aerial photographic library (**Table 4.4**). Historical aerial photography (1947) was also reviewed to assess historic disturbance and vegetation condition.

Table 4.4 Aerial Photographic Imagery as the Basis of Revised RE maps

Map Name/Film Number	Year	Scale	Run/Photograph
Byerwen/QAP5812	2000	1:40,000	Run 2, 18–22 Run 3, 71–74 Run 4, 112–114 Run 5, 163–165
Byerwen/QAP5831	2000	1:40,000	Run 6, 183–188 Run 7, 237–241

DEHP certified RE mapping was referenced throughout all stages of stereoscopic assessment to provide a preliminary indication of the limitations of existing mapping, as well as assist with the selection of survey site locations. Recent satellite imagery from Google Earth (2009) was consulted where necessary throughout the project area to provide an indication of recent clearing and land use patterns. This mapping was also refined based on recent (2011) aerial imagery for the project area provided by the proponent.

The revised RE mapping presented in this report is based on aerial photo interpretation and ground validation of the certified RE map. DEHP certified RE mapping is presented at a scale of 1:100 000 which generally delineates polygons of >20 ha with a minimum polygon size for remnant vegetation (isolated by non-remnant vegetation) of 5 ha. The revised mapping produced for this assessment defines remnant polygons down to a size of 5 ha. Where possible significant ecosystems have been mapped as homogenous rather than heterogeneous polygons. This provides greater certainty in regard to the location of sensitive vegetation types. Revised RE mapping is considered

to more accurately define the spatial extent of REs in the project area and forms the basis of the impact assessment component of this report.

Stereoscopic assessment of aerial photography was used to establish the boundary of Tertiary landforms (Laterite jump-ups) within the project area as a means to prioritise areas for mapping revision. Lateritic landforms are considered to be low risk in terms of their potential to host significant vegetation communities and therefore detailed mapping revision was not undertaken in these areas. Vegetation present on the lateritic landforms (north western portion of the project area) was assumed to be consistent with certified RE mapping.

In total, a 10 463 ha portion of the project area was subject to detailed mapping revision. The revised mapping is represented at a spatial scale of 1:40 000, the scale of aerial photography used, with captured vegetation line work developed with an accuracy of +/-40 m.

4.3.2 Regrowth Vegetation

The project area supports various stages of regrowth vegetation (ie vegetation which has regrown following previous clearing). Regrowth vegetation was mapped for the project area using historical aerial photography from 1963 (Commonwealth, 1:50 000 scale) and 2000 (Byerwen 8455, 1:40 000 scale). The boundaries of regrowth areas from the 2000 aerial photography were subsequently overlain on 2009 aerial imagery available at the time of mapping and clipped to show current regrowth boundaries. Areas of regrowth, in particular areas of regrowth brigalow, were examined during the field survey to characterise the various stages of regrowth development within the project area.

Discussion with local graziers indicate that brigalow regrowth in the project area has been subject to long-term, cyclical disturbance. Regrowth brigalow is pulled on a roughly 6 year cycle to maximise the grazing capacity of the land, allowing brigalow shrubs to replenish soil nitrogen prior to removal. As a result, many of the areas mapped by DEHP as HVR are poorly developed regrowth habitats, often with a development age of less than 5 years or comprising stunted, widely spaced and often dead shrubs. These areas have been assessed as having limited value and have been excluded from the revised RE map.

Based on historical aerial photo analysis, field survey and discussions with landholders, three categories of regrowth vegetation are recognised within the project area:

- Regrowth vegetation which has achieved remnant status (ie where the vegetation has reached 70% of the height and 50% of the canopy cover of an undisturbed example of the same RE). These areas have been mapped as remnant in the revised RE map.
- Advanced regrowth vegetation that has not yet achieved remnant status but exhibits the structural and floristic elements of a defined RE type. Areas of advanced regrowth vegetation have been mapped as HVR in the revised RE map.

Due to the inclusion of regrowth Brigalow as a TEC under the EPBC Act², particular care has been taken to identify areas of regrowth Brigalow which meet the condition class criteria set out under the Brigalow TEC SPRAT profile (DSWEPAC 2013). Important considerations are that the regrowth community is: (i) generally more than 15 years of age; (ii) exotic perennial plants have no more than 50% cover (assessed in a minimum area of 0.5 ha); and (iii) individual patches are greater than 0.5 ha. Areas of Brigalow mapped as HVR and other areas of advanced regrowth Brigalow were assessed against the criteria to determine whether they should also be identified as the Brigalow TEC.

- Other woody regrowth vegetation. These areas have been mapped as non-remnant and non-HVR in the revised RE map.

4.3.3 Targeted Native Grassland Surveys

Targeted surveys were undertaken over a 2 day period in June 2011 to record the extent and condition of native grassland communities in the northern part of EPC 739 and to establish whether these met the criteria for the 'Natural grasslands of the Queensland Central Highlands and northern Fitzroy Basin' TEC. Groundcover was assessed using five 1 m x 1 m subplots placed at 10 m intervals along a transect with visual cover estimations of dominant species. Ecological and structural data together with full species lists were also recorded.

4.3.4 Targeted Surveys for *Kelita uncinella*

The previously undescribed species, *Kelita uncinella*, was first detected in the project area during the initial CQU surveys. *K. uncinella* is a spreading annual herb found on steep, rocky slopes in habitats with an over-storey of lancewood (*Acacia shirleyi*) and a mid-storey of semi-evergreen vine thicket (SEVT) (Unidel 2011). It is locally common at sites where it occurs (Bean 2010).

Targeted surveys for *K. uncinella* were undertaken as part of baseline flora assessments within the project area. Field surveys were initially undertaken in areas of predicted habitat in mapped areas of RE 11.7.2 and known sites within the project area were visited by Unidel ecologists to record the habitat variables. The information collected was analysed in the office and potential habitat within the project area predicted based on a review of high resolution aerial imagery, geology mapping, RE mapping and topography to identify areas for further targeted surveys. A second survey was undertaken to assess the predicted habitat areas. The presence or absence of *K. uncinella* was recorded at each of the survey sites. The distribution of recorded populations was mapped using a combination of hand-held GPS and recent aerial imagery.

² Brigalow (*Acacia harpophylla* dominant and co-dominant) Threatened Ecological Community.

4.3.5 Survey Limitations

The vegetation mapping is represented at a spatial scale of 1:40 000, the scale of aerial photography used, with captured vegetation line work produce with an accuracy of +/-40 m. The effort expended for vegetation survey is consistent with the requirements of Neldner *et al* (2005), and importantly accounts for seasonal variation. In this regard the survey is consistent with the project terms of reference.

Access to some parts of the project area was restricted as a result of rugged terrain and/or the absence of constructed roads or access tracks. In particular, vegetation communities on rugged breakaway country (land zone 7) in the northern and central parts of the project area were difficult to access. Access was also restricted to the north-west portion of the project area. In general, these areas are characterised by a simple suite of vegetation communities that can be mapped and attributed with a high degree of confidence from available aerial imagery. Survey of representative habitats in accessible locations provided information relevant to the structural and floristic characterisation of vegetation in areas that could not be accessed.

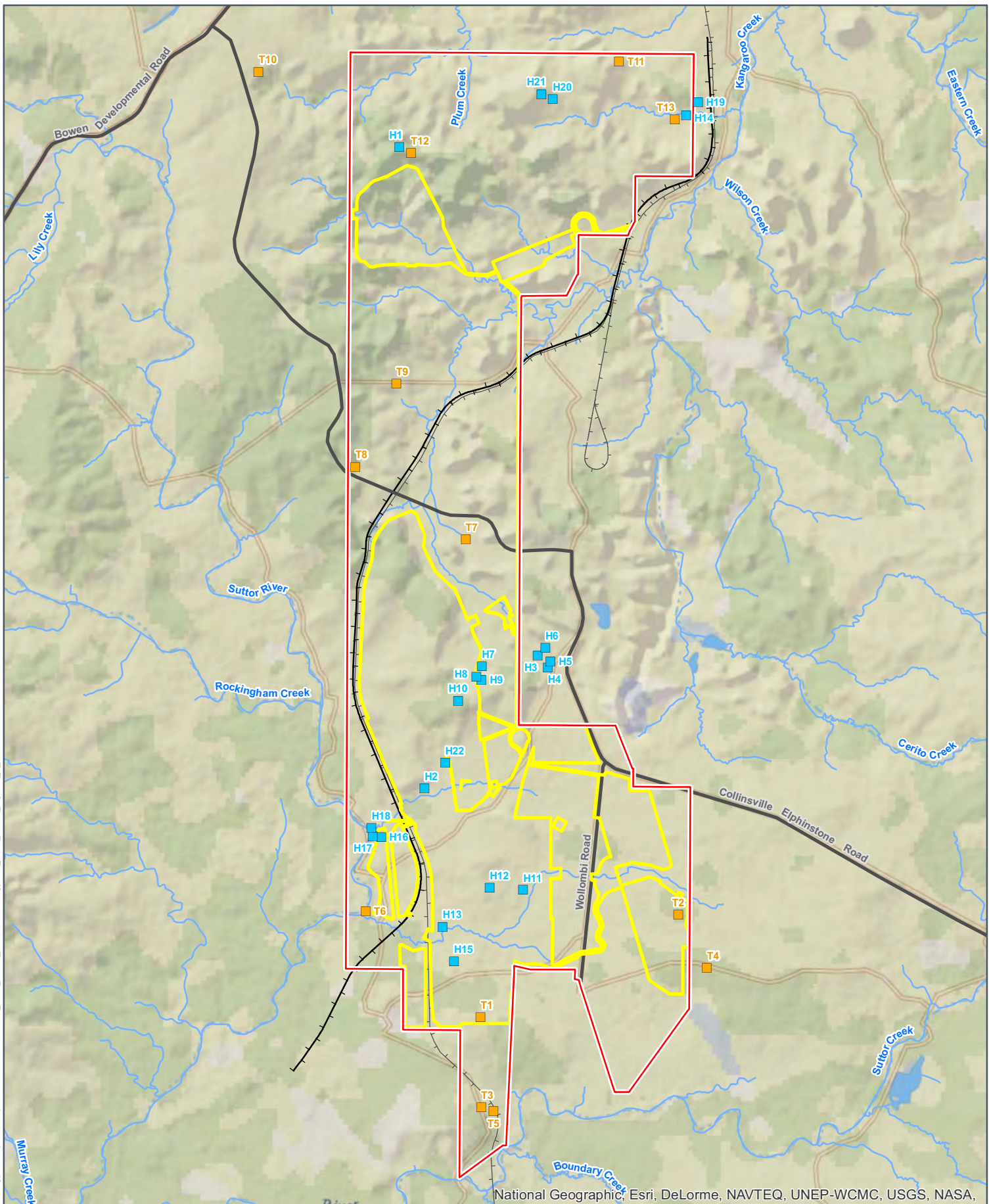
Field survey effort was concentrated in areas of predicted impact based on a preliminary impact footprint provided by the proponent. As a result of subsequent modifications to the impact footprint based on the results of studies completed for the EIS, a number of survey sites are now located outside the project footprint. Again, structural and floristic data from representative vegetation communities is considered adequate to extrapolate across unsurveyed areas.

Perennial trees and shrubs remain identifiable outside optimum sampling periods and timing is not a constraint with respect to threatened flora potentially occurring in the project area. The timing of surveys (early March) in native grasslands in the south-eastern portion of the project area was considered favourable to detect annual grass species (*Dichanthium queenslandicum*, *Dichanthium setosum* and *Digitaria porrecta*).

4.4 FAUNA FIELD ASSESSMENTS

The existing terrestrial fauna values of the project area described in this report have been derived from desktop and field surveys. Three separate fauna surveys were conducted in the project area between 2009 and 2012 (**Table 4.5**). Baseline fauna surveys involved fauna trapping at 13 sites and secondary habitat assessments at 22 sites within representative habitat types (**Table 4.7**). Trapping and habitat assessment sites in the project area are shown on **Figure 4.2**.

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National Geographic, Esri, DeLorme, NAVTEQ, UNEP-WCMC, USGS, NASA,

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Figure 4.2 - Fauna Survey Sites

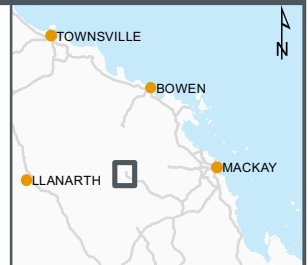
WORK REQUEST NUMBER: WR_2012_00216

DATA SOURCES:

Remnant Watercourses © State of Queensland 2011

- Main Road
- Proposed Alpha Coal Project Rail Line
- GAP Railway
- Stream Order (2 and above)
- Project Area
- Project Footprint
- Trapping Location
- Habitat Assessment Site

DATE	AUTHOR	APPROVED	REVISION NOTE	REV.
28/09/2012	AB	JC	Issued for Review	A
16/11/2012	SN	JC	Issued for Review	B
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Table 4.5 Summary of Terrestrial Fauna Field Surveys

Purpose	Project area	Wet Season Survey	Dry Season Survey
General fauna survey (CQU)	EPC 614	30 March–10 April 2009	3–12 August 2009
General fauna survey	EPC 739	-	14–22 October 2010
General fauna survey	EPC 739	5–9 March 2012	-

4.4.1 Consideration of Survey Guidelines

Fauna survey methodologies were developed having regard to the following survey guidelines:

- Reptiles
 - Guidelines for detecting reptiles listed as threatened under the *Environment Protection and Biodiversity Conservation Act 1999* (Department of the Environment, Water, Heritage and the Arts 2011a)
 - *Environment Protection and Biodiversity Conservation Act 1999* Draft referral guidelines for the nationally listed Brigalow Belt reptiles (Department of the Environment, Water, Heritage and the Arts 2011b).
- Birds
 - Guidelines for detecting birds listed as threatened under the *Environment Protection and Biodiversity Conservation Act 1999* (Department of the Environment, Water, Heritage and the Arts 2010)
 - Black-throated finch – SEWPaC Significant impact guidelines for the endangered black-throated finch (southern) (*Poephila cincta cincta*) (BTF Recovery Team 2009).
- Mammals
 - Guidelines for detecting mammals listed as threatened under the *Environment Protection and Biodiversity Conservation Act 1999* (Department of the Environment, Water, Heritage and the Arts 2011c)
 - Bats – Guidelines for detecting bats listed as threatened under the *Environment Protection and Biodiversity Conservation Act 1999* (Department of the Environment, Water, Heritage and the Arts 2010).

4.4.2 Survey Site Selection

Survey sites were located to maximise detection and/or capture of target (threatened, near threatened and regionally significant) fauna species. At the landscape scale, DEHP certified RE and HVR mapping was used to target:

- Vegetation types that provide a representative example of the various habitat types that occur within the project area

- Vegetation types that exhibit preferred habitat qualities for fauna species, in particular threatened or near threatened species known or potentially occur within the project area
- The presence of wetlands and or dams that provide watering points for fauna species
- The presence of bioregional corridors which facilitate fauna dispersal across the landscape
- Riparian vegetation along watercourses that can act as fauna dispersal corridors and often contain microhabitat features such as hollow bearing trees
- The presence of rocky outcrops that can provide potential habitat for fauna species such as quolls and bats
- Soil types with a particular focus on the black clay soils located to the north-west of the project area that may represent preferred habitat for reptile species.

At the site-scale, trapping and observation was undertaken in microhabitats providing the best opportunity for detection of target species.

4.4.3 Fauna Trapping

Fauna trapping was undertaken across representative habitat types in the project area. Habitats sampled by survey event are summarised in **Table 4.6**. A description of fauna trapping sites is provided as **Attachment C**.

Table 4.6 Habitat Types Sampled by Survey Event

Survey	Lateritic Uplifts	Undulating Black Cracking Clays	Undulating Sandy Plains	Clay Floodplains With Gilgai	Alluvial Floodplains	Wetlands	Cleared
CQU (2009)	-	-	✓	✓	✓	-	✓
AMEC (2010)	✓	✓	✓	-	✓	-	-
AMEC (2012)	✓	✓	✓	✓	✓	✓	✓

A summary of trapping techniques used for the fauna surveys is provided in **Table 4.7**. Detailed fauna survey methodologies including a summary of trapping hours and techniques are provided in **Attachment A**.

Table 4.7 Fauna Sampling Techniques

Trapping Technique	Description
Elliott Traps	At each trapping location, both Type A and Type B Elliott traps were placed 5–8 m apart and baited with a mixture of rolled oats and peanut butter. Trap placement was influenced by vegetation diversity, the size and shape of the vegetation patches, and naturally occurring features such as logs, rock outcrops, tree bases and clumping vegetation. Traps were cleared each morning and reset in the afternoon in accordance with animal ethics requirements.
Pitfall Traps	Pitfall traps are PVC tubes that are approximately 25 cm in diameter and 45 cm deep. These tubes were placed approximately 5 m apart along a plastic line fence.
Funnel Traps	Funnel traps were deployed on either side of a drift fence flush to the ground surface. A shade cloth covering each funnel trap was used to protect trapped species from daytime heat. Funnel trap lines were cleared early morning and late afternoon in accordance with animal ethics requirements.
Camera Traps	Camera trapping involves the placement of motion activated cameras in areas likely to be frequented by fauna species. Camera traps were deployed at a large dam in the southern portion of the project area (Site T8) and along a fence line on a vehicle track where frequent fauna movement was evident (Site T9).
Ultrasonic Bat Recording	Ultrasonic bat recording using both Anabat and Binary Acoustic Technology equipment was undertaken at various locations throughout the project area. Such devices record frequencies in the ultrasonic spectrum to enable the identification of bat species.
Mist Netting	Mist nets comprised of thin nylon mesh suspended between two poles. This trapping technique was applied along a creek line in the north of a project area to confirm the identity of bat species recorded by the Ultrasonic recording system.
Spotlighting	Hand-held spotlights and head torches were used to sample nocturnal mammals (flying, arboreal and terrestrial), birds (owls and nightjars), reptiles and frogs.
Mawbey Traps	Mawbey traps were utilised to trap possums, quolls and bandicoots. Baited with jam coated apple and pet jerky, these traps were placed under trees and grass clumps at Site T2.
Intensive Diurnal Searches	Active diurnal searches were undertaken that involved intensive investigation of ground layer (under logs, rocks and leaf litter), low vegetation (under bark and in tree stumps) and rock crevices for all amphibians, reptiles, bats and animal signs (eg scats, bird feeding remnants, remains and tracks).
Owl Audio Call Playback	Recorded owl calls were utilised to elicit identifiable calls of nearby birds.

4.4.4 Habitat Assessments

Habitat assessments captured specific microhabitat data from numerous locations within different vegetation groups across the project. This assessment of habitat features identified the presence, abundance and quality of microhabitat features considered critical for the survival of threatened, near threatened and regionally significant fauna species. Consideration of habitat quality as a predictor of the likelihood of occurrence is considered to be a precautionary approach and is particularly relevant for cryptic species.

Targeted fauna habitat assessments were carried out at 22 sites of approximately 100 m x 100 m within the project area with the aim of identifying microhabitat features for target fauna species identified through the desktop analysis. The location of these sites is shown on **Figure 4.2**. The presence and density of the following microhabitat features were recorded at each of the sites:

- Regional Ecosystem
- Total basal area (m²/ha)
- Stems >10 cm diameter at breast height (dbh)(stems/ha)
- Density hollow trees (no./ha)
- Avg. height of tallest trees (m)
- Canopy cover %
- Canopy species
- Samplings (stems/ha)
- Shrubs (stems/ha)
- Live trees, decorticating bark (m²/ha)
- Dead trees, exfoliating bark (m²/ha)
- Logs-solid (no./ha)
- Logs-hollow (no./ha)
- Grass cover %
- Average grass height (cm)
- Low shrub cover %
- Fine litter cover %
- Coarse litter cover %
- Rocks present
- Soil cracks
- Free water present
- Caves present
- Soil texture.

4.5 SPECIES ASSESSMENTS

The likelihood of occurrence for individual species has been determined based on a review of previous records, a review of known habitat preferences and an assessment of habitat availability and the presence of microhabitat features within the project area. This included known RE associations for each species, known records and distribution ranges. Species were assigned to one of the following categories:

- **Known to occur:** this category includes species or communities which have been recorded from the project area.
- **Likely to occur:** this category includes species previously recorded in proximity to the project area, and which have suitable habitat features available on site which may support the species.
- **May occur:** this category includes those species where suitable habitats or RE associations are present in the project area but where there are no known records in the area.
- **Unlikely to occur:** this category includes those species for which the project area offers limited or no potential habitat, is outside their known range and/or is without broader habitat requirements.

Impacts on potential habitat for flora and fauna species have been calculated based on RE associations for individual species derived from known habitat associations and published literature. RE associations provide an indication of the presence of suitable habitat but do not take account of the actual distribution of suitable microhabitat (eg logs, leaf litter) or niche habitat (eg suitable nesting sites) within each RE. The areas are therefore likely to represent an overestimate of actual habitat availability for most species. The likelihood of occurrence and RE associations for threatened fauna species is discussed in **Section 7.3**.

5. PROJECT AREA DESCRIPTION

The project area is located within the Brigalow Belt North Bioregion and on the boundary of two subregions: Wyarra Hills to the east, and the Northern Bowen Basin to the west. The region is characterised by a sub-humid to semi-arid climate.

The Wyarra Hills subregion comprises a fringing core of low hills with duplex soils and lateritic mesa tops and breakaways with shallow rocky soils. Vegetation characteristic of the subregion comprises silver-leaved ironbark (*Eucalyptus melanophloia*) woodlands with bloodwoods (*Corymbia* spp.) and lancewood (*Acacia shirleyi*) and/or bendee (*A. catenulata*) on scarps and mesas, and *Eucalyptus persistens*, poplar box (*E. populnea*) on lower slopes (Young *et al* 1999).

The Northern Bowen Basin subregion contains the major areas of outcrop of Triassic and Permian sediments within the Bowen Basin and there are also areas of basalt and Tertiary sediments (Young *et al* 1999). The landscape is predominantly undulating with brigalow (*Acacia harpophylla*) and Dawson gum (*E. cambageana*) dominant on clay soils, and an open woodland of narrow-leaved ironbark (*E. crebra*) or poplar box on shallower texture-contrast soils (Young *et al* 1999). There are also areas of bluegrass (*Dichanthium sericeum*) downs with the sandstone range areas dominated by narrow-leaved ironbark and bloodwoods species (Young *et al* 1999).

Land use within the Brigalow Belt North Bioregion includes grazing, cropping, tourism and mining, particularly coal, with coal deposits occurring in the Bowen and Galilee Basins. Nature conservation has received increasing attention in the bioregion due to the extensive loss of habitat that has occurred, and accompanying declines in species populations (Young *et al* 1999).

5.1 LANDFORM

The project area is comprised of diverse geological features, which combine to provide a complex array of habitats. Significant tracts of land in the northern and central portions of the project area are found on sandstone plateaus which fall to form steep wash out slopes and grade into broad undulating plains with heavier clay soils and sandy soils. These plans are dissected by incised alluvial systems often with deep outer banks displaying significant soil profiles and bedrock. Basaltic and lateritic outcrops occur sporadically within the project area providing varying soil structures and complex vegetation composition and habitat features such as rocky outcrops and scalds.

5.2 DRAINAGE, WATERWAYS AND WETLANDS

The project area is located in the Burdekin River catchment. The northern and most of the central sections of the project area are within the Bowen sub-catchment and are drained by Plum Creek, Kangaroo Creek and their tributaries, which form part of the Broken River sub-catchment. The southern section of the project area is within the Suttor sub-catchment and is drained by the Suttor River and its tributaries (**Figure 5.1**). Watercourses in the project area are ephemeral and flow only after sustained or intense rainfall in the catchment. Stream flows are highly variable, with flows typically

occurring during the wetter months (January through March) with low to no flow for the rest of the year.

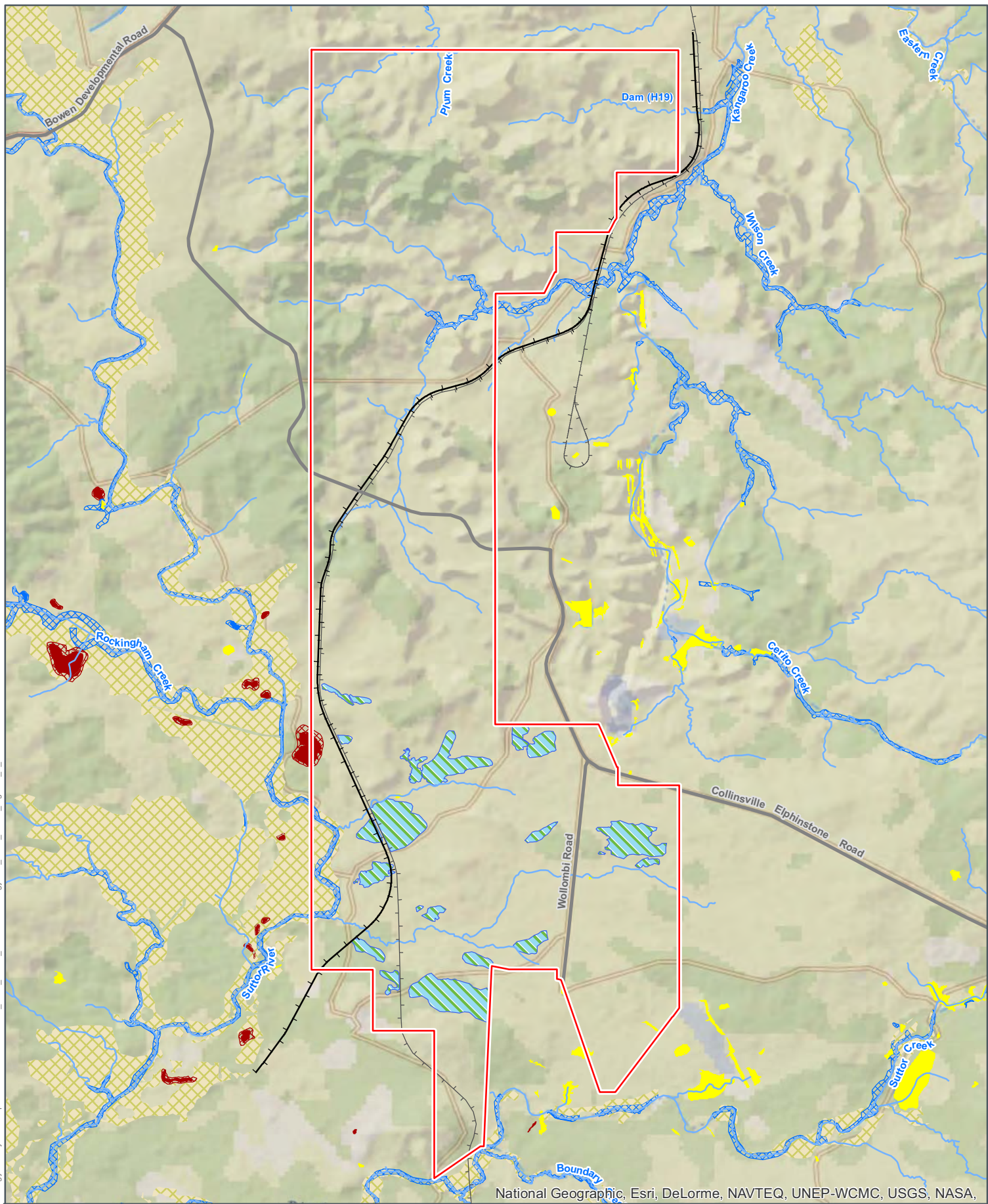
Permanent and semi-permanent water sources in the project area are associated with farm dams and wetland habitats. Key features include:

- The Queensland Wetlands mapping (DERM 2011) identifies a palustrine wetland in the west of the project area. The wetland (Site S3) is situated on a closed depression of the Suttor River floodplain, and is intersected by the western boundary of the project area. At the time of surveys, this wetland was a vegetated swamp covering approximately 60 ha (1 km x 0.6 km), with an average depth of 0.5 m. It was dominated by forest red gum (*Eucalyptus tereticornis*) and emergent macrophytes (**Plate 1**).

The wetland has a catchment area of 4.2 km² (KBR 2012a). However, surface hydrology within the catchment of this wetland has been altered by the construction of a railway line, although the extent of impacts associated with the construction of this feature are unknown. The wetland is likely to be semi-permanent in nature, given that forest red gum is susceptible to the impacts of waterlogging and is characteristic of ephemeral wetlands.

- A large farm dam at site H2 (approximately 5 ha) occurs on gently undulating sandy loam plains in a cleared pastoral area and surrounded by vegetation with a sparse canopy of eucalypt species (**Plate 2**). The shrub layer supported a variety of native species including *Melaleuca* sp., *Acacia* sp., emu apple (*Owenia acidula*) and dry rainforest species with the ground layer dominated by pasture grasses. A few fallen logs were present most likely as a result of land maintenance activities.
- Gilgai wetland habitats on clay plains (**Plate 3**). The indicative extent of these habitats across the project area has been defined using high resolution aerial imagery and is presented in **Figure 5.1**.
- A smaller dam at site H13 (in the southern part of the project area). This dam occurs within a wide alluvial system on dark heavy clay soils along a tributary of the Suttor River in the south-east of the project area. Vegetation that fringed the wetland included a relatively intact canopy layer of Queensland blue gum (*Eucalyptus tereticornis*) and brigalow (*Acacia harpophylla*). The shrub layer of both these communities was generally degraded due to cattle grazing. Vegetated areas surrounding the dam, particularly the lower lying areas which become inundated after rain, may represent habitat for cryptic wetland birds such as rails, crakes, bitterns and snipes.
- A smaller dam at site H19 (in the northern part of the project area) within sandy clay plains on the north eastern boundary of the project area. Little vegetation persists around the dam with evidence that the area has been cleared for pastoral purposes. The site was found to provide habitat for a variety of wetland birds including listed migratory species such as the great egret (*Ardea alba*). Squatter pigeon (*Geophaps scripta scripta*) was also observed drinking at this site.

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National Geographic, Esri, DeLorme, NAVTEQ, UNEP-WCMC, USGS, NASA,

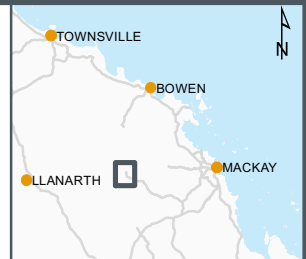
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Figure 5.1 - Wetlands and Drainage Features

WORK REQUEST NUMBER: WR_2012_00295

DATA SOURCES:
Wetland Info © State of Queensland 2011
Remnant Watercourses © State of Queensland 2011

Main Road					Lucustrine System (Water Body)
Proposed Alpha Coal Project Rail Line					Palustrine System (Water Body)
GAP Railway					Riverine System (Water Body)
Stream Order (2 and above)					Palustrine System (Regional Ecosystem)
Project Area					Riverine System (Regional Ecosystem)
Indicative extent of gilgai wetland habitat					Remnant Regional Ecosystem 1-50% Wetland (Mosaic Units)
DATE	AUTHOR	APPROVED	REVISION NOTE	REV.	
16/11/2012	SN	JC	Issued for Review	B	
04/12/2012	CM	JC	Issued for Review	C	
11/01/2013	AB	JC	Issued for Review	D	
08/03/2013	SG	JC	Issued for Use	0	



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QC Check List: Completed



Plate 1 Palustrine Wetland the Western Boundary of the Project Area



Plate 2 Permanent Water Source associated with Farm Dam at Site H2 (2012)

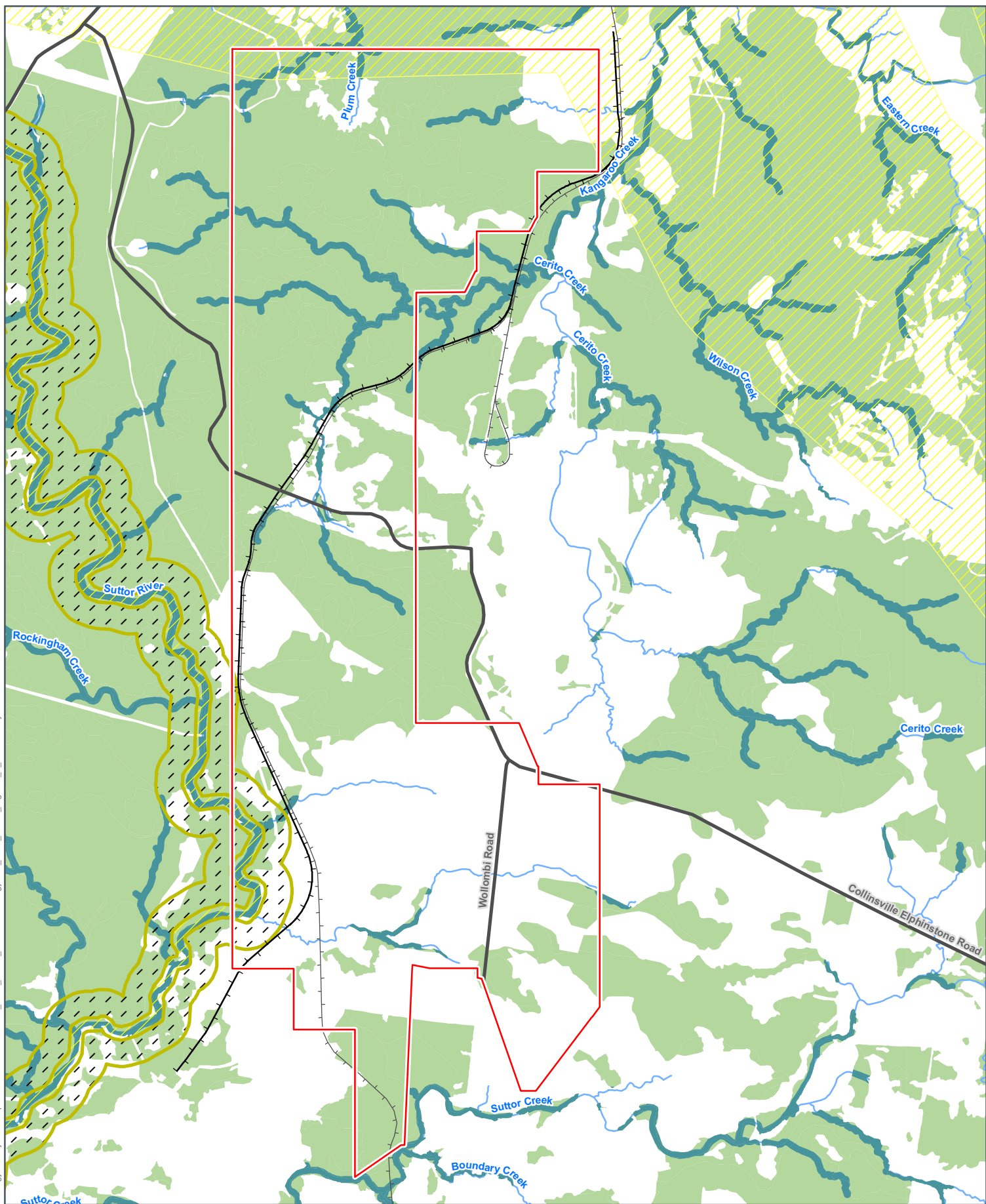


Plate 3 Inundated gilgai on Clay Plains

5.3 CONNECTIVITY AND WILDLIFE CORRIDORS

Habitat connectivity within the project area is linked to riparian corridors associated with the Suttor River and Kangaroo Creek and contiguous areas of terrestrial vegetation in the central and northern parts of the project area. Areas to the south and north of the project area form part of large bioregional corridors listed as having state significance in accordance with BPA mapping (**Figure 5.2**). Contiguous tracts of remnant vegetation in the northern parts of the project area have links into these corridors but do not form part of the corridors themselves.

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Figure 5.2 - Connectivity

WORK REQUEST NUMBER: WR_2012_00295

DATA SOURCES:

Wetland Info © State of Queensland 2011
Remnant Watercourses © State of Queensland 2011

- Main Road
- Proposed Alpha Coal Project Rail
- GAP Railway
- Stream Order (2 and above)
- Project Area
- Riparian Vegetation Buffer
- Remnant Vegetation
- BPA Corridor Buffer
- State
- Regional

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14/11/2012	SN	JC	Issued for Review	B
05/12/2012	SH	JC	Issued for Review	C
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5.4 OTHER VALUES

5.4.1 Areas of High Ecological Significance

Environmentally sensitive areas are those classed as having some national, state, regional or local biodiversity significance. Areas identified as being sensitive in respect to flora and fauna were identified based on the spatial data, desktop searches and observations made throughout the various field surveys and are summarised in **Table 5.2**.

5.4.2 Biodiversity Planning Assessments

Areas recognised as having state, regional or local significance in accordance with BPA mapping are detailed in **Table 5.1** and mapped in **Figure 5.3**. Large areas of state or regional significance are located to the north of the project area and smaller areas within the central sections of the project area. The large areas to the north of the project area are recognised as having state or regional significance due to it forming part of a bioregional corridor.

A small area in the northern section of the project area has been assigned state significance due to the occurrence of spinifex ridges. Spinifex can form a component of RE 11.7.3 which is mapped in that locality. According to the description, *Triodia mitchellii* is the dominant ground layer in RE 11.7.3, representing a distinct variation in species composition. The ground truthing of RE 11.7.3 within this locality confirmed that *Triodia mitchellii* did not form an understorey component of this RE and therefore this northern section of the project area should not be considered of state significance.

Table 5.1 Areas Mapped as State, Regional or Locally Significant in Accordance with BPA Mapping

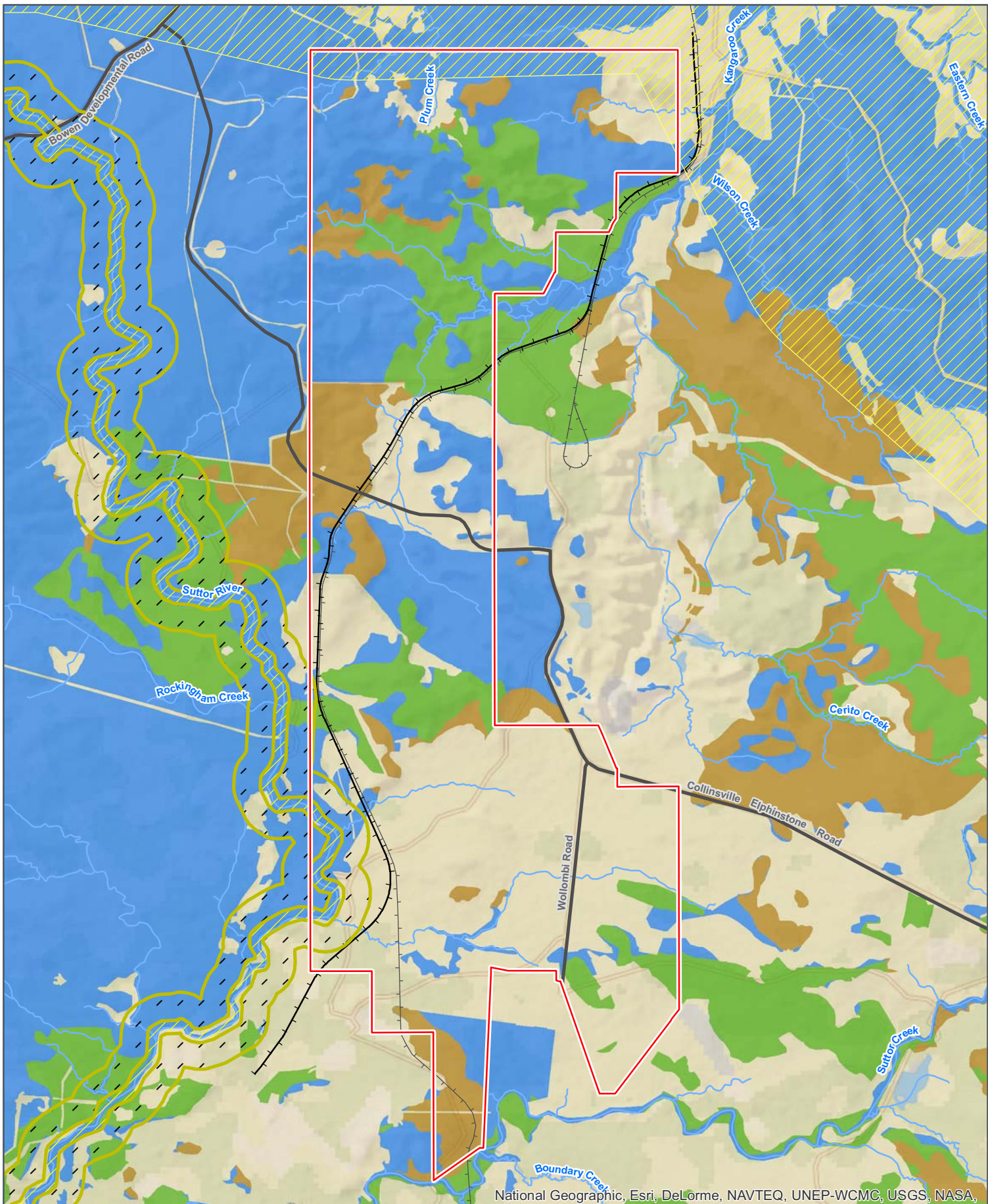
BPA Significance	Area in project area (ha)
State	7313
Regional	3246
Local	2144
TOTAL	12 703

Table 5.2 Areas of High Ecological Significance that Occur within the Project Area

Significant Biodiversity Values	Description of Value within Project Area	Further Detail of Value Provided in Report
Environmentally Sensitive Areas[#]	There are no Category A ESAs in the project area. Category B ESAs are restricted to RE types where the biodiversity status is endangered. The location of Category B ESAs is shown in Figure 5.4	Regional Ecosystems Section 6.1
Protected areas	No protected area estates are located within the project area. The proposed Redcliffe Vale National Park is located to the east of Newlands coal mine but is remote from the project area and is not relevant to the project. The Newlands Nature Refuge abuts the eastern boundary of the project area and is separated from the project area by the Collinsville-Elphinstone Road. Blackjack Mountain Nature Reserve is located approximately 7 km from the project area.	–
Threatened Ecological Communities[#]	The project area supports approximately 1 172 ha of brigalow TEC (comprising 1112 ha of remnant and 60 ha of regrowth), 345 ha of SEVT TEC and 117 ha of natural grasslands TEC.	Threatened Ecological Communities Section 6.2
Endangered and Of Concern REs[#]	The project area supports approximately 1457 ha of endangered RE (biodiversity status) and 1766 ha of concern RE (biodiversity status).	Regional Ecosystems Section 6.1
High Value Regrowth representative of Endangered REs[#]	The project area supports approximately 71 ha of high value regrowth vegetation representative of endangered REs 11.3.1, 11.4.9, 11.8.13 and 11.9.5 and RE 11.8.5 which has a no concern at present biodiversity status.	High Value Regrowth Section 6.1.5
REs with 'low' or 'medium' representation in Protected Areas[#]	REs with a low or medium representation in protected areas are outlined in Table 6.1	Regional Ecosystems Section 6.1
DEHP Mapped Essential Habitat Areas[%]	The project area contains mapped EHAs for the near threatened flora species <i>Cerbera dumicola</i> and vulnerable ornamental snake (<i>Denisonia maculata</i>). Mapped essential habitat areas are shown in Figure 5.5 . Both species are known to occur in the project area.	Threatened flora and fauna Section 6.3.1 and Section 7.3
Habitat for Threatened Flora and Fauna	Areas providing important habitat for threatened or near threatened flora and fauna species that are likely to be impacted by the project were identified within the project area. These areas have been discussed and mapped for each individual species.	Threatened flora and fauna Section 6.3.1 and 7.3

Significant Biodiversity Values	Description of Value within Project Area	Further Detail of Value Provided in Report
Drainage Features and Riparian Vegetation	The major creeks within the project area include Suttor River, Plum Creek, Kangaroo Creek and their respective tributaries. These areas can provide important habitat for a range of species and riparian vegetation along drainage features and can facilitate fauna movement across a landscape.	Drainage, waterways and wetlands Section 5.2
Wetlands[#]	No Ramsar or Nationally Important Wetlands occur within, or immediately downstream of the project area. Freshwater wetlands (palustrine, lacustrine (farm dams) and riverine) are mapped for and were observed within the project area. These areas were found to provide habitat for a range of wetland birds including those listed as migratory under the EPBC Act.	Drainage, waterways and wetlands Section 5.2
Connectivity and Wildlife Corridors	The BPA expert panel report identifies terrestrial corridors of State Significance to the north and the south of the project area. Corridors of State and regional significance are mapped along the Suttor River in the west of the project area.	Connectivity and Wildlife Corridors Section 5.3

Notes: # Based on revised RE mapping for the project area, % as mapped by DEHP, Essential Habitat Version 3.1.
@ As mapped by DEHP Queensland Wetland Mapping.



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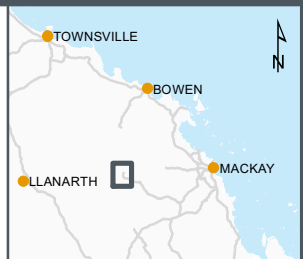
Figure 5.3 - Biodiversity Planning Assessment

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DATA SOURCES:
Remnant Watercourses, BPA Brigalow Belt, BPA Corridor Buffers © State of Queensland 2013

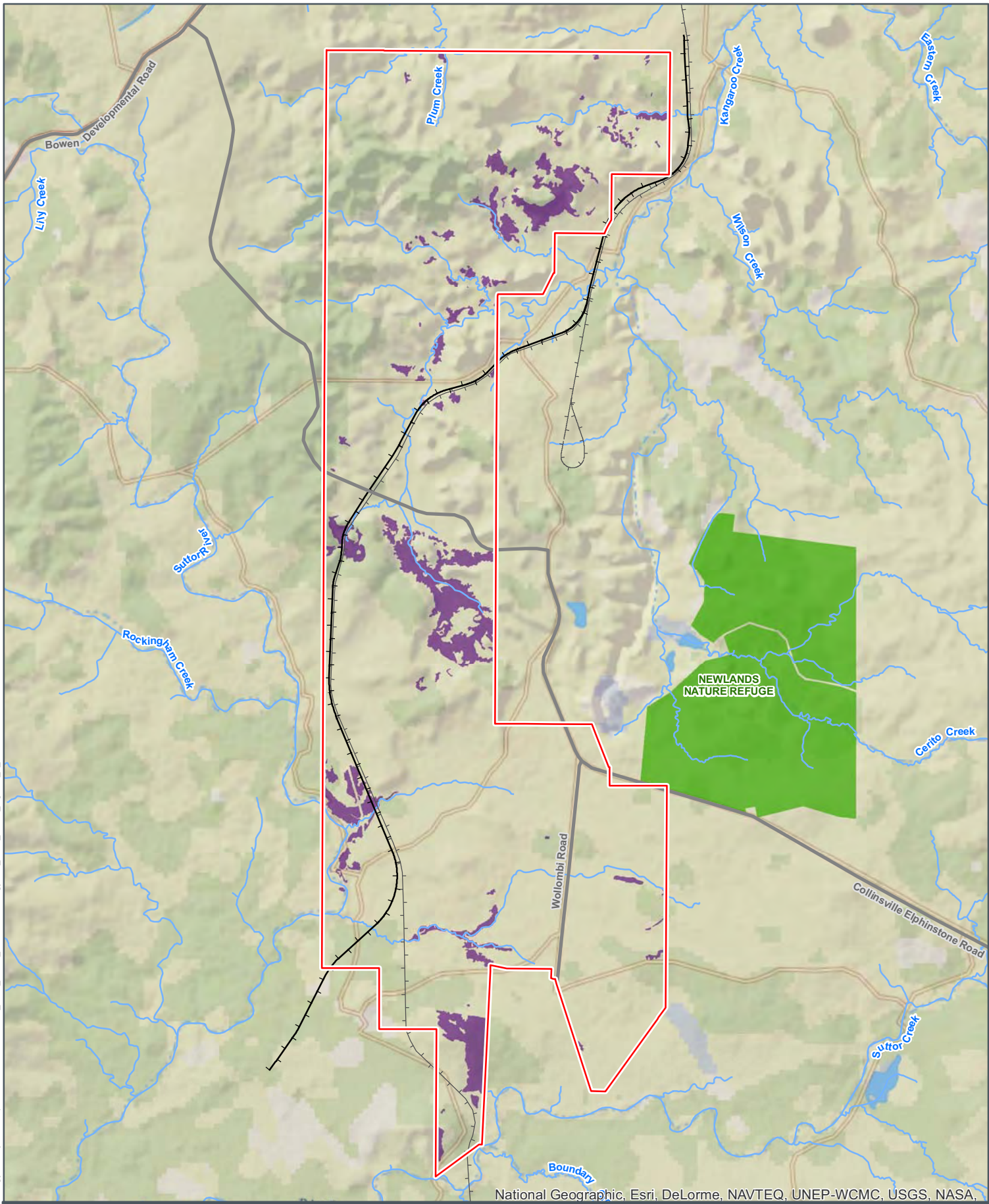
		Biodiversity Significance		BPA Corridor Buffer	
Main Road		State Habitat for EVR taxa		State	
Proposed Alpha Coal Project Rail Line		State		Regional	
GAP Railway		Regional			
Stream Order (2 and above)		Local or Other Values			
Project Area		Non Bioregion Ecosystem			

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14/11/2012	SN	JC	Issued for Review	B
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Figure 5.4 - Environmentally Sensitive Areas and Protected Areas

WORK REQUEST NUMBER: WR_2012_00295

DATA SOURCES:
Remnant Watercourses © State of Queensland 2011
ESA Layers © State of Queensland 2010 - 2012

- Main Road
 - Proposed Alpha Coal Project Rail Line
 - GAP Railway
 - Stream Order (2 and above)
 - Project Area
- Category B**
- Endangered Regional Ecosystem
 - Protected Areas**
 - Nature Refuge

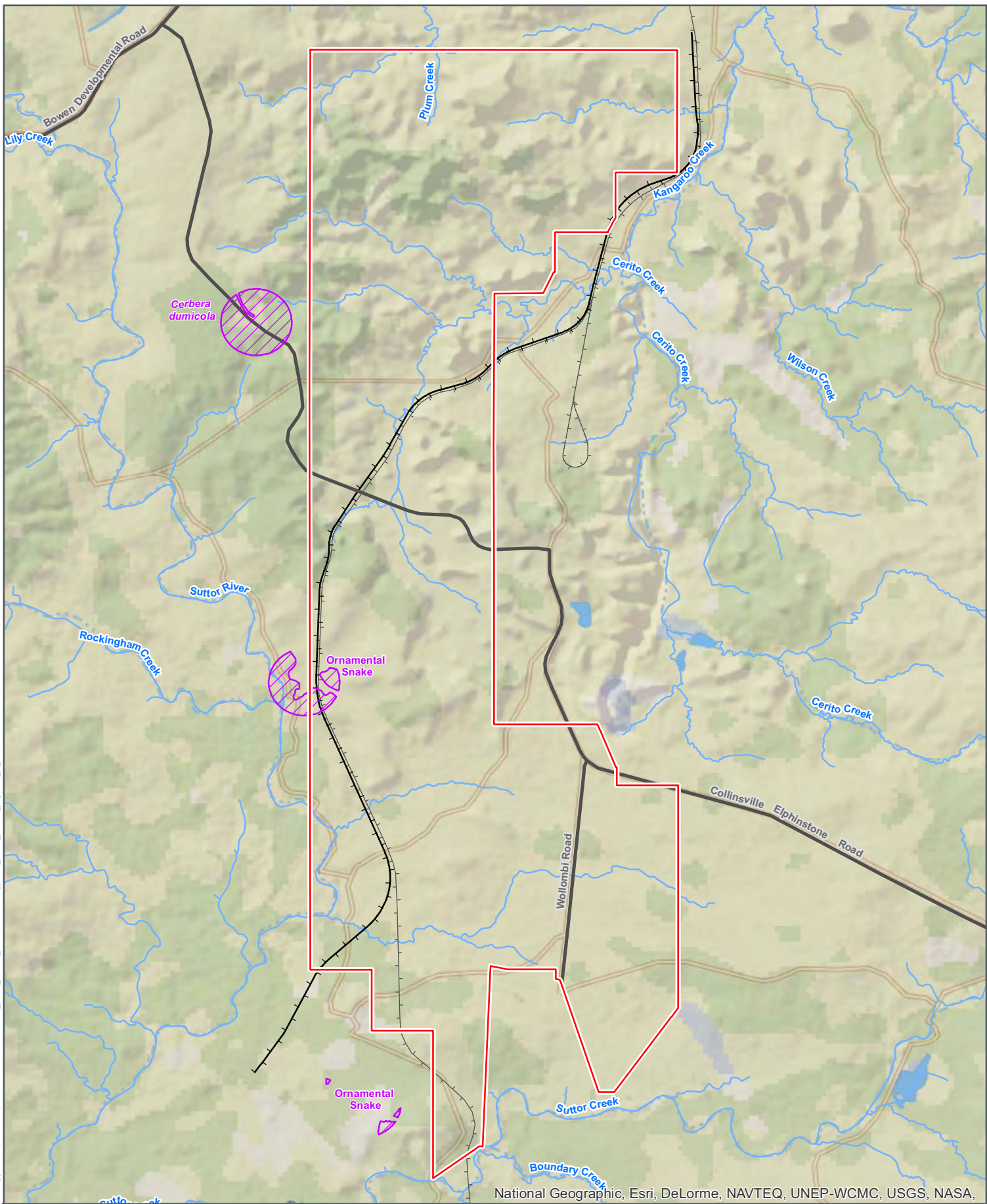
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National Geographic, Esri, DeLorme, NAVTEQ, UNEP-WCMC, USGS, NASA,

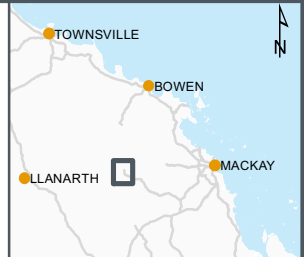
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Figure 5.5 - Essential Habitat

WORK REQUEST NUMBER: WR_2012_00295

DATA SOURCES:
Remnant Watercourses © State of Queensland 2011
Essential Habitat v3.1 © State of Queensland 2011

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14/11/2012	SN	JC	Issued for Review	B
04/12/2012	CM	JC	Issued for Review	C
08/03/2013	SG	JC	Issued for Use	0



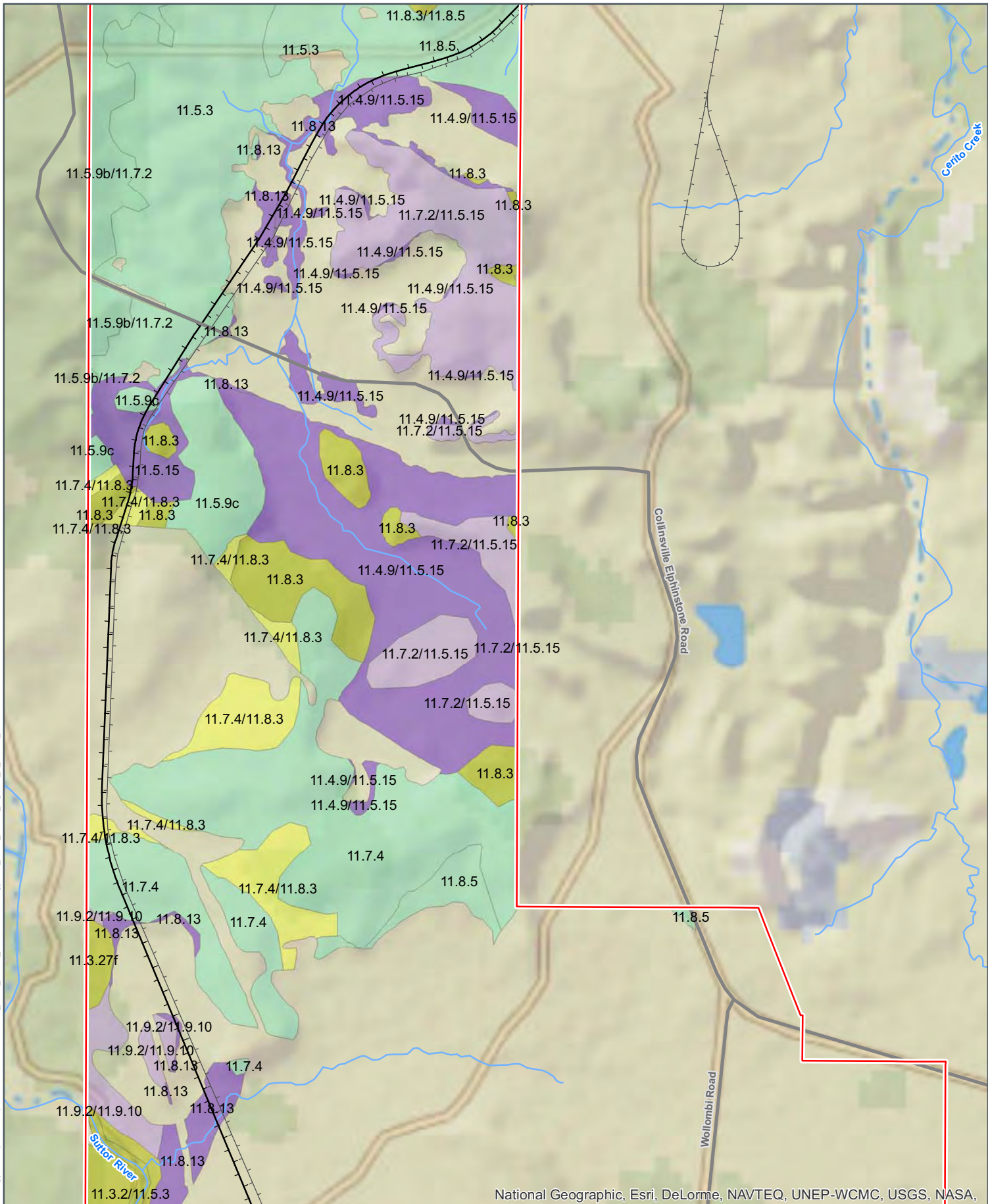
6. TERRESTRIAL FLORA VALUES

6.1 REGIONAL ECOSYSTEMS

Current certified RE mapping (Version 6.1) for the project area is shown in **Figure 6.1**, **Figure 6.2** and **Figure 6.3**. Certified RE mapping was verified in the field to confirm the extent and description of vegetation communities in the project area. The revised RE mapping has been used as the basis for the assessment of terrestrial flora values in the project area and is presented in **Figure 6.4**, **Figure 6.5** and **Figure 6.6**.

Revised RE mapping shows that 50% of the project area (approximately 11 411 ha) supports remnant vegetation. The balance of the project area (approximately 11 211 ha) is non-remnant or regrowth vegetation, comprising mostly cleared grazing land (**Section 6.1.5**). Approximately 1505 ha of vegetation mapped as remnant by DEHP has been ground-truthed as non-remnant.

Of the 24 REs mapped by DEHP for the project area, 15 were recorded during the field survey. Eight RE types not previously mapped for the project area (RE 11.4.2, 11.4.8, 11.5.1, 11.5.16, 11.7.1, 11.7.1x1, 11.7.6 and 11.8.4) are included in the revised RE mapping. In total, the revised RE mapping has recorded 23 REs from the project area. A comparison of the extent of certified RE mapping and revised RE mapping is provided in **Table 6.1**.



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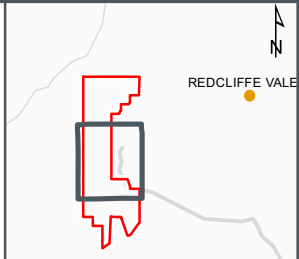
Figure 6.2 - DEHP Regional Ecosystem Mapping (Central Section)

WORK REQUEST NUMBER: WR_2012_00295

DATA SOURCES:
Remnant Watercourses © State of Queensland 2011

- Main Road
 - Proposed Alpha Coal
 - Project Rail Line
 - GAP Railway
 - Stream Order (2 and above)
 - Project Area
- Regional Ecosystems V6.1 (DEHP)**
- Endangered - Dominant
 - Endangered - Sub-dominant
 - Of Concern - Dominant
 - Of Concern - Sub-dominant
 - No concern at present

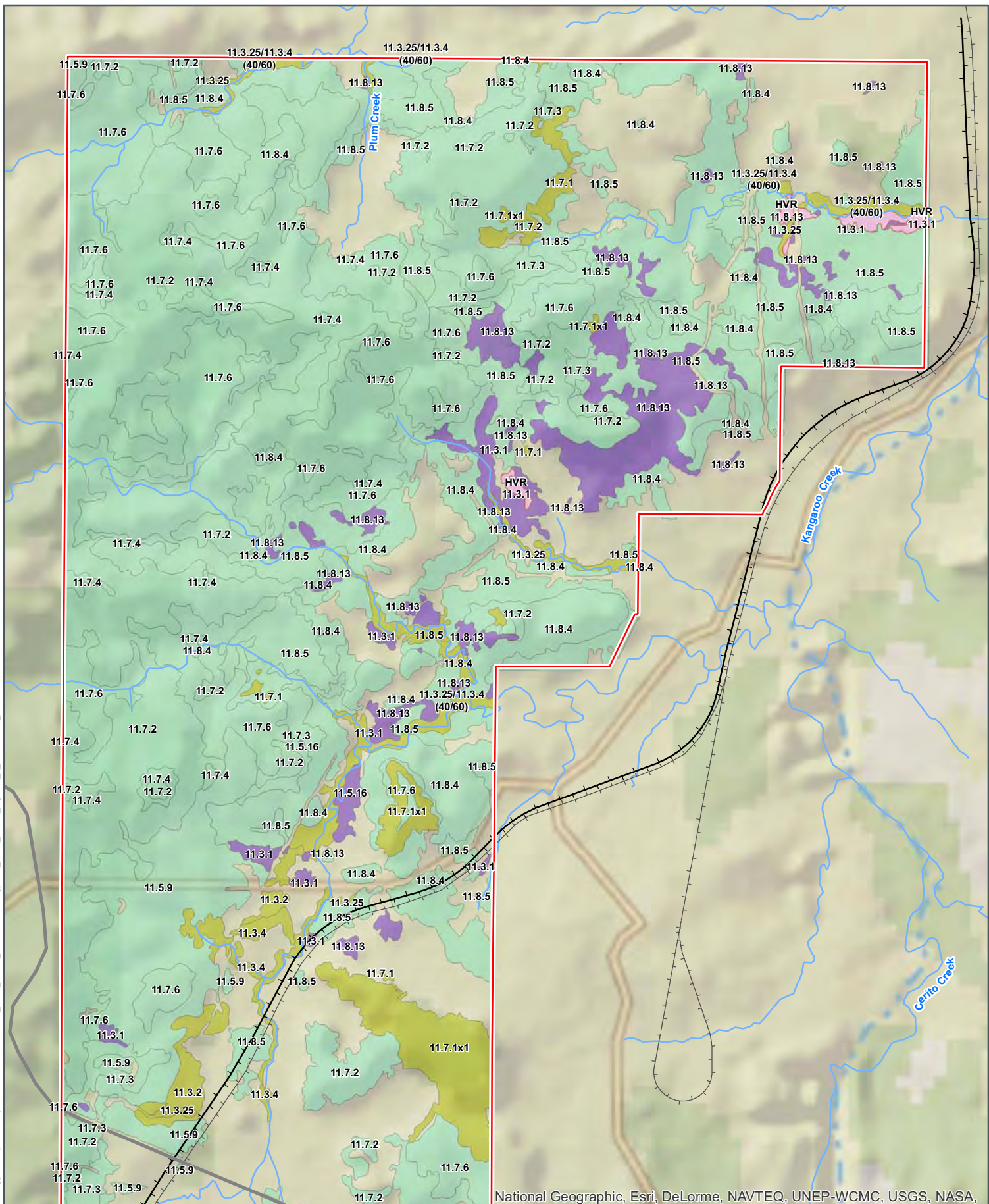
DATE	AUTHOR	APPROVED	REVISION NOTE	REV.
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National Geographic, Esri, DeLorme, NAVTEQ, UNEP-WCMC, USGS, NASA,

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Figure 6.4 - Revised Regional Ecosystem Mapping (North Section)

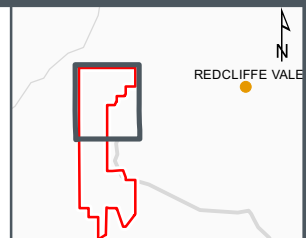
WORK REQUEST NUMBER: WR_2012_00295

DATA SOURCES:

Remnant Watercourses © State of Queensland 2011

	Main Road	Regional Ecosystems	
	Proposed Alpha Coal Project Rail Line		Endangered
	GAP Railway		Of Concern
	Stream Order (2 and above)		No Concern
	Project Area		High Value Regrowth
			(Least Concern & Endangered)

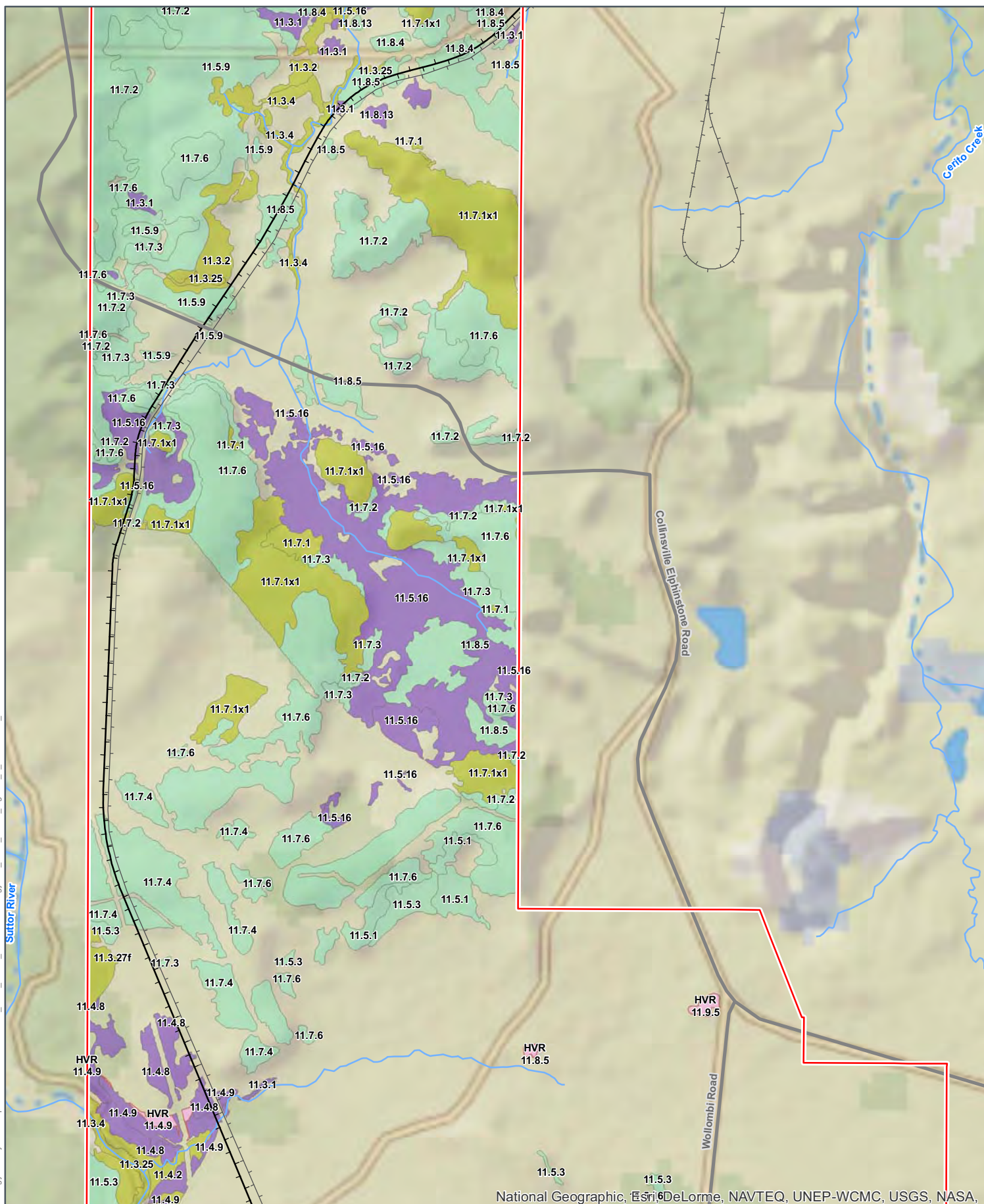
DATE	AUTHOR	APPROVED	REVISION NOTE	REV.
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Figure 6.5 - Revised Regional Ecosystem Mapping (Central Section)

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DATA SOURCES:

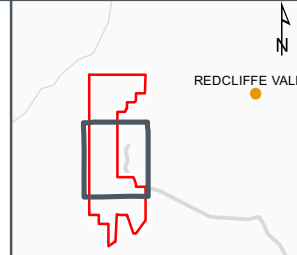
Remnant Watercourses © State of Queensland 2011

- Main Road
- Proposed Alpha Coal Project Rail Line
- GAP Railway
- Stream Order (2 and above)
- Project Area

Regional Ecosystems

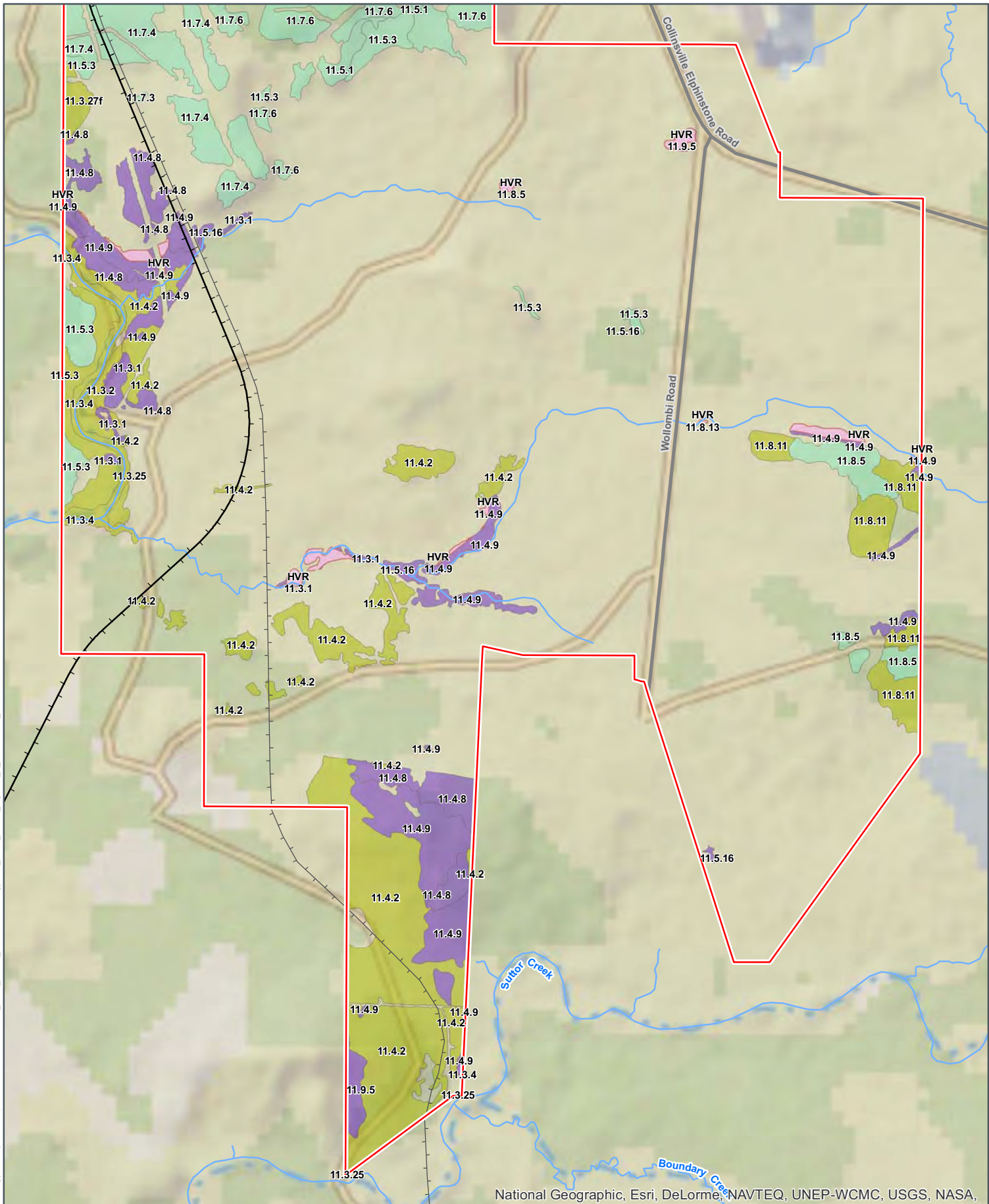
- Endangered
- Of Concern
- No Concern
- High Value Regrowth (Least Concern & Endangered)

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Figure 6.6 - Revised Regional Ecosystem Mapping (South Section)

WORK REQUEST NUMBER: WR_2012_00295

DATA SOURCES:

Remnant Watercourses © State of Queensland 2011

Regional Ecosystems				
	Main Road		Endangered	
	Proposed Alpha Coal		Of Concern	
	Project Rail Line		No Concern	
	GAP Railway		High Value Regrowth	
	Stream Order (2 and above)		Least Concern & Endangered	
	Project Area			

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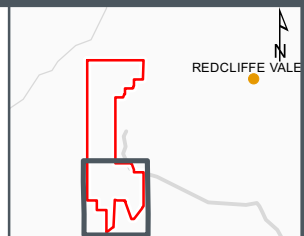


Table 6.1 Area of REs in the Project Area from Certified RE Mapping (Version 6.1) and Revised RE Mapping Prepared for the Project

RE	Description	Management Status			Area (ha) (Certified RE Mapping)	Area (ha) (Revised RE Mapping)	Ground Truth Site	Extent in Reserves
		BD Status [#]	VM Status	EPBC Status				
11.3.1	<i>Acacia harpophylla</i> and/or <i>Casuarina cristata</i> open forest on alluvial plains.	E	E	Brigalow TEC	18	118	T35, T40, Q80, Q106	Low
HVR 11.3.1	Advanced regrowth <i>Acacia harpophylla</i> and/or <i>Casuarina cristata</i> open forest on alluvial plains.	E	E	Brigalow TEC	–	36	T21	–
11.3.2	<i>Eucalyptus populnea</i> woodland on alluvial plains.	OC	OC	–	97	78	T34, Q104, Q105	Low
11.3.4	<i>Eucalyptus tereticornis</i> and/or <i>Eucalyptus</i> spp. tall woodland on alluvial plains.	OC	OC	–	15	223	T39, Q36	Low
11.3.10	<i>Eucalyptus brownii</i> woodland on alluvial plains.	NC	LC	–	3	–	Not observed	Low
11.3.25	<i>Eucalyptus tereticornis</i> or <i>Eucalyptus camaldulensis</i> woodland fringing drainage lines.	OC	LC	–	140	157	Q20, T21, Q38	Low
11.3.27 (11.3.27f)	Freshwater wetlands/ Lacustrine wetland (eg lake)/Palustrine wetland (eg vegetated swamp)/ <i>Eucalyptus coolabah</i> and/or <i>E. tereticornis</i> open woodland to woodland fringing swamps.	OC	LC	–	29	20	Q68	Low

RE	Description	Management Status			Area (ha) (Certified RE Mapping)	Area (ha) (Revised RE Mapping)	Ground Truth Site	Extent in Reserves
		BD Status [#]	VM Status	EPBC Status				
11.4.2	<i>Eucalyptus</i> spp. and/or <i>Corymbia</i> spp. grassy or shrubby woodland on Cainozoic clay plains.	OC	OC	–	–	566	Q73, Q76, Q77, Q78, Q79, Q86, T83	Low
11.4.8	<i>Eucalyptus cambageana</i> woodland to open-forest with <i>Acacia harpophylla</i> or <i>A. argyrodendron</i> on Cainozoic clay plains.	E	E	Brigalow TEC	–	155	Q65, Q66, Q75, Q81, Q85, T70, T75	Low
11.4.9	<i>Acacia harpophylla</i> shrubby open forest to woodland with <i>Terminalia oblongata</i> on Cainozoic clay plains.	E	E	Brigalow TEC	887	237	Q3, T15, T16, Q72, Q74, Q81, S82, T83	Low
HVR 11.4.9	Advanced regrowth <i>Acacia harpophylla</i> shrubby open forest to woodland with <i>Terminalia oblongata</i> on Cainozoic clay plains.	E	E	Brigalow TEC	–	18	Not observed	–
11.5.1	<i>Eucalyptus crebra</i> , <i>Callitris glaucophylla</i> , <i>Angophora leiocarpa</i> , <i>Allocasuarina luehmannii</i> woodland on Cainozoic sandplains/remnant surfaces.	NC	LC	–	–	58	Q14, Q90, Q91, Q93, T33	Low
11.5.2	<i>Eucalyptus crebra</i> , <i>Corymbia</i> spp., with <i>E. moluccana</i> on lower slopes of Cainozoic sand plains/remnant surfaces.	NC	LC	–	39	–	Not observed	Low

RE	Description	Management Status			Area (ha) (Certified RE Mapping)	Area (ha) (Revised RE Mapping)	Ground Truth Site	Extent in Reserves
		BD Status [#]	VM Status	EPBC Status				
11.5.3	<i>Eucalyptus populnea</i> +/- <i>E. melanophloia</i> +/- <i>Corymbia clarksoniana</i> on Cainozoic sand plains/remnant surfaces.	NC	LC	–	1357	93	Q14, T33, Q61, S63, Q81, S82, T83, Q88, Q103	Low
11.5.9 (b, c)	<i>Eucalyptus crebra</i> and other <i>Eucalyptus</i> spp. and <i>Corymbia</i> spp. woodland on Cainozoic sand plains/remnant surfaces.	NC	LC	–	1142	450	Q103, Q107, Q108, Q109, Q110, Q111, Q112, Q113, Q114, Q115	Low
11.5.15	Semi-evergreen vine thicket on Cainozoic sand plains/remnant surfaces.	E	LC	SEVT TEC	335	–	T2, Q3, T5, Q6, Q7, Q8, T9, Q10, Q13, T15, T16, T18, T19, T31	Low
11.5.16	<i>Acacia harpophylla</i> and/or <i>Casuarina cristata</i> open forest in depressions on Cainozoic sand plains/ remnant surfaces.	E	E	Brigalow TEC	–	581	T2, T5, T19	Low
11.7.1	<i>Acacia harpophylla</i> and/or <i>Casuarina cristata</i> and <i>Eucalyptus thozetiana</i> or <i>E. microcarpa</i> woodland on lower scarp slopes on Cainozoic lateritic duricrust.	OC	LC	–	–	71	Q4, T17, T25, Q41	Low
(11.7.1 x 1)	Semi-evergreen vine thicket.	OC	LC	–	–	534	T1, Q43	Low
11.7.2	<i>Acacia</i> spp. woodland on Cainozoic lateritic duricrust. Scarp retreat zone.	NC	LC	–	1612	2302	Q6, Q7, Q8, T9, Q10, Q13, T18, Q23, T33, Q43, Q47, Q103, Q107, Q108, Q109, Q110, Q112, Q113, Q114, Q115	Low

RE	Description	Management Status			Area (ha) (Certified RE Mapping)	Area (ha) (Revised RE Mapping)	Ground Truth Site	Extent in Reserves
		BD Status [#]	VM Status	EPBC Status				
11.7.3	<i>Eucalyptus persistens</i> , <i>Triodia mitchellii</i> open woodland on stripped margins of Cainozoic lateritic duricrust.	NC	LC	–	61	296	Not observed	Low
11.7.4	<i>Eucalyptus decorticans</i> and/or <i>Eucalyptus</i> spp., <i>Corymbia</i> spp., <i>Acacia</i> spp., <i>Lysicarpus angustifolius</i> on Cainozoic lateritic duricrust.	NC	LC	–	1064	291	Q24, T60, Q61, Q62, Q65, Q87, Q88, Q90, Q91	Low
11.7.6	<i>Corymbia citriodora</i> or <i>Eucalyptus crebra</i> woodland on Cainozoic lateritic duricrust.	NC	LC	–	–	1942	T9, T18, Q42, T60, Q62, Q87, Q112	Low
11.8.3*	Semi-evergreen vine thicket on Cainozoic igneous rocks.	OC	OC	–	626	–	T1, Q4, T17, Q23, Q24, T25, Q41	Low
11.8.4	<i>Eucalyptus melanophloia</i> woodland on Cainozoic igneous rocks. Hillsides.	NC	LC	–	–	1422	Q28, Q30, Q37, Q44, Q50	High
11.8.5	<i>Eucalyptus orgadophila</i> open woodland on Cainozoic igneous rocks.	NC	LC	–	2776	1334	Q3, T15, T16, S22, T26, Q27, Q28, Q29, Q30, T32, T35, Q36, Q37, Q38, T39, T40, Q44, Q45, Q46, S51, S52, S53, S54, S55, S56, S57, S58, S59, Q61, S97, S98, Q99, Q100, S102, Q104, Q105, Q106	Low

RE	Description	Management Status			Area (ha) (Certified RE Mapping)	Area (ha) (Revised RE Mapping)	Ground Truth Site	Extent in Reserves
		BD Status [#]	VM Status	EPBC Status				
HVR 11.8.5	<i>Eucalyptus orgadophila</i> open woodland on Cainozoic igneous rocks.	NC	LC	–	–	3	Not observed	–
11.8.11	<i>Dichanthium sericeum</i> grassland on Cainozoic igneous rocks.	OC	OC	Natural grasslands TEC	773	117	S22, T26, Q27, Q28, Q29, Q30, S51, S52, S53, S54, S55, S56, S57, S58, S59, S97, Q98, Q99, Q100, Q101, S102	Low
11.8.13	Semi-evergreen vine thicket and microphyll vine forest on Cainozoic igneous rocks.	E	E	SEVT TEC	1008	345	Q29, Q46, Q49, T31, T48	Low
HVR 11.8.13	Semi-evergreen vine thicket and microphyll vine forest on Cainozoic igneous rocks.	E	E	–	–	8	Not observed	–
11.9.1	<i>Acacia harpophylla-Eucalyptus cambageana</i> open forest to woodland on fine-grained sedimentary rocks.	E	E	Brigalow TEC	39	–	Not observed	Low
11.9.2	<i>Eucalyptus melanophloia</i> +/- <i>E. orgadophila</i> woodland on fine-grained sedimentary rocks.	NC	LC	–	286	–	Q20, T21	Medium
11.9.3	<i>Dichanthium</i> spp., <i>Astrebla</i> spp. grassland on fine-grained sedimentary rocks.	NC	LC	Natural grasslands TEC	57	–	Q20, T21	Low
11.9.5	<i>Acacia harpophylla</i> and/or <i>Casuarina cristata</i> open forest on fine-grained sedimentary rocks.	E	E	Brigalow TEC	79	21	Not observed	Low

RE	Description	Management Status			Area (ha) (Certified RE Mapping)	Area (ha) (Revised RE Mapping)	Ground Truth Site	Extent in Reserves
		BD Status [#]	VM Status	EPBC Status				
HVR 11.9.5	Regrowth <i>Acacia harpophylla</i> and/or <i>Casuarina cristata</i> open forest on fine-grained sedimentary rocks.	E	E	Brigalow TEC	–	6	Not observed	–
11.9.9	<i>Eucalyptus crebra</i> woodland on fine-grained sedimentary rocks.	NC	LC	–	445	–	Not observed	Low
11.9.10	<i>Eucalyptus populnea</i> , <i>Acacia harpophylla</i> open forest on fine-grained sedimentary rocks.	E	OC	–	28	–	Not observed	Low
Non-remnant	N/A	N/A	N/A	–	9740	11 211	Q11, Q12, Q27, Q45, S51, S52, S53, S54, S55, S56, S57, S58, S59, Q64, Q67, Q68, Q69, Q71, Q75, Q76, Q77, Q78, Q79, Q84, Q85, Q86, Q89, Q92, Q94, Q95, Q96, Q101, Q116,	–

Note #: Detailed in the RE description Database or as assessed during field surveys.

6.1.1 Endangered Regional Ecosystems

The revised RE mapping shows that six endangered REs (Biodiversity Status) occur within the project area. These are:

- RE 11.3.1 - *Acacia harpophylla* and/or *Casuarina cristata* open forest on alluvial plains
- RE 11.4.8 - *Eucalyptus cambageana* woodland to open forest with *Acacia harpophylla* or *A. argyrodendron* on Cainozoic clay plains
- RE 11.4.9 - *Acacia harpophylla* shrubby open forest to woodland with *Terminalia oblongata* on Cainozoic clay plains
- RE 11.5.16 - *Acacia harpophylla* and/or *Casuarina cristata* open forest in depressions on Cainozoic sand plains/remnant surfaces
- RE 11.8.13 - Semi-evergreen vine thicket and microphyll vine forest on Cainozoic igneous rocks, lowlands
- RE 11.9.5 - *Acacia harpophylla* and/or *Casuarina cristata* open forest on fine-grained sedimentary rocks.

The revised RE mapping shows that endangered REs comprise 1457 ha of the project area. It is important to note that the project area includes some areas of regrowth brigalow vegetation that meets TEC listing, however does not meet requirements to be considered remnant vegetation protected under the VM Act or classified as an ESA. Rather, these areas are considered to qualify as brigalow HVR.

The following endangered REs are mapped by DEHP but do not occur in the project area:

- 11.5.15 - Semi-evergreen vine thicket on Cainozoic sand plains/remnant surfaces
- 11.9.1 - *Acacia harpophylla*-*Eucalyptus cambageana* open forest to woodland on fine-grained sedimentary rocks
- 11.9.10 - *Acacia harpophylla*, *Eucalyptus populnea* open forest on fine-grained sedimentary rocks.

6.1.2 Of Concern Regional Ecosystems

The revised RE mapping shows that seven of concern REs (Biodiversity Status) occur within the project area. These are:

- RE 11.3.2 - *Eucalyptus populnea* woodland on alluvial plains
- RE 11.3.4 - *Eucalyptus tereticornis* and/or *Eucalyptus* spp. tall woodland on alluvial plains
- RE 11.3.25 - *Eucalyptus tereticornis* or *E. camaldulensis* woodland fringing drainage lines
- RE 11.3.27 - Freshwater wetlands
- RE 11.4.2 - *Eucalyptus* spp. and/or *Corymbia* spp. grassy or shrubby woodland on Cainozoic clay plains

- RE 11.7.1 - *Acacia harpophylla* and/or *Casuarina cristata* and *Eucalyptus thozetiana* or *E. microcarpa* woodland on lower scarp slopes on Cainozoic lateritic duricrust
- RE 11.8.11 - *Dichanthium sericeum* grassland on Cainozoic igneous rocks.

The revised RE mapping shows that of concern RE's comprise 1766 ha of the project area. Ground truthing surveys confirmed that no RE 11.8.3 (Semi-evergreen vine thicket on Cainozoic igneous rocks) occurs within the project area.

6.1.3 No Concern at Present Regional Ecosystems

The revised RE mapping shows that nine no concern at present RE's (Biodiversity Status) occur within the project area. These are:

- RE 11.5.1 - *Eucalyptus crebra*, *Callitris glaucophylla*, *Angophora leiocarpa*, *Allocasuarina luehmannii* woodland on Cainozoic sandplains/remnant surfaces
- RE 11.5.3 - *Eucalyptus populnea* and/or *E. melanophloia* and/or *Corymbia clarksoniana* on Cainozoic sand plains/remnant surfaces
- RE 11.5.9 - *Eucalyptus crebra* and other *Eucalyptus* spp. and *Corymbia* spp. woodland on Cainozoic sand plains/remnant surfaces. Plateaus and broad crests
- RE 11.7.2 - *Acacia* spp. woodland on lateritic duricrust. Scarp retreat zone
- RE 11.7.3 - *Eucalyptus persistens*, *Triodia mitchellii* open woodland on stripped margins of lateritic duricrust
- RE 11.7.4 - *Eucalyptus decorticans* and/or *Eucalyptus* spp., *Corymbia* spp., *Acacia* spp., *Lysicarpus angustifolius* on lateritic duricrust
- RE 11.7.6 - *Corymbia citriodora* or *Eucalyptus crebra* woodland on lateritic duricrust
- RE 11.8.4 - *Eucalyptus melanophloia* woodland on Cainozoic igneous rocks. Hillsides
- RE 11.8.5 - *Eucalyptus orgadophila* open woodland on Cainozoic igneous rocks.

The revised RE mapping shows that no concern at present RE's comprise 8188 ha of the project area.

6.1.4 Threshold Regional Ecosystems

The certified RE mapping shows that two threshold REs occur in the project area:

- RE 11.5.15 - Semi-evergreen vine thicket on Cainozoic sand plains/remnant surfaces
- RE 11.8.3 - Semi-evergreen vine thicket on Cainozoic igneous rocks.

Certified RE map polygons containing these REs were targeted through flora survey sample sites (Q3, T9, T15, T16 and T18) however, these REs were not observed in the project area.

6.1.5 High Value Regrowth Vegetation

HVR mapping for the project area was revised based on a combination of aerial photo analysis and field surveys. Within the project area, HVR occurs predominantly as advanced brigalow regrowth with small areas of HVR 11.8.5 and HVR 11.8.13 mapped for the project area (**Figure 6.4**, **Figure 6.5** and **Figure 6.6**). A total of 71 ha of HVR vegetation (comprising 68 ha of endangered RE and 3 ha of least concern RE) is included in the revised RE map. Many areas mapped by DEHP as HVR containing endangered REs were found to be poorly developed stands of brigalow, often with a development age of less than five years or comprising of stunted, widely spaced shrubs as a result of ongoing grazing land use. These areas have been excluded from the revised RE map. Other areas of advanced regrowth have been assessed as meeting remnant criteria and are shown on the revised RE map as remnant vegetation.

6.2 THREATENED ECOLOGICAL COMMUNITIES

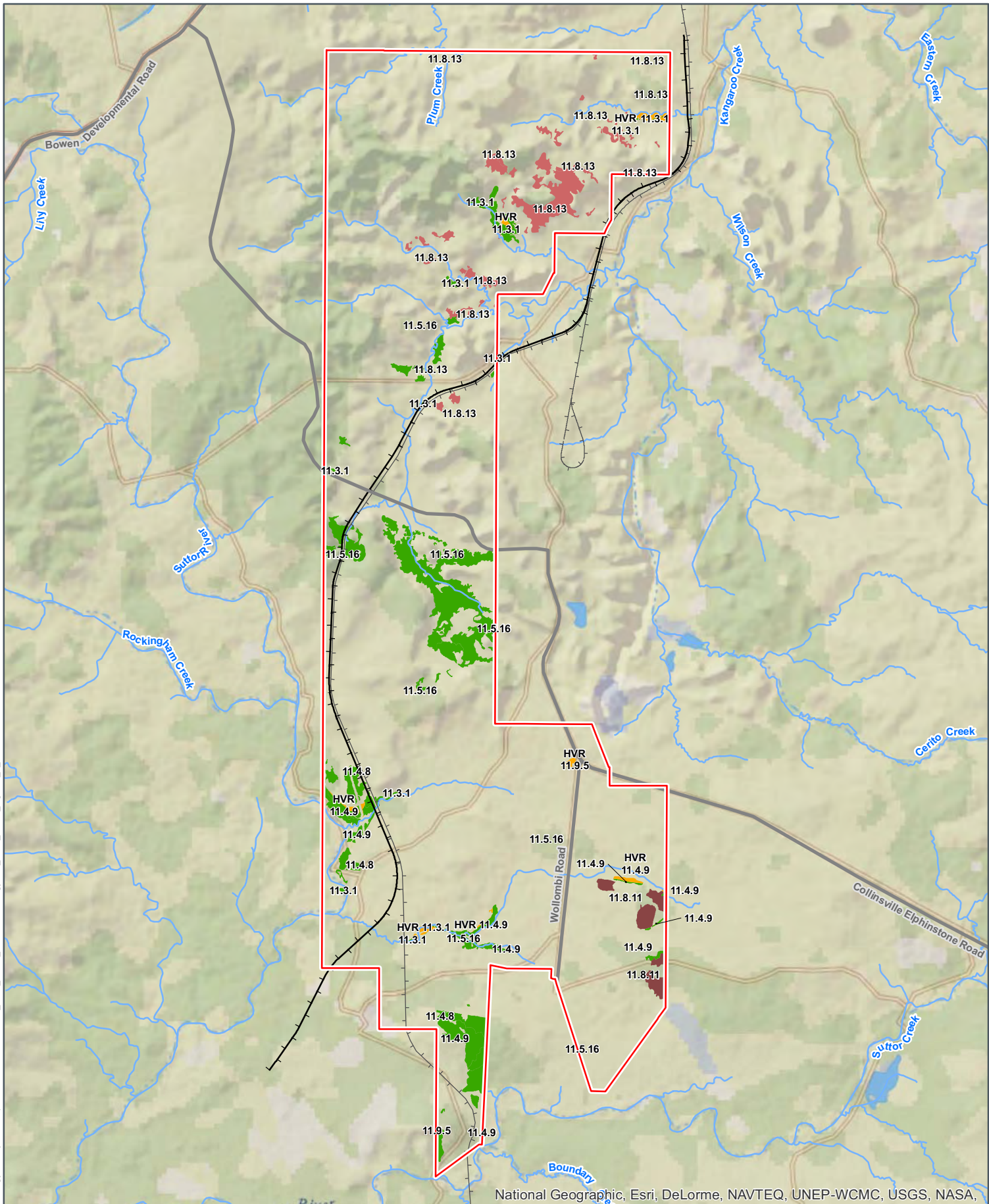
Three of the TECs identified as potentially occurring by the desktop assessment were confirmed as present within the project area. The area of each TEC and its constituent REs is summarised in **Table 6.2**. The distribution and extent of TECs in the project area is shown in **Table 6.4** and discussed in **Sections 6.2.1–6.2.3**.

Table 6.2 TECs and Analogous REs mapped as Occurring within the Project Area

EPBC Community Description	EPBC Act Status	Equivalent RE	Area of RE within Project Area (Revised Mapping) (ha)	Representative Sites (Ground-truthed RE)
Brigalow (<i>Acacia harpophylla</i>) dominant and co-dominant [#]	E	11.3.1	118	T21, T35, T40, Q80, Q106
		HVR 11.3.1	36	
		11.4.8	155	Q65, Q66, Q75, Q81, Q85, T70
		11.4.9	237	Q72, Q74, S82
		HVR 11.4.9	18	
		11.5.16	581	T2, T5, T19
		11.9.5	21	-
		HVR 11.9.5	6	
TOTAL BRIGALOW TEC			1172	
Semi-evergreen vine thickets of the Brigalow Belt (north and south) and Nandewar Bioregions	E	11.8.13	345	Q29, Q46, Q49, T31, T48, Q29

EPBC Community Description	EPBC Act Status	Equivalent RE	Area of RE within Project Area (Revised Mapping) (ha)	Representative Sites (Ground-truthed RE)
Natural Grasslands of the Queensland Central Highlands and the northern Fitzroy Basin	E	11.8.11	117	S22, T26, Q27, Q28, Q29, S51, S52, S53, S54, S55, S56, S57, S58, S59, S97, Q98, Q101, S102

Note #: Estimated areas for brigalow TEC take into account the regrowth vegetation more than 15 years old which meets the listing requirements for the TEC.



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Figure 6.7: Threatened Ecological Communities

WORK REQUEST NUMBER: WR_2012_00295

DATA SOURCES:
Remnant Watercourses © State of Queensland 2011

TEC

- Brigalow TEC (Regrowth)
- Brigalow TEC (RE)
- SEVT TEC (RE)
- Natural Grassland

Legend:

- Main Road
- Proposed Alpha Coal
- Project Rail Line
- GAP Railway
- Stream Order (2 and above)
- Project Area

Revision Table:

DATE	AUTHOR	APPROVED	REVISION NOTE	REV.
28/09/2012	AB	JC	Issued for Review	A
16/11/2012	SN	JC	Issued for Review	B
04/12/2012	CM	JC	Issued for Review	C
08/03/2013	SG	JC	Issued for Use	0

amec

QC

0 1 2
Kilometres
1:150,000
(A4) GDA 1994 MGA Zone 55

Location Map:

TOWNSVILLE
BOWEN
LLANARTH
MACKAY

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

The brigalow (*Acacia harpophylla* dominant and co-dominant) TEC occurs as small remnants across the entire project area, with larger tracts of this community located within the central and southern portions of the project area. REs representative of this community observed within the project area are:

- RE 11.3.1 - *Acacia harpophylla* and/or *Casuarina cristata* open forest on alluvial plains
- RE 11.4.8 - *Eucalyptus cambageana* woodland to open forest with *Acacia harpophylla* or *A. argyrodendron* on Cainozoic clay plains
- RE 11.4.9 - *Acacia harpophylla* shrubby open forest to woodland with *Terminalia oblongata* on Cainozoic clay plains
- RE 11.5.16 - *Acacia harpophylla* and/or *Casuarina cristata* open forest in depressions on Cainozoic sand plains/remnant surfaces
- RE 11.9.5 - *Acacia harpophylla* and/or *Casuarina cristata* open forest on fine-grained sedimentary rocks.

These REs are assigned a Biodiversity Status of endangered.

RE 11.3.1 generally occurs as fragmented linear strips along drainage lines or as isolated pockets amongst more extensive flood plain vegetation. Very few intact examples were recorded. Most areas consisted of established regrowth brigalow trees, assessed as being greater than 15 years old through examination of historical aerial photography (T21, T35, T40, Q80, Q106). Typically, canopy heights were 8–12 m. While this extent of regrowth fails to satisfy the VM Act remnant status criteria (refer Neldner *et al* 2005), it achieves the criteria for identification as Brigalow TEC (refer Environment Australia 2001). All areas of occurrence were heavily impacted by grazing. Class 2 declared weed species (LM Act), including: parthenium (*Parthenium hysterophorus*); Harrisia cactus (*Harrisia martini*); and prickly pear (*Opuntia stricta*) were also common.

Areas of RE 11.4.8 are located in the southern part of the project area (**Figure 6.3**). Fragmented examples of this community were observed along the Suttor River alluvial corridor in the central west portion of the project area (Q65, Q56, Q75). These patches were considered to be of poor condition due to partial clearing, large canopy gaps and/or the presence of weed species such as prickly pear. Other confirmed areas of this RE were observed in a large patch of vegetation in the south-east of the project area (T70, Q81, S82 and Q81). These areas of the RE were characterised by a relatively intact canopy and lower abundance of weed species (compared to Q65, Q66, Q75), and were considered to be in moderate to good condition.

Areas of RE 11.4.9 were also confined to the southern part of the project area fringing the Suttor River and tributaries and along the far south-eastern boundary (**Figure 6.3**). Two of these confirmed patches showed evidence of previous disturbance, with regrowth intermixed with intact canopy trees (Q72, Q74). A third location (S82) in the south of the project area exhibits minimal canopy disturbance (canopy cover of 60%) and weed incursion.

RE 11.5.16 was not mapped by DEHP, however, field surveys observed this RE in the centre of the project area. RE 11.5.16 is generally associated with broad eroded plains between laterite jump-ups formed from a mixture of colluvial and alluvial wash (a transitional alluvial system) which separates into areas of heavy clay soils (gilgai) in topographic depressions. The remnants generally comprised regrowth vegetation greater than 15 years of age. However canopy gaps attributable to historic and more recent clearing were evident at sites T2 and T5. The most advanced regrowth was observed at site T19, where canopy cover exceeded 50% and canopy height was 14 m. The Class 2 declared weed species prickly pear (*Opuntia stricta*) and harrisia cactus (*Eriocereus martinii*) were occasional to frequent occupants of the shrub and ground layers, and buffel grass (*Cenchrus ciliaris*) formed a dominant ground cover in many areas observed.

RE 11.9.5 was mapped in a single location - west of the GAP railway on the far southwest boundary of the project area (**Figure 6.6**). This location was outside of the impact area and no site-specific information for this small vegetation unit was collected during field surveys.

Areas mapped as brigalow HVR were viewed in aerial imagery and ground truthed to establish whether the regrowth qualified as a brigalow TEC. Generally, regrowth that has been cleared within the past 15 years would not have regained the structure and species composition typical of remnant Brigalow and therefore does not qualify as the TEC. A proposal to clear regrowth Brigalow must be approved under the EPBC Act if:

- Clearing of the regrowth requires a permit under Queensland legislation (eg the regrowth is mapped as HVR)
- The regrowth brigalow is more than 15 years old (Environment Australia 2001).

Based on the revised mapping it is estimated that approximately 60 ha, also mapped as HVR in the revised RE map, meets the listing criteria for brigalow TEC. This regrowth has been included in the revised brigalow TEC areas provided in **Table 6.2**. The revised RE mapping indicates that approximately 1172 ha of brigalow TEC occurs in the project area.

6.2.2 Semi-evergreen Vine Thickets of the Brigalow Belt (North and South) and Nandewar Bioregions

The SEVT of the Brigalow Belt (North and South) and Nandewar Bioregions TEC is shown by the certified RE map as RE 11.8.13 (Semi-evergreen vine thicket and microphyll vine forest on Cainozoic igneous rocks, lowlands) and RE 11.5.15 (Semi-evergreen vine thicket on Cainozoic sand plains/remnant surface). Flora surveys confirmed the presence of RE 11.8.13, but found RE 11.5.15 to be absent from the project area (**Figure 6.1–Figure 6.3**).

The revised RE mapping has significantly reduced the extent of SEVT TEC in the project area (from 1343 ha to 345 ha). This reduction is largely due to a revision of landzone boundaries. On the certified RE mapping, the basaltic horizon is consistently mapped at a higher altitude in the landscape, upslope or along lateritic scarps and plateaus. Field survey confirmed that extensive areas mapped as this TEC

(eg RE 11.8.3) occur on laterite rather than basaltic scree, and are therefore more appropriately assigned to RE 11.7.1 (which is not representative of the SEVT TEC). Furthermore, areas mapped as RE 11.5.15 were generally found not to exhibit the appropriate landform characteristics to be considered this TEC. The revised RE mapping shows that the SEVT TEC is restricted to the northern portions of the project area, where it occurs as RE 11.8.13. The SEVT TEC was confirmed at sites Q29, T31, Q46, T48 and Q49.

Trees and shrubs in areas of confirmed RE 11.8.13 exhibited typical microphyll leaf sizes characters. Common canopy species encountered were: native acalypha (*Acalypha eremorum*), small-leaved plum (*Planchonella cotinifolia*), dogwood (*Erythroxylum australe*), white croton (*Croton insularis*), python tree (*Gossia bidwillii*), white myrtle (*Drypetes deplanchei*) and native olive (*Notelaea microcarpa*), with emergents of broad-leaved bottle tree (*Brachychiton australis*). Canopy height ranged from 3–7 m with emergent trees reaching heights of 20 m. Small pockets of brigalow open forest on basalt were also mapped within this community.

SEVT TEC condition varied depending on slope and substrate. Where the community was located on rockier scree slopes, the rock talus was effective in excluding fire and limiting grazing pressure. Native groundcover was evident at these sites. Where the community was located in areas with a developing soil profile (site Q49) there was evidence of both fire and grazing, and of reduced canopy structure and coverage.

The revised RE mapping shows that 345 ha of this TEC occurs within the project area.

6.2.3 Natural Grasslands of the Queensland Central Highlands and the northern Fitzroy Basin

The Natural Grasslands of the Queensland Central Highlands and the northern Fitzroy Basin TEC (Natural Grasslands TEC) occurs in eight subregions of the Brigalow Belt Bioregion (TSSC 2008a), including Province 6 (Northern Bowen basin) in which the project area is located (**Figure 1.1**). The Natural Grasslands TEC is typically composed of perennial native grasses. It is found on soils that are fine textured (often cracking clays) derived from either basalt or fine-grained sedimentary rocks, on flat or gently undulating rises. They occur in areas with relatively high summer rainfall and where the tree canopy is usually absent. If tree cover is present, the projective crown cover is no more than 10% (TSSC 2008b). TSSC (2008a) sets out key diagnostic characteristics for the Natural Grasslands TEC.

The certified RE mapping shows that two REs characteristic of the Natural Grasslands TEC occur in the project area:

- RE 11.8.11 - *Dichanthium sericeum* grassland on Cainozoic igneous rocks
- RE 11.9.3 - *Dichanthium* spp., *Astrebla* spp. grassland on fine-grained sedimentary rocks.

Flora surveys specifically targeted the areas of RE 11.8.11 and RE 11.9.3 shown on the certified RE map (sites S22, T26, Q27, Q28, Q29, Q30, S51, S52, S53, S54, S55, S56, S57, S58, S59, S97, Q98, Q99, Q100, Q101, S102, Q20, T21). The surveys confirmed that the Natural Grasslands TEC was present in the project area, but that RE 11.9.3 was absent, and the extent of RE 11.8.11 was significantly less than shown by the certified RE map³. The 117 ha of RE 11.8.11 shown on the revised RE map is restricted to the south eastern corner of the project area (sites S97, Q98, S102) (**Figure 6.7**).

The areas of RE 11.8.11 were found to be in good condition, with limited visible weed infestation and light grazing pressure. Secondary site S97 (which is representative of natural grassland habitats within the project area but not located in the project area) was found to have three Natural Grassland TEC indicator species (TSSC 2008a) (**Plate 4**). Secondary site 102 supported three indicator species, and its environs were considered an example of the Natural Grasslands TEC in good condition.



Plate 4 Natural grassland of the Queensland Central Highlands and the Northern Fitzroy Basin

³ The certified RE map showed 773 ha of RE 11.8.11. The revised RE map showed 116ha of RE 11.8.11.

Flora surveys across the northern parts of the project area found that the grassland communities in these areas (sites S51, S52, S53, S54) were dominated by the exotic Indian bluegrass (*Bothriochloa pertusa*) and lacked the necessary indicator species for identification as the Natural Grasslands TEC. Based on revised mapping, approximately 117 ha of the Natural Grasslands TEC occurs within the project area.

6.3 FLORA SPECIES

A total of 436 terrestrial flora species were recorded from the project area, including: one previously undescribed flora species, *Kelita uncinella*; two threatened flora species listed under the NC Act; and one threatened flora species⁴ listed under the EPBC Act. The location of these species in relation to the project footprint is shown in **Figure 6.8**. A full flora species list for the project area is provided in **Attachment D**.

6.3.1 Threatened Flora Species

Desktop assessments identified 10 threatened flora species either known, or with the potential to occur in the project area. Three of these species have been recorded in or immediately adjacent to the project area during field surveys (or are known from previous records). These species and others identified through desktop assessments as potentially occurring in the project area are summarised in **Table 6.3**.

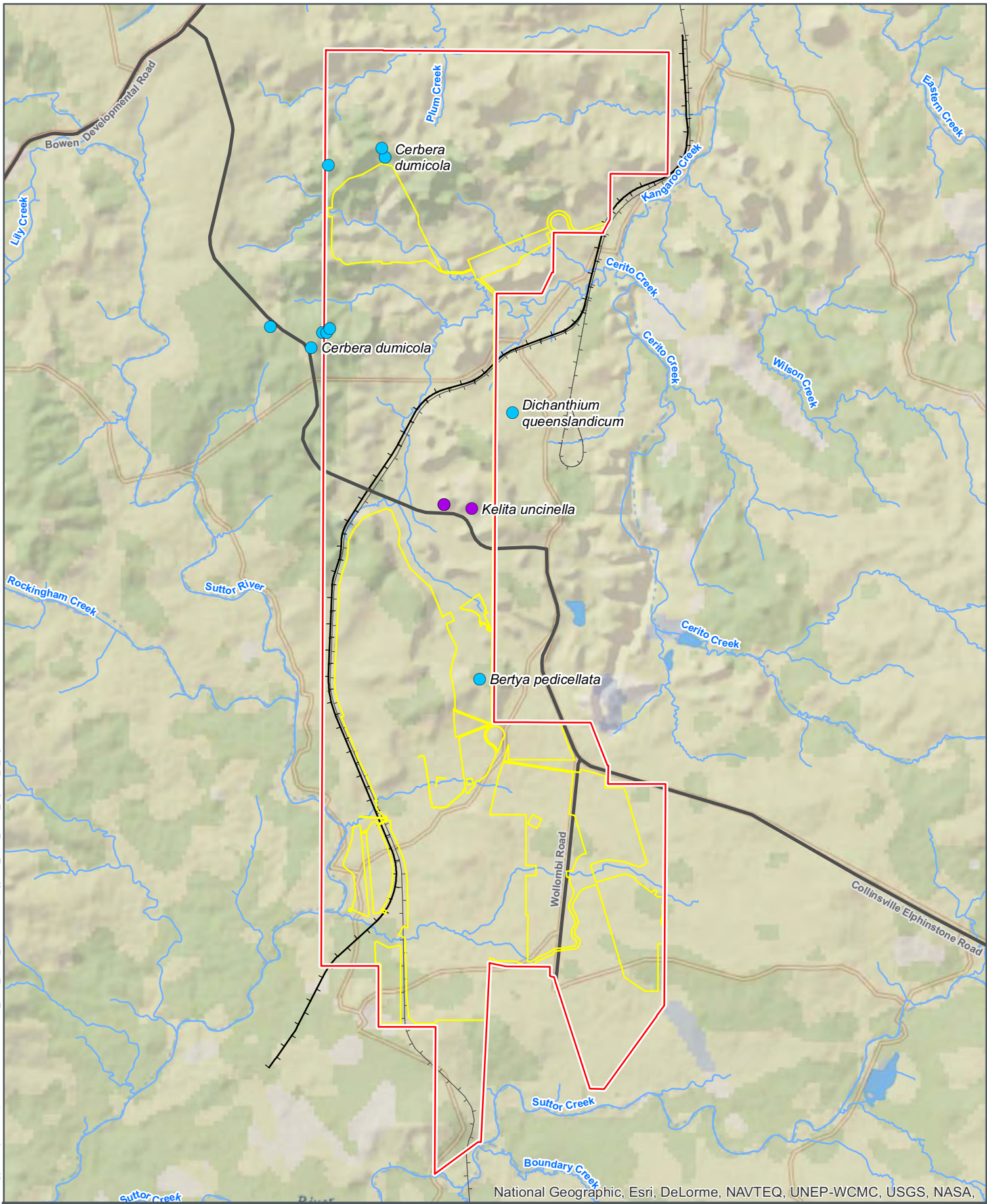
6.3.2 Species of Scientific Significance

Surveys of the project area during 2009 identified a previously undescribed genus and species from the Amaranthaceae family, *Kelita uncinella* (Bean 2010). *K. uncinella* is a prostrate, longitudinally striate annual herb with alternate leaves. It differs from two closely related genera, *Ptilotus* R.Br. and *Omegandra* G.J. Leach and C.C. Towns, by the denticulate leaf margins, the zygomorphic flowers, the uncinata awns on the tepals, and the thick-walled fruits (Bean 2010).

Areas with the potential to contain *K. uncinella* were predicted based on habitat descriptions for described populations and targeted surveys carried out in these areas. Targeted surveys recorded several new populations of *K. uncinella* in the central part of the project area. Populations of *K. uncinella* are associated with the southern slopes of low hills dominated by lancewood woodland containing a significant proportion of SEVT species in the understorey. *K. uncinella* was found to occur in shaded sites under moderate to dense cover afforded by a range of SEVT species. In some areas, *K. uncinella* was quite extensive and formed a dominant or co-dominant ground layer. *K. uncinella* often occurred on bare areas however was occasionally found in sites with extensive native grass cover where it trailed across the top of the grass tussocks.

The locations of survey sites for *K. uncinella* and confirmed records for populations of this species in the project area are shown in **Figure 6.9**.

⁴ Note: This species was located slightly outside of the project area.



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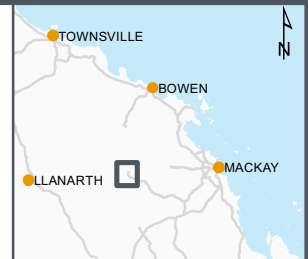
Figure 6.8 - Significant Flora

WORK REQUEST NUMBER: WR_2012_00295

DATA SOURCES:
Remnant Watercourses © State of Queensland 2011

Main Road		Flora Species Significant	
Proposed Alpha Coal	Threatened Species		
Project Rail Line	Scientific		
GAP Railway			
Stream Order			
(2 and above)			
Project Area			
Project Footprint			

DATE	AUTHOR	APPROVED	REVISION NOTE	REV.
04/10/2012	AB	JC	Issued for Review	A
16/11/2012	SN	JC	Issued for Review	B
05/12/2012	SH	JC	Issued for Review	C
08/03/2013	SG	JC	Issued for Use	0



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QC Check List: Completed

Table 6.3 Likelihood of Occurrence of Threatened Flora Species within the Project Area

Species	Common Name	Status		Back On Track Priority Species*	Source [#]	Preferred Habitat	Recorded Location	Likelihood of Occurrence
		EPBC Act	NC Act					
<i>Bertya pedicellata</i>	–	–	NT	-	FS	This species is commonly found in open and closed forest on rocky hills with shallow skeletal or sandy soils. Often associated with brown bloodwood (<i>Corymbia trachyphloia</i>), <i>Dodonaea filifolia</i> (shrub), <i>Acacia catenulata</i> , <i>A. curvinervia</i> and lancewood (<i>A. shirleyi</i>). Clearing and inappropriate fire regimes threaten this species (Wang 1995).	Recorded in the central part of the project area within RE 11.7.2.	Known
<i>Cerbera dumicola</i>	–	–	NT	-	WO, H	<i>Cerbera dumicola</i> is a small tree or shrub growing to 4 m high, with labours foliage, bleeding latex from leaves and branches. The taxon is endemic to Central Queensland occurring primarily in Lancewood thickets away from the coast, as well as sub-coastal vine thickets (Forster 1992). This species is often associated with lateritic jump ups (Land zone 7) common to the north-west of the project area.	Recorded from a number of locations in the north-west of the project area within RE 11.7.2, 11.7.4 and 11.7.6. Observed associated with the upper slopes of laterite breakaways.	Known

Species	Common Name	Status		Back On Track Priority Species*	Source [#]	Preferred Habitat	Recorded Location	Likelihood of Occurrence
		EPBC Act	NC Act					
<i>Dichanthium queenslandicum</i>	king blue grass	V	V	-	EPBC, HERBRECS, WO	An erect perennial grass to 80 cm which is known from Brigalow Belt north and south bioregions. The species inhabits both remnant and non-remnant grasslands. The primary habitat for this species is RE 11.8.11.	A single HERBRECS record occurs just outside the eastern boundary of the project area in non-remnant grassland immediately west of the Newlands Coal Mine. Detailed survey of the species' primary habitat (RE 11.8.1) was undertaken without additional specimens being located ⁵ . This degree of survey effort is considered sufficient to exclude <i>D. queenslandicum</i> as a known occurrence.	May occur

⁵ The areas mapped as RE 11.8.11 (and a 2 km radius surrounding these polygons) in the southeast of the project area have been subject to the following survey effort: (i) three 2500 m² survey plots were established by CQU within (or in the ecotone) of the RE 11.8.11 - mapped polygons (CQU 2009) (polygons 117, 119 & 121 (Figure 3.1); (ii) three 500m² polygons were established within (or in the ecotone) of the RE 11.8.11 - mapped polygons (Unidel 2010) (Polygons 62, 63 & 93) (Figure 3.1); (iv) two 2500m² survey plots were established within 2km of the RE 11.8.11 - mapped polygons (CQU 2009) (Polygons 118 & 120); (v) six 500m² polygons were established within 2 km of the RE 11.8.11-mapped polygons (Unidel 2010) (Polygons 58-61; 64 & 92) and (vi) significant traverse within the area bound by the noted survey plots was undertaken to define the extent of the RE 11.8.11 polygons.

Species	Common Name	Status		Back On Track Priority Species*	Source [#]	Preferred Habitat	Recorded Location	Likelihood of Occurrence
		EPBC Act	NC Act					
<i>Dichanthium setosum</i>	Blue grass	V	-	-	WO ⁶	<i>Dichanthium setosum</i> is associated with heavy basaltic black soils and stony red-brown hardsetting loam with clay subsoil (Ayers <i>et al</i> 1996; DEC 2005a) and is found in moderately disturbed areas such as cleared woodland, grassy roadside remnants, grazed land and highly disturbed pasture. The primary habitat for this species is RE 11.8.11.	This species was not recorded within the project area, nor within a 20 km radius of the project area. However, there are nine Queensland Herbarium specimen records from the broader Isaac Regional Council local government area, and <i>D. setosum</i> is often co-located with <i>D. queenslandicum</i> . Detailed survey of the species' primary habitat (RE 11.8.11) (refer discussion above for <i>D. queenslandicum</i>) is considered sufficient to exclude <i>D. setosum</i> as a known occurrence.	May occur

⁶ This species was not recorded in the PMST or Wildlife online database searches. However, there are nine Queensland Herbarium specimen records from the broader Isaac Regional Council local government area, and it is recognised that *Dichanthium setosum* can co-occur with *Dichanthium queenslandicum*. On this basis, *D. setosum* has been identified as a species requiring further consideration.

Species	Common Name	Status		Back On Track Priority Species*	Source [#]	Preferred Habitat	Recorded Location	Likelihood of Occurrence
		EPBC Act	NC Act					
<i>Croton magneticus</i>	–	V	NT	-	H	A deciduous small tree or shrub growing to 5 m. Its distribution ranges from Greenvale to near Collinsville, extending to coastal islands of Magnetic and Gloucester. It inhabits deciduous vine thickets on sandstone, acid volcanic or granitic substrates.	A single HERBRECS record was located approximately 10 km north of the project area.	May occur
<i>Eucalyptus raveretiana</i>	black ironbox	V	V	Yes	EPBC	<i>Eucalyptus raveretiana</i> is a tree reaching 30–40 m that is endemic to central coastal and sub coastal Queensland. It typically occurs along rivers and streams where it may grow in association with Queensland blue gum (<i>Eucalyptus tereticornis</i>), Moreton Bay ash (<i>Corymbia tessellaris</i>), river oak (<i>Casuarina cunninghamiana</i>) and paperbark (<i>Melaleuca</i> spp.), or in coastal habitats as an emergent to rainforest on alluvium. Its distribution is scattered and disjunct, being known from the tributaries of the Fitzroy River, the Suttor and its upper tributaries; the Bowen, Burdekin, Don, Bogie, Broughton, O'Connell, and Andromache rivers. This species may occur along the Suttor River and tributaries in association with RE 11.3.25.	The species has been recorded on the Bowen River and its major tributaries near Collinsville approximately 60 km north of the project area.	May occur

Species	Common Name	Status		Back On Track Priority Species*	Source [#]	Preferred Habitat	Recorded Location	Likelihood of Occurrence
		EPBC Act	NC Act					
<i>Digitaria porrecta</i>	finger panic grass	E	NT	-	EPBC	<i>Digitaria porrecta</i> is a loosely tufted perennial grass growing to 60 cm, known from four disjunct populations with a range extending over 1000 km. Major populations are found in the Dalby area although the species is known from the Central Highlands district near Nebo (TSSC 2008b) but no records exist for the South Kennedy pastoral district in which the project area is located. The species is associated with heavier cracking clay soils formed on basalts in both disturbed and undisturbed habitats. Potential for the species to occur in the project area in REs 11.8.11 and 11.8.5 as well as disturbed areas on heavier clay soils.	Potential habitat exists but the closest record is located 100 km south-east of the project area. This specimen was recorded in undulating downs country, cracking self-mulching clay soil, open grassland.	May occur
<i>Cajanus mareebensis</i>		E	E	-	EPBC	Occurs in <i>Melaleuca-Acacia</i> , <i>Eucalyptus-Callitris</i> and/or <i>Eucalyptus-Corymbia</i> grassy woodlands on sandy soils derived from granite with a lower horizon of impeded drainage	Closest HERBRECS record located west of Tully, approximately 450 km north-west of the project area.	Unlikely

Species	Common Name	Status		Back On Track Priority Species*	Source [#]	Preferred Habitat	Recorded Location	Likelihood of Occurrence
		EPBC Act	NC Act					
<i>Leucopogon cuspidatus</i>		V	-	-		<i>Leucopogon cuspidatus</i> occurs in eastern Queensland from Blackdown Tableland in the south to the Mount Stewart area near Homestead Township in the north occurs in open forests, woodlands and heath on rocky slopes with granitic or serpentinite substrates (DSEWPac 2008).	Closest HERBRECS records recorded on exposed outcrops on cliff edges on decomposed granite soils on Mount Britton, in Homevale National Park located 75 km south-west of the project area.	Unlikely
<i>Acacia ramiflora</i>		V	-	-	EPBC	A slender shrub, similar in appearance to <i>Acacia simsii</i> . It is geographically restricted to the Great Dividing Range. It has been observed on sandstone hills in the Torrens Creek/Pentland area and Robertson River area. Its distribution is not known to overlap with any TECs (TSSC 2008a).	Known population located within White Mountains National Park located 400 km to the north-west of the project area. No known records in the vicinity of the project area.	Unlikely

Species	Common Name	Status		Back On Track Priority Species*	Source [#]	Preferred Habitat	Recorded Location	Likelihood of Occurrence
		EPBC Act	NC Act					
<i>Cycas ophiolitica</i>		E	E	-	EPBC	A trunked cycad that rarely grows to 4 m. <i>Cycas ophiolitica</i> grows on hills and slopes in sparse, grassy open forest at altitude ranges 80–400 m above sea level. Preferred habitat includes shallow, stony, infertile soils, which are developed on sandstone and serpentinite, and is associated with species such as <i>Corymbia dallachiana</i> , <i>C. erythrophloia</i> , <i>C. xanthope</i> and <i>Eucalyptus fibrosa</i> . <i>Cycas ophiolitica</i> has also been found on mudstone in association with <i>Corymbia dallachiana</i> , <i>C. erythrophloia</i> and <i>Eucalyptus crebra</i> , and on alluvial loams with <i>Corymbia intermedia</i> , <i>Eucalyptus drepanophylla</i> and <i>E. tereticornis</i> (Hill 1998a; Queensland Herbarium 2007).	The species occurs in two disjunct populations with a northern population near Marlborough and a southern population near Rockhampton (Queensland Herbarium 2007). Closest population is restricted to the Rockhampton and therefore considered unlikely to occur in the project area.	Unlikely

Notes: * Back on Track priority species for the Burdekin region (DEHP 2010).
EPBC- EPBC Protected Matters Search, HERBRECS – Queensland Herbarium , WO – Wildlife Online, FS – Field Surveys.

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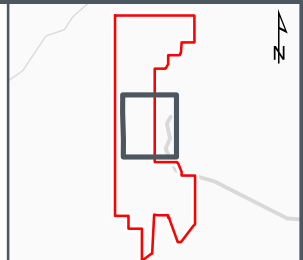
Figure 6.9 - Distribution of
Kelita uncinella

WORK REQUEST NUMBER: WR_2012_00295

DATA SOURCES:
Remnant Watercourses © State of Queensland 2011

- K. uncinella Survey Sites**
- Main Road
 - Proposed Alpha Coal
 - Project Rail Line
 - GAP Railway
 - Stream Order (2 and above)
 - Project Area
 - K. uncinella* Recorded
 - K. uncinella* Not Recorded
 - Predicted Habitat Area

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02/10/2012	AB	JC	Issued for Review	A
16/11/2012	SN	JC	Issued for Review	B
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08/03/2013	SG	JC	Issued for Use	0



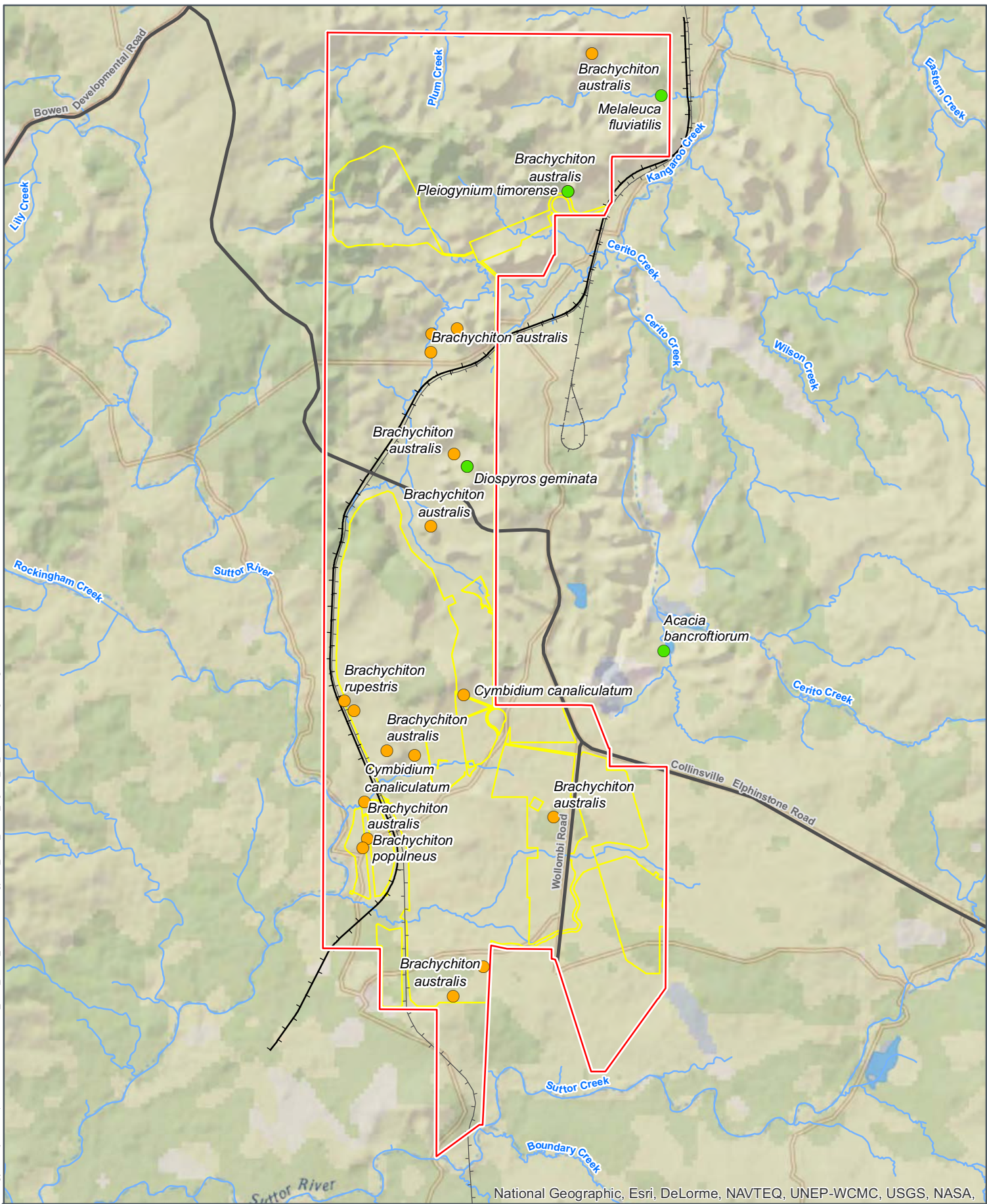
6.3.3 Flora of Bioregional Significance

The application of a range of generic criteria may be applied to define or classify non-threatened bio-regionally significant flora species. These include regional endemism, isolated distribution, disjunction, reaching limits of geographical range, or special scientific, cultural and commercial interest. Analysis of HERBRECS data and field assessment indicates that three regionally significant species occur in the project area and an additional two species are located in close proximity to the project area (Table 6.4). Recorded locations of bio-regionally significant flora species within the project area are shown in Figure 6.10.

Table 6.4 Regionally Significant Flora Species

Regionally Significant Species	Preferred Habitat	Recorded Location
<i>Diospyros geminata</i>	A Queensland endemic species which is restricted to vine thickets in the project area. The species is observed to be locally rare within its preferred habitat.	Q4
<i>Melaleuca fluviatilis</i>	A tree up to 30 m, endemic to Queensland, which was restricted to riparian vegetation (RE 11.3.25). The species was observed to be locally rare within its preferred habitat, occurring as scattered individuals along larger stream channels.	Q 20
<i>Pleiogynium timorens</i> (Burdekin plum)	A species endemic to Queensland which is restricted in the project area to vine thickets occurring on basalt (RE 11.8.13). The species has particular significance as a cultural resource.	Q47, T48, Q49
<i>Acacia bancroftiorum</i>	A species endemic to Queensland which is locally restricted to <i>Acacia shirleyi</i> woodlands (RE 11.7.2) and mixed eucalypt woodlands (RE 11.5.9). Dense thickets of the species were observed in disturbed areas north of the project area.	Closest HERBRECS record in proximity to Newlands Mine approximately 5 km from the project area.
<i>Phyllanthus maderaspatensis</i>	A Queensland endemic species known to be common in woodlands within the Brigalow Belt North Bioregion where it is recognised as a non-threatened priority species. The species is recorded from the HERBRECS database only.	Closest HERBRECS record along Collinsville-Elphinstone Rd approximately 20 km east of project area.

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Figure 6.10 - Flora of Bioregional Significance and Type A Species

- Main Road
- Proposed Alpha Coal Project Rail Line
- GAP Railway
- Stream Order (2 and above)
- Project Area
- Project Footprint

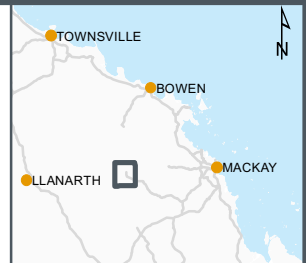
- Flora Species Significance**
- Bioregional
 - Type A

WORK REQUEST NUMBER: WR_2012_00295

DATA SOURCES:

Remnant Watercourses © State of Queensland 2011

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02/10/2012	AB	JC	Issued for Review	A
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08/03/2013	SG	JC	Issued for Use	0



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QC Check List: Completed

6.3.4 Type A Flora Species

Type A restricted plants are horticultural species that are not considered sufficiently rare to be classified as threatened species, however are harvested and traded to an extent that if unregulated a threat to the species may arise (DEHP 2010). To ensure that populations of these species are not depleted to a point of becoming threatened the taking of these species is regulated under the NC Act. Type A Flora Species recorded during the field study and general locations within the project area are detailed in **Table 6.5**. The location of these species as recorded in the project area is shown in **Figure 6.10**.

Table 6.5 Type A Flora Species Recorded within the Project area

Species	Common Name	Recorded Location
<i>Brachychiton australis</i>	broad-leaved bottle tree	Ten individuals recorded throughout the project area (Plate 5).
<i>Brachychiton populneus</i>	Kurrajong	One individual of this species was located near the south-west boundary of the project area.
<i>Brachychiton rupestris</i>	narrow-leaved bottle tree	Two specimens recorded in the centre of the project area.
<i>Cymbidium canaliculatum</i>	black orchid	Two specimens recorded in the south of the project area.



Plate 5 Broad-leaved Bottle Tree (*Brachychiton australis*) Observed within the Project Area

6.3.5 Flora Species Cultural, Commercial or Recreational Significance

A number of plant species recorded from the project area are identified as species of cultural, commercial or recreational significance. These species are discussed below.

Culturally Significant Flora Species

Culturally significant flora species are those that were, and continue to be, used by Indigenous people for food, medicine and materials for timber and tools.

Species recorded within the project area that may have provided food resources (eg seeds, leaves and berries) for Indigenous people includes: wattles (*Acacia* sp.), split jack (*Capparis lasiantha*), wild orange (*Capparis canescens*), current bush (*Carissa ovata*), ruby saltbush (*Enchylaena tomentosa*), and narrow-leaved bottle tree (*Brachychiton rupestris*), Kurrajong (*Brachychiton populneus*) and Burdekin plum (*Pleiogynium timorense*).

Flora species that have medicinal properties that may have been utilised by Indigenous people for ailments such as wounds, bites and headaches include: wattles, soap tree (*Alphitonia excelsa*), native quinine (*Petalostigma pubescens*), flax lilies (*Dianella* spp.), cockatoo apple (*Planchonia careya*), Kurrajong (*Brachychiton populneus*) and hop bush (*Dodonaea viscosa*).

Plant species that may have provided materials for utensils, spear throwers, canoe paddles, boomerangs, fibre, digging sticks and dye for Indigenous people include: eucalypts (*Eucalyptus* and *Corymbia* spp.), paperbarks (*Melaleuca* spp.), native quinine, flax lilies, cockatoo apple and Casuarina species.

Commercial Significant Flora Species

Several tree species of commercial significance were observed in the project area.

- Lemon-scented spotted gum (*Corymbia citriodora*): engineering (eg wharf/bridge construction, poles, railway sleepers and mining timbers), construction (eg house framing, flooring, fencing and landscaping), decorative (eg furniture and joinery) and other uses such as tool handles, agricultural machinery, sporting goods, boat construction and carriage building
- Narrow-leaved red ironbark (*Eucalyptus crebra*): engineering (eg wharf/bridge construction, poles and railway sleepers), construction (eg house framing, flooring, fencing and landscaping), and decorative uses such as furniture and joinery
- Queensland blue gum (*Eucalyptus tereticornis*): engineering (eg wharf/bridge construction, poles, railway sleepers and mining timbers), construction (eg house framing, flooring, fencing, and landscaping), decorative (eg furniture and joinery), other uses such as structural plywood, boat construction and carriage building
- Burdekin plum (*Pleiogynium timorense*): decorative (eg cabinet making, turnery).

There was no sign of commercial timber harvesting, but scattered cut stumps indicated small scale use of timber for on-farm purposes. Other species of commercial significance which were recorded within the project area correspond with the Type A plants.

Recreational Significant Flora Species

National parks, reserves or conservation areas with public access are not located within the project area. As a result, there are minimal attractions for the area to be used for recreational activities and therefore no vegetation communities or flora species of recreational value are considered to be present.

6.3.6 Least Concern Flora Species

A total of 434 least concern (ie non-threatened) flora species were identified during the field surveys. A list of all species identified during the field survey is provided in **Attachment D**. No systematic sampling of cleared lands was undertaken with records attained by observation and miscellaneous collections made during walking traverses and roadside observations. Additional site information in these areas would undoubtedly increase the number of herbaceous groundcovers, graminoids and exotic species, however it would provide minimal additional information of that gained from utilisation of the HERBRECS or Wildlife Online databases.

6.3.7 Introduced Flora

Introduced flora assessed in this report include non-native flora that are Weeds of National Significance (WONS) and declared plants. Other than Type A flora species there were no horticultural crops recorded growing in the project area. The Commonwealth Government recognises 20 WONS across Australia, based on their:

- Invasiveness and impact characteristics
- Potential and current area of spread
- Current primary industry, environmental and socio-economic impacts.

The WONS species *Cryptostegia grandiflora*, *Opuntia stricta*, *Opuntia tomentosa* and *Parthenium hysterophorus* were observed within the project area (**Figure 6.11**). The LP Act lists declared species for Queensland. Under the LP Act, pest species for both plants and animals are classified into three categories:

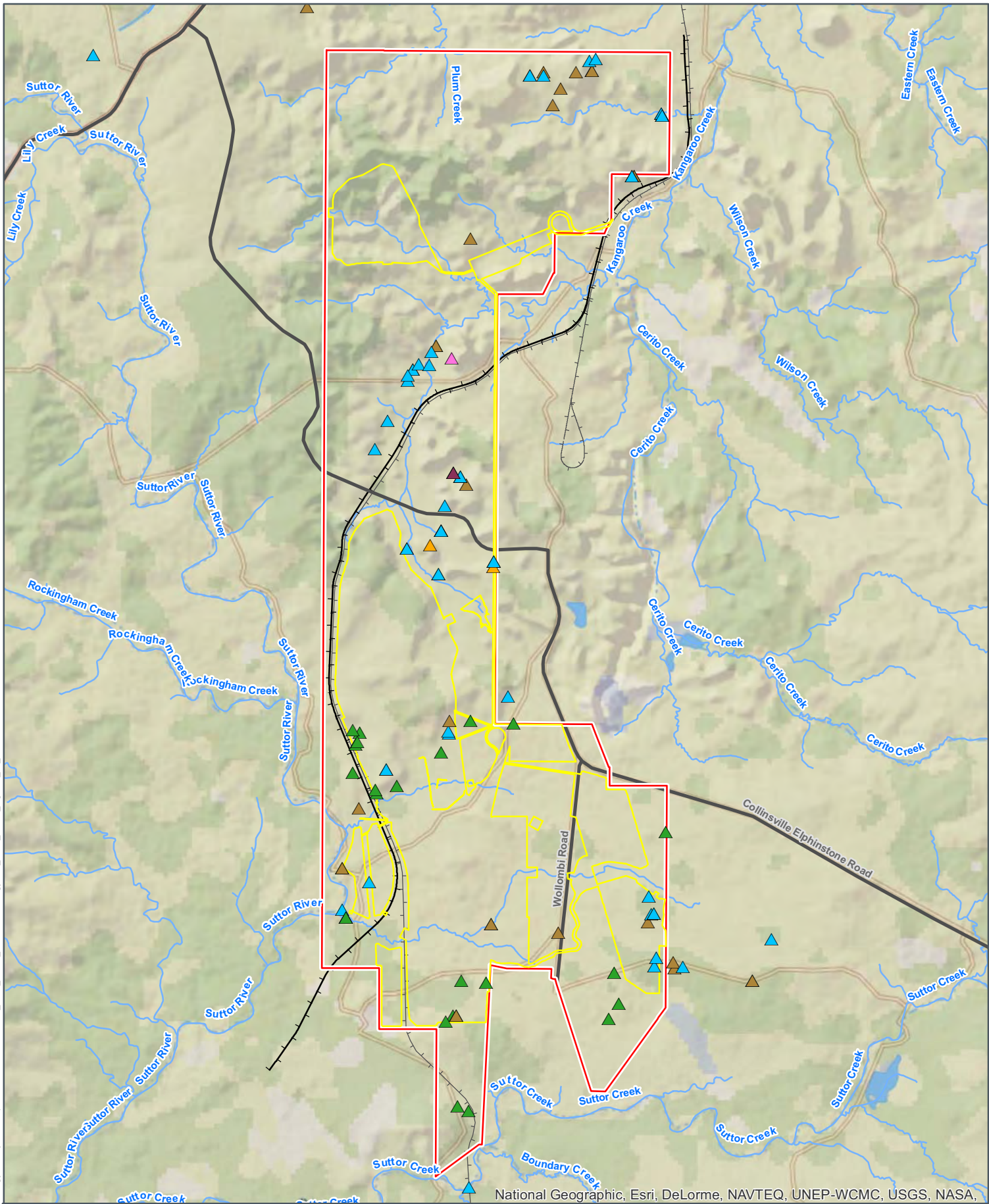
- Class 1 species are not generally established in Queensland and have potential to cause adverse economic, environmental or social impact. The landowner is obliged to take reasonable steps to keep their land free of Class 1 pest species, unless the owner holds a declared pest permit allowing the pests to be kept on the land
- Class 2 species are established in Queensland and can cause significant adverse economic, environmental or social impact. The landowner is obliged to take reasonable steps to keep their land free of Class 2 pest species, unless the owner holds a declared pest permit allowing the pests to be kept on the land
- Class 3 species are established in Queensland and have, or could have, adverse economic, environmental or social impact. Legislative obligations relating to control of these species are generally limited to specific conservation areas.

Six declared weeds (all Class 2) were observed within the project area. The general location of these declared weeds is described in **Table 6.6** and shown in **Figure 6.11**.

The project area extends is located within the Whitsundays Regional Council and the Isaac Regional Council areas. Under local government laws, weeds of regional significance have been declared under the Whitsundays Regional Council Pest Management Plan (WRC 2009). The Isaac Regional Council has not prepared a pest management plan. The regionally significant weed noogoora burr (*Xanthium pungens*) was observed in the project area.

Site surveys identified 56 introduced flora occurring within the project area (**Attachment B**). The most widespread environmental weed encountered was buffel grass (*Cenchrus ciliaris*) which was a pervasive pest in nearly all communities encountered, however was most prevalent in woodland REs 11.5.16 and 11.8.5. The species is also the dominant ground cover in non-remnant areas where it has been established as cattle fodder. Other common environmental weed species include a large number of grasses (*Sporobolus coromandelianus*, *Eriochloa meyeriana*, *Eragrostis cilianensis*, *Dichanthium aristatum*, *Cynodon dactylon*, *Bothriochloa pertusa*), *Sida* spp. (*Sida spinosa*, *Sida rhombifolia*), *Xanthium pungens*, *Xanthium spinosum* and scattered occurrences of sensitive weed (*Mimosa pudica*). Weed cover

generally reflects site history and disturbance with areas intensively utilised for grazing typically devoid of native ground covers.



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Figure 6.11 - Weeds

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DATA SOURCES:
Remnant Watercourses © State of Queensland 2011

Legend

- Main Road
- Proposed Alpha Coal
- Project Rail Line
- GAP Railway
- Stream Order (2 and above)
- Project Area
- Project Footprint

Weed Species

- Fireweed
- Harrisia cactus
- Noogoora Burr
- Parthenium
- Prickly Pear
- Rubber Vine
- Velvety tree pear

Table

DATE	AUTHOR	APPROVED	REVISION NOTE	REV.
02/10/2012	AB	JC	Issued for Review	A
14/11/2012	SN	JC	Issued for Review	B
06/12/2012	SH	JC	Issued for Review	C
08/03/2013	SG	JC	Issued for Use	0

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(A4) GDA 1994 MGA Zone 55

Map

TOWNSVILLE
BOWEN
LLANARTH
MACKAY

Table 6.6 WONS, State and Locally Declared Weeds Recorded in the Project area

Scientific Name	Common Name	Declaration*	Field Sites	RE	Comments
<i>Cryptostegia grandiflora</i>	rubber vine	Class 2 WONS	Q20, Q45	11.3.25, Non-remnant	Scattered occurrences are restricted to riparian areas and heavily disturbed non-remnant vegetation.
<i>Harrisia martinii</i>	harrisa cactus	Class 2	Q11, T19, T21, T31, T40, Q64, Q65, Q66, Q67, T70, Q81, S82, Q84, Q89, Q92, Q94, Q95, Q96	11.3.1, 11.4.8, 11.4.9, 11.5.16, non-remnant	All occurrences were <5% cover. Found only on heavier soils including cracking clays and alluvium.
<i>Opuntia tomentosa</i>	velvet pear	Class 2 WONS	T1, T17	11.7.1 x 1	Typically scattered large individuals within vine thicket communities. The majority of occurrences are <5% cover.
<i>Opuntia stricta</i>	prickly pear	Class 2 WONS	T2, Q3, Q4, T5, Q11, Q12, T15, T16, T19, T21, S22, T26, Q27, T31, T32, T35, T40, T48, S51, S52, S54, S55, S57, S59, S97, Q98, Q100	11.5.16, 11.8.5, 11.3.1, 11.3.2, 11.3.4, 11.8.11, 11.8.13, non-remnant	Typically scattered occurrences at <5% cover. A pervasive species occurring in the majority of ecosystems surveyed.
<i>Parthenium hysterophorus</i>	parthenium	Class 2 WONS	T2, Q3, T5, Q11, Q12, T15, Q13, T16, T19, Q20, T21, T26, Q28, Q29, T32, T34, T35, Q36, Q38, T39, S53, Q99, S102, Q104, Q105, Q106	11.3.1, 11.3.2, 11.3.25, 11.3.4, 11.5.16, 11.7.2, 11.8.4, 11.8.5, 11.8.11, 11.8.13, non-remnant	A pervasive species forming ground cover in heavier soil substrates. Typical cover is <5% in ecosystems of low disturbance although cover of up to 20% was observed in heavily degraded and grazed areas.
<i>Senecio madagascariensis</i>	fireweed	Class 2	Q12	11.3.25	In low abundances at sites associated with Suttor River.
<i>Xanthium pungens</i>	noogoora burr	WRC	Recorded in the south west of the project area along Suttor River.	11.3.1, 11.3.25	In low to high densities at sites associated with Suttor River.

Note *: WONS = Weed of National Significance; Class2 under the LP Act; or WRC= declared locally under the Whitsundays Regional Council Pest Management Plan.

7. TERRESTRIAL FAUNA VALUES

The diversity of flora species and vegetation communities in combination with varying topography and substrate supports a generally rich array of fauna in the project area. The four comprehensive fauna surveys conducted between 2009 and 2012 resulted in the detection of 222 vertebrate species. The species richness is composed of 15 amphibian species, 34 reptile species, 148 bird species and 25 species of mammal including 17 bat species. A full species list is presented in **Attachment E**.

7.1 FAUNA HABITAT

The project area is comprised of numerous geological features which combine to provide a diverse and complex array of fauna habitats. Significant tracts of land within the northern and central portions of the project area are found on sandstone plateaus which fall to form steep wash out slopes. The project area also contains broad undulating plains consisting of heavier clays and sandy plains. These plains are regularly bisected by incised alluvial systems often with deep outer banks displaying a variety of exposed soil profiles and bed rock. Basaltic and lateritic outcrops occur sporadically within the project area providing varying soil structures and subsequently complex vegetation compositions and habitat features such as rocky outcrops and scalds.

Fauna habitat is described in terms of its species diversity and condition, connectivity with adjoining areas of intact habitat and the extent to which it supports threatened species. Habitat diversity refers to the type and abundance of habitats within an area, generally the greater the habitat diversity of an area the greater the range of fauna species utilising the area. Land in the project area is primarily used for grazing which is concentrated in the eastern portion of the area where better soils occur. As a result, habitat values in this area are substantially degraded. The project area has been divided up into the following habitat types:

- Lateritic topped uplift and escarpments
- Undulating black cracking clays supporting brigalow
- Undulating sandy plains supporting eucalypt forest with shrubby understorey
- Clay floodplains with gilgai supporting brigalow
- Alluvial floodplains with poplar box/blue gum
- Natural and artificial wetlands
- Cleared.

The general fauna habitat types observed within the project area, vegetation characteristics, microhabitat features and fauna species considered likely to utilise these habitats are discussed in **Table 7.1**.

Table 7.1 Fauna Habitats that Occur within the Project Area

Habitat Type	Site Number	Survey Type	Habitat Description
Lateritic uplift and escarpments	T10, T12, H1, H4, H6, H8, H21	Trapping, habitat assessment, spotlighting	This habitat type occurred on the northern uplifts located to the north-west (T10, T12, H1 and isolated rocky knolls (H4, H6) and escarpments (H8) located in the central portion of the project area. The RE commonly associated with this habitat is REs on land zone 7. Generally this habitat type occurred on lateritic soils that cap the sandstone uplifts. In higher areas, soils were generally shallow and rocky, with soil depth increasing further down slope or in eroded gullies. Sandstone escarpments and rocky outcrops were common. Wind eroded caves were generally found to be underdeveloped and accordingly were not considered suitable habitat for the northern quoll (<i>Dasyurus hallucatus</i>), rock wallabies or cave roosting microbats. However, these caves may provide habitat for reptile species (H6). In the northern escarpments vegetation was generally dominated by lancewood with emergent shrub species with small pockets of dry rainforest species observed in incised gullies with exposed rocky substrates. On knolls and escarpments in the centre of the project area, lancewood dominated the upper slopes while brigalow species were observed on the deeper black or sandy/clay soils located down slope. On the higher slopes, where vegetation was sparse and rocky scalds common, low densities of ground cover and fallen timber development occurred. As canopy cover increased downslope, the amount of fallen timber and leaf litter development generally increased. Microhabitat such as fallen timber was particularly prevalent at the trapping site T12 and accordingly was selected for trapping purposes due to its potential to provide favourable habitat for reptiles and a range of other species. Numerous bird species were observed within this habitat, most notably passerine species. The bio-regionally significant grey crowned babbler was also regularly recorded in these areas. Common reptile species were regularly observed foraging and sheltering in leaf litter and under bark such as Bynoe's gecko (<i>Heteronotia binoei</i>) and barred-sided skink (<i>Eulamprus tenuis</i>). Numerous common microbat species were observed and captured throughout this habitat such as Gould's wattled bat (<i>Chalinolobus gouldii</i>), inland broad-nosed bat (<i>Scotorepens balstoni</i>) and lesser long-eared bat (<i>Nyctophilus geoffroyi</i>). Transects undertaken during the night observed a high density of cane toads. This introduced species is known to potential represent a threat to carnivorous native fauna such as amphibian specialist snake species or the northern quoll should it be present within this habitat.

Habitat Type	Site Number	Survey Type	Habitat Description
Undulating black cracking clays supporting brigalow	T7, T11, T13, H3, H5, H7	Trapping, habitat assessment	This habitat type occurred on black cracking clays adjacent to extensive sandstone escarpments (H7) which widened into large flat alluvial/clay plains (H5, T13, T7) located within the north-east portion of the project area. Scattered emergent ironbark and suppressed belah occurred across the broader plain, with areas of regenerating and mature brigalow communities occurring on lower slopes. Woody debris and microhabitat features such as sandy banks were common throughout this habitat and potentially afforded denning and roosting sites for species such as bee-eaters, pardalotes and terrestrial reptiles and mammals. As this area has been largely disturbed by clearing and cattle grazing, the shrub layer was largely absent, however where small patches occurred, the shrub layer afforded foraging and refuge habitat for passerine and common terrestrial fauna species (H7). Fallen timber and complex ground cover development was minimal. However, the cracking soils provided habitat for small terrestrial fauna species such as amphibians and reptiles. Overall, the habitat quality in this unit is considered to be low.
Undulating sandy plains supporting eucalypt forest with shrubby understorey	T3, T4, T5, T8, T9, H9, H10, H12, H14, H20	Trapping, habitat assessment	This habitat type was found within broad undulating plain typically found on sandy loam soils in the central western portions of the project area. A large rocky sandstone escarpment borders the area to the north (H9). Vegetation on site is dominated by remnant poplar box (T9, T5, H12, and H14) with areas of bloodwood and ironbark (H20, H10, H9, and T3). These areas are indicative of RE 11.5.3 and 11.9.9, respectively. This area has been subject to historic clearing, thinning and cattle grazing resulting in the ground cover being dominated by improved pasture grasses with little fallen timber or leaf litter development. In areas where a more complex understorey was present (H14, H9, T3) refuge habitat for smaller terrestrial species was noted, particularly for small passerines. Rocky areas along the lower slope of the escarpment provided potential microhabitat for reptiles and small marsupials, with sandy soils providing potential habitat for burrowing or fossorial species. The shrub layer composed of sandalwood and wilga provided potential habitat for small passerine species, such as lorikeets, thornbills and honey-eaters. Hollows were present in areas with mature eucalypts (H14) and were likely to be utilised by hollow-dependant species such as parrots, gliders and some microbat species.

Habitat Type	Site Number	Survey Type	Habitat Description
Clay floodplains with gilgai supporting brigalow	T1, H22	Trapping, habitat assessment, spotlighting	This habitat type occurred on a broad, sandy clay floodplain within the southern central portion of the project area. Gilgai were present within the lowest part of the floodplain and support regenerating brigalow regrowth and dense pastoral grasses. Large areas of this habitat type (H22) provided marginal habitat for wetland birds such as egrets, large mobile mammals such as macropods, amphibian and wetland associated reptile species as tall grass development was dense and gilgais were typically small in size and shallow in nature. This habitat type has been subjected to historical broad scale clearing and grazing pressure resulting in minimal timber or leaf litter development. Overall, the habitat quality in this unit is considered to be low.
Alluvial floodplains with poplar box/blue gum	T6, H11, H15, H16, H17, H18,	Trapping, habitat assessment	The Suttor River alluvial floodplains in the south western portion of the project area were characterised by sandy/clay soils and supported remnant vegetation dominated by blue gum/poplar box analogous with RE 11.3.25. Some areas along the river (H15, H16 and H17) supported very small pockets of regenerating SEVT species while sandy river banks provide potential nesting habitat for birds, such as the rainbow bee-eater (<i>Merops ornatus</i>). Hollows and stags present habitat for arboreal fauna such as parrots, gliders, owls, micro bats and reptiles. The shrub layer was largely absent as a result of historic clearing and pressure from grazing however, the ground layer consisted of dense pastoral and native grasses as well as areas of good timber and leaf litter development which may have potentially serve as potential habitat for terrestrial fauna such fossorial reptiles. The threatened listed species, the ornamental snake (<i>Denisonia maculata</i>) was detected at H17. It is likely that the Suttor River acts a contiguous corridor which is an important ecological feature allowing the movement of wildlife through the landscape.

Habitat Type	Site Number	Survey Type	Habitat Description
Natural and artificial wetlands	H2, H13, H19	Habitat assessment	This habitat type includes a series of artificial dams and natural wetlands, however little natural wetland habitat occurred within the project area. Dams constructed at H13 and H19 are characterised by soils with high clay content fringed by eucalypt or brigalow vegetation communities. The recently constructed dam found at H2 has created a large shallow wetland habitat with an island of vegetation (persisting at the time of survey) in the middle. This island and wetland was supporting significant bird activity. All dams recently assessed within the project area exhibit signs of disturbance however, supported relatively higher levels of bird activity. Fauna recorded at H2, H13 and H19 included wetland species such as ducks, egrets, herons, plovers and turtles. The square-tailed kite (<i>Lophoictinia isura</i>) and squatter pigeon (<i>Geophaps scripta scripta</i>) were detected in proximity to a wetland at H2 and H19 respectively. The threatened black throated finch (<i>Poephila cincta cincta</i>) was tentatively recorded from the same area, although a positive identification was not made. Low lying areas adjacent to the dams and wetlands support emergent vegetation and affords habitat for cryptic wetland birds such as rails, crakes, bitterns and snipes. Overall, the habitat quality in this unit is considered to be low.
Cleared pastoral areas	T2	Trapping	Grasslands occurred across a significant portion of the project area. Generally, these areas were dominated by exotic pasture species with small areas representing native grassland communities (RE 11.8.11). The majority of these habitats were displaying deleterious impacts associated with cattle grazing. These impacts can reduce the diversity and abundance of reptiles and other terrestrial species (Woinarski and Ash 2002). Bird species were the most common fauna group observed within grassland habitats. The squatter pigeon (vulnerable under EPBC and NC Acts) was observed foraging in non-native grasslands within the project area. Wetland and wide ranging species such as the listed squatter pigeon is known to forage in cleared pastoral areas where suitable seed is available and water is proximate. The Australian painted snipe and the migratory Latham's snipe will forage in flooded pastoral areas. Other migratory species such as the white-throated needletail (<i>Hirundapus caudacutus</i>), cattle egret (<i>Ardea ibis</i>) and rainbow bee-eater (<i>Merops ornatus</i>) will also forage above paddocks. Overall, the habitat quality in this unit is considered to be low.

7.1.1 Breeding Places

Wetlands within the project area provide potential breeding habitat for wetland bird species (**Figure 5.1**). Tree hollows also represent important breeding habitat for a range of arboreal species including birds, possums and bat species. Hollows were generally found to be most common within eucalypt forests on undulating sandy plains and the alluvial floodplains within poplar box/blue gum. Hollows are generally restricted to large mature trees within the landscape, thus hollows can be expected to occur within the areas of mature remnant vegetation and would not be expected to occur in areas that have been previously cleared.

The lateritic topped uplifts to the north of the project area were targeted during the field survey to confirm the presence of caves that may represent breeding places for a range of fauna species. Inspection of escarpments generally found wind eroded crevices to be of an insufficient size and depth to represent suitable breeding species for the northern quoll (*Dasyurus hallucatus*) or other small mammal species.

7.2 TERRESTRIAL FAUNA ASSEMBLAGES

7.2.1 Birds

7.2.1.1 Wetland Birds

The greatest diversity of bird species was recorded within wetlands (including farm dams and gilgai formations), riparian. Seasonal summer rains prior to the Unidel 2012 survey inundated the wetlands, gulgais and low lying areas providing habitat for a wide range of wetland bird species including several MNES – listed species. A large dam located in the south-west of the project area (H2 within MLA 70434) and two farm dams located in the south and north-east of the project area (H13 within MLA 70435 and H19 within MLA 10355; respectively) and the resultant lacustrine wetlands afford habitat for numerous wetland species including species of dotterel, heron, cormorant, ibis and duck (**Attachment E**).

7.2.1.2 Passerines

The diversity of passerines in remnant brigalow and eucalypt woodland correlated to the condition of the understory vegetation. A higher diversity of passerines, including several species of honeyeater, was detected in vegetation with a structurally complex shrub and ground layer.

The observation of the highly mobile and nomadic, pictorella mannikin (*Heteromunia pectoralis*) within the project area occurs within the south eastern most extent of the range for this small passerine, with no recent records occurring within the northern Burdekin basin (Blakers 1984). As the pictorella manikins move between the coast and country to forage, the observation within the project area may reflect quality foraging opportunities.

Ground dwelling species, such as the singing bushlark (*Mirafra javanica*) and Richard's pipit (*Anthus novaeseelandiae*) were detected in the open, pastoral grasslands in the southern half of the project area; while species associated with dense grasslands, such

as the buff-banded rail (*Gallirallus philippensis*), red-backed fairy-wren (*Malurus melanocephalus*), rufous songlark (*Cincloramphus mathewsi*) and tawny grassbird (*Megalurus timoriensis*) were detected within a grassy woodland understorey in the northern sections of the project area.

7.2.1.3 Birds of Prey

Four birds of prey: the square-tailed kite (*Lophoictinia isura*) observed foraging over immature eucalypt woodland; the collared sparrow hawk (*Accipiter cirrocephalus*) which feeds on small passerine birds, the nankeen kestrel (*Falco cenchroides*) and the black-shouldered kite (*Elanus axillaris*) were among the raptors detected flying overhead during the fauna surveys. In addition to these four species, the red goshawk (*Erythrorhynchus radiatus*) is likely to inhabit the project area, although a sedentary species with a large home range, similar to the square-tailed kite this species is also likely to forage within mature woodland and open forests in the north-east of the project area. The notable abundance of the three species in the 2012 survey suggests a plentiful supply of prey and an indication of the ecologically diverse and productive nature of the landscape.

7.2.2 Mammals

7.2.2.1 Bats

A total of 17 microbat species were detected during the fauna surveys. Bat activity was generally greater within areas of remnant vegetation where mature trees and stags containing hollows provide critical roosting and breeding habitat. Notably no flying foxes were recorded potentially as a result of low foraging opportunities (ie eucalypts not flowering).

7.2.2.2 Macropods

The red kangaroo (*Macropus rufus*), eastern grey kangaroo (*Macropus giganteus*), black-striped wallaby (*Macropus dorsalis*) and the rufous bettong (*Aepyprymnus rufescens*) were recorded in the project area during the fauna surveys. With the exception of the eastern grey kangaroo, macropods were detected in low abundance. Following a 2011 observation, a targeted search was conducted to detect the unadorned rock wallaby (*Petrogale inornata*). The low sandstone escarpment in the north of the project area was surveyed however, no direct or indirect observations indicating presence was detected during the Unidel 2012 study.

7.2.2.3 Small Ground Mammals

The eastern chestnut mouse (*Pseudomys gracilicaudatus*), bush rat (*Rattus fuscipes*), northern brown bandicoot (*Isodon macrourus*), common planigale (*Planigale maculate*), narrow-nosed planigale (*Planigale tenuirostris*) and the culturally significant short beaked echidna (*Tachyglossus aculeatus*) were detected within the project area during the fauna surveys.

7.2.2.4 Arboreal Mammals

The bio-regionally significant yellow-bellied glider (*Petaurus australis*) was recorded within riparian habitat during the 2009 survey and the brush-tailed possum (*Trichosurus vulpecular*) was recorded on two of three fauna surveys. During the Unidel 2012 survey, two brush-tailed possums were observed in an isolated patch of poplar box (*Eucalyptus populnea*) woodland in the south-east of the project area. No koalas (*Phascolarctos cinereus*) were detected during the fauna surveys, nor were past records identified from Wildlife Online or the Queensland Museum within 20 km of the project area. Riparian vegetation in the south eastern part of the project area may afford habitat; however, should this species occur within the project area, abundance would be expected to be low.

7.2.3 Reptiles

The diversity of small reptiles, such as skinks (*Carlia* sp., *Menetia* sp., *Ctenotus* sp.) was highest within riparian zones (RE 11.3.25) and associated ecotones, scattered throughout the project area with suitable microhabitat such as leaf litter, coarse woody debris providing potential retreat sites for these and other herpetofauna. Within these riparian tracts of vegetation the ornamental snake (*Denisonia maculata*) is also likely to be found foraging for amphibians inhabiting a moist understory. The dubious gecko (*Gehyra dubia*), ocellated velvet gecko (*Oedura monilis*) and zigzag velvet gecko (*Oedura rhombifer*) were observed under loose bark on trees within brigalow habitat on undulating clay plains to the south of the project area. In brigalow and eucalypt open woodland habitats, dense shrubby clumps of *Carissa ovata* and scattered logs and fallen timber provide critical cover for the common death adder (*Acanthophs antarcticus*) and smaller reptiles including fire-tailed skink (*Morethia taeniopleura*) and the common dwarf skink (*Menetia greyii*). Similarly the threatened *Lerista* sp., retro-slider (*Lerista allanae*) and Mount Cooper striped lerista (*Lerista vittata*), will be found in these areas in the presence of loamy clay soils. Other fossorial and semi-fossorial reptiles were found to occur under decomposing logs and fallen debris within brigalow and eucalypt woodlands including the short-necked worm-skink (*Anomalopus brevicollis*) and eastern mulch-slider (*Lerista fragilis*). Despite extensive active diurnal and nocturnal searches, reptiles are considered to be the least represented fauna group as a result of their habitat preferences and cryptic, solitary nature.

7.2.4 Amphibians

The southern portion of the project area contains wetland areas, such as farm dams, a palustrine wetland and gilgai as well as waterways including the Suttor River and Kangaroo Creek and associated tributaries. Wetlands and waterways afford potential habitat for amphibian species, particularly during the summer season when they are most active. A total of 14 frog species were observed during the surveys including the green stripe frog (*Cyclorana alboguttata*), northern dwarf tree frog (*Litoria bicolor*), bumpy rocket frog (*Litoria inermis*), graceful tree frog (*Litoria gracilentia*), northern laughing frog (*Litoria rothii*) and the ornate burrowing frog (*Opisthodon ornatus*).

7.3 THREATENED FAUNA

Six threatened fauna species listed under the EPBC Act and/or NC Act were recorded from the project area during fauna surveys (**Figure 7.1**). A further 10 fauna species are considered likely to occur or may occur in the project area. These species and their likelihood of occurrence within the project area are summarised in **Table 7.2**.

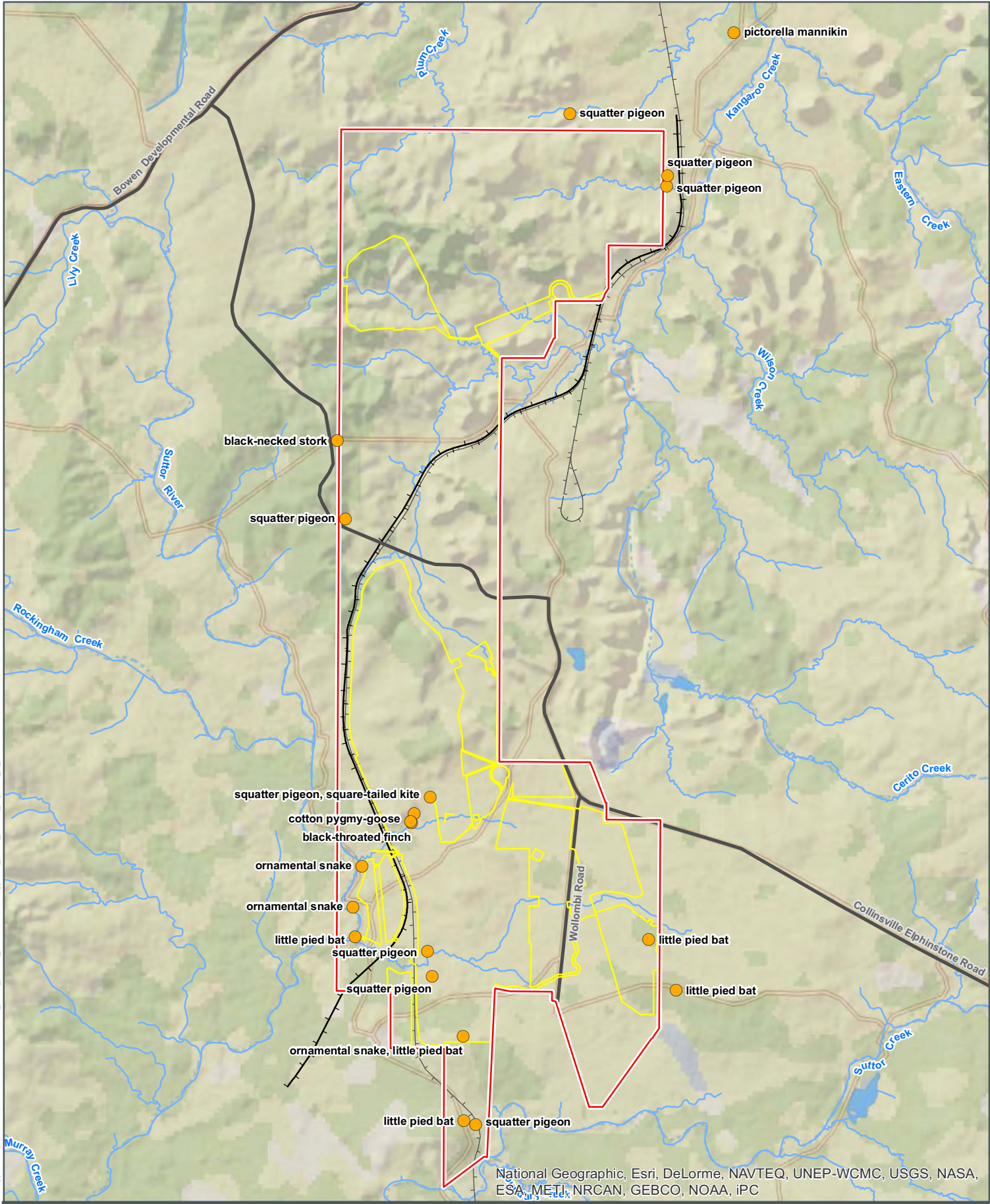


Figure 7.1 - Threatened Fauna

WORK REQUEST NUMBER: WR_2012_00295

DATA SOURCES:
Remnant Watercourses © State of Queensland 2011

Main Road

Proposed Alpha Coal Project Rail Line

GAP Railway

Stream Order (2 and above)

Project Area

Project Footprint

Significant Fauna

Threatened Fauna

DATE	AUTHOR	APPROVED	REVISION NOTE	REV.
04/10/2012	AB	JC	Issued for Review	A
14/11/2012	SN	JC	Issued for Review	B
04/12/2012	SH	JC	Issued for Review	C
08/03/2013	SG	JC	Issued for Use	0

012

Kilometres

1:160,000

(A4) GDA 1994 MGA Zone 55

TOWNSVILLE

BOWEN

LLANARTH

MACKAY

North arrow

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QC Check List: Completed

Table 7.2 Likelihood of Threatened Species Occurrence in the Project Area

Species		Status		Habitat Requirements	Assessment Summary
Common Name	Scientific Name	EPBC Act	NC Act		
Known to Occur					
ornamental snake	<i>Denisonia maculata</i>	V	V	Woodlands and open forests containing brigalow (<i>Acacia harpophylla</i>), gidgee (<i>Acacia cambagei</i>), blackwood (<i>Acacia argyrodendron</i>) or coolabah (<i>Eucalyptus coolabah</i>) communities or pure grassland associated with gilgais or other wetlands. Microhabitat features include coarse woody debris such as fallen timber as well as rocky areas and deep soil cracks.	The ornamental snake was recorded during the 2009 and 2012 surveys from riparian forests associated with the Suttor River floodplain and brigalow communities in the southern part of the Project area. The habitat condition on the site is considered generally poor relative to pre-clearing or remnant condition (due to thinning and grazing impacts); however the habitat quality for this species is moderate to high and provides important habitat. This species occurs in many disturbed areas, including cleared land with gilgai microrelief.
cotton pygmy-goose	<i>Nettapus coromandelianus</i>	—	NT	Deep, freshwater lagoons, swamps and dams with floating or emergent vegetation adjacent to hollow bearing trees or stags.	The cotton pygmy-goose was recorded utilising a dam in the southern part of the project area during the 2009 dry season. Large farm dams, such as that located at site H2 habitat for this species, which is expected to be an occasional vagrant in the project area. There is limited habitat available for this species in the project area, and overall habitat value is low.

Species		Status		Habitat Requirements	Assessment Summary
Common Name	Scientific Name	EPBC Act	NC Act		
black-necked stork	<i>Ephippiorhynchus asiaticus</i>	–	NT	Ephemeral and permanent wetlands, including floodplains or flooded pastures and swamps as well as shallow banks of rivers.	A black-necked stork was detected during the 2010 survey within a large wetland located in the south-west of the project area (H2). Aside from the wetland from which this species was recorded, habitat quality across the project area is low.
square-tailed kite	<i>Lophoictinia isura</i>	–	NT	Open forest and woodlands generally near a watercourse.	One observation of this species foraging over immature eucalypt regrowth south-west of the project area was recorded during the 2012 survey. Open woodland and forest in proximity to water afford foraging habitat for this species. All remnant vegetation types provide suitable foraging habitat for this species. More mature woodlands and open forests are likely to support nesting habitat. Overall habitat quality is moderate to high.
squatter pigeon	<i>Geophaps scripta scripta</i>	V	V	Open dry eucalypt woodland on sandy soil near permanent water.	Squatter pigeons were detected during the 2009, 2010 and 2012 surveys from grassy woodlands in the southern parts of the project area and sites (T5, T8 and H19). Despite its conservation status, this species is widespread in central Queensland (Wormington <i>et al</i> 2009) and is expected to occur in grassy woodland habitats in proximity to watering points across the site. Overall habitat quality for this species is moderate to high within remnant vegetation and low in previously cleared lands and regrowth vegetation.

Species		Status		Habitat Requirements	Assessment Summary
Common Name	Scientific Name	EPBC Act	NC Act		
little pied bat	<i>Chalinolobus picatus</i>	–	NT	Open, eucalypt forests and woodlands with hollow bearing trees or stags.	Positive records from echolocation recordings at sites in the southern part of the project area (T1, T2, T3, T4, T5). Subsequent habitat assessments recorded suitable habitat trees with potential roosting hollows along alluvial corridors. Overall habitat quality for this species is moderate to high within remnant vegetation and low in previously cleared lands and regrowth vegetation.
Likely to Occur					
black-throated finch (southern)	<i>Poephila cincta cincta</i>	E	E	Riparian areas within open eucalypt, acacia or melaleuca forest and woodlands.	Two individuals suspected to be <i>Poephila cincta cincta</i> were recorded during baseline surveys, although a positive identification was not made. Although they could not confidently be attributed to <i>P. cincta cincta</i> in the field, a precautionary approach is adopted and the species has been considered as a likely occurrence.
common death adder	<i>Acanthophis antarcticus</i>	–	NT	Remnant or mature regrowth vegetation with a shrubby understorey and dense leaf litter. Diverse vegetation communities afford habitat (eg wet sclerophyll forests, woodlands, shrub lands, grasslands, rainforest and coastal heath lands).	This species has the potential to occur in all areas of remnant vegetation with shrubby understorey and a thick layer of leaf litter within the project area.
Australian painted snipe	<i>Rostratula australis</i>	V, M	V	Ephemeral and permanent shallow, freshwater wetlands and inundated grasslands, sewage ponds and dams.	The large dam (H2) within the south-west of the project area and the ephemeral gilgai wetlands afford habitat for this species.

Species		Status		Habitat Requirements	Assessment Summary
Common Name	Scientific Name	EPBC Act	NC Act		
May Occur					
red goshawk	<i>Erythroriorchis radiatus</i>	V	E	Coastal and sub coastal tall, open forest, tropical savannah, woodland, rainforest edges and gallery forest along, or adjacent to, watercourses and wetlands	Eucalypt forest and woodlands adjacent to the Suttor River and the south-west of the project area afford foraging and potentially breeding habitat. This species was not detected during the survey.
Mount Cooper striped lerista	<i>Lerista vittata</i>	E	E	Woodlands dominated by ironbark (<i>Eucalyptus crebra</i> and <i>E. melanophloia</i>) and bloodwood (<i>Corymbia clarksoniana</i> and <i>C. intermedia</i>) with shrub and/or grassy ground layers on deep red earths, undulating plains and steep hills on granitic rocks as well as SEVT which extends onto areas of ironstone (duricrust) and spinifex communities.	This species was not detected during fauna surveys, however lower quality habitat in RE 11.5.9 and SEVT vegetation areas exists in the north-west section of the project area.
yakka skink	<i>Egernia rugosa</i>	V	V	Dense ground cover and abundant coarse woody debris (eg hollow logs) or rock in a variety of vegetation types including: poplar box (<i>Eucalyptus populnea</i>), ironbark, brigalow (<i>Acacia harpophylla</i>), cypress pine (<i>Callitris glaucophylla</i>), mulga (<i>A. aneura</i>), bendee (<i>A. catenulata</i>) lancewood (<i>A. shirleyi</i>) woodlands and open forests.	This species was not detected during fauna surveys but habitat may be suitable within remnant vegetation on the uplifts and escarpments in the north-western parts of the site within areas that have dense ground cover and fallen hollow logs.

Species		Status		Habitat Requirements	Assessment Summary
Common Name	Scientific Name	EPBC Act	NC Act		
star finch	<i>Neochmia ruficauda ruficauda</i>	E	E	Damp grasslands, sedgeland or grassy woodlands (composed of <i>Eucalyptus coolabah</i> , <i>E. tereticornis</i> , <i>E. tessellaris</i> , <i>Melaleuca leucadendra</i> , <i>E. camaldulensis</i> and <i>Casuarina cunninghamii</i>) near permanent water or regularly inundated areas.	Not recorded during field surveys, nor are there records in proximity to the project area. Poplar box/blue gum woodlands associated with the Suttor River may represent potential habitat for this species.
northern quoll	<i>Dasyurus hallucatus</i>	E	–	Forest or woodland with rocky areas and complex vegetation structure in a variety of vegetation types including: eucalypt forest and woodlands, rainforests, sandy lowlands, shrublands and grasslands.	Not recorded in the project area despite active searching for scats and overhangs which may provide shelter for denning purposes. It is still possible that this species may utilise the area although undetected.
koala	<i>Phascolarctos cinereus</i>	V	V, SLC	Eucalyptus dominated temperate, sub-tropical and tropical forest, woodland and semi-arid habitats.	No koala observations were recorded during the fauna survey. Eucalyptus woodland in riparian corridor (RE 11.3.25) may afford habitat however if koala are present within the project area they are expected to be unlikely.
south-eastern long-eared bat	<i>Nyctophilus corbeni</i>	V	V	Inland woodland vegetation dominated by eucalypt and bloodwood species as well as box, ironbark and cypress pine woodlands. Loose bark, fissures and hollows on trees afford roosting habitat.	This species was not recorded during the fauna surveys, however potentially suitable habitat occurs in woodland vegetation dominated by eucalypt and bloodwood species as well as box, ironbark and cypress pine woodlands. Loose bark, fissures and hollows on trees afford roosting habitat.

Species		Status		Habitat Requirements	Assessment Summary
Common Name	Scientific Name	EPBC Act	NC Act		
Unlikely to Occur					
brigalow scaly-foot	<i>Paradelma orientalis</i>	V	V	Open forests and woodland containing remnant vegetation, including: brigalow, cypress, bull oak, spotted gum, vine thickets and <i>Acacia falciformis</i> , with abundant coarse woody debris and dense leaf litter.	Open forests and woodland containing remnant vegetation with abundant coarse woody debris and dense leaf litter in the central and southern parts of the project area afford habitat however, this species reaches its northern distributional limit near Nebo. Numerous surveys conducted over the last decade between Nebo and Collinsville have failed to detect this species further north and, as such, it is considered unlikely to occur in the project area.
stripe-tailed delma	<i>Delma labialis</i>	V	V	Dense leaf litter or other ground cover in low and tall open forests, open woodland (all with grassy understory), wet sclerophyll forest, coastal microphyll /notophyll vine forests/thickets, eucalypt forest and woodland with dense grass trees (<i>Xanthorrhoea</i> sp.) and acacia mid-storey to understory, spinifex, and seasonally dry tea-tree (<i>Melaleuca viridiflora</i>) swamp.	The distribution of this species is not expected to extend past the Clarke Range approximately 100 km west of the project area. If present, it would be expected to be found in areas of remnant vegetation located on the foothills of uplifts in the north-western parts of the project area.
retro slider	<i>Lerista allanae</i>	E	E	Non-cracking black soils on undulating plains formed on basalt, shale, sandstone and unconsolidated sediments.	All known records taken from the Basalt Downs subregion near Clermont (Young <i>et al</i> 1989). Considered unlikely to occur because of its restricted distribution.

7.3.1 Ornamental snake (*Denisonia maculata*) – Known to Occur



Plate 6 Ornamental snake
(photo: Jason Richard)

The ornamental snake is listed as vulnerable under the EPBC Act and the NC Act. It is endemic to Queensland and occurs in the Dawson and Fitzroy River drainage system of central coastal Queensland (Cogger *et al* 1993).

It is found in woodlands and open forests associated with water, particularly gilgais, in Land Zone 4. Vegetation of woodland and open woodland include brigalow (*Acacia harpophylla*), gidgee (*Acacia cambagei*), blackwood (*Acacia argyrodendron*) or coolibah (*Eucalyptus coolabah*)-dominated vegetation communities, or pure grassland associated with gilgais (Brigalow Belt Reptiles Workshop 2010).

During the day the species shelters under fallen timber, coarse woody debris, rocks, bark and in deep soil cracks on gilgai mounds, particularly during dry periods. At night, the species forages near water, almost exclusively on frogs. The

ornamental snake gives birth to live young with an average litter size of seven offspring.

A DEHP mapped essential habitat area for the snake occurs on the western boundary of the project area in proximity to the Suttor River. This species was not found in proximity to this essential habitat area, but was observed approximately 5 km to the south within an area mapped as RE 11.3.4 located within floodplains of the Suttor River (H17). Dominated by Queensland blue gum and river red gum, this site is considered to form part of a faunal corridor that exists along the Suttor River and associated low flow terrace. Given both the essential habitat area (based on the prior recordings) and 2012 record of this species are located within this riparian corridor it is considered likely to represent important habitat for this species.

The area in which this species was recorded contained preferred micro-habitat features for this species including a high density of fallen timber and debris, associated with regular flooding events and historical tree felling. The species was recorded under a log that was overturned during active searches. The ornamental snake was also recorded during the 2009 surveys within a brigalow community (RE 11.4.9) located in the south of the project area (CQU 2009) (**Figure 7.1**).

7.3.2 Squatter pigeon (*Geophaps scripta scripta*) – Known to Occur

The squatter pigeon is listed as vulnerable under both the EPBC Act and the NC Act and was observed during surveys in 2009, 2010 and 2012.

This species is patchily distributed through Queensland and is commonly observed in more open areas of dry eucalypt woodland on sandy soil dissected by low gravelly ridges, and close to permanent water (QPWS 1999a). The diet of this species consists of fallen grass seeds, herbs and shrubs.

The squatter pigeon breeds from March to September (in the tropics) in a scape in the ground lined with dry grass. It is often seen in pairs or in small family groups. Movement is restricted as this species is ground dwelling and flies to nearby trees only when flushed or for courtship.

This species was incidentally recorded in the southern section of the project area in poplar box grassy woodlands in 2009 and at Site T8 in 2010 in grassy eucalypt and acacia woodland (**Figure 7.1**). In 2010, four individuals were recorded at Site T2 and were observed both on the ground and resting on logs. In 2012, the species was observed watering at a small farm dam occurring on sandy plains (H19). This species would be expected to utilise a wide range of habitat types and would be expected to have a common presence in the project area.



**Plate 7 Squatter pigeon
(photo: BG Thompson)**

7.3.3 Square-tailed kite (*Lophoictinia isura*) – Known to Occur

This species is listed as near threatened under the NC Act. Despite this species being recorded within inland Australia it is more commonly known to occur in coastal and sub-coastal Eastern Australia and south western Western Australia (Merchant and Higgins 1993).

The square-tailed kite routinely hunts in the morning and afternoons or evenings. It feeds on passerines, especially honeyeaters, and insects in the tree canopy (Marchant and Higgins 1993). It is most commonly observed foraging on the boundary of remnant and cleared areas.

The breeding season occurs July to February with nests generally located along or near watercourses in the fork or on a large, horizontal limb of *eucalypt* spp. (Cameron 1992; Jolly 1989).

This species was observed in the project area during the 2012 fauna surveys. The species was foraging over immature eucalypt regrowth to the south west of the project area (**Figure 7.1**).

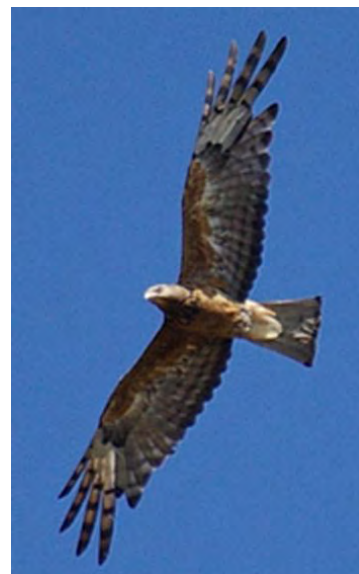


Plate 8 Square-tailed kite
(photo: Geoff Park)

7.3.4 Cotton pygmy-goose (*Nettapus coromandelianus*) – Known to Occur

The cotton pygmy-goose is listed as near threatened under the NC Act. It is a tiny duck with a small, dark, goose-like bill. This species is a rare vagrant in the southern part of its range on the north coast of New South Wales, however is relatively common in suitable aquatic habitats in north eastern Queensland (Marchant and Higgins 1990, Blakers *et al* 1984).

This species is almost entirely aquatic, preferring deep freshwater lagoons, swamps and dams, particularly those with waterlilies or other floating vegetation (NPWS 1999). The cotton pygmy-goose requires dead trees with hollows near water for nesting and roosting sites (NPWS 1999). The species feeds on seeds, inflorescences and other parts of aquatic vegetation. Seasonal changes in abundance have been observed, where birds gather on water that remains in the winter season.

This species was observed during the dry season 2009 survey utilising a dam in the southern section of the project area (**Figure 7.1**). Farm dams located within the project area, in particular the large dam located in the south west of the project area (H2) are considered to provide potential habitat for this species. Should this species utilise habitat within the project area, it would be expected to be an occasional vagrant.

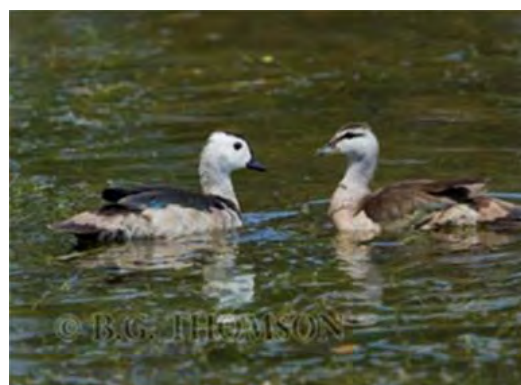


Plate 9 Cotton pygmy-goose
(photo: BG Thompson)

7.3.5 Black-necked stork (*Ephippiorhynchus asiaticus*) – Known to Occur



Plate 10 Black-necked stork
(photo: Cheng Hiang Lee)

The black-necked stork is listed as near threatened under the NC Act and was observed during the 2010 Unidel survey (**Figure 7.1**).

This species is mainly restricted to coastal and near coastal areas of northern and eastern Australia. It inhabits wetlands, such as floodplains of rivers with large shallow swamps and pools and deeper permanent bodies of water. Individuals may occasionally use nearby grasslands, woodlands or flooded paddocks to search for food. This species feeds on fish, small crustaceans and amphibians (Pringle 1985).

They breed from March to May and nest using a large platform of sticks and other vegetation built in a small tree in or near water. Male and female pairs bond for several years. Outside the breeding seasons small family groups may be partially nomadic or may stay in the one location (Pringle 1985).

Lacustrine and palustrine wetlands within the project area could provide potential habitat for this species. This species would be expected to forage in more permanent larger wetlands within the project area, such as the large wetland located in the south west of the project area (H2).

7.3.6 Little pied bat (*Chalinolobus picatus*) – Known to Occur



Plate 11 Little pied bat
(photo: BG Thompson)

This species is listed as near threatened under the NC Act and has a wide distribution in south inland Queensland. They occur in open eucalypt forest and woodland and roost in small colonies in abandoned mines, farm houses, caves, rocky outcrops and hollowed trees near water. Generally, large eucalypts and stags containing hollows provide important roosting habitat for this species. It is therefore expected the greater the number of suitable hollow bearing trees onsite the greater potential that this species is present.

Little pied bats have also been caught flying over farm dams and watercourses in relatively flat and featureless country. Although little is known of their movement, closely related species are known to fly 5 km from their roosting sites to feed. Their diet consists of insects and they breed in October.

During the 2009 fauna survey ANABAT recordings positively identified this species at five habitat sites (T1–T5) (**Figure 7.1**) in the southern section of the project area. This species was not observed, caught or recorded during the subsequent two fauna

surveys undertaken and as a result this species presence in the project area is considered to be rare. The habitat assessment recorded the most suitable hollow bearing trees within eucalypt forests along alluvial corridors and therefore this is considered preferred roosting habitat for this species within the project area.

7.3.7 Black-throated finch (*Poephila cincta*) (subspecies unknown) – Likely to Occur



Plate 12 Black-throated finch (southern subspecies) (photo: Chris Williamson)

The black-throated finch has two subspecies. *Poephila cincta cincta*, the southern subspecies, has a white rump, is found south of Townsville and is listed as endangered under the EPBC and NC Act. The northern subspecies, *Poephila cincta atropygialis*, has a black rump and is found north of Cairns with its range extending south (Zann 1976). The latter of these species is not listed under the EPBC or NC Act.

This southern subspecies is largely constricted to the northern part of its former distribution, which extended from north-east NSW to Queensland's Atherton Tablelands and west to central Queensland. It inhabits grassy open woodlands and forest typically dominated by eucalyptus, acacia and melaleuca species often along or near watercourses or in the vicinity of water (BTF Recovery Team 2007). Almost all known records of this species south of the tropics are within riparian habitats (BTF Recovery Team 2007). According to the National recovery plan for the Black-throated finch southern subspecies (*Poephila cincta cincta*) (BTF Recovery Team 2007) REs in which this species has been recorded within the Brigalow Belt North Bioregion include REs 11.3.12, 11.3.25b, 11.3.27, 11.3.30, 11.3.35 and 11.11.19.

The black-throated finch feeds on fallen grass seed and requires daily water. It can breed all year, however breeding activity peaks in February and May. They nest in loose colonies in trees and shrubs (DEWHA 2009b). The movement patterns on this species are poorly understood, however a study of foraging ecology (Mitchell 1996) suggested that the finch may undertake some movements in response to rainfall or drought prompted by food availability. It is also suggested that outside of breeding periods there may be some local movement away from nesting areas in search of food resources (Mitchell 1997).

This species was targeted during the survey with repeat visits to dams and wetlands with the goal of recording this species coming in to water. Two individual birds suspected to be the black-throated finch were observed in proximity to the large wetland in the south-west of the project area. The birds were not viewed through binoculars and were sighted for a short period of time. The black-throated finch (southern) may be confused with the chestnut-breasted mannikin (*Lonchura castaneothorax*) in particular, which is common along the north east coast of Australia and from which it cannot be distinguished without close examination. As such, the presence of this species has not been confirmed. For the purpose of this assessment,

a precautionary approach has been adopted and it is assumed that the species observed is the threatened southern sub-species.

Given this species preference to riparian habitats it is considered that it may travel along the Suttor River riparian corridor which located approximately 2 km to the south west of where this species was observed. It is considered that this species would be a rare vagrant to the project area and may have dispersed into this area following a number of good seasons.

7.3.8 Common death adder (*Acanthophis antarcticus*) – Likely to Occur

The common death adder is listed as near threatened under the NC Act and is distributed from the Gulf region of the Northern Territory across to central and eastern Queensland and New South Wales (Cogger 2000).



Plate 13 Common death adder
(photo BG Thompson)

This species occurs in a wide range of habitats including rainforest, wet sclerophyll forests, woodlands, shrublands, grasslands and coastal heathlands (QPWS 2001). This species is generally associated with areas of dense leaf litter that allow this species to hide and ambush prey.

Common death adders are generally sedentary but may be encountered as they move between shelter sites in search of mates on warm evenings. This species breeds in February or March and can give birth from 2–32 live young.

This species is very difficult to detect but is considered likely to occur in vine thicket and denser scrubs with good leaf litter in the central part of the project area and in upland areas with similar microhabitat. The species is expected to have a rare presence within the project area.

7.3.9 Australian painted snipe (*Rostratula australis*) – Likely to Occur

The Australian painted snipe is listed as vulnerable under the EPBC Act and the NC Act. It is also listed as a migratory species under the EPBC Act. This species has a scattered distribution throughout Queensland and south-eastern Australia but has also been recorded less frequently in Tasmania, South Australia, the Northern Territory and Western Australia.

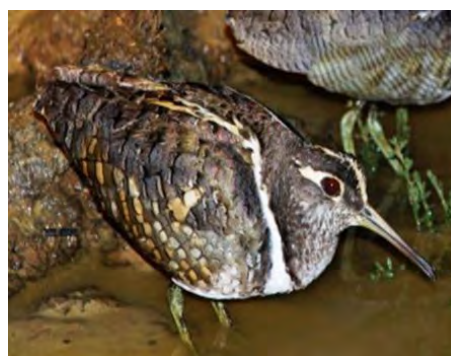


Plate 14 Australian painted snipe
(photo J. Richard)

This species inhabits inland and coastal shallow freshwater ephemeral and permanent wetlands. It has also been recorded using artificial habitats such as dams, sewage ponds and waterlogged grasslands. It forages nocturnally on mud flats and

in shallow water (DSEWPac 2003).

The painted snipe nests on the ground among tall vegetation, in a scrape in the ground lined with grass and leaves. It breeds September to December. Some individuals are apparently resident while others appear to be nomadic, temporarily occupying areas where suitable habitat exists (DSEWPac 2003).

This species was not observed during the field surveys, however has been previously recorded within 100 km. The species is unlikely to be resident in the project area however, it is likely to occur as a rare vagrant. Potential habitat for this species within the project area includes the large dam located to the south-west and the ephemeral gilgai wetlands which occur in the south.

7.3.10 Koala (*Phascolarctos cinereus*) – May Occur

The combined Queensland, New South Wales and Australian Capital Territory koala populations are listed as vulnerable under the EPBC Act. Under the NC Act, the koala is listed as special least concern and vulnerable in the South East Queensland Bioregion only.

The distribution of the koala extends from north-east Queensland to the Eyre Peninsula, South Australia with a continuous distribution across a range extending over approximately one million square kilometres (Martin and Handasyde 1999). Koala populations are often separated by cleared land or unsuitable habitat (Martin and Handasyde 1999; NSW DECC 2008). Female koalas can produce up to one offspring each year, occurring between October and May but averages tend to be from 0.3–0.8 per year (McLean 2003).

Koalas inhabit a range of temperate, sub-tropical and tropical forest, woodland and semi-arid communities dominated by species from the genus eucalyptus (Martin and Handasyde 1999) the primary food source for this species. The distribution of the koala is influenced by altitude (limited to <800 m ASL), temperature and, in the drier areas of their range, leaf moisture (Munks *et al* 1996). A study in north-western Queensland found the Koala to inhabit creek lines and that leaf moisture was probably a critical determinant of their occurrence (Munks *et al* 1996).

Given the lack of known records, the koala may occur within the project area. Should this species be present it would be expected to occur in the alluvial corridor to the south-west of the project area which contains primary food trees and where leaf moisture would be expected to be higher.

7.3.11 Red goshawk (*Erythrotriorchis radiatus*) – May Occur

The red goshawk is listed as vulnerable under the EPBC Act and endangered under the NC Act. It has a wide but sparse distribution across coastal and sub-coastal regions of Australia, from the Kimberley region in northern Western Australia across to east Queensland and down the east coast to Sydney (QPWS 1999b).

This species inhabits coastal and sub-coastal tall open forest, tropical savannahs crossed by wooded or forested watercourses, woodlands, edges of rainforest, gallery forest along watercourses and wetlands.

The red goshawk is a sedentary species but their home range has been estimated at up to 22 000 ha. They build nests in the crowns of tall living trees, often in proximity to permanent water and breed from August to November and the nests may be used in successive years.

This species was not recorded in project area during the field surveys. The closest records for this species are from near Mackay and Clermont however, this may reflect a lack of detailed surveys in the Northern Bowen Basin rather than an absence of this species in the region. Preferred habitat for this species is considered to be the forested woodlands located in proximity to the Suttor River in the south-west of project area. This species is considered a possible occurrence over time.

7.3.12 Star finch (*Neochmia ruficauda ruficauda*) – May Occur



Plate 15 Star finch
(photo: BG Thompson)

The star finch is listed as endangered under the EPBC Act and the NC Act and occurs in central Queensland. Its distribution is probably severely fragmented (Garnett and Crowley 2000) and its population is extremely limited with an estimated 50 individuals remaining.

It inhabits damp grasslands, sedgelands or grassy woodlands near permanent water or regularly inundated areas. Studies of sites where this species was previously observed found these areas to be generally woodlands that were dominated by tree species that are associated with permanent water or regular inundation. These tree species include *Eucalyptus coolabah*, *E. tereticornis*, *E. tessellaris*, *Melaleuca leucadendra*, *E. camaldulensis* and *Casuarina cunninghamii* (Holmes 1996).

This species is sedentary and feeds primarily on seeds but also on insects and other invertebrates. Some local dispersal may occur (Garnett and Crowley 2000).

This species has been recorded nesting in November (Holmes 1996) in bottle-shaped nests built 3–9 m high in trees. Little else is known of this species, however from a species level, they have been recorded to breed all year round, although eggs have only been recorded February to May and in September (Higgins *et al* 2006).

This species was not observed during field studies nor has it been recorded in proximity to the project area. Notwithstanding, it is considered that the poplar box/blue gum woodlands which were occur on the alluvial plains of the Suttor River (south-west of the project area) may represent potential habitat for this species.

7.3.13 Northern quoll (*Dasyurus hallucatus*) – May Occur



Plate 16 Northern quoll
(photo: BG Thompson)

The northern quoll is listed as endangered under the EPBC Act and is found in Queensland from the south-east of the Queensland to the Gulf of Carpentaria.

The northern quoll occupies a variety of habitats across its current range including rocky areas, eucalypt forest and woodlands, rainforests, sandy lowlands and beaches, shrublands, grasslands and deserts. Habitat usually

requires some form of rocky area or structurally diverse woodland or forest for denning/shelter purposes with surrounding vegetated habitats used for foraging and dispersal. This denning/shelter habitat is important for the species for the purposes of breeding, refuge from fire and/or predation and long term viability of the species (DSEWPac 2011c).

Mating is highly synchronised, occurring late May–early June. This species is sedentary with a moderately large home range. The female range averages approximately 35 ha and males cover in excess of 100 ha during the breeding season (DSEWPac 2011c).

This species was targeted during the field surveys by active searching for scats and overhangs which may provide shelter for denning purposes. Surveys undertaken within the lateritic uplifts habitat to the north-west of the project area found few caves present. Cave habitats that were observed were generally considered to be relatively recent geological formations, thus were small and underdeveloped and were not considered suitable denning habitat for the northern quoll.

Despite the fauna survey targeting this species it was not observed during the field surveys. Notwithstanding, it is considered possible that this species may utilise habitat within the project area.

7.3.14 South-eastern long-eared bat (*Nyctophilus corbeni*) – May Occur

This species is listed as vulnerable under the EPBC Act and the NC Act. It is restricted largely to the Murray Darling Basin in south-eastern Australia where it is patchily distributed and rarely recorded (Turbill and Ellis 2006). The majority of records are from the Brigalow Belt South Bioregion, with the most easterly record from the Bunya Mountains National Park, the most northerly records occurring in the

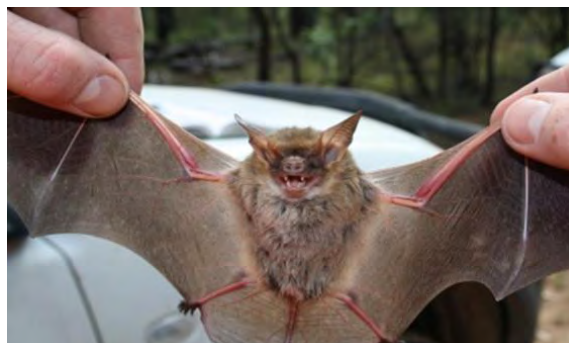


Plate 17 South-eastern long-eared bat
(photo: Mitchell Taylor)

Expedition Range and Dawson River areas and the most westerly records west of Bollon in the Mulga lands Bioregion (Schulz and Lumsden 2010).

This species inhabits a range of inland woodland vegetation types but shows a preference for areas surrounded by a large amount of woody vegetation (within 10 km), warmer areas within the region over winter and highly drained, lower fertility soils (Pennay 2002).

Roosts have been found in dead spouts on mallee eucalypts, with some under bark or in fissures of dead buloke (*Allocasuarina luehmannii*) or belah (*Casuarina cristata*). Individuals tended to use multiple roosts. Pregnant and lactating females have been trapped in November in central-western New South Wales and Queensland (Schulz and Lumsden 2010). Known populations of this species are concentrated in the southern part of its range (Schulz and Lumsden 2010), with the project area located at the northern extent, however this species may use the project area for foraging and roosting.

7.3.15 Yakka skink (*Egernia rugosa*) – May Occur

This species is listed as vulnerable under both the EPBC Act and the NC Act. It is found in isolated populations throughout subhumid to semi-arid areas in the interior of Queensland, from St George in the south to Coen and Cape York Peninsula in the north (Richardson 2006).

The yakka skink occurs in a wide variety of vegetation types including poplar box (*Eucalyptus populnea*), ironbark, brigalow (*Acacia harpophylla*), cypress pine (*Callitris glaucophylla*), mulga (*A. aneura*), bendee (*A. catenulata*) lancewood (*A. shirleyi*) woodlands and open forests. They favour dense ground vegetation, fallen timber or rock, large hollow log, stick-raked piles (DSEWPAC 2011b).

Potential habitat for this species could include areas with dense ground cover and fallen hollow logs. Given the absence of these habitat features within the southern portions of the project area it is considered that the remnant vegetation on the uplifts and escarpments of the north-west portion of the project area could represent potential habitat for this species. Given the lack of known records in the vicinity, it is considered that this species may occur in the project area.

7.3.16 Mount Cooper striped lerista (*Lerista vittata*) – May Occur

The Mount Cooper striped lerista is listed as endangered under both the EPBC Act and the NC Act. The known distribution of this species is severely fragmented and populations have been identified approximately 80 km south-east of Charters Towers, 100 km to 200 km north-west of Hughenden (Chudleigh Plateau) and Mount Cooper (although population from the Chudleigh Plateau appear to be different and further research is required). No information is available on the breeding of this species. This species is likely to be nocturnal (TSSC 2008).

This species has been recorded in a variety of habitats including ironbark (*Eucalyptus crebra* and *E. melanophloia*) and bloodwood (*Corymbia clarksoniana* and *C. intermedia*) dominated woodland with shrub and/or grassy ground layers on deep red earths, undulating plains and steep hills on granitic rocks, SEVT which extends onto areas of ironstone (duricrust) and spinifex communities. REs 11.5.9 and 11.5.15 are considered important habitat to this species.

According to the revised RE mapping approximately 484 ha of RE 11.5.9 occurs within the project area. Furthermore, the areas of SEVT within the project area were generally found to be in previously cleared and in poor condition and therefore would be unlikely to represent good habitat for this species. It is considered that this species may occur within the project area.

7.3.17 Brigalow scaly-foot (*Paradelma orientalis*) – Unlikely to Occur

The brigalow scaly-foot is listed as vulnerable under both the EPBC Act and the NC Act. It occurs in the central Brigalow Belt of Queensland (Cogger 2000). More recently, the distribution has been extended to the west (to the Chesterton Range near Charleville), to the south (Eena State Forest near Inglewood) and to the north (Ulcanbah Station and Bacchus Downs Station (Kutt et al 2003).

Although the project site occurs within the modelled distribution of the brigalow scaly-foot (DSEWPac 2011), this species reaches its northern distributional limit at Nebo, in Dipperru National Park. Numerous field surveys for coal mining projects between Nebo and Collinsville over the past 10 years have failed to detect the species, including surveys at Hail Creek Mine, Burton Mine, Suttor Creek, Eastern Creek, Newlands, Rosalla Creek, Lenton and Collinsville Mines.

This species was targeted during the fauna species however this species was not recorded and is considered an unlikely occurrence.

7.3.18 Stripe-tailed delma (*Delma labialis*) – Unlikely to Occur

The striped-tailed delma is listed as vulnerable under the EPBC Act and the NC Act. It is distributed from Townsville to Keswick Island, off Mackay, Queensland (Cogger 2000). A large proportion of the species' range occurs within the brigalow belt.

This species inhabits low open coastal forest with grassy understorey as well as dry, very open rocky hill slopes, seasonally dry paperbark tea-tree (*Melaleuca viridiflora*) swamp, and in wet sclerophyll forest (Shea 1987). The species is diurnal and shelters under leaf litter, logs and sheets of iron.

Given that known recordings of this species are generally restricted coastal areas and preferred habitat features, it is not expected that this species distribution extends past the Clarke Range located approximately 100 km east of the project area. Should this species occur it would be expected to be found in low land remnant vegetation located on the foothills of the uplifts that occur in the north-west of the project area. It is considered unlikely that this species may occur within the project area.

7.3.19 Retro slider (*Lerista allanae*) - Unlikely to Occur

The retro slider is a burrowing skink listed as endangered under both the EPBC Act and NC Act. Few records of this species exist, thus little is known about its life cycle, reproductive behaviour, movement, diet or feedings habits (Cogger *et al* 1993).

This species has a restricted distribution with all known records taken from the Basalt Downs subregion of the Brigalow Belt Bioregion in proximity to Clermont (Young *et al* 1990). The species is associated with non-cracking black soils on undulating plains formed on basalt, shale, sandstone and unconsolidated sediments). Recent studies recorded the species within leaf litter and friable soils between trees and shrubs. These records were taken on brown to dark brown, non-cracking clay based soils (30–60% clay content) in RE 11.8.5 and RE11.8.11/11.8.5 or in areas where this RE did occur but now are clear from vegetation.

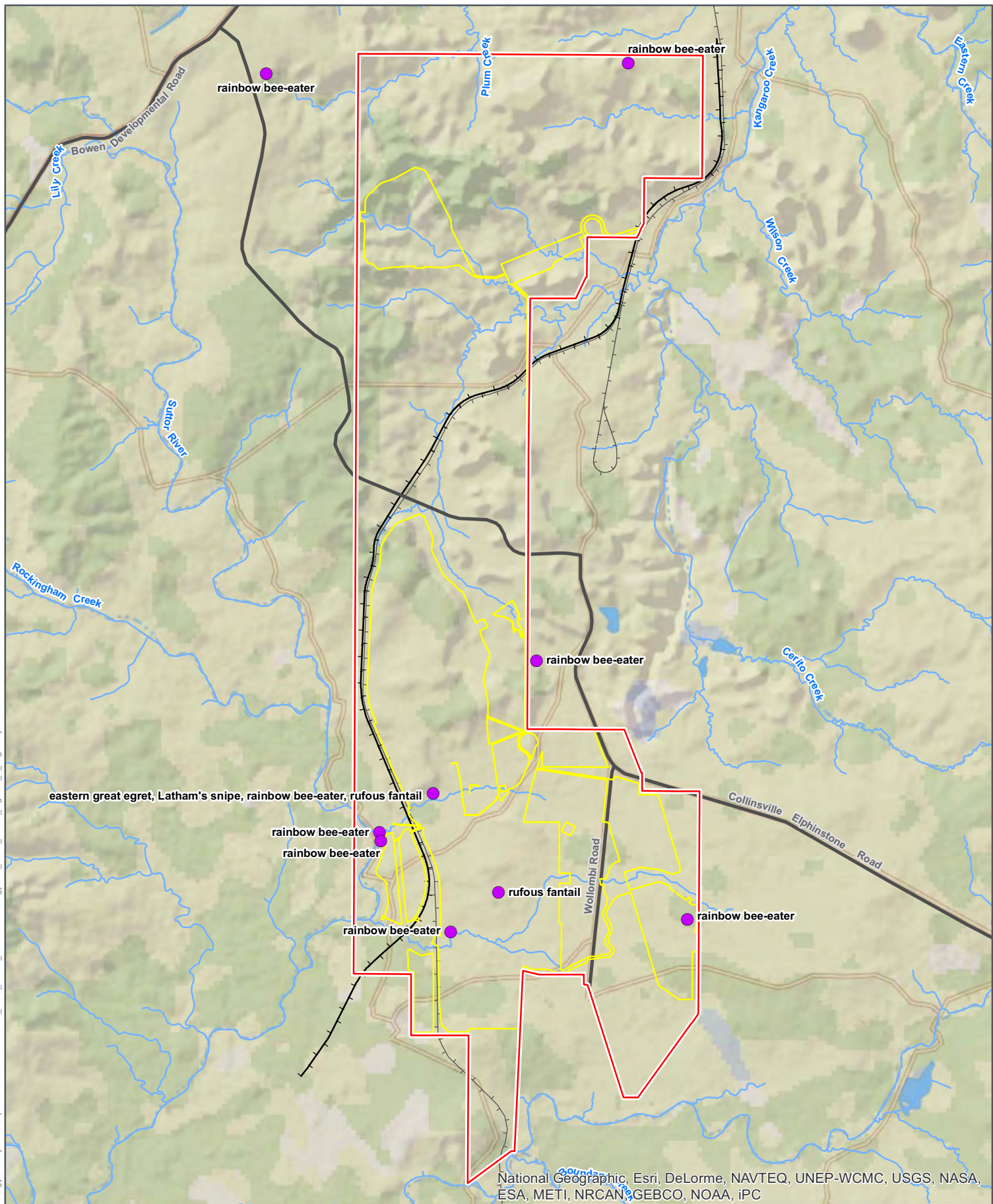
Given its restricted distribution the presence of this species within the project area is considered unlikely.

7.4 MIGRATORY FAUNA SPECIES

Five migratory fauna species listed under the EPBC Act were recorded from the project area during fauna surveys. A further five species are likely to occur in the project area. A number of migratory species were recorded using farm dams and wetland areas in the project area, which are considered to provide the most suitable habitat. After periods of significant rain the areas of gilgai which occur in the black clay soils to the south of the project area would retain water. This was the situation during the 2012 survey which was conducted during the wet season. These areas would expect to provide temporary wetland habitats for migratory species, in particular species such as the Latham's snipe (*Gallinago hardwickii*) and the Australian painted snipe (*Rostratula australis*).

These species and their likelihood of occurrence within the project area are summarised in **Table 7.3**. Overall the habitat values for migratory species are limited and of low value.

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National Geographic, Esri, DeLorme, NAVTEQ, UNEP-WCMC, USGS, NASA, ESA, METI, NRCAN, GEBCO, NOAA, IPC

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Figure 7.2 - Migratory Fauna

Main Road		Significant Fauna	
Proposed Alpha Coal Project Rail Line		Migratory Fauna	
GAP Railway			
Stream Order (2 and above)			
Project Area			
Project Footprint			

DATE	AUTHOR	APPROVED	REVISION NOTE	REV.
04/10/2012	AB	JC	Issued for Review	A
14/11/2012	SN	JC	Issued for Review	B
04/11/2012	SH	JC	Issued for Review	C
08/03/2013	SG	JC	Issued for Use	0



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QC Check List: Completed

Table 7.3 Likelihood of Migratory Fauna Species Occurring within the Project area

Species		Status		Habitat Requirements	Assessment Summary
Common Name	Scientific Name	EPBC Act	NC Act		
Known to Occur					
eastern great egret	<i>Ardea modesta</i>	M	-	Freshwater wetlands and intertidal mudflats.	Recorded utilising farm dams within the project area. No suitable nest sites were observed in the project area.
white-bellied sea-eagle	<i>Haliaeetus leucogaster</i>	M	-	Permanent waterbodies including: estuaries, dams and wetlands.	Recorded at a small farm dam adjacent to Kangaroo Creek to the north east of the project area. Could nest in proximity to the Suttor River
Latham's snipe	<i>Gallinago hardwickii</i>	M	-	Open, freshwater wetlands with low, dense vegetation including: swamps, flooded grasslands or heathlands and bogs.	Recorded at large dam (H2) located to the south west of the project area. Inhabits open, freshwater wetlands with low, dense vegetation. Suitable habitat present in association with Palustrine wetland (S3). Foraging habitat rather than breeding habitat as species does not breed in Australia.
rainbow bee-eater	<i>Merops ornatus</i>	M	-	Ubiquitous, potentially foraging over any habitat type. Nests in soft, loamy soil or flat ground of a bank.	This species was detected numerous times during the fauna surveys. Stream banks in the project area may provide burrow sites for this species.
rufous fantail	<i>Rhipidura rufifrons</i>	M	-	The undergrowth of woodlands, forests, coastal and sub-coastal scrub including semi evergreen vine thicket, riparian areas and mangroves.	This species was recorded at H2 and H12 in the project area and is associated with the undergrowth of woodlands, forests and riparian areas. There are no breeding records in proximity to the project area and no suitable nest sites were observed at the time of the fauna survey.

Species		Status		Habitat Requirements	Assessment Summary
Common Name	Scientific Name	EPBC Act	NC Act		
Likely to Occur					
cattle egret	<i>Ardea ibis</i>	M	-	Grassy, open pastures and shallow, open wetlands.	Riparian areas of the project area. Suitable habitat present in association with Palustrine wetland (S3).
fork-tailed swift	<i>Apus pacificus</i>	M	-	High to low airspace over varied habitat (rainforest to semi-desert).	This species forages aerially over a range of habitat types and is considered likely to occur in the project area.
white-throated needletail	<i>Hirundapus caudacutus</i>	M	-	Ubiquitous, potentially foraging over any habitat type.	This species forages aerially over a range of habitat types and is considered likely to occur in the project area.
Australian painted snipe	<i>Rostratula australis</i>	V, M	V	The Australian painted snipe inhabits shallows and margins of freshwater wetlands, dams, marshy areas and wet pastures.	Cryptic species with irregular occurrence. The large dam (H2) within the south-west of the project area and the ephemeral gilgai wetlands afford habitat for this species. Suitable habitat present in association with Palustrine wetland (S3).
satin flycatcher	<i>Myiagra cyanoleuca</i>	M	—	Inhabits heavily vegetated gullies in eucalypt dominated forests and taller woodlands, often near wetlands and watercourses.	This species was recorded at locations outside the project area and is considered likely to occur in riparian environs along the Suttor River.
May Occur					
glossy ibis	<i>Plegadis falcinellus</i>	M	-	Well vegetated freshwater wetlands, wet pastures, flood plains saline areas.	Grassy, open pastures and shallow, open wetlands in riparian areas of the project area. Suitable habitat present in association with Palustrine wetland (S3).
Unlikely to Occur					
barn swallow	<i>Hirundo rustica</i>	M	-	Prefers disturbed open agricultural areas and open urban areas for forage and roost.	Prefers disturbed open agricultural areas and open urban areas for forage and roost. Most recordings originate from coastal areas.

Note *: V = Vulnerable, NT= Near Threatened, M = Migratory.

7.5 FAUNA OF BIOREGIONAL SIGNIFICANCE

Fauna species of bioregional significance include species of regional endemism, with isolated distributions, reaching limits of geographical range, or special scientific, cultural and commercial interest. Species listed as a priority in the Back on Track Actions for Biodiversity (DEHP 2010) are also considered to be of bioregional significance.

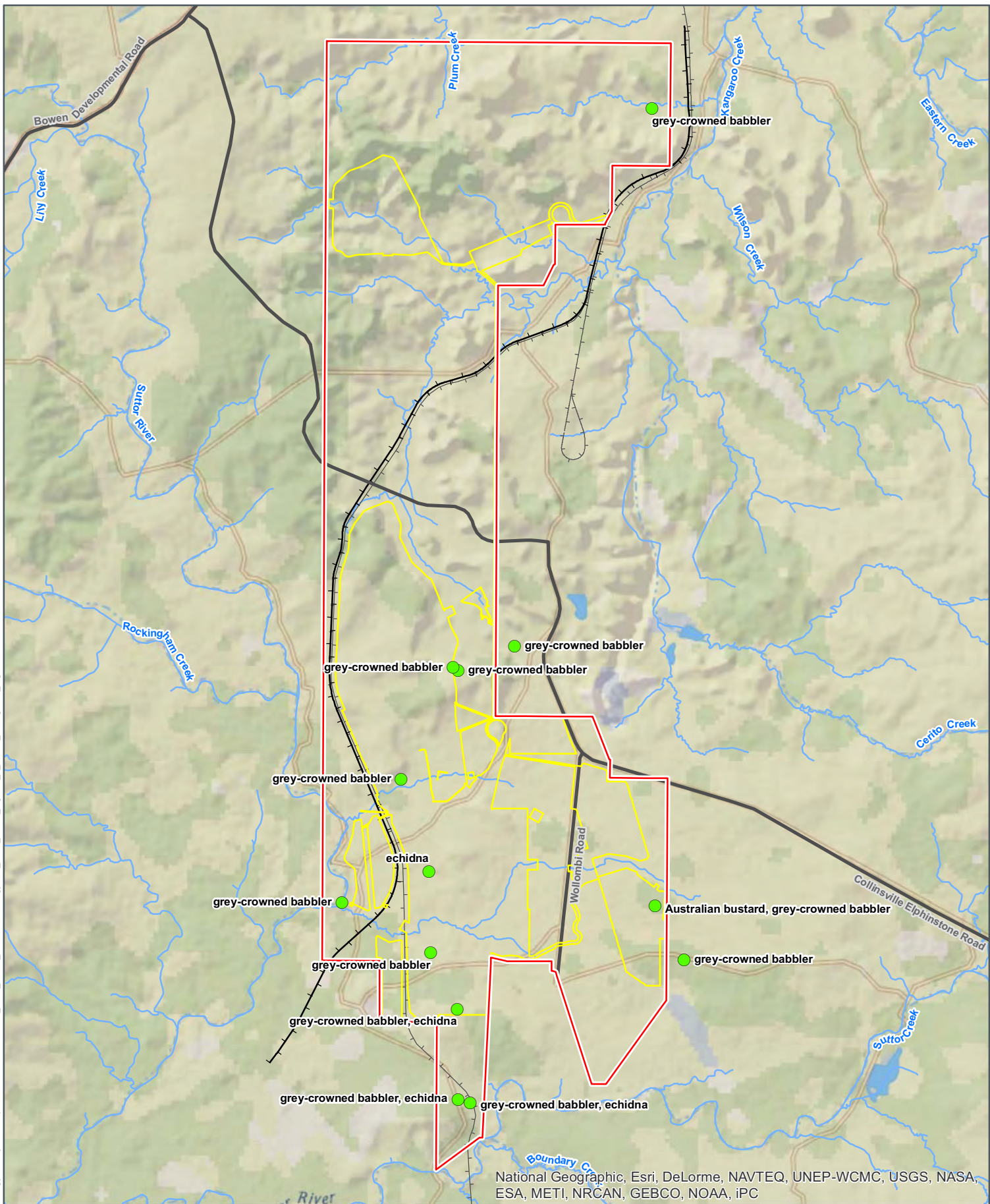
Habitat within the project area was found to support several species of bioregional significance. All of the fauna surveys recorded the grey-crowned babbler (eastern) (*Pomatostomus temporalis temporalis*) and the Australian bustard (*Ardeotis australis*) within the project area. Both species are considered to potentially utilise and were observed within a wide range of habitat types that occur within the project area. Despite neither of these species being listed under Commonwealth and State legislation, these species are considered to be near threatened in accordance with the IUCN 1994 guidelines (Garnett and Cowley 2000).

7.6 FAUNA OF CULTURAL SIGNIFICANCE

Fauna of cultural significance are those species that have an Indigenous, historic, aesthetic or social value. Species of high cultural significance include the short-beaked echidna (*Tachyglossus aculeatus*), platypus (*Ornithorhynchus anatinus*) and koala (*Phascolarctos cinereus*). **Table 7.4** summarises the likelihood of bioregional or culturally significant species occurrence in the project area.

The short-beaked echidna is recorded in all of the fauna surveys. During the 2009 survey, this species was found to be common in four of the six trapping sites (located in different habitat types) suggesting that it utilises a diverse range of habitats across the project area. Koala (*Phascolarctos cinereus*) may be present in remnant vegetation throughout the study area and may inhabit well connected riparian areas within the project area, in particularly those associated with the Suttor River).

Given the ephemeral nature and substrate of the Suttor River, it is considered unlikely that the platypus (*Ornithorhynchus anatinus*) utilises habitat within the river. This river is similar to the Burdekin River (located to the north), where studies have concluded that the platypus is unlikely in low lying arid regions (Kolomyjec 2010). Notwithstanding, it does remain possible that this species may be seeking refuge in the large permanent dams located onsite. This, however, is considered highly unlikely given the presence of cattle and associated impacts on adjacent vegetation quality, bank stability and water quality.



National Geographic, Esri, DeLorme, NAVTEQ, UNEP-WCMC, USGS, NASA, ESA, METI, NRCAN, GEBCO, NOAA, IPC

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**Figure 7.3 -
Bioregionally/Culturally
Significant Fauna**

WORK REQUEST NUMBER: WR_2012_00295

DATA SOURCES:

Physical Road Network © State of Queensland 2010
Remnant Watercourses © State of Queensland 2011

- Main Road
 - Proposed Alpha Coal Project Rail Line
 - GAP Railway
 - Stream Order (2 and above)
 - Project Area
 - Project Footprint
- Significant Fauna**
- Bioregional/Culturally Significant Fauna

DATE	AUTHOR	APPROVED	REVISION NOTE	REV.
04/10/2012	AB	JC	Issued for Review	A
14/11/2012	SN	JC	Issued for Review	B
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Table 7.4 Likelihood of Bioregional or Culturally Significant Species Occurrence in the Project area

Species		Status*		Habitat Requirements	Assessment Summary
Common Name	Scientific Name	EPBC Act	NC Act		
Known to Occur					
grey-crowned babbler	<i>Pomatostomus temporalis temporalis</i>	-	-	Open forests, woodlands and road verges with grassy ground cover.	All fauna surveys detected this species within a range of habitat types.
Australian bustard	<i>Ardeotis australis</i>	-	-	Australian bustards are found in tussock grassland, grassy woodland, and low shrublands.	All fauna surveys detected this species within a range of habitat types.
short-beaked echidna	<i>Tachyglossus aculeatus</i>	-	SLC	The echidna has a wide range or diverse habitats across Australia. Refuge microhabitat includes shrubs, hollow logs, rocky areas or old burrows. Except for nursery burrows, they have no fixed nest or shelter sites.	Echidnas were detected in all three fauna surveys in numerous locations around the project area.
May Occur					
koala	<i>Phascolarctos cinereus</i>	V	V, SLC	Eucalyptus dominated temperate, sub-tropical and tropical forest, woodland and semi-arid habitats.	No koala observations were recorded during the fauna survey. Eucalyptus woodland in riparian corridor (RE 11.3.25) may afford habitat however if koala are present within the project area they are expected to be rare.
Unlikely to Occur					
platypus	<i>Ornithorhynchus anatinus</i>	-	SLC	Permanent, freshwater streams, lakes or rivers, including artificial dams.	No suitable habitat. No records in the project area.

Note *: V = Vulnerable; SLC = Special Least Concern.

7.7 INTRODUCED FAUNA

Six introduced pest fauna species were recorded during the field surveys and it is likely that an additional three pests occur with the project area. Of these, four Class 2 pests and two non-declared pests were observed. These species are detailed in **Table 7.5**.

Table 7.5 Pest Fauna Species Observed During the Field Surveys or Likely to Occur within the Project area

Scientific Name	Common Name	Declaration*	Likelihood
<i>Canis lupus dingo</i>	dingo	Class 2	Present
<i>Canis lupus familiaris</i>	feral dog	Class 2	Present
<i>Capra hircus</i>	goat	Class 2	Likely
<i>Felis catus</i>	feral cat	Class 2	Present
<i>Hemidactylus frenatus</i>	house gecko	Class 1	Likely
<i>Mus musculus</i>	house mouse	Non-declared	Present
<i>Oryctolagus cuniculus</i>	rabbit	Class 2	Likely
<i>Bufo marinus</i>	cane toad	Non-declared	Present
<i>Sus scrofa</i>	feral pig	Class 2	Present

Note *: Declaration under the LP Act as Class1, Class2, or Class 3.

Feral pest species such as the feral dog, cat, goat, pig and rabbit would be expected to occur throughout the project area and were observed in all habitat types throughout the project area.

A significant amount of cane toads (*Bufo marinus*) were observed within the gilgai habitats located on the black soil plains located in the south and south east of the project area. Cane toads were also observed in large numbers in the sandstone uplift and escarpments to the north-west of the study. This finding is of importance given that this area is also potential habitat for the northern quoll (*Dasyurus hallucatus*) which feed on the cane toad. Ingestion of a cane toad results in the death of a northern quoll and as a result the cane toad is recognised as a key threatening process for this species.

8. POTENTIAL IMPACTS AND IMPACT MITIGATION

The project comprises a number of components and operational activities, including open cut pits and associated infrastructure as described in **Section 2.2** of this report. Each of these components and activities has the potential to have direct and indirect impacts on terrestrial flora and fauna values in the project area. A summary of the key project component and associated impacts is provided in **Table 8.1**. Each of these impact types is discussed in further detail below.

Table 8.1 Key Project Components and Associated Potential Impacts

Project Component	Associated impacts
Open cut pits and waste rock dumps	• Land clearance and habitat loss. • Habitat fragmentation. • Impacts on surface water. • Impacts on groundwater. • Dust. • Noise. • Light. • Increased risk of fire. • Weeds. • Feral animals.
Northern and Southern Infrastructure Areas (incl. CHPPs)	• Land clearance and habitat loss. • Habitat fragmentation. • Impacts on surface water. • Impacts on groundwater. • Increased dust levels. • Increased noise levels. • Increased light levels. • Traffic impacts (mortality, dust, noise). • Increased risk of fire (rail loops).
Infrastructure corridors, train loading facilities, haul roads and other linear infrastructure	• Land clearance and habitat loss. • Habitat fragmentation. • Impacts on surface water. • Impacts on groundwater. • Increased dust levels. • Increased noise levels. • Traffic impacts (mortality, dust, noise). • Increased risk of fire.
Creek diversions	• Land clearance and habitat loss. • Habitat fragmentation. • Impacts on surface water.

8.1 SUMMARY OF DIRECT IMPACTS

8.1.1 Land Clearance

Land clearance would occur during the construction phase as a result of the establishment of supporting infrastructure, including the Northern and Southern Infrastructure Areas, internal haul roads, linear infrastructure and creek diversions and during the operational phase as a result of the progressive development of open cut pits and associated spoil placement areas.

Land clearance within the project area has been minimised by concentrating development within cleared areas in the southern part of the project area. Only very limited clearing of remnant vegetation is required for the establishment of the South and East pits and the Southern Infrastructure Area. In particular, pits and associated infrastructure have been sited to avoid substantial impacts on remaining areas of contiguous remnant vegetation in the southern part of the project area. This includes substantial areas of endangered and of concern vegetation communities (including brigalow TEC with good connectivity to intact brigalow communities on adjoining land near Xstrata Coal's Wollombi mine) and remnant vegetation associated with the Suttor River.

While the need for land clearance has been minimised through the site layout, full development of the project over the 50 year period would result in the loss of approximately 2391.1 ha of remnant native vegetation and 21.4 ha of advanced regrowth. The majority of this vegetation would be cleared from the West Pit, North Pit and Northern Infrastructure Area with smaller areas of clearing associated with the other pits as well as the central infrastructure corridor connecting the Northern and Southern Infrastructure Areas.

Vegetation clearing over the life of the project would result in a reduction in the extent of endangered and of concern vegetation communities and a reduction in the available habitat for fauna, including threatened and migratory species within the project area. The majority of the remnant vegetation to be cleared (1612.8 ha) is classified as no concern at present (by biodiversity status), with the remaining area comprised of endangered (313.9 ha) and of concern (465.2 ha) RE types. The effects of land clearance may include:

- Loss of vegetation communities or individual threatened species
- Reduced species abundance and biodiversity
- Loss of habitat, loss of connectivity between habitat areas and associated diminished fauna movement
- Loss of land stabilisation and riparian filtration functions.

A summary of total clearing areas by RE type is provided in Table 8.2. Clearing of vegetation would occur in stages as mining progresses. The location of areas to be cleared over the entire mine life in relation to the project footprint is shown in **Figure 8.1 to Figure 8.3**. Staged clearing areas are shown in **Figure 8.4–Figure 8.10**.

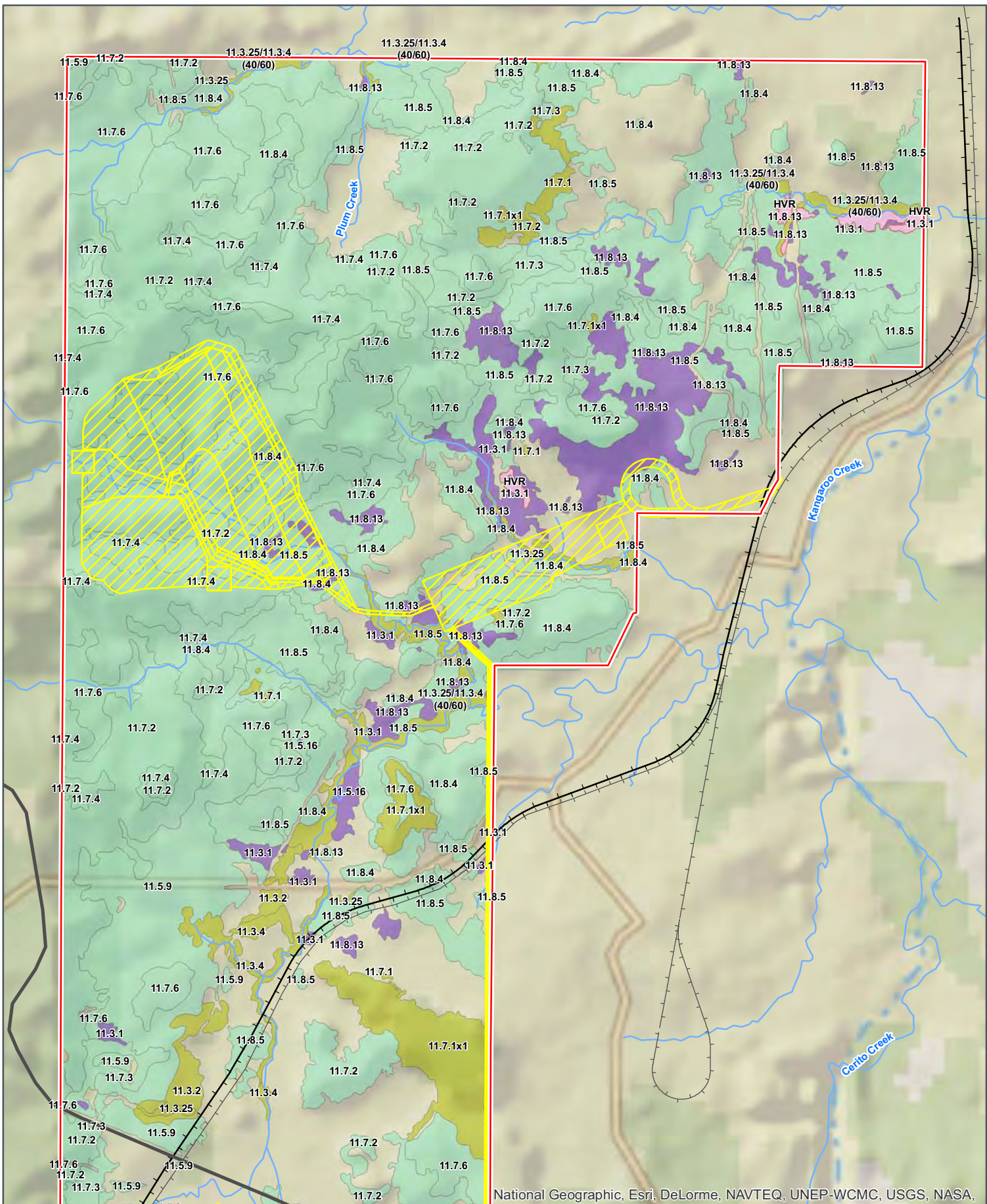
Table 8.2 Total Area of Impact by RE

RE	Biodiversity Status	VM Act Status	TEC	Impact Area (ha)
11.3.1	Endangered	Endangered	Brigalow	8.7
11.3.4	Of concern	Of concern	–	1.6
11.3.25	Of concern	Least concern	–	8.7
11.4.2	Of concern	Of concern	–	156.4
11.4.8	Endangered	Endangered	Brigalow	34.6
11.4.9	Endangered	Endangered	Brigalow	62.2
11.5.1	No concern at present	Least concern	–	20.2
11.5.3	No concern at present	Least concern	–	31.0
11.5.16	Endangered	Endangered	Brigalow	190.4
11.7.1 and 11.7.1X1	Of concern	Least concern	–	214.1
11.7.2	No concern at present	Least concern	–	240.7
11.7.3	No concern at present	Least concern	–	40.3
11.7.4	No concern at present	Least concern	–	175.0
11.7.6	No concern at present	Least concern	–	841.9
11.8.4	No concern at present	Least concern	–	74.8
11.8.5	No concern at present	Least concern	–	188.1
11.8.11	Of concern	Of concern	Natural grasslands	84.4
11.8.13	Endangered	Endangered	SEVT	18.0
Total Remnant				2391.1
HVR 11.3.1	Endangered	Endangered	Brigalow	11.0
HVR 11.4.9	Endangered	Endangered	Brigalow	7.6
HVR 11.8.5	No concern at present	Least concern	-	0.6
HVR 11.8.13	Endangered	Endangered	-	0.4
HVR 11.9.5	Endangered	Endangered	Brigalow	1.8
Total HVR				21.4
Non-Remnant				5070.2
TOTAL				7482.7

General mitigation measures to be implemented to reduce the impacts of vegetation clearance and habitat loss include:

- Clear delineation of areas of native vegetation requiring removal to equipment operators and supervisors before any clearance to ensure disturbance is minimised.

- Maintenance of retained areas of existing vegetation to assist in providing a source of seed for mine rehabilitation works.
- Preparation of a site rehabilitation management plan which incorporates rehabilitation monitoring and trials.
- Use of native species for rehabilitation wherever possible. If native species are unsuccessful, introduced stoloniferous grasses may be used to achieve rapid surface coverage. Buffel grass or a similar species may be used in areas identified for grazing where a suitable buffer to native vegetation is established using a non-invasive cover crop mixed with native grass seed.
- Monitoring of rehabilitation success to be conducted at locations representative of the range of conditions on the rehabilitating areas. Reviews will be conducted of monitoring data to assess trends and monitoring program effectiveness.



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Figure 8.1 - Vegetation Community Impacts (North Section)

WORK REQUEST NUMBER: WR_2012_00295

DATA SOURCES:

Remnant Watercourses © State of Queensland 2011

Main Road		Proposed Alpha Coal		Project Rail Line		GAP Railway		Stream Order (2 and above)		Project Area		Project Footprint	

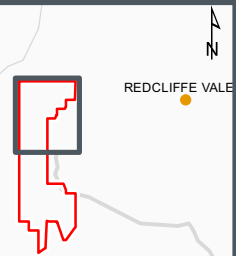
Regional Ecosystems

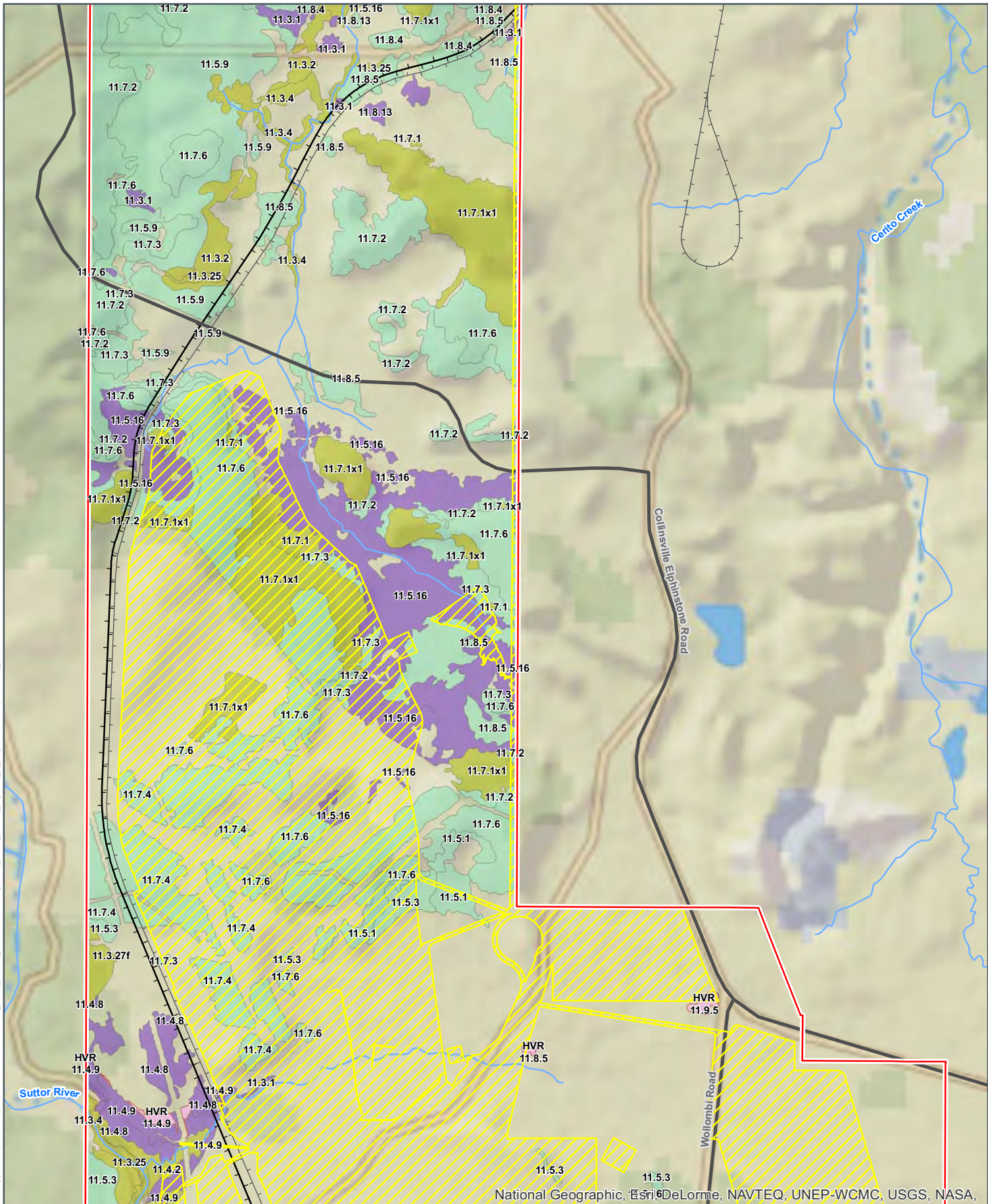
Endangered
Of Concern
No Concern
High Value Regrowth (Least Concern & Endangered)

DATE	AUTHOR	APPROVED	REVISION NOTE	REV.
04/10/2012	AB	JC	Issued for Review	A
14/11/2012	SN	JC	Issued for Review	B
04/12/2012	SH	JC	Issued for Review	C
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Figure 8.2 - Vegetation Community Impacts (Central Section)

WORK REQUEST NUMBER: WR_2012_00295

DATA SOURCES:
Remnant Watercourses © State of Queensland 2011

 Main Road
  Proposed Alpha Coal Project Rail Line
  GAP Railway
  Stream Order (2 and above)
  Project Area
  Project Footprint

Regional Ecosystems

-  Endangered
-  Of Concern
-  No Concern
-  High Value Regrowth (Least Concern & Endangered)

DATE	AUTHOR	APPROVED	REVISION NOTE	REV.
02/10/2012	AB	JC	Issued for Review	A
14/11/2012	SN	JC	Issued for Review	B
04/12/2012	SH	JC	Issued for Review	C
08/03/2013	SG	JC	Issued for Use	0

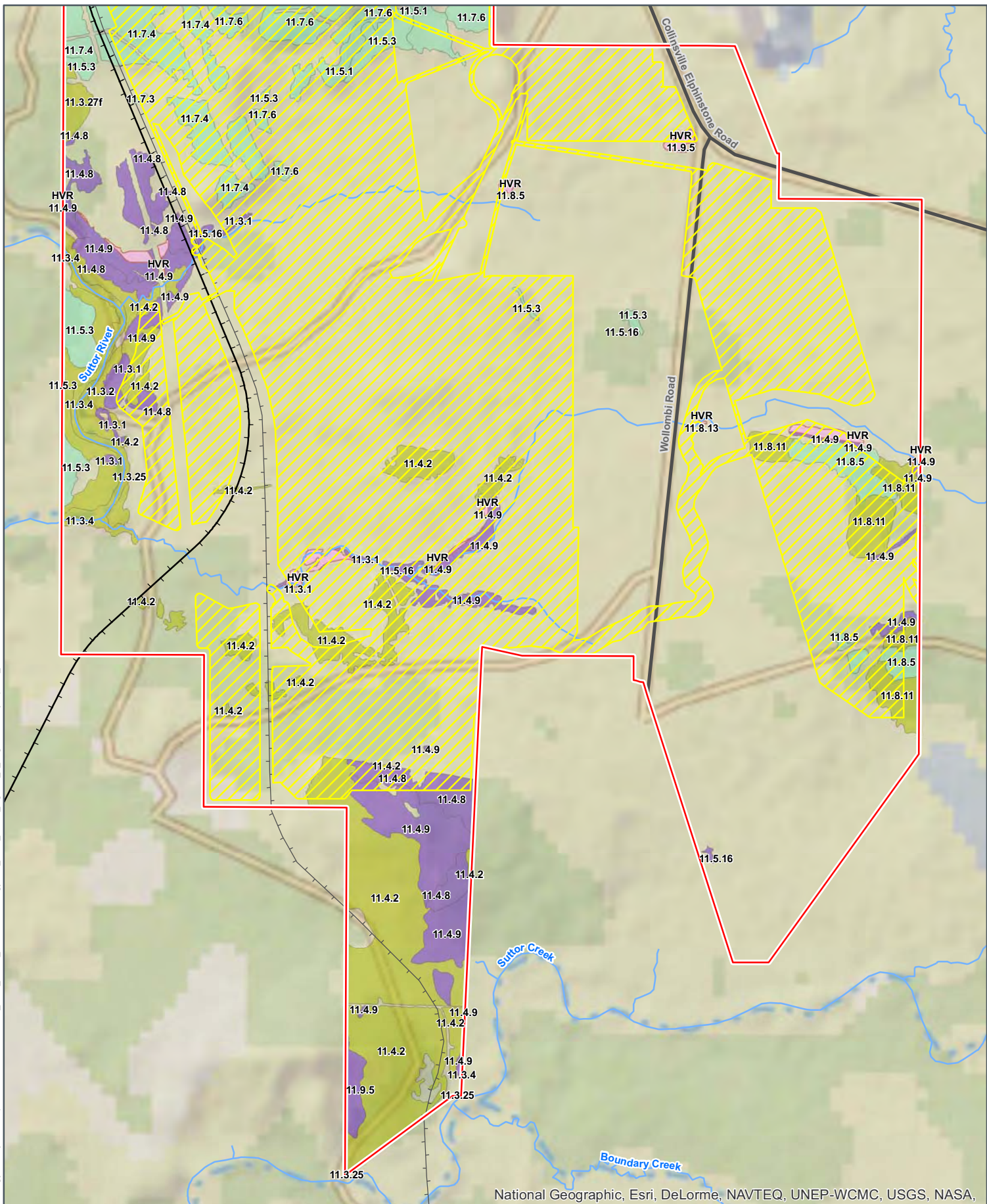
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Figure 8.3 - Vegetation Community Impacts (South Section)

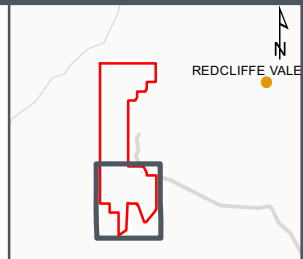
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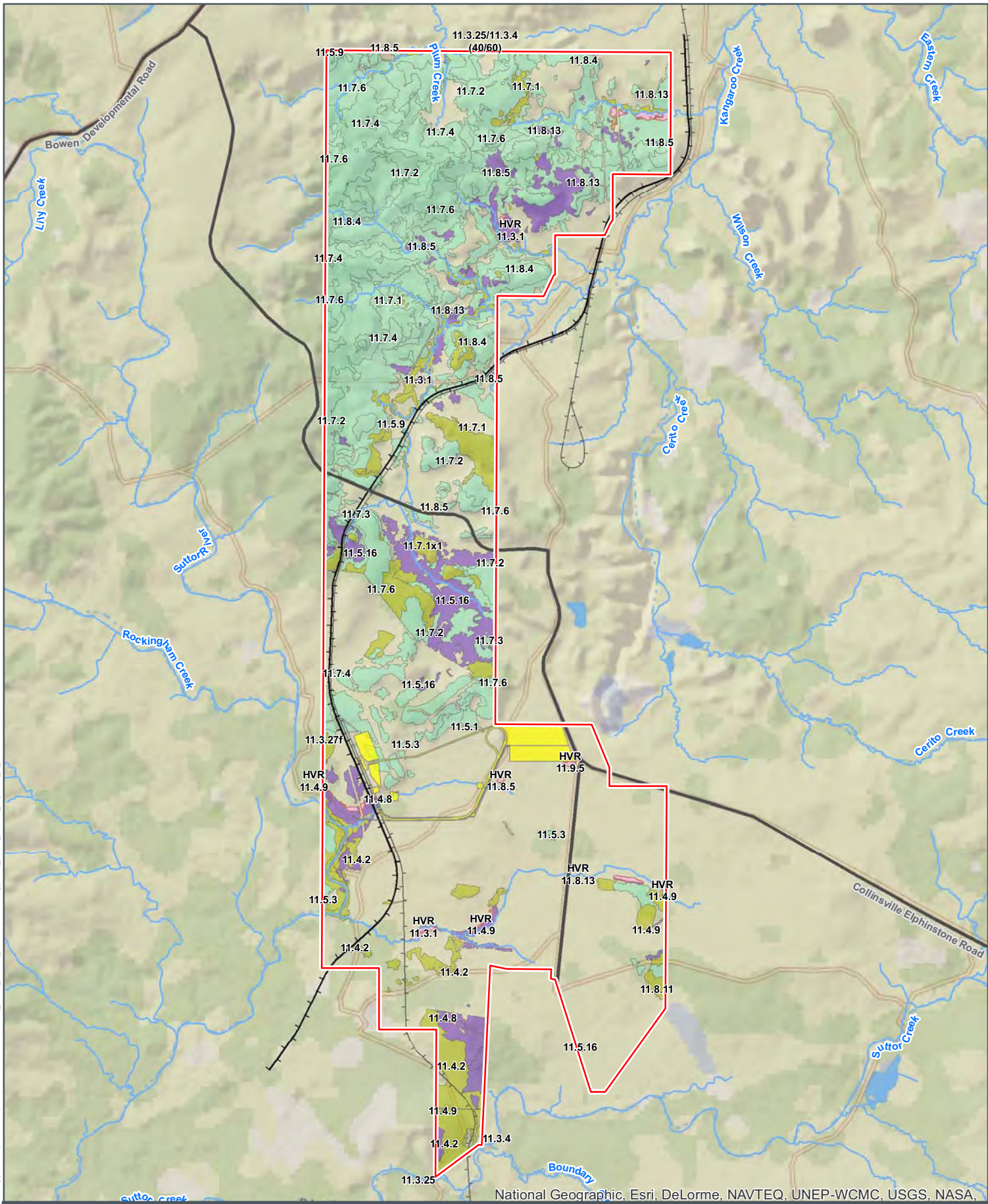
DATA SOURCES:

Remnant Watercourses © State of Queensland 2011

- Main Road
- Proposed Alpha Coal
- Project Rail Line
- GAP Railway
- Stream Order (2 and above)
- Project Area
- Project Footprint
- Regional Ecosystems
 - Endangered
 - Of Concern
 - No Concern
 - High Value Regrowth (Least Concern & Endangered)

DATE	AUTHOR	APPROVED	REVISION NOTE	REV.
02/10/2012	AB	JH	Issued for Review	A
14/11/2012	SN	JC	Issued for Review	B
04/12/2012	SH	JC	Issued for Review	C
08/03/2013	SG	JC	Issued for Use	0





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LEGEND

Figure 8.4 - Project Staging

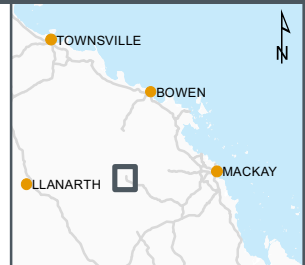
Year 1

WORK REQUEST NUMBER: WR_2012_00295

DATA SOURCES:

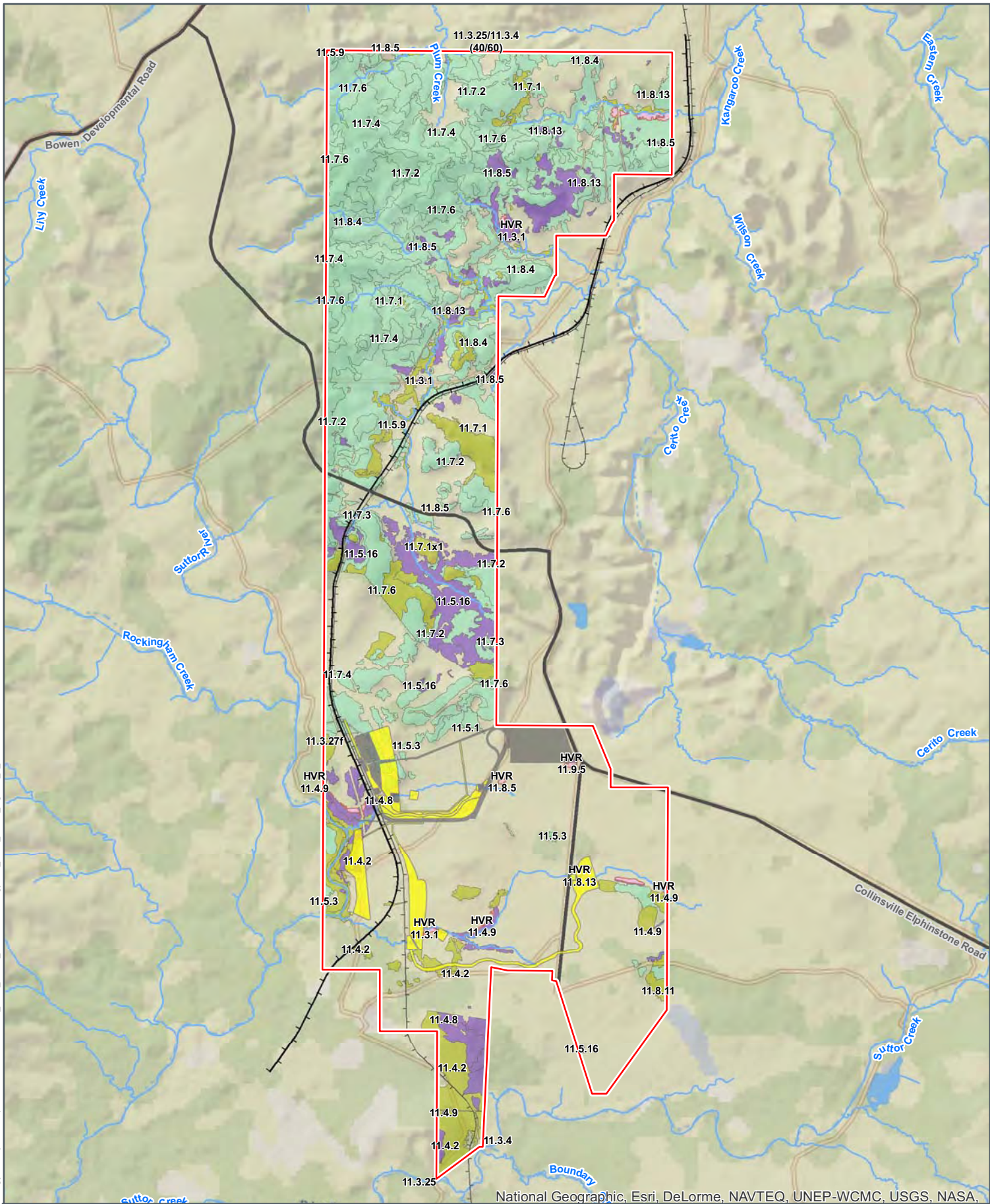
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Project Staging					Regional Ecosystems	
Year 01					Endangered	
					Of Concern	
					No Concern	
					High Value Regrowth (Least Concern & Endangered)	
DATE	AUTHOR	APPROVED	REVISION NOTE		REV.	
4/12/2012	TOD	KH	Issued for Review		A	
06/12/2012	CM	KH	Issued for Review		B	
08/03/2013	SG	KH	Issued for Use		0	

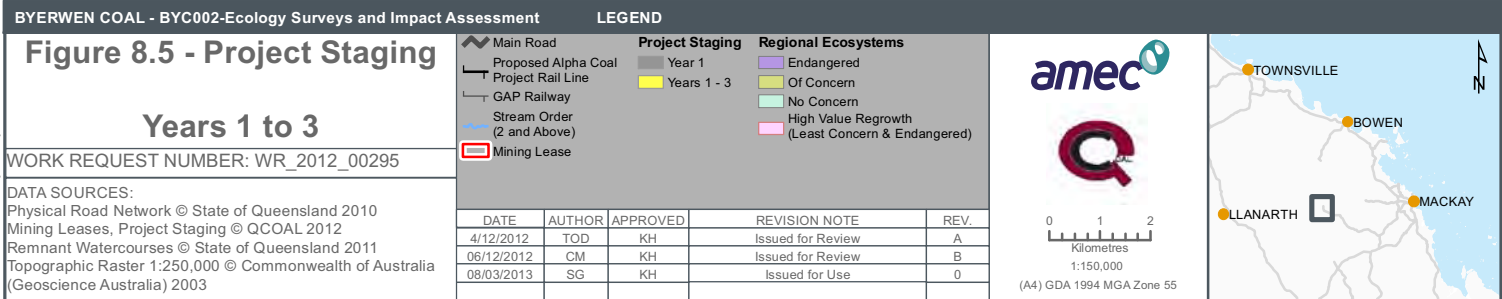


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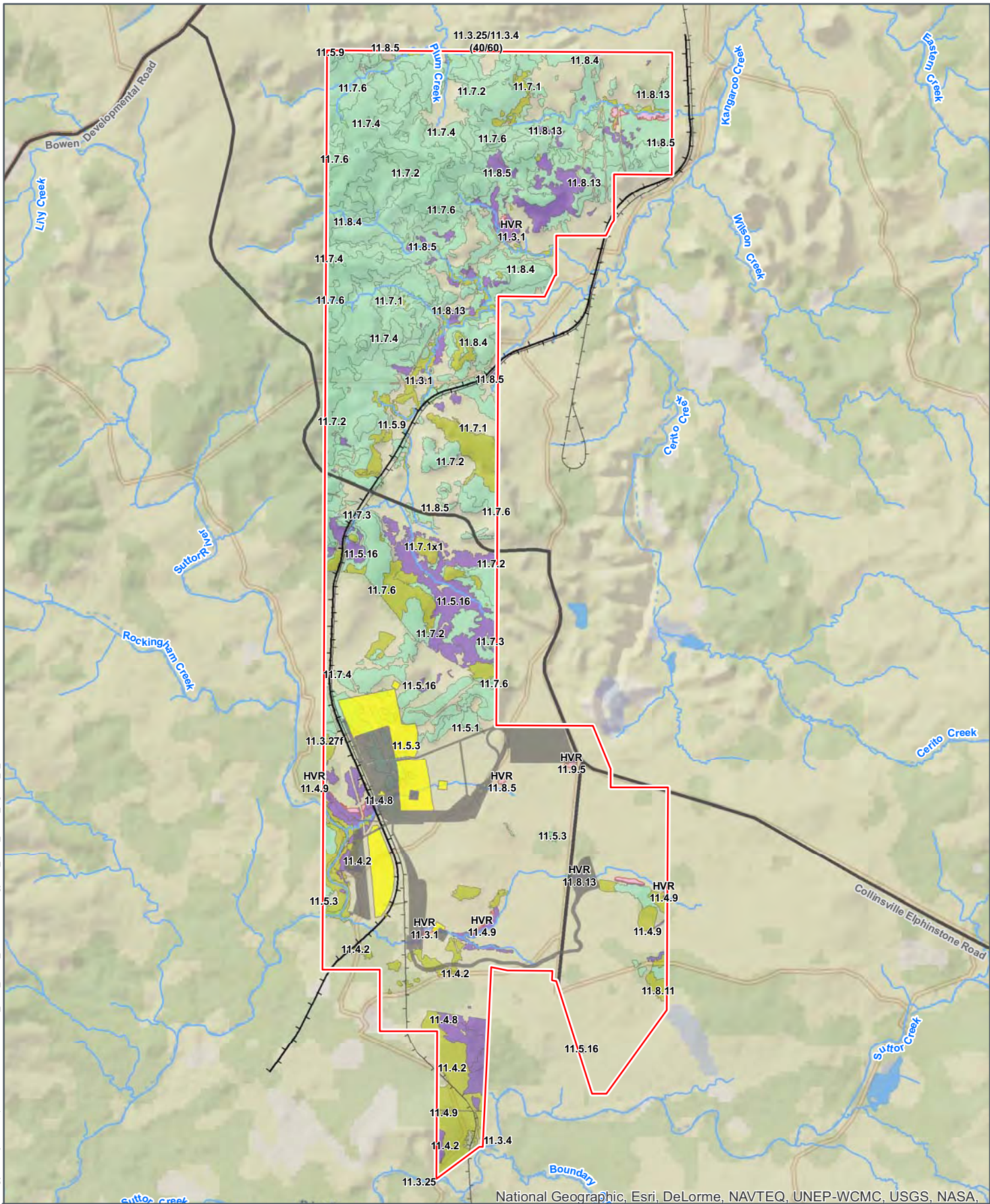


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Figure 8.6 - Project Staging

Years 3 - 5

WORK REQUEST NUMBER: WR_2012_00295

DATA SOURCES:

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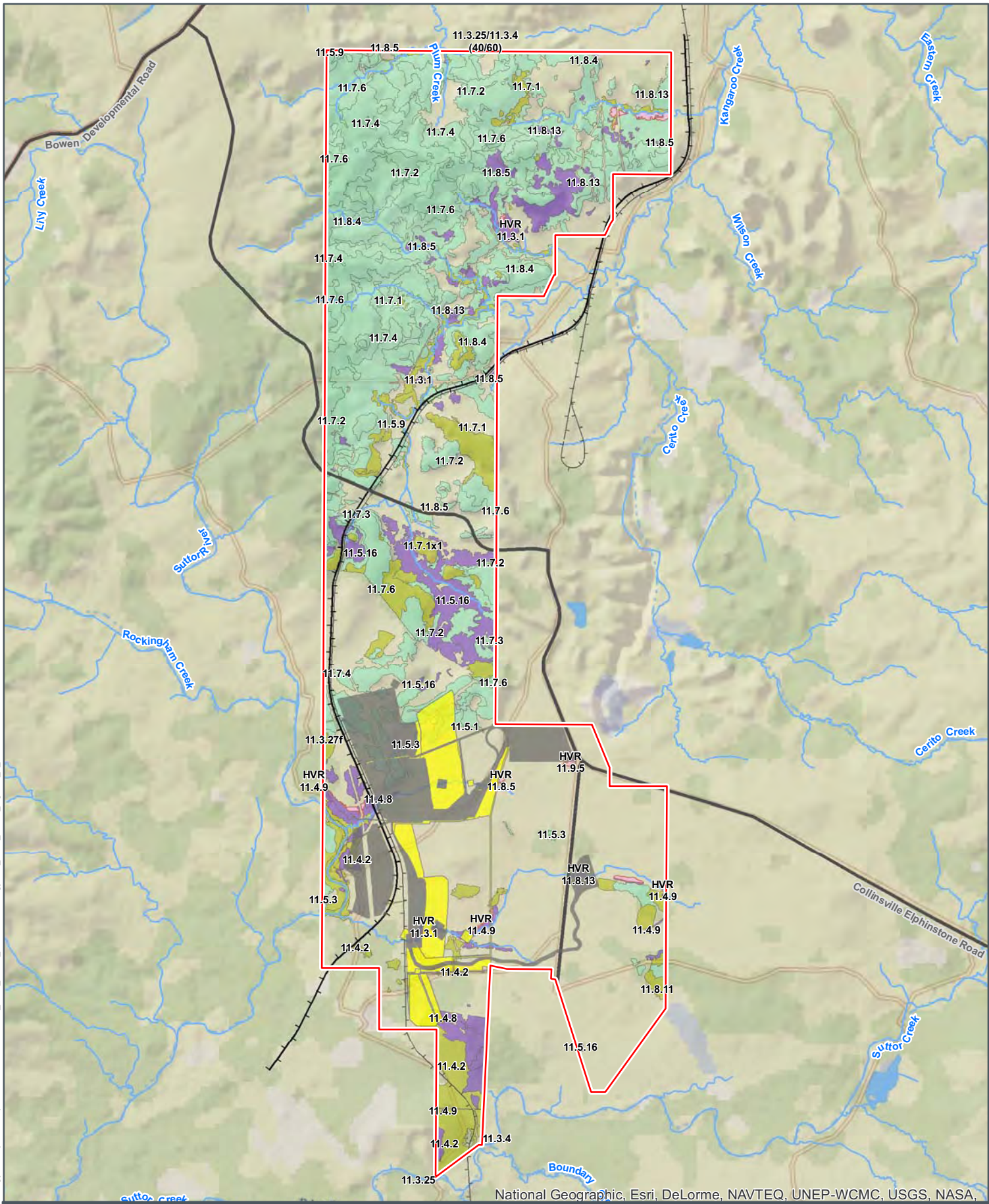
Main Road		Project Staging		Regional Ecosystems	
Proposed Alpha Coal	Years 1 - 3	Years 1 - 3	Endangered	Endangered	
Project Rail Line	Years 3 - 5	Years 3 - 5	Of Concern	Of Concern	
GAP Railway			No Concern	No Concern	
Stream Order (2 and Above)			High Value Regrowth (Least Concern & Endangered)	High Value Regrowth (Least Concern & Endangered)	
Mining Lease					

DATE	AUTHOR	APPROVED	REVISION NOTE	REV.
4/12/2012	TOD	KH	Issued for Review	A
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Figure 8.7 - Project Staging

Years 5 - 10

WORK REQUEST NUMBER: WR_2012_00295

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LEGEND

Project Staging

- Years 1 - 5
- Years 5 - 10

Regional Ecosystems

- Endangered
- Of Concern
- No Concern
- High Value Regrowth (Least Concern & Endangered)

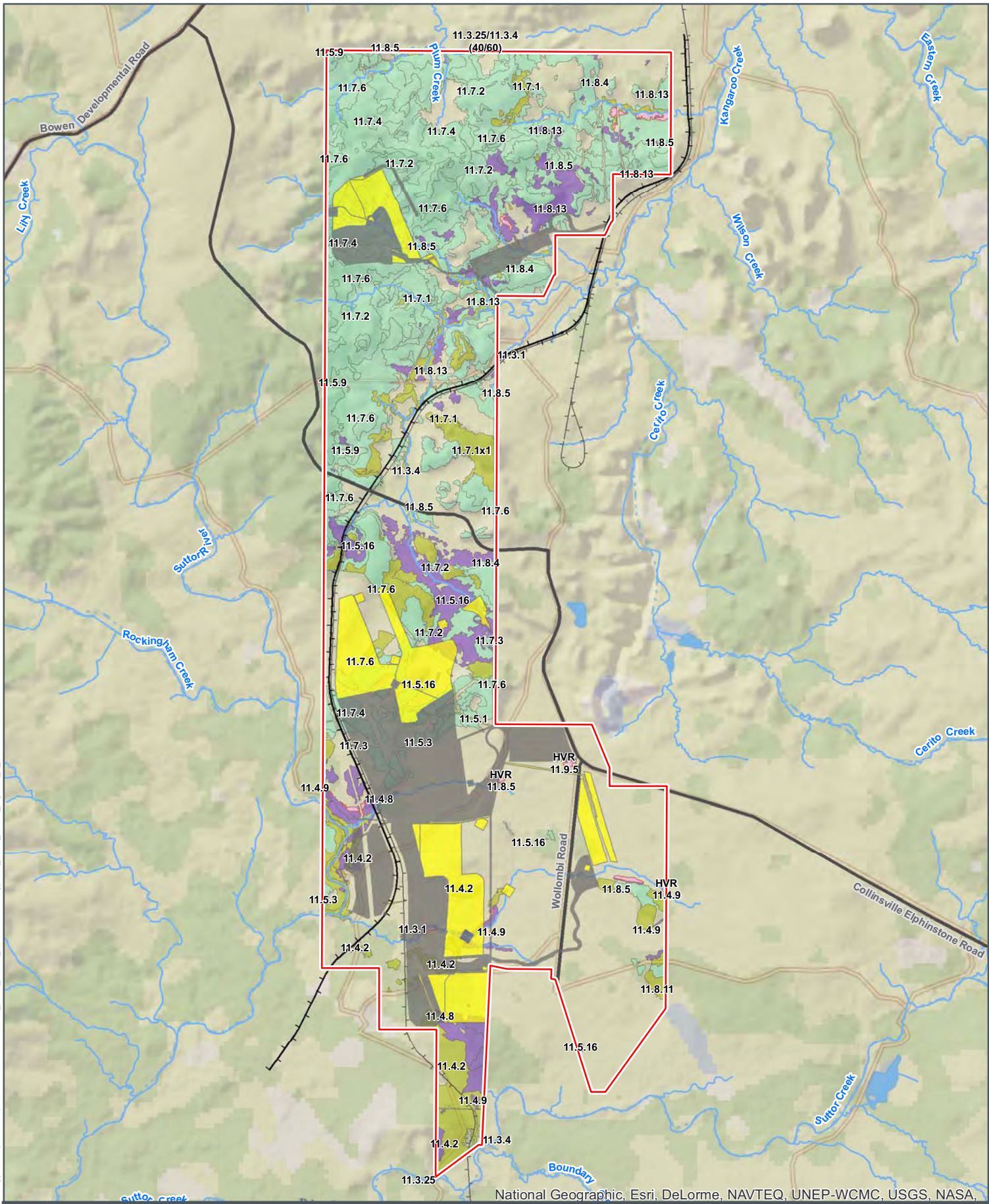
DATE	AUTHOR	APPROVED	REVISION NOTE	REV.
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Figure 8.9 - Project Staging

Years 16 - 25

WORK REQUEST NUMBER: WR_2012_00295

DATA SOURCES:
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LEGEND

Main Road
Railway
Mining Lease

Project Staging

Years 1 - 16
Years 16 - 25

DATE	AUTHOR	APPROVED	REVISION NOTE	REV.
4/12/2012	TOD	KH	Issued for Review	A
06/12/2012	CM	KH	Issued for Review	B
05/02/2013	SG	KH	Issued for Use	0

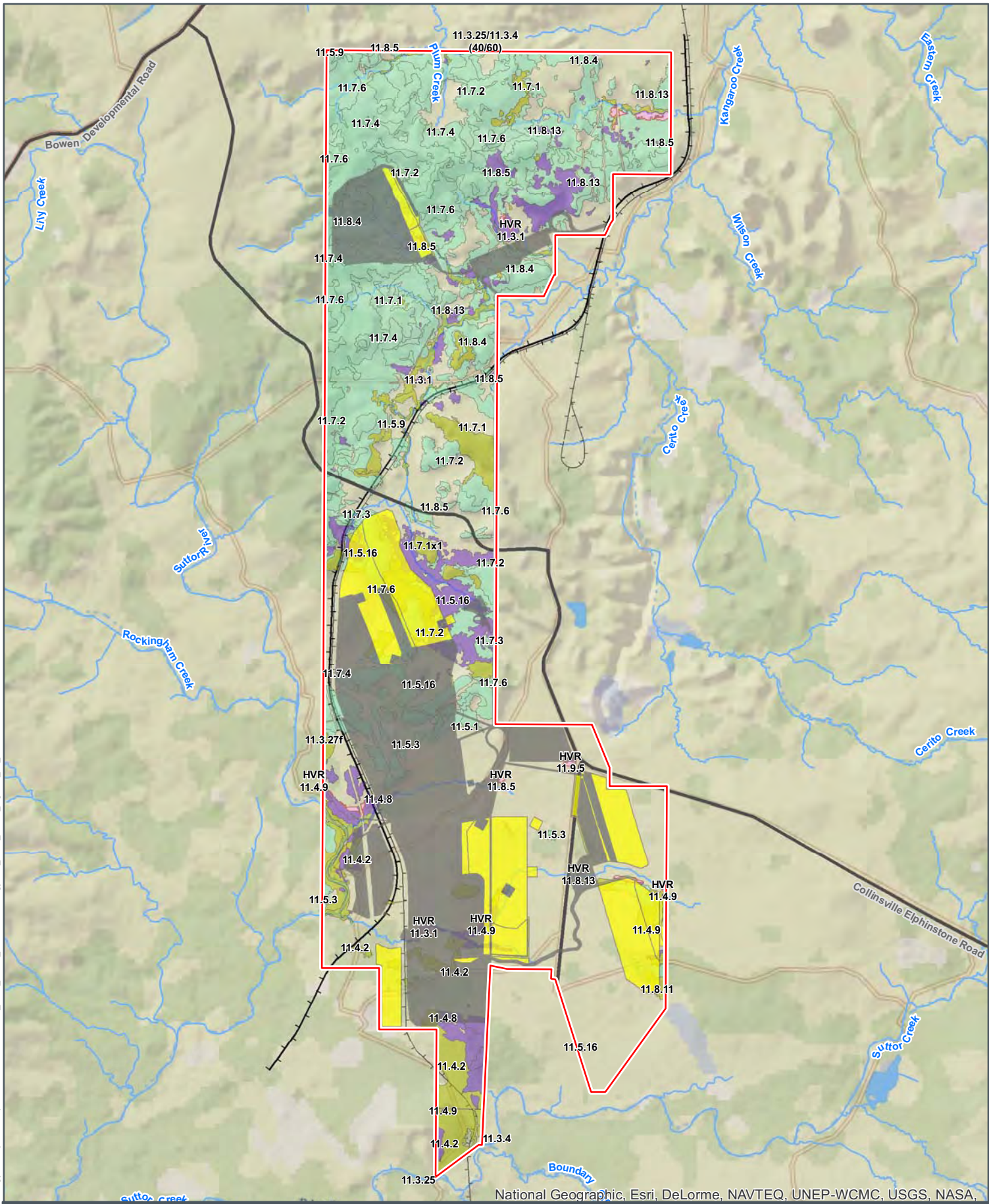
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TOWNSVILLE
BOWEN
LLANARTH
MACKAY

QC Check List: Completed



National Geographic, Esri, DeLorme, NAVTEQ, UNEP-WCMC, USGS, NASA,

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LEGEND

Figure 8.10- Project Staging

Years 25 - 46

WORK REQUEST NUMBER: WR_2012_00295

DATA SOURCES:

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Remnant Watercourses © State of Queensland 2011
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Main Road		Project Staging		Regional Ecosystems	
Proposed Alpha Coal		Years 1 - 25		Endangered	
Project Rail Line		Years 25 - 46		Of Concern	
GAP Railway				No Concern	
Stream Order				High Value Regrowth	
(2 and Above)				(Least Concern & Endangered)	
Mining Lease					
DATE	AUTHOR	APPROVED	REVISION NOTE	REV.	
4/12/2012	TOD	KH	Issued for Review	A	
06/12/2012	CM	KH	Issued for Review	B	
08/03/2013	SG	KH	Issued for Use	0	



8.1.2 Habitat Loss

It is important to note that the overall habitat value of the project area has been significantly affected by historical clearing and the ongoing effects of grazing. The project will cause further impact on these (already highly compromised) habitats. However, habitat loss has been minimised by concentrating development in cleared areas as described above. The primary residual impacts on habitat within the project footprint would be expected to arise as a result of:

- Removal of permanent, yet artificial, water sources associated with the dams at H2 and H13. These dams are the only sources of permanent water in the southern part of the project area and are an important resource for wetland birds and other terrestrial fauna species. This includes species which were observed near site H2 such as the squatter pigeon and cotton pygmy-goose. Removal of these dams represents the loss of a habitat resource for these species and potentially the black-throated finch which was recorded from the same area. Other potentially permanent water sources identified using aerial photography are located approximately 6.5 km to the north-west (adjacent to the Suttor River) and 6 km to the south-west.
- Removal of gilgai wetland habitat from the southern part of the project area. Historic clearing has reduced the habitat value of these wetlands through the removal of vegetation and microhabitat features however, gilgai on cracking clay soils represent a loss of potential habitat for the ornamental snake.
- Encroachment on riparian vegetation associated with Suttor Creek by the spoil dumps associated with South Pit 1 (also see **Section 8.1.3**).
- Removal of riparian vegetation associated with the North Pit footprint.
- Removal of habitat, such as tree hollows and coarse woody debris, from within pit and infrastructure footprints.
- Reducing the catchment area of the palustrine wetland on the south-west boundary of the project area (S3). Further discussion is provided in Section 8.1.3 of the Aquatic Ecology Impact Assessment (AMEC 2012).

Impacts on habitat and associated fauna can be minimised by:

- Minimising vegetation clearance along drainage features in order to maintain bank stability, habitat connectivity and movement corridors for terrestrial fauna species and a habitat refuge for fauna seeking shelter and water.
- Clearing riparian vegetation in a staged manner to allow fauna to migrate to adjacent habitats.
- Having a suitably qualified spotter-catcher available when clearing in habitat areas.
- Progressive rehabilitation of mined areas to incorporate the provision of nest hollows and microhabitat features such as trees and logs.

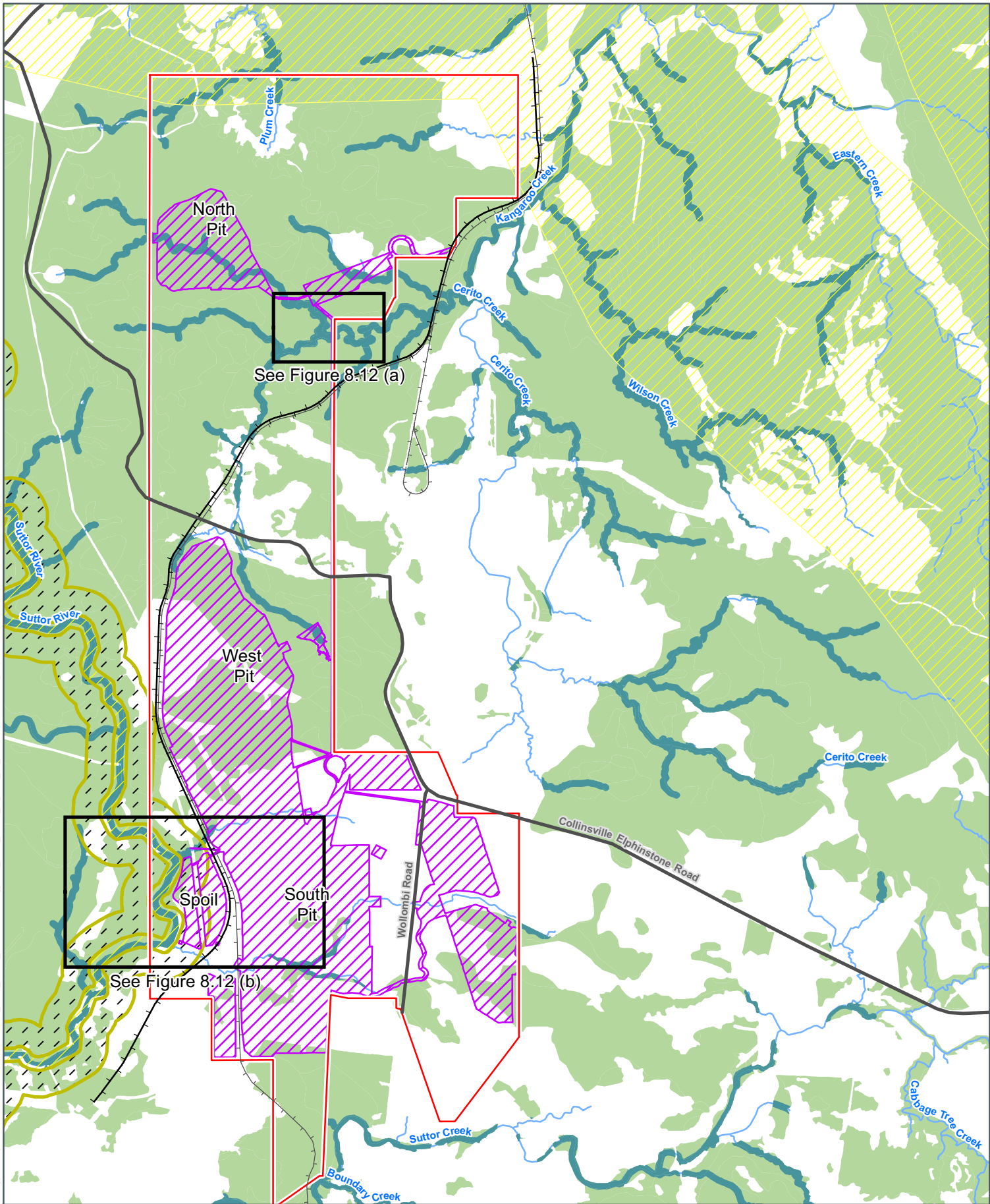
8.1.3 Habitat Fragmentation/Loss of Connectivity

Habitat fragmentation occurs when continuous areas of habitat, such as forests, woodlands or grasslands, are subdivided into a number of separate components. This term encompasses two interrelated components: habitat loss (ie a reduction in the amount of habitat) and fragmentation (ie a breaking apart of habitat) (Bennett 2006). The impacts of habitat fragmentation are also scale-dependent and may differ depending on the species or community under consideration. For example, loss of small areas of habitat that do not present a significant barrier to movement by highly mobile species (eg birds of prey) may present a much greater barrier to dispersal of less mobile or far-ranging species (eg amphibians or small reptiles such as skinks).

Connectivity across the broader project area has been considered in terms of habitat connections and broader corridors with regional linkages beyond the boundaries of the project area. Within the project area connectivity is linked to riparian corridors associated with the Suttor River and Kangaroo Creek and contiguous areas of terrestrial vegetation in the central and northern portions of the project area.

There are three primary areas of impact on connectivity within the project area as a result of the project, namely:

- Loss of connectivity within the band of terrestrial vegetation in the central part of the project area associated with the establishment of the West Pit (**Figure 8.11**). This would result in areas to the east of the pit footprint becoming isolated from large, contiguous tracts of vegetation to the west of the project area. While isolated, this patch of vegetation is still relatively large and will sustain habitat but has the potential to fragment populations of less mobile species.
- Removal of riparian corridors along the tributary of Kangaroo Creek and excise of remnant vegetation from the contiguous band in the northern part of the project area associated with the establishment of the North Pit (**Figure 8.11**).
- Reduced connectivity of riparian corridors along Kangaroo Creek associated with the construction of the central infrastructure corridor (**Figure 8.12**). Fauna movement along this corridor and access for less mobile species to upstream habitats to the south and west would be restricted. The alignment of the road also increases the potential for interaction between vehicles and fauna moving along the corridor, which would be mitigated by imposing slower speed limits at the crossing point.



BYERWEN COAL - BYC002-Ecology Surveys and Impact Assessment

Figure 8.11 - Site-Scale Connectivity Impacts

WORK REQUEST NUMBER: WR_2012_00295

DATA SOURCES:
Remnant, Watercourses, BPA Brigalow Belt, BPA Corridor Buffers © State of Queensland 2013

Main Road
 Proposed Alpha Coal Project Rail Line
 GAP Railway
 Stream Order (2 and above)

Project Area
 Project Footprint
 Riparian Vegetation Buffer
 Remnant Vegetation
 Non-remnant vegetation

BPA Corridor Buffer
 State
 Regional

0 1 2
Kilometres
1:150,000
(A4) GCS GDA 1994

DATE	AUTHOR	APPROVED	REVISION NOTE	REV.
02/10/2012	AB	JC	Issued for Review	A
14/11/2012	SN	JC	Issued for Review	B
04/12/2012	SH	JC	Issued for Review	C
08/03/2013	SG	JC	Issued for Use	0
13/03/2013	TOD	JC	Issued for Use	1

Figure 8.12 (a) - Impacts on Kangaroo Creek Riparian Corridor

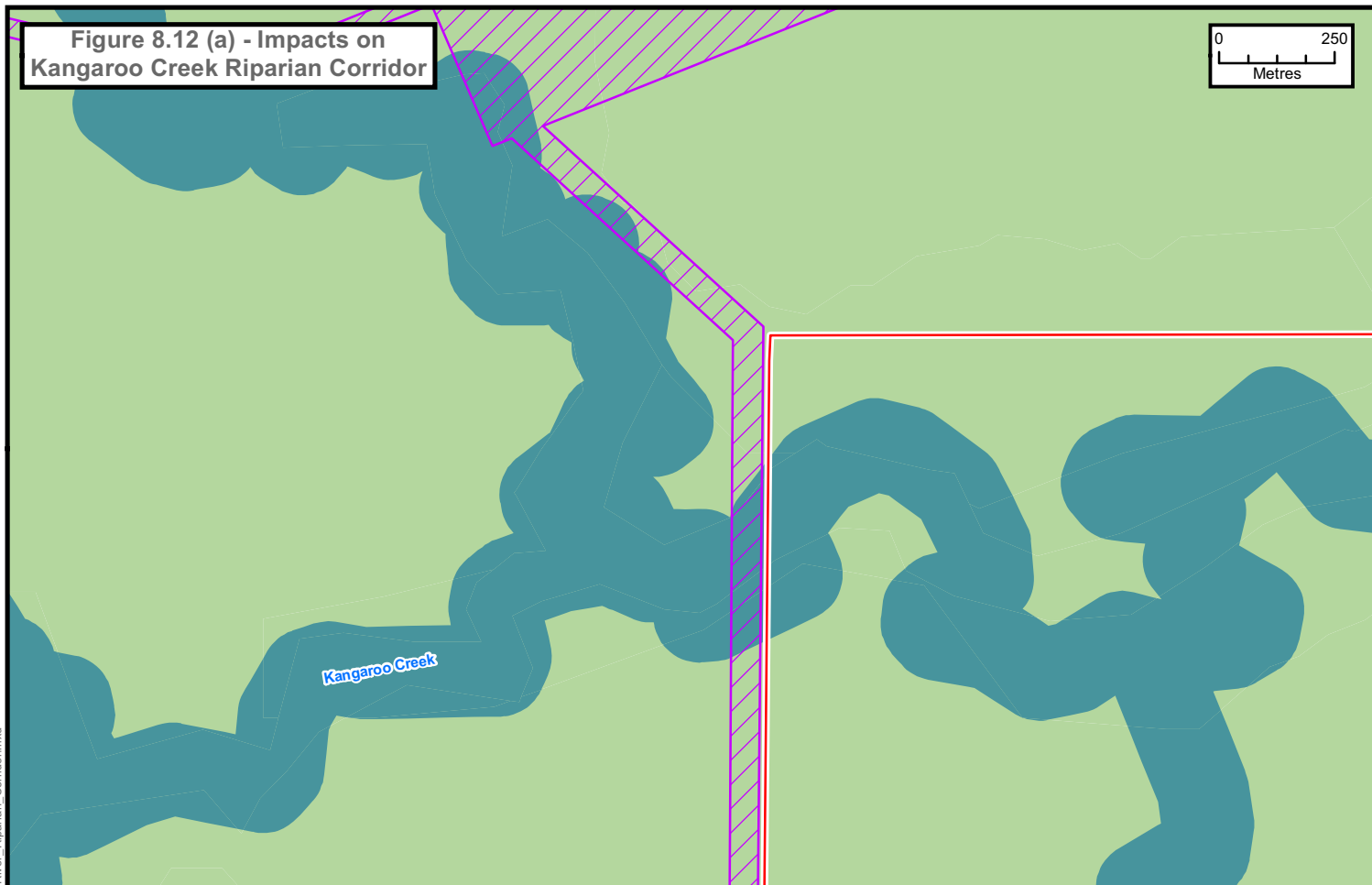
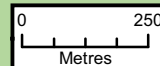
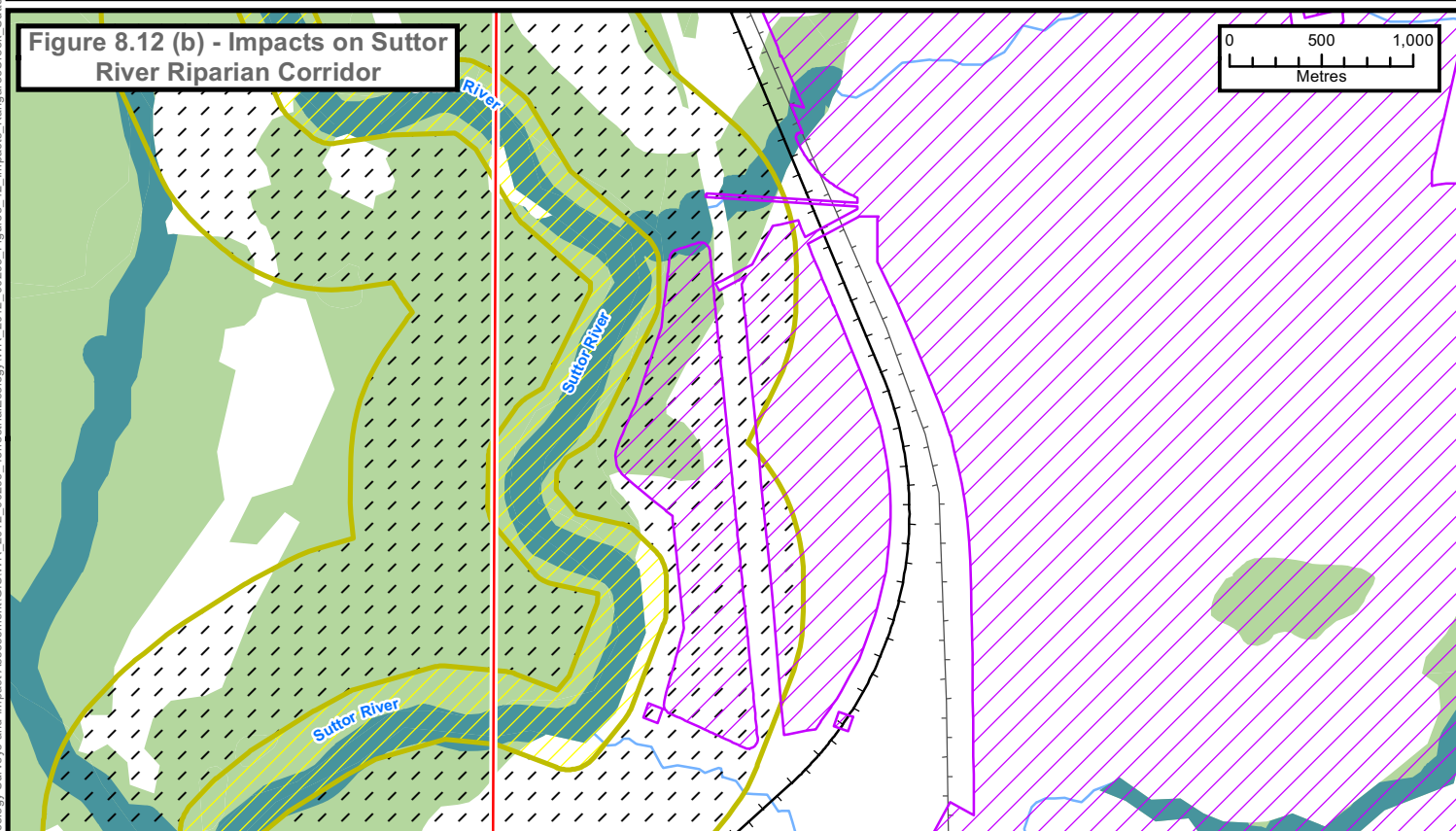
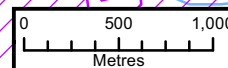


Figure 8.12 (b) - Impacts on Sutor River Riparian Corridor



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Figure 8.12 - Impacts on Kangaroo Creek and Sutor River Riparian Corridors

WORK REQUEST NUMBER: WR_2012_00295

DATA SOURCES:
Wetland Info © State of Queensland 2011
Remnant Watercourses © State of Queensland 2011

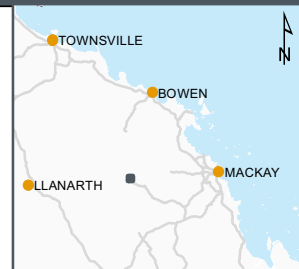
DATE	AUTHOR	APPROVED	REVISION NOTE	REV.
14/11/2012	SN	JC	Issued for Review	B
05/12/2012	SH	JC	Issued for Review	C
30/01/2013	AB	JC	Issued for Review	D
08/03/2013	SG	JC	Issued for Use	0
13/03/2013	TOD	JC	Issued for Use	1

- Main Road
- Proposed Alpha Coal Project Rail Line
- GAP Railway
- Stream Order (2 and above)
- Project Area
- Project Footprint
- Remnant Vegetation
- Non-remnant vegetation
- Riparian Vegetation Buffer
- BPA Corridor Buffer
- State
- Regional

amec



(A4) GCS GDA 1994



The encroachment on vegetation fringing the Suttor River associated with the spoil dumps for South Pit 2 is not expected to cause a significant impact to connectivity along this north-south corridor (**Figure 8.12**) however, the width of this corridor would be reduced by the westernmost dump. Modelling undertaken by KBR (2012a) indicates that armouring would be required to prevent scouring of the spoil dump during a 1000 year ARI flood event which has the potential to encroach further on this corridor. Placement of spoil would need to be closely supervised to ensure no unnecessary clearing occurs and that water and sediment are managed to avoid impacts on vegetation and water quality within and adjacent to the Suttor River.

These site-scale impacts on connectivity are not considered to have a significant impact on regional-scale connectivity or the value of biodiversity corridors of State and Regional significance.

8.1.4 Edge Effects

A key impact associated with the clearing of vegetation and construction of infrastructure and open cut pits is the creation of smaller patches of vegetation, with a greater edge to surface area ratio. Impacts associated with this increase in edge area are known as 'edge effects' and include increased exposure to weed invasion, light and wind penetration (which can alter microclimate features). Plant communities may become susceptible to disease and an overall decrease in health; over time community structure and composition may change as a result. The quality of associated fauna habitats may deteriorate as a result and some species are known to avoid disturbed habitats. For example, the south-eastern long-eared bat (*Nyctophilus corbeni*) and northern quoll (*Dasyurus hallucatus*) are both typically associated with undisturbed remnant habitats.

The impacts of edge effects are difficult to quantify as these effects occur gradually over time. Therefore, direct impacts such as vegetation loss and fragmentation are used to determine impacts. Rehabilitation of disturbed areas and the provision of buffers around undisturbed areas of remnant vegetation will help to minimise edge effects. Similarly, adopting other measures described throughout this assessment will help to lessen the impact of edge effects over the life of the project.

8.1.5 Impacts on Surface Water

Impacts on surface waters arising from the project with the potential to impact terrestrial flora and fauna values in the project area are:

- Impacts on surface water inflows to the palustrine wetland on the south-western boundary of the project area
- Diversion of tributaries of the Suttor River in the southern part of the project area
- Diversion of tributaries of Kangaroo Creek in the northern part of the project area
- Impacts associated with altered flow paths, flow volumes and water quality associated with waterway crossings (eg for roads).

Surface Water Inflows to Palustrine Wetland

During mining, the catchment supplying water to the palustrine wetland on the south-western project area boundary would be disrupted, temporarily reducing flow to the wetland (KBR 2012a). Impacts and proposed mitigation are discussed in Section 8.1.3 of the Aquatic Ecology Impact Assessment (AMEC 2012).

Watercourse Diversions

Watercourse diversions will result in the loss of riparian vegetation and associated habitat resources for fauna species over the short-to-medium term. The loss of stabilisation and filtration functions associated with riparian vegetation can lead to erosion and a reduction in water quality which can have indirect impacts by reducing food sources for terrestrial fauna species. Subject to re-establishment of 'natural' channels which include riparian vegetation and appropriate management to prevent erosion, no significant impacts on terrestrial flora and fauna values are expected as a result of watercourse diversions. Connectivity impacts associated with watercourse diversions are discussed in **Section 8.1.3**.

Waterway Crossings

Waterway crossings associated with the central infrastructure corridor will result in the loss of riparian vegetation and reduced access to surface water resources in Kangaroo Creek. In addition to habitat loss, indirect effects such as decreased water quality, particularly sedimentation, may decrease foraging opportunities for waterbirds, such as ducks, storks and egrets. Diminished water quality associated with dust and sediment-laden runoff from roads can also impact aquatic fauna and indirectly impact terrestrial fauna by reducing food sources. Connectivity impacts associated with this waterway crossing are discussed in **Section 8.1.3**. Impacts associated with waterway crossings may be reduced by minimising the number of crossings required, designing to prevent scour and implementing appropriate sediment and erosion controls at crossing points.

8.1.6 Impacts on Groundwater

An assessment of groundwater resources carried out for the EIS concluded that there is little or no groundwater-surface water interaction in the project area. In the absence of groundwater baseflows to wetlands and drainage features and the absence of surface expressions of groundwater, any groundwater drawdown is unlikely to impact on terrestrial flora and fauna values in the study area.

8.1.7 Dust

Dust generation has the potential to smother plants, reducing photosynthesis and resulting in decreased vegetation condition or the death of vegetation. Loss of vegetation also has indirect impacts on terrestrial fauna through the loss of food and habitat resources. Project activities likely to generate dust include open cut mining, waste rock stockpiling, vehicle movements, stockpiling (topsoil, spoil, ROM and product coal), coal processing and coal transport (eg conveyors, haul trucks, etc).

Doley (2006) examined the physical effects of dust on vegetation and suggested that the most sensitive plant functions may be altered with monthly dust loads (deposition) of about 266 mg/m²/day for dust with medium diameters of 50 µm. Dust deposition contours for the project area generated from air quality modelling undertaken by Noise Mapping Australia (NMA 2012), indicate a 266 mg/m²/day deposition rate may be exceeded in the immediate vicinity of mining operations. Areas where this deposition rate may be exceeded appear to be mainly within the project footprint. As limited vegetation will be retained within the project footprint, detrimental dust effects on plant health would be minor.

8.1.8 Noise

Increased noise from blasting, operation of machinery, vehicle traffic and coal processing have the potential to disturb terrestrial fauna and impact on feeding and breeding behaviour. Noise effects on wildlife and other animals are categorized as primary, secondary, or tertiary. Primary effects are direct physical auditory changes, such as eardrum rupture, temporary and permanent hearing threshold shifts, and auditory effects as stress, behavioural changes, interference with mating, and detrimental changes in the ability to obtain sufficient food, water, cover and predation. Tertiary effects are the direct result of both primary and secondary effects, and potentially include population declines. It is unlikely there will be any primary effects on wildlife.

The learning ability of many animal species is discussed by Busnel (1971). The animal's initial reaction to a new noise source is fright and avoidance but if other sensory systems are not stimulated (for instance optical or smell), the animal learns quickly to ignore the noise source, particularly when it exists in the presence of humans.

Migratory birds have the potential to be influenced by noise from the Project. Studies of birds (Larkin 1996) have shown that they will habituate to loud noises that are not biologically meaningful for them. For example if the noise is associated with possible harm such as thunder on a cloudy day, birds will avoid it, but routine noises such as traffic will not disturb them. Examples are provided of sea-birds that voluntarily co-exist with relatively loud noise environments, such as around airports, and birds roosting on light-posts above busy motorways.

Background levels of incidental noise will increase once the mine commences operation. Noise impacts may interfere with communication within species. The degree of noise disturbance is often species specific and influenced by a number of factors including volume, frequency and noise characteristics. Those species that rely on sound for their basic behaviour such as birds are most likely to be impacted (Coffin 2007). Some animals are likely to become habituated to the background noise emissions created by the Project. For example, wetland birds in the Caley Valley wetland near Bowen have remained in areas impacted by background noise from the existing port facility. Species in the area may have become more tolerant of mining related noise emissions given the proximity to Newlands Mine.

For these reasons, the impact on fauna is not expected to be significant outside of the immediate vicinity of mining operations; however high intensity activities such as blasting should be restricted to daylight hours to minimise impacts on the breeding and feeding behaviour of nocturnal animals.

8.1.9 Light

Key sources of light generation in the project area will be the open cut pits, the CHPPs and the mine infrastructure areas (Northern and Southern), associated access roads and rail facilities. Headlights and flashing lights associated with vehicle movements will also contribute. Combined, these sources would also be expected to result in 'sky glow' or the general lightening of the night sky. Light spill has the potential to impact on nocturnal species by disrupting feeding behaviour and reducing effective home ranges. It can also impact on the breeding behaviour of some species. Conversely, increased light will attract insects which may be beneficial for some insectivorous nocturnal feeders. This may benefit a small number of fauna species, such as some bird and bat species. Threatened species which are active at night and may be impacted by light spill in the project area include the brigalow scaly-foot, common death adder, ornamental snake, echidna, northern quoll, koala and Mount Cooper striped lerista.

8.1.10 Traffic Impacts (Mortality, Noise, Dust)

Traffic generation associated with the project has the potential to impact terrestrial flora and fauna in the following ways:

- Mortality resulting from vehicle collision
- Dust generation, which has the potential to smother roadside plants thereby affecting vegetation condition and reducing available habitat and food resources
- Noise disturbance which can disrupt fauna behaviour.

Direct fauna mortality associated with vehicle movement on haul roads, access roads and rail lines has the potential to impact on a number of fauna species. Reptile species which may use road verges as habitat are susceptible to collision as they are less mobile than other species. The slow-moving squatter pigeon is also known to be at risk of vehicle strike.

The highest risk of direct fauna mortality is likely to be associated with vehicles travelling along the central infrastructure corridor. This risk is heightened in the northern section of the project area where the corridor crosses fauna movement corridors associated with Kangaroo Creek. These crossings should be designed to minimise the potential for interaction with fauna and reduced speeds should be implemented to minimise the risk of vehicle collision. Provision of lighting also reduces the risk of startling animals crossing the road at night.

Other watercourse crossings are associated with haul roads connecting open cut pits and the mine infrastructure areas also need to be designed to minimise the potential for vehicle interaction with fauna. Native fauna injured during construction and operational phases of the project would be taken to a vet or wildlife carer. In the event of injuries to

domestic fauna or livestock, personnel would call for veterinary assistance and notify the appropriate landholder.

8.1.11 Increased Fire Risk

The project has the potential to increase fire risk associated with the operation of vehicles, activities undertaken by site personnel (eg from welding, cigarette butts) and spontaneous combustion of thermal coal. Uncontrolled fires have the potential to alter ecosystem characteristics and directly and indirectly impact on ecological values in the project area. Appropriate management systems should be put in place to prevent accidental ignition of fires as well as spontaneous combustion of coal. This could include active watering, orientation of stock and waste piles based on wind directions, and wind breaks. Vegetation retained on site should be managed for fuel load and appropriate fire regimes should be put in place to maintain biodiversity values while minimising the risk of bushfire. Fire regimes and management measures should be documented in a site-specific fire management plan.

8.1.12 Weeds

A number of pest plants were identified during field surveys. Four of these species occur on the list of WONS, namely rubber vine (*Cryptostegia grandiflora*), prickly pear (*Opuntia stricta*), velvet pear (*Opuntia tomentosa*) and parthenium (*Parthenium hysterophorus*). Parthenium was well-established in a number of locations, with up to 20% cover observed in heavily degraded and grazed areas. Two additional species, Harrisia cactus (*Harrisia martinii*) and fireweed (*Senecio madagascariensis*), are declared as Class 2 weeds under the LP Act. Of particular note is the need to manage the potential for parthenium weed to establish in areas of natural grasslands TEC to be retained adjacent to the East Pit 2 footprint.

Weed management measures to be implemented in the project area should include:

- Wash down facilities to be constructed at access points for vehicles arriving and departing from the project site. These facilities are to be bunded and located away from drainage lines to minimise the risk of weed spread.
- Vehicles entering the project site and leaving properties known to contain declared weeds will be thoroughly washed down before entering clean areas; ensuring that wheels, wheel arches and the undercarriage are free of mud and plant material.
- Radiators, grills and vehicle interiors will be cleaned of accumulated seed and plant material.
- Vehicles to keep to roads or compacted surfaces (preventative) and reduce vehicle movements in wetted soil where avoidance is not possible.
- Identified weeds of management concern, including declared and environmental weeds, to be controlled in accordance with local best practice management as described in the Pest Fact sheets published by the Department of Agriculture, Fisheries and Forestry.
- Treated areas will be monitored to assess the success of declared weed eradication.

- Weed management to be included in the site induction program for the project to promote awareness of weed management issues.
- A site-specific weed and pest management plan is to be developed for the project. This should specifically address the potential for spread of parthenium weed into intact areas of natural grasslands TEC adjacent to the East Pit 2 footprint.

8.1.13 Pest Animals

Feral animals declared as pests under the LP Act represent a threat to primary industries and natural resources and responsibility for control rests with landholders. The following pest animals were recorded from the project area:

- Feral dog (*Canis lupus familiaris*)
- Dingo (*Canis lupus dingo*)
- Feral cat (*Felis catus*)
- Feral pig (*Sus scrofa*)
- Rabbit (*Oryctolagus cuniculus*)
- Goat (*Capra hircus*).

Other introduced species identified were the cane toad (*Bufo marinus*), house mouse (*Mus musculus*) and house gecko (*Hemidactylus frenatus*). These species are not declared pests and, as such, no formal control is required. However, cane toads are considered to pose a threat to the ornamental snake, common death adder, northern quoll and rainbow bee-eater (through usurping of nesting burrows), and control programs are recommended to mitigate impacts on these species. The impacts of these species are likely to include the following:

- Predation on native species
- Competition for food resources, which may decrease abundance of prey for native predator species
- Habitat changes due to destruction of plants; changed floristic composition; reduced regeneration of plants; alteration of soil structure; increased invasion and spread of weeds
- Increased access for non-native predator species
- Toxicity to native species
- Reduced water quality and availability
- Spread of exotic invertebrates and creation of habitats suitable for disease, including the spread of root-rot fungus, *Phytophthora cinnamomi*.

The following general mitigation measures are proposed for the management of pest animal species:

- Appropriate disposal and management of wastes on site
- Development of a pest species management program.

8.2 SUMMARY OF INDIRECT IMPACTS

Indirect impacts as defined by the Significant Impact Guidelines for Matters of National Environmental Significance (DEWHA 2009) are:

- 'Downstream' or 'downwind' impacts, such as those on wetlands or ocean reefs from sediment, fertilisers or chemicals which are washed or discharged into river systems
- 'Upstream' impacts such as those associated with the extraction of raw materials and other inputs which are used to undertake the action
- 'Facilitated impacts' which result from further actions (including actions by third parties) which are made possible or facilitated by the action. For example, the construction of a dam for irrigation water facilitates the use of that water by irrigators with associated impacts. Likewise, the construction of basic infrastructure in a previously undeveloped area may, in certain circumstances, facilitate the urban or commercial development of that area.

Discharges of mine water would be managed in accordance with the mine water management strategy for the project (KBR 2012a). Subject to appropriate management of mine-affected water and sediment-affected water, no downstream impacts on surface water resources would be expected to arise as a result of the project. A hydrogeological assessment has indicated there are no notable groundwater dependent ecosystems, in addition a specific stygofauna assessment has indicated no stygofauna requiring management or mitigation associated with this project.

The project will utilise the GAP rail corridor. While this eliminates the need for separate disturbance to transport coal to Abbott Point, it does increase rail traffic and associated fire risk and potential for coal dust impacts along the rail corridor. The impacts of the rail corridor have been previously been assessed through the environmental assessment processes for the Goynella to Abbott Point Expansion Project (which incorporates the Northern Missing Link).

Noise and light generated by the project are unlikely to be sufficient to have a significant impact on terrestrial flora and fauna values outside the boundaries of the project area and downstream impacts related to noise and light are considered unlikely. The impact of dust generation has been discussed under **Section 8.1.7**.

8.3 IMPACTS ON TERRESTRIAL FLORA VALUES

8.3.1 Endangered and Of Concern Vegetation Communities

Impacts on endangered and of concern REs have been avoided where possible by siting infrastructure in cleared areas or areas containing vegetation communities with lesser conservation value (ie least concern RE types). Despite this, the establishment of open cut pits and surface infrastructure for the project will result in the loss of 313.9 ha of remnant endangered RE and 465.2 ha of remnant of concern RE from the project area (**Table 8.3**).

Table 8.3 Area of Clearing for Remnant REs

Biodiversity Status	REs Represented	Impact Area (ha)
Endangered	11.3.1, 11.4.8, 11.4.9, 11.5.16, 11.8.13	313.9
Of Concern	11.3.4, 11.3.25, 11.4.2, 11.7.1, 11.8.11	465.2

A substantial amount of the clearing in endangered and of concern RE types will occur from the northern extent of the West Pit which supports large areas of endangered brigalow (RE 11.5.16). A total of 190.4 ha of RE 11.5.16 from an estimated bioregion-wide 3759 ha (including previously unmapped areas within the project area) would be cleared as a result of the project. The remaining area of endangered and of concern RE will primarily be cleared from the following footprint areas:

- North Pit – Clearing of small areas of endangered semi-evergreen vine thicket (RE 11.8.13)
- South Pits 1 and 2 – Clearing of mostly fragmented areas of endangered brigalow communities (RE 11.4.9, 11.4.8, 11.5.16), smaller areas of RE 11.3.1 (brigalow) associated with the Suttor River floodplain and of concern RE 11.4.2 (*Eucalyptus* spp. and/or *Corymbia* spp. grassy woodland)
- East Pit 2 – Clearing in areas of native grassland (RE 11.8.11) and smaller areas of endangered brigalow woodland (RE 11.4.9)
- Northern Infrastructure Area and Central Infrastructure Corridor – Clearing of very small areas of endangered semi-evergreen vine thicket (RE 11.8.13) and of concern riparian eucalypt woodland (RE 11.3.4) associated with tributaries of Kangaroo Creek.

Impacts on endangered and of concern REs will be minimised by marking the areas to be cleared to avoid unnecessary loss of these communities. Progressive rehabilitation of mined areas will also be undertaken over the life of the project using species characteristic of the original ecosystems wherever possible. Residual impacts on endangered and of concern vegetation communities are addressed in a separate Environmental Offsets chapter prepared as part of the EIS for the project.

8.3.2 High Value Regrowth

Clearing for the establishment of open cut pits and supporting infrastructure will result in the loss of 20.8 ha of endangered HVR RE. This clearing area is mostly comprised of regrowth brigalow vegetation communities (**Table 8.4**).

Table 8.4 Area of Clearing for High Value Regrowth RE

Biodiversity Status	REs Represented as HVR	Impact Area (ha)
No Concern at present	HVR 11.8.5	0.6
Endangered	HVR 11.3.1, HVR 11.4.9, HVR 11.8.13, HVR 11.9.5	20.8

8.3.3 Threatened Ecological Communities

Clearing for the establishment of open cut pits and supporting infrastructure will result in an overall reduction in the extent of TECs in the project area. **Table 8.5** summarises the area of threatened ecological communities within the project footprint.

Table 8.5 Area of Clearing for Listed TECs

TEC	REs Represented	Impact Area (ha)
Brigalow (<i>Acacia harpophylla</i>) dominant and co-dominant	11.3.1, 11.4.8, 11.4.9, 11.5.16, 11.9.5	316.3
Natural grasslands	11.8.11	84.4
Semi-evergreen vine thicket	11.8.13	18.0

Open cut mining activities may also result in the altered distribution of cracking clay soils supporting brigalow and natural grassland communities and soils supporting the SEVT TEC. It may be desirable to stockpile soils from these areas separately for use in rehabilitation and/or offset areas. Brigalow and SEVT communities are also fire-sensitive and may be impacted by altered fire regimes in the project area. Management of weeds is required to prevent weed invasion and associated habitat degradation and/or increased fire risk. In particular, management would need to address:

- Edge effects in the areas of SEVT TEC affected by the new rail loop
- Measures to prevent the spread of parthenium into adjacent areas of natural grassland TEC in the vicinity of the East Pit 2.

Impacts on TECs in the project area will be minimised as described in **Section 8.1**. Impacts which cannot be avoided, minimised or mitigated in this manner are addressed in a separate Environmental Offsets chapter prepared as part of the EIS for the project.

8.3.4 Watercourse Vegetation

Clearing of watercourse vegetation has been calculated in accordance with the Regional Vegetation Management Code for the Brigalow Belt and New England Tablelands bioregions (DERM 2009a) which specifies the following buffer distances from the high bank of watercourses:

- 50 m for stream order 1 or 2 watercourses
- 100 m for stream order 3 or 4 watercourses
- 200 m for stream order 5 or greater watercourses.

Based on these definitions a total of 247.3 ha of remnant watercourse vegetation would be removed from the project area. Clearing areas for remnant vegetation within these buffer distance by project stage area summarised in **Attachment F**. Impacts on remnant watercourse vegetation would be mitigated by:

- Designing the central infrastructure corridor to minimise the number of waterway crossings where it intersects Kangaroo Creek and tributaries (this has been incorporated into the design assessed in this report).

- Maintaining adequate buffers from the Suttor River riparian corridor, and providing appropriate scour and erosion protection to maintain the integrity of vegetation and ecological function.
- Restricting disturbance of watercourse vegetation to that necessary for the works.
- Maintaining adequate buffer distances from watercourses not directly impacted by mining.
- Emulating natural vegetation communities along realigned watercourses through planting endemic species characteristic of the original vegetation communities impacted.

Residual impacts on watercourse vegetation are addressed in a separate Environmental Offsets chapter prepared as part of the EIS for the project.

8.3.5 Significant Flora Species

***Bertya pedicellata* - Known to Occur in the Project Area**

Bertya pedicellata is listed as near threatened under the NC Act and was recorded from RE 11.7.2 in the central part of the project area. This species occurs in a wide range of habitat types, and has been recorded flowering from March–November with fruit from August–November. Threats to this species are unknown but are likely to include habitat loss, inappropriate fire regimes, mining and construction activities.

Recorded populations within the project area are outside the project footprint and will not be impacted by mining and associated activities. Approximately 240.7 ha of potential habitat for this species will be cleared from the North Pit footprint, West Pit footprint and Northern Infrastructure Area. Access to these areas was limited during the field survey and it is considered possible that they contain additional populations of this species.

Fragmentation of potential habitat for this species would also occur, with remaining habitat exposed to edge effects and associated potential for weed invasion and degradation of habitat. Impacts on potential habitat for this species will not be significant if appropriate weed, pest and fire management regimes are adopted.

***Cerbera dumicola* - Known to Occur in the Project Area**

Cerbera dumicola is listed as near threatened under the NC Act and is known to occur at a number of locations in the far northwest of the project area. Known populations of this species in the project area were associated with REs 11.7.2, 11.7.4 and 11.7.6. The ecology of this species is not well understood but threats are likely to include habitat loss, inappropriate fire regimes, mining and construction activities.

Recorded populations within the project area are outside the project footprint and will not be impacted by mining and associated activities. Approximately 1257.7 ha of potential habitat for this species will be cleared from the North Pit footprint and the northern extent of the West Pit. Access to these areas was limited during the field survey and it is considered possible that they contain additional populations of *C. dumicola*. If present, mining in these areas would result in the loss of *C. dumicola* plants from the pit footprints.

Fragmentation of potential habitat for this species would also occur, with remaining habitat exposed to edge effects and associated potential for weed invasion and degradation of habitat. This species has been observed to re-sprout following fire (SGAP 2007); while this species is therefore expected to be relatively fire-tolerant too frequent fires may have an adverse impact on this species. Appropriate fire management regimes should be implemented to minimise the potential for adverse impacts on this species.

***Kelita uncinella* - Known to Occur in the Project area**

Kelita uncinella has not been assessed by any scientific committee and has no legislative status at present. However, the species description by Bean (2010) recommends a conservation status of endangered. Analysis of habitat data for this species reported by Unidel (2011) suggest that *K. uncinella* occupies habitats protected from fire and is likely to be a fire-sensitive species. Buffel grass was also observed to be absent or rare from sites supporting known populations and may out compete *K. uncinella* in suitable microhabitats.

No known populations will be impacted as a result of the project. Indirect impacts could arise from alterations to fire regimes within the species' habitat or through actions that increase the incursion of buffel grass. Indirect impacts on potential habitat for this species would not occur provided appropriate weed, pest and fire management regimes are adopted. Given the restricted distribution of this species, it is recommended that known populations are monitored during the construction and operational phases of the project.

8.3.6 Flora of Bioregional Significance

Three flora species of Bioregional Significance were recorded from the project area: (i) *Diospyros germinata* (Site Q24); (ii) *Melaleuca fluviatilis* (Site Q20); and (iii) Burdekin plum (Sites Q47; T48 and Q49) (**Figure 6.10⁷**). The specimens of *Diospyros germinata* and *Melaleuca fluviatilis* are outside of the project and are unlikely to be significantly affected by the project. Sites at which Burdekin plum was recorded fall within the project footprint, and it is expected that these specimens will be removed. However, Burdekin plum is a widespread and common species in the tropical north eastern portions of Queensland.

8.3.7 Type A Flora Species

Four Type A flora species were recorded from the project area: (i) Broad-leaved bottle tree – ten specimens were recorded, four of which fall within the project footprint; (ii) Kurrajong – one specimen was recorded, which falls within the project footprint; (iii) narrow-leaved bottle tree - two specimens were recorded, which fall within the project footprint; and (iv) black orchid – two specimens recorded, which fall within the project footprint. All of these species remain widespread and reasonably common in the Brigalow Belt Bioregion.

⁷ The noted flora survey sites are shown in **Figure 4.1**.

8.3.8 Culturally, Commercially and Recreationally Significant Species

Section 6.3.5 describes culturally, commercially and recreationally significant species. These species are scattered throughout the project area, and occur within the project footprint. However, these species are also reasonably widespread and common in the Brigalow Belt Bioregion.

8.4 IMPACTS ON TERRESTRIAL FAUNA VALUES

Table 8.6 provides a summary of impacts on potential habitat for threatened and migratory fauna species based on RE associations (ie remnant vegetation) within the project area. It should be noted that these calculations provide an estimate of habitat loss based on broadly suitable habitat only. As such, areas of broadly suitable habitat which have been identified may not actually be of significance, or therefore require mitigation, when determining impacts on the species in question. The following sections provide an assessment of impacts on terrestrial fauna values known or likely to occur within the project area.

Table 8.6 Summary of Impacts on Threatened Fauna and Migratory Species

Species		Status		Brief Habitat Requirements	RE Associations within the Project Area	Area (ha) of Remnant Vegetation Impacted within the Project area
Common Name	Scientific Name	EPBC Act	NC Act			
Known to Occur						
ornamental snake	<i>Denisonia maculata</i>	V	V	Woodlands and open forests containing brigalow (<i>Acacia harpophylla</i>), gidgee (<i>Acacia cambagei</i>), blackwood (<i>Acacia argyrodendron</i>) or coolabah (<i>Eucalyptus coolabah</i>) communities or pure grassland associated with gilgais or other wetlands. Microhabitat features include coarse woody debris such as fallen timber as well as rocky areas and deep soil cracks.	11.3.1, 11.3.25, 11.3.4, 11.4.2, 11.4.8, 11.4.9, 11.8.11, 11.8.13, 11.8.4, 11.8.5	E – 123.5 OC – 251.1 NC – 262.9
cotton pygmy-goose	<i>Nettapus coromandelianus</i>	–	NT	Deep, freshwater lagoons, swamps and dams with floating or emergent vegetation adjacent to hollow bearing trees or stags.	11.3.1, 11.3.2, 11.3.25,11.3.4, 11.3.27	E - 8.7 OC - 10.3
black-necked stork	<i>Ephippiorhynchus asiaticus</i>	–	NT	Ephemeral and permanent wetlands, including floodplains or flooded pastures and swamps as well as shallow banks of rivers.	11.3.1, 11.3.25, 11.3.4, 11.3.27	E - 8.7 OC - 10.3
square-tailed kite	<i>Lophoictinia isura</i>	–	NT	Open forest and woodlands generally near a watercourse.	11.3.25, 11.3.2, 11.3.4, 11.5.1, 11.7.1, 11.7.4 11.7.6	OC – 224.4 NC - 1037.1
squatter pigeon	<i>Geophaps scripta scripta</i>	V	V	Open dry eucalypt woodland on sandy soil near permanent water.	11.3.2, 11.3.4, 11.3.25, 11.5.1, 11.7.4, 11.7.6,	OC - 10.3 NC - 1037.1

Species		Status		Brief Habitat Requirements	RE Associations within the Project Area	Area (ha) of Remnant Vegetation Impacted within the Project area*
Common Name	Scientific Name	EPBC Act	NC Act			
little pied bat	<i>Chalinolobus picatus</i>	–	NT	Open, eucalypt forests and woodlands with hollow bearing trees or stags.	11.3.1, 11.3.2, 11.3.4, 11.3.25, 11.5.1, 11.7.1, 11.7.2, 11.7.4, 11.7.6, 11.9.5	E – 8.7 OC – 224.4 NC – 1277.8
eastern great egret	<i>Ardea modesta</i>	M	-	Freshwater wetlands and intertidal mudflats.	11.3.2, 11.3.25, 11.3.27	OC – 8.7
white-bellied sea-eagle	<i>Haliaeetus leucogaster</i>	M	-	Permanent waterbodies including: estuaries, dams and wetlands.	11.3.25, 11.3.27,	OC – 8.7
Latham's snipe	<i>Gallinago hardwickii</i>	M	-	Open, freshwater wetlands with low, dense vegetation including: swamps, flooded grasslands or heathlands and bogs.	11.3.25, 11.3.27	OC – 8.7
rainbow bee-eater	<i>Merops ornatus</i>	M	-	Ubiquitous, potentially foraging over any habitat type. Nests in soft, loamy soil or flat ground of a bank.	Aerial foraging over all RE types	E – 313.9 OC – 465.2 NC – 1612.0
rufous fantail	<i>Rhipidura rufifrons</i>	M	-	The undergrowth of woodlands, forests, coastal and sub-coastal scrub including semi evergreen vine thicket, riparian areas and mangroves.	11.3.25, 11.3.27, 11.9.5	OC – 8.7

Species		Status		Brief Habitat Requirements	RE Associations within the Project Area	Area (ha) of Remnant Vegetation Impacted within the Project area*
Common Name	Scientific Name	EPBC Act	NC Act			
Likely to Occur						
black-throated finch (southern)	<i>Poephila cincta cincta</i>	E	E	Riparian areas within open eucalypt, acacia or melaleuca forest and woodlands	11.3.1, 11.3.2, 11.3.25, 11.3.4, 11.3.27, 11.4.2, 11.4.8, 11.4.9, 11.5.1, 11.5.16, 11.5.3, 11.5.9, 11.8.11, 11.8.13, 11.8.4, 11.8.5	E – 207.9 OC – 160.0 NC – 238.3 ⁸
common death adder	<i>Acanthophis antarcticus</i>	–	NT	Remnant or mature regrowth vegetation with a shrubby understorey and dense leaf litter. Diverse vegetation communities afford habitat (eg wet sclerophyll forests, woodlands, shrub lands, grasslands, rainforest and coastal heath lands).	11.3.1, 11.7.4, 11.7.6, 11.7.1x1, 11.9.5	E – 8.7 OC – 214.1 NC – 1016.9
Australian painted snipe	<i>Rostratula australis</i>	V, Mi	V	Ephemeral and permanent shallow, freshwater wetlands and inundated grasslands, sewage ponds and dams.	11.3.25, 11.3.2, 11.3.27, 11.9.5	OC – 8.7
cattle egret	<i>Ardea ibis</i>	M	-	Grassy, open pastures and shallow, open wetlands.	11.3.2, 11.3.25, 11.3.27,	OC – 8.7
fork-tailed swift	<i>Apus pacificus</i>	M	-	High to low airspace over varied habitat (rainforest to semi-desert).	Aerial foraging over all RE types	E – 313.9 OC – 465.2 NC – 1612.0

⁸ The quantum of impact was determined by buffering potential watering sites for this species by a distance of 1 km and determining the extent of remnant grassy woodland within this area.

Species		Status		Brief Habitat Requirements	RE Associations within the Project Area	Area (ha) of Remnant Vegetation Impacted within the Project area*
Common Name	Scientific Name	EPBC Act	NC Act			
white-throated needletail	<i>Hirundapus caudacutus</i>	M	-	Ubiquitous, potentially foraging over any habitat type.	Aerial foraging over all RE types	E – 313.9 OC – 465.2 NC – 1612.0
Painted snipe	<i>Rostratula benghalensis</i> s. lat.	M	–	The painted snipe inhabits shallows and margins of freshwater wetlands, dams, marshy areas and wet pastures.	11.3.25, 11.3.2, 11.3.27, 11.9.5	OC – 8.7
satin flycatcher	<i>Myiagra cyano-leuca</i>	M	-	Satin Flycatchers inhabit heavily vegetated gullies in eucalypt-dominated forests and taller woodlands, and on migration, occur in coastal forests, woodlands, mangroves and drier woodlands and open forests	Riparian forest on adjoining the Suttor River	0

Note *: Area calculation based on RE biodiversity status, Endangered (E), Of Concern (OC), No Concern at Present (NC).

8.4.1 Threatened Fauna

Ornamental snake – Known to Occur

The loss or degradation of riparian habitat surrounding drainage features, dams, wetlands and particularly gilgai is expected to have the largest impact on the ornamental snake. The main area of high value habitat are the lower areas of the clay floodplains containing regenerating brigalow stands and gilgai located within the footprint of South Pit 2 as well as DEHP-mapped essential habitat (**Figure 5.5**) within the spoil pile footprint associated with the West Pits.

The drainage features within the project area, particularly in the southern half, are also habitat of value for the ornamental snake. The relocation of the watercourse between West Pit 1 and South Pit 1 and the intersection of creek crossing by the central infrastructure corridor is also expected to impact ornamental snake habitat.

The Draft Referral guidelines for the nationally listed Brigalow Belt reptiles (DSEWPac 2011) determined that clearing two or more hectares of “important habitat” represents a significant threat to the ornamental snake. It was also determined that the alteration of water quality or quantity affecting four or more hectares of important riparian habitat is significant to this species. Given the location of the habitat within a central activity area within the project area, there is limited potential for rehabilitation of the disturbed habitat.

Management measures would focus on minimising the impact on riparian vegetation associated with the location of the spoil dump within the Suttor River floodplain. Adequate buffers would be maintained from retained vegetation and scour protection provided for the spoil dump to minimise the potential for erosion, sedimentation and associated impacts on water quality, particularly during larger flood events (KBR 2012a). Vehicle movements around the spoil dump would be minimised, particularly at night, to reduce the risk of vehicle strike and the disruption associated with lighting in this habitat.

Squatter pigeon (southern) – Known to Occur

General threats to the squatter pigeon population are primarily associated with habitat degradation and increased predation from introduced species (QPWS 1999a). Historically, populations of the squatter pigeon declined during the late nineteenth and early twentieth centuries. However, the decline in numbers has now slowed. There is an abundance of suitable available habitat in Central Queensland and the species is relatively widespread and locally abundant throughout its range (SEWPaC 2012d). Threats to this species include loss of habitat due to clearing for agricultural or industrial purposes, habitat degradation by grazing herbivores (eg sheep, cattle, rabbits) and excessive predation, particularly by cats and foxes.

Grassy woodland habitat will be removed from the project area as a result of the establishment of the West Pit and South Pit 1 footprints. However, this area is likely to represent an overestimate of impacts on habitat for this species, as squatter pigeon typically occurs in proximity to water. Clearing would result in a localised reduction of breeding and foraging habitat in the southern part of the project area however, this habitat type is widespread in the region and impacts on the species as a whole would not be significant.

There is also a risk of mortality to both adult birds and young due to vehicle strike as this species is ground-dwelling. Where possible, clearing in proximity to water would be undertaken outside breeding times (September through October), with fauna spotter-catchers employed to search for nests and/or stir up birds ahead of clearing works outside these times. Speed limits would be imposed on haul roads close to watering points during the construction and early operational phases of the project prior to the removal of suitable habitat from within the project footprint.

Little pied bat – Known to occur

The little pied bat was detected at five sites (T1–T5) within the southern section of the disturbance footprint and will be directly impacted by the loss of vegetation during the development of South Pit 2 and the East Spoil Pit 2. This species roosts in tree hollows of mature trees, such as eucalypts and can forage up to 17 km from a roost site (Churchill 2008). The highest density of hollow-bearing trees in the project area would be expected to occur along the Suttor River and within poplar box woodlands (RE 11.4.2) around site H15.

Remnant vegetation associated with little pied bat habitat within the project area may be affected through the phases of the project. Subject to appropriate management of the spoil dump located on the edge of the floodplain as described elsewhere in this report, no impact on hollow-bearing trees in the Suttor River riparian zone would be expected to result from the project. Mature hollow-bearing trees would be lost from the poplar box woodlands near site H15 and also in other areas of remnant vegetation within North Pit 1, the Northern Infrastructure Area, West Pit 1, 2 and 3, South Pit 2, East Pit 2 and South Pit 1.

Habitat fragmentation and loss of connectivity may also affect the little pied bat. Little pied bats appear to be most scarce in highly fragmented landscapes; however the habitats where they do persist are well-connected, small patches of native vegetation (IUCN 2012). The habitat loss within the footprint of West Pit 3 and the associated spoil pile will fragment high value habitat resulting in an isolated stand of remnant vegetation. Other impacts include light pollution and increased dust levels which may interfere with insect behaviour and breeding resulting in loss of food sources for bats.

Consideration should also be given to connectivity in habitat through the central part of the project area.

Cotton pygmy-goose – Known to Occur

The greatest impact on the cotton pygmy goose is expected to be the removal or degradation of permanent and/or ephemeral wetlands as well as the surrounding riparian habitat, as this species is almost entirely aquatic and utilises these water bodies and nearby stags as foraging and breeding habitat. The cotton pygmy-goose was observed within the southern dam at H2 located within the footprint of West Pit 1. The cotton pygmy-goose is likely to use both farm dams in the southern section of the disturbance footprint and the nearby section of Suttor River (in times of inundation). While the two farm farms (H2 and H13) are within the disturbance footprint, the project is not expected to impact the Suttor River pending the appropriate management of the adjacent spoil piles.

The removal of the dams and wetland areas at H2 and H13 will incur a loss of foraging and breeding habitat for this species, however as the cotton pygmy-goose is highly mobile it is expected that this species can migrate to adjacent water bodies with suitable fringing vegetation. Disturbance to other drainage features such as the creek diversion between South Pit 1 and 2 and the central infrastructure corridor creek crossings which approach the Northern Infrastructure Area are not expected to affect the cotton pygmy goose as this species is likely to use a variety of wetlands and dam areas seasonally and capable of relocating with changes in the availability of suitable wetland habitat.

Black-necked stork – Known to Occur

The black-necked stork is expected to be most affected by the loss of foraging and breeding habitat within the project area. This species forages and nests adjacent to permanent or ephemeral wetlands and was detected foraging in the wetland associated with the dam at H2. Dams in the southern half of the disturbance footprint, particularly those within the West Pit 1 and South Pit 1 footprint provide high value breeding and foraging habitat for the black-necked stork.

While other suitable foraging and nest sites occur outside of the project area, this species is secretive and nests in isolated pairs in wetlands with low levels of disturbance (Dorfman *et al* 2001). Light and noise resulting from the construction, operation and decommissioning stages of the project may disrupt black-necked stork foraging or breeding behaviour and displace them from the local area.

Other potential impacts as a result of the phases and activities associated with the project include increased abundance of cane toads, road mortality and collision with barbed wire fences and overhead feeder lines. With a wingspan of up to 2 m, collision with powerlines constituted the main cause of anthropogenic mortality within the black-necked stork distribution in NSW (Clancy 2010). To a lesser extent, collision with barbed wire fences occurred more with juvenile birds.

Bird flight diverters attached to feeder lines are known to reduce to avian collisions with powerlines and should be considered when developing mitigation strategies. Plain wire, instead of barbed, may reduce juvenile black-necked storks (as well as other species prone to collision (eg kangaroos, emus) collision and probably mortality. A pest species management plan and a strategy to reduce vehicle collisions should also be developed.

Black-throated finch – Likely to Occur

This species was targeted during the survey with repeat visits to dams and wetlands with the goal of recording this species coming in to water. A pair of black-throated finches was tentatively recorded in proximity to the large wetland at H2. This record is treated as tentative because it is based on a fleeting glimpse of two birds without the aid of binoculars and the fact that the species can be readily confused with other finches. The precautionary principal has been applied and the species is treated as though likely to be present. As there are no previous records of this species in or near the project area, it is thought that these individuals may have dispersed along the Suttor River following consecutive years of high summer rainfall. It is not confirmed whether these individuals were the northern subspecies or the threatened southern species and for the purpose of this assessment, a precautionary approach assumed that the species observed is the threatened southern sub-species.

The main impact on the black-throated finch is potentially the removal or degradation of riparian habitat. While the black-throated finch inhabits open woodlands and forest with a grassy understorey, almost all recent records, south of the tropics, have been in riparian habitat (BTF Recovery Team 2004). The foraging habitat of the black-throated finches requires access to water and grass seeds while breeding habitat is variable. Nesting may occur in a fork of a tree, shrub, sapling or hollow of a native or non-native species in remnant or non-remnant vegetation (DSEWPac 2012c). The relatively broad breeding microhabitat suggests that distance to a suitable water source may be a limiting habitat factor. The dams located at H2 and H13 within the footprint of West Pit 1 and South Pit 1, respectively, is expected to have the largest effect on black-throated finch in terms of habitat loss as they sites afford high value wetlands fringed by eucalypt species and Brigalow adjacent to pastoral grasslands. The Suttor River riparian corridor is also considered to afford breeding and foraging habitat for the black-throated finch. Impacts on this species may be mitigated by conducting detailed searches of nesting habitat within proximity to important water sources (ie transects along the Suttor River riparian corridor and dam at H2) and replicating suitable habitats where possible.

Subject to appropriate management of weeds, introduced fauna species and fire regimes, no additional impacts on this species are expected to result from the project.

Square-tailed kite – Known to Occur

The removal or degradation of vegetation along drainage features, such as the Suttor River and permanent water sources are expected to have the largest effect on square-tailed kite breeding and foraging habitat. This species constructs nests in the fork or on a large limb of mature eucalypts within 1 km of water (Aumann and Baker-Gabb 1991).

Based on RE associations, approximately 10 ha of breeding habitat occur in the project area while foraging habitat would also include areas of non-remnant vegetation. This figure does not account for the availability of microhabitat features with the REs, therefore the affected high value breeding habitat may be more constrained within the project area and disturbance footprint. With the avoidance of wetlands and drainage features by project infrastructure where ever practicable, potential impacts on these highly mobile species are expected to be minor.

Common death adder – Likely to Occur

The main effect on the death adder as a result of project development will be the loss of habitat within shrubby remnant or mature eucalypt or acacia woodland (particularly in Brigalow). Potential habitat occurs throughout the project area but specifically areas within the footprint of South Pit 2, West Pit 3 and the northern section of the central infrastructure corridor and the Northern Infrastructure Area were identified as high value areas for this species.

Additional impacts on the common death adder as a result of project development include increased road mortality, habitat alternation due to weed establishment and potential changes in fire regimes and the increased abundance of cane toads. Conversely, stored equipment/supplies may create shelter resources which could have safety and potentially mortality implications.

Impacts on this species would be managed by employing fauna spotter-catchers to flush out individual animals prior to clearing in remnant areas and implementing appropriate weed, pest and fire management protocols and measures to reduce vehicle strike. This species is venomous and personnel interacting with this species should be trained in the management and handling of venomous snakes.

8.4.2 Migratory Fauna

There are ten EPBC-listed migratory species that occur or have the potential to occur within the project area. The potential impacts to migratory species in the project area are predicted to be minor or negligible as many of the species are highly mobile and capable of relocating with changes in the availability of suitable wetland habitat. There are no migratory species where an ecologically important proportion of the population will be impacted.

Eastern great egret – Known to Occur

The removal or degradation of permanent and/or ephemeral wetlands is likely to have the largest effect on the eastern great egret. Gilgais, inundated flood plains, dam sites and water courses, particularly those concentrated in the south-western section of the project area, afford foraging habitat for this species. The large wetland associated with the dam at H2 and the dam at H13 are located within the footprints of West Pit 1 and South Pit 1, however the dam at H19 and the riparian areas along the Suttor River are located outside the development footprint and are likely to experience little disturbance. The spoil pile however, located west of South Pit 1 should be managed to reduce the probability of habitat degradation within the Suttor River riparian areas.

Disturbance to other drainage features such as the creek diversions between South Pit 1 and 2 and the central infrastructure corridor creek crossings approaching the Northern Infrastructure Area are not expected to affect the eastern great egret as this species is highly mobile and capable of relocating with changes in the availability of suitable wetland habitat.

As this species breeds in colonies in the northern parts of Australia, no disturbance to breeding habitat is expected as a result of this project.

Rainbow bee-eater – Known to Occur

The rainbow bee-eater is a common and widespread species across Australia inhabiting a range of habitat types throughout the project area including remnant and non-remnant vegetation. Foraging habitat is varied and includes disturbed and undisturbed areas while breeding habitat involves the excavation of a burrow in soil such as along a river bank, dam wall, gravel pit or soil piles. Sandy banks associated with water courses within the footprint of West Pit 2 and 3 and the Suttor River afford high quality nesting habitat. The excavation of open pits and the stocking of spoil may increase the availability of nesting sites, while conversely create susceptibility of nest disturbance through ongoing project activities.

This species utilises a broad range of habitats and all remnant vegetation within the project footprint would be considered suitable habitat for this species. Large areas of suitable remnant habitat will remain in areas which would not be disturbed by mining and the impacts presented in **Table 8.6** somewhat overstate the extent of impact. Impacts on this species may be mitigated by timing works in and around watercourses to avoid breeding times (September–February) and to deploy fauna spotter-catchers to search for nest burrows in stream banks when works during this period cannot be avoided.

Rufous fantail – Known to Occur

This species utilises the shrub layer sub canopy of woodlands adjacent to riparian areas as breeding and foraging habitat. High value habitat is located at the farm dam at site H2 and the riparian corridor of waterways in the southern section of the project area. The removal of the dam and diversion of the creek located between South Pit 1 and South Pit 2 is likely to impact foraging habitat however, this species typically breeds in moister vegetation types. Impacts on breeding habitat for this species may be mitigated by minimising impacts on the Suttor River riparian corridor as described throughout **Section 8** of this report.

White-bellied sea-eagle – Known to Occur

The white-bellied sea-eagle is generally associated with coastal environments and large, inland bodies of water or major drainages. It is a highly mobile species that is likely to use suitable habitat in the project area as a flyover resting site or potentially to forage. Project activities are expected to have a minor or negligible effect on the white-bellied sea-eagle.

Cattle egret – Likely to Occur

The cattle egret inhabits predominately shallow and open wetlands, but unlike the eastern great egret, forages away from wetlands in low lying grasslands and improved pastures. Suitable habitat for this species is more prevalent within the southern half of the project area, largely within the footprint of the West and South pits, within non-remnant vegetation in proximity to water.

As the cattle egret appears tolerant of some level of ground disturbance, the largest effect as a result of project activities is expected to be displacement during the construction phase. While noise and vehicle traffic may reduce cattle egret activity during the operational phase, new dams and cleared areas may generate foraging opportunities. Potential positive impacts for this species that may occur as a result of the development of this Project are negligible when compared with scale of disturbances already occurring from agricultural activities (with potentially positive impacts) in the vicinity of this Project. As this species breeds in colonies in the coastal areas of Australia, no disturbance to breeding habitat is expected as a result of this project.

Latham's snipe and Australian painted snipe – Known and Likely to Occur Respectively

The removal or degradation of ephemeral water bodies is likely to have the largest effect on Latham's snipe and the Australian painted snipe. High value habitat includes the large wetland associated with the dam at H2 and the dam at H13 which are both located within the footprints of West Pit 1 and South Pit 1. The creek diversion and crossings between South Pit 1 and South Pit 2 and south of the Northern Infrastructure Area is also likely to affect the habitat for these species. The dam at H19 and the riparian areas along the Suttor River are located outside the development footprint and no impacts on these areas are expected to result from the project.

Fork-tailed swift and White-throated needletail – Likely to Occur

The fork-tailed swift and white-throated needletail are highly mobile, aerial species which adapt to many habitat types. Breeding and foraging habitat are considered unlikely to be affected by the project.

Satin flycatcher – Likely to Occur

Satin Flycatchers inhabit heavily vegetated gullies in eucalypt-dominated forests and taller woodlands, and on migration, occur in coastal forests, woodlands, mangroves and drier woodlands and open forests. The satin flycatcher is considered likely to occur in riparian vegetation adjoining the Suttor River (outside of the project area).

8.4.3 Bioregional and Culturally Significant Fauna

Four species within the project area are recognised for their bioregional or culturally significance. The culturally-significant short-beaked echidna occupies a wide range of habitats across a large distribution and the effects of habitat loss as a result of land clearing are expected to be minimal. Road mortality resulting from increased traffic, particularly along the central infrastructure corridor, is likely to have the largest impact

on ground dwelling short-beaked echidna and management plans to avoid vehicle strike should be applied.

The bioregional significant Australian bustard (*Ardeotis australis*) and grey-crowned babbler (eastern) (*Pomatostomus temporalis temporalis*) also have large distributions and habitat loss is not expected to significantly impact these species.

9. CUMULATIVE IMPACTS

9.1 BACKGROUND

Cumulative impacts on terrestrial ecology values were assessed by considering impacts of current and planned projects within the Brigalow Belt North bioregion on endangered and of concern RE types and TECs associated with these projects. The proponent has identified 56 projects which have the potential to contribute to cumulative environmental and social impacts, including:

- Projects in the Bowen Basin, or within 150 km of the project
- Projects in the Isaac Regional Council, Whitsunday Regional Council, or Mackay Regional Council local government areas
- Projects for which an EIS process has commenced under the EP Act or *State Development and Public Works Organisation Act 1971*
- Projects for which an EIS process has commenced under the EP Act or SDPWO Act
- Other projects of which The proponent is aware
- Known major infrastructure projects (eg power stations or water infrastructure) that are seeking approval or have obtained development approval other than through an EIS.

The majority of planned development in the region relates to coal mining projects and, to a lesser extent, development of infrastructure to support the coal mining industry (rail and pipeline corridors). The most relevant impacts to be considered relate to the area of terrestrial remnant vegetation (which also provides an indication of fauna habitat) and the extent of sensitive vegetation communities.

It is difficult to draw consistent comparisons across all of these projects due to: (i) the varying availability of associated ecological assessment reports; (ii) the quality and manner in which impact data is expressed; and (iii) the fluid nature of development footprints which remain in the planning phase. For this reason we have adopted the (highly) precautionary approach of assuming that all vegetation within the broader project area of each project (normally a mining lease) will be removed. This clearly results in a significant overestimation of vegetation which is likely to be affected, particularly for TEC's and endangered RE's, which proponents preferentially avoid compared to the more common vegetation types. It is very important to keep this approach in mind when considering the following analysis.

9.2 METHOD

The potential impact⁹ for each project was based on the project MLs, project boundary or, for linear features, buffered lines derived from a GIS layer provided by ELP. The area of each value type potentially disturbed was summed across all projects and the contribution of the Byerwen Project to the total potential disturbance of endangered and of concern REs and TECs. To reiterate, this method adopts the highly conservative assumption that all vegetation types in a given project area would be cleared.

Potential disturbance areas were restricted to the provided MLs, distinct project boundaries and buffers for linear projects (**Attachment G**). The areas covered by Exploration Permits for Coal (EPC), Exploration Permits for Minerals (EPM) and Mineral Development Licences (MDLs) have not been included as their areas are disproportionate to the likely disturbance generated by the project. As a consequence, projects consisting of EPCs, EPMs and MDLs have been excluded from the assessment. These are:

- Anthony Project (EPM)
- Dysart East (MDL)
- Goonyella Riverside Mine (EPC)
- Goonyella Riverside Mine (MDL)
- Integrated Isaac Plains (EPC)
- Moranbah South (MDL)
- Sarum Project (EPC)
- Sonoma Project (EPC)
- Talwood Project (EPC)
- Wilunga Project (EPC)
- Winchester South (MDL).

The Conner's River Dam and Pipeline Projects have also been excluded from this assessment due to the project's cancellation in July 2012 (SunWater 2012). Projects located outside the Brigalow Belt North bioregion were also excluded from this assessment. In many cases the cumulative impact project areas overlapped. To obtain an accurate account of terrestrial vegetation potentially affected by the projects, overlapping areas were accounted for within one project only (usually within the project of the larger extent). The areas of project overlay are shown in **Attachment G**.

9.2.1 Input data

The area of endangered and of concern REs affected by the projects has been derived from certified RE mapping (Version 6.1). This data maps vegetation types according to their status under the VM Act. Potential disturbance areas for TECs have been defined in accordance with Commonwealth listing advice as described in **Table 9.1**.

⁹ It is important to understand the approach which has been used to assess potential impact. Refer to discussion provided under **Section 9.1**.

Table 9.1 Definition of TECs for Cumulative Impact Assessment

TEC	Definitions
Brigalow	All brigalow RE types within the Brigalow Belt North bioregion (REs 11.3.1, 11.4.3, 11.4.7, 11.4.8, 11.4.9, 11.4.10, 11.5.16, 11.9.1, 11.9.5, 11.9.6, 11.11.14, 11.12.21)
SEVT	All SEVT RE types within the Brigalow Belt North bioregion (REs 11.2.3, 11.3.11, 11.4.1, 11.5.15, 11.8.3, 11.8.6, 11.8.13, 11.9.4, 11.9.8, 11.11.18)
Natural grasslands	- Natural grassland REs (REs 11.3.21, 11.4.4, 11.4.11, 11.8.11, 11.9.3, 11.9.12, 11.11.17) within the following subregions of the Brigalow Belt North bioregion: - BBN6 Northern Bowen Basin - BBN9 Anakie Inlier - BBN10 Basalt Downs - BBN11 Isaac-Comet Downs - BBN12 Nebo-Connors Range - BBN13 South Drummond Basin.

9.3 ASSESSMENT OF PROJECT IMPACTS

An assessment of the cumulative impacts of the identified projects on impacted endangered and of concern REs and impacted TECs based on calculations of potential disturbance areas is provided in **Table 9.2**.

Table 9.2 Cumulative impacts on Endangered and Of concern REs

Projects	Endangered REs					Of concern REs				
	11.3.1	11.4.8	11.4.9	11.5.16	11.8.13	11.3.4	11.3.25	11.4.2	11.7.1/ 11.7.1 x 1	11.8.11
Byerwen Coal Project	8.7	34.6	62.2	190.4	18.0	1.6	8.7	156.4	214.1	84.4
Abbot Point Coal Terminal	-	-	-	-	-	-	-	-	-	-
Arrow Bowen Pipeline Project	3.2	1.6	4.4	-	1.1	10.0	22.5	0.2	-	12.2
Bow Energy Gas Pipeline	3.8	1.4	-	-	-	0.1	5.6	-	-	-
Bowen basin Coal Growth Caval Ridge	58.1	247.9	417.9	-	-	-	229.8	41.6	-	148.2
Bowen Basin Coal Growth Daunia Mine	29.8	-	77.5	-	-	-	7.5	-	-	-
Burton Project	-	-	-	-	-	167.2	276.4	-	-	24.9
Central Queensland Gas Pipeline	13.4	4.0	0.8	-	-	0.2	8.4	2.6	1.0	-
Central Queensland Integrated Rail	7.2	10.6	2.1	-	-	3.9	18.2	-	-	0.1
Clermont Coal Mine	-	-	186.8	-	-	-	-	-	-	77.6
Cows Coal	-	-	-	-	-	-	-	-	-	-
Drake Coal Project	-	-	-	--	-	52.1	-	-	-	-
Eagle Downs Coal Terminal	0.2	-	56.8	-	2.7	-	0.2	-	-	397.0
Eaglefield Expansion	-	10.5	24.2	-	52.9	-	22.9	-	-	435.1
Ellenfield Coal Mine	-	-	31.9	-	-	-	261.9	-	-	-
Goonyella Riverside Mine ML	-	31.9	665.4	-	-	19.5	165.6	-	-	-
Grosvenor Coal	-	-	0.8	-	-	0.9	11.0	4.1	-	-
Integrated Issac Plains ML	5.7	-	2.8	-	-	0.0	30.1	-	-	-
Jax Project	11.4	-	-	-	-	42.7	2.8	-	-	-

Projects	Endangered REs					Of concern REs				
	11.3.1	11.4.8	11.4.9	11.5.16	11.8.13	11.3.4	11.3.25	11.4.2	11.7.1/ 11.7.1 x 1	11.8.11
Millenium Expansion Project	-	-	162.1	-	-	-	-	-	-	-
Moorvale Coal	17.1	-	17.4	-	-	-	26.1	-	-	-
Moranbah CSG Operation	63.0	65.7	555.1	-	155.3	58.1	1756.3	633.8	60.5	1539.6
Nebo Moranbah Power Stations	-	-	-	-	-	-	8.2	-	-	-
New Lenton	-	-	-	-	-	118.9	459.3	-	-	776.9
Newlands Coal	14.7	-	277.2	-	21.2	-	240.9	-	-	636.9
Newlands Coal Extension	21.3	-	-	10.3	12.6	14.9	259.6	-	-	38.9
Northern Missing Link	0.1	0.5	5.5	-	6.0	1.1	1.0	0.5	-	4.8
NQ gas Pipeline	2.8	2.2	6.1	-	1.0	5.4	3.1	0.3	-	0.3
Olive Downs	7.2	-	1.8	-	-	-	10.2	-	-	-
PL224	-	127.7	7.2	-	-	-	174.5	-	4.3	88.3
Saraji East	61.0	109.3	165.8	-	-	-	342.1	-	-	-
Twin Hills	-	3.6	-	-	-	-	-	-	-	-
Vermont Coal	-	49.0	49.0	-	-	-	-	-	-	-
Wards Well Underground	-	-	-	-	81.8	-	86.7	-	-	1640.6
Water For Bowen Project	-	-	-	-	-	0.1	18.7	-	-	-
Total Cumulative Impacts of Projects	328.7	700.3	2780.6	200.7	352.7	496.8	4458.2	839.5	279.9	5905.9
Total Area within Bioregion	80877.0	71162.0	95498.0	3178.0	6623.0	183756.0	514852.0	34532.0	78579.0	178562.0
% of Cumulative Impacts of Projects within the Bioregion	0.4	1.0	2.9	6.3	5.3	0.3	0.9	2.4	0.4	3.3

Table 9.3 Cumulative Impacts on TECs

Projects	Brigalow TEC	Natural Grasslands TEC	SEVT TEC
Byerwen Coal Project	316.3	84.4	18.0
Abbot Point Coal Terminal	-	-	41.9
Arrow Bowen Pipeline Project	15.9	13.1	1.1
Bow Energy Gas Pipeline	6.2	0.3	-
Bowen basin Coal Growth Caval Ridge	723.9	148.2	-
Bowen Basin Coal Growth Daunia Mine	111.3	8.6	-
Burton Project	65.9	24.9	-
Central Queensland Gas Pipeline	25.8	-	0.3
Central Queensland Integrated Rail	26.2	8.2	5.8
Clermont Coal Mine	186.8	77.6	-
Cows Coal	-	-	-
Dalrymple Bay Coal Terminal	-	-	-
Drake Coal Project	-	104.5	-
Dudgeon Point Coal terminal	-	-	-
Eagle Downs Coal Terminal	127.6	518.0	2.7
Eaglefield Expansion	34.7	435.1	11.6
Ellensfield Coal Mine	114.3	-	0.7
Goonyella Riverside Mine ML	697.3	1.2	-
Grosvenor Coal	0.8	-	-
Integrated Issac Plains ML	8.5	-	-
Jax Project	11.4	-	-
Jilalan Rail Yard	-	-	-
Millenium Expansion Project	185.5	36.4	-
Moorvale Coal	69.5	-	-
Moranbah CSG Operation	945.5	1886.3	155.3
Nebo Moranbah Power Stations	-	-	-
New Lenton	11.5	776.9	-
Newlands Coal	514.8	636.9	21.2
Newlands Coal Extension	1440.3	90.1	14.7
Northern Missing Link	6.3	4.8	13.7
NQ gas Pipeline	11.2	0.3	4.5
Olive Downs	22.0	-	-

Projects	Brigalow TEC	Natural Grasslands TEC	SEVT TEC
PL224	134.9	88.3	-
Saraji East	336.0	1.4	-
Sarsfield Project	-	-	-
Twin Hills	3.6	-	-
Vermont Coal	98.0	-	-
Wards Well Underground	4.3	1640.6	405.7
Water For Bowen Project	-	-	-
Total Cumulative Impacts of Projects	6256.3	6586.3	697.4
Total area within Bioregion	579883.0	35606.0	12042.0
% of Byerwen Coal Project Impact within Total Cumulative Impact	5.1	1.3	2.6
% of Byerwen Coal Project Impact within Bioregion	.1	.2	.1
% of Cumulative Impacts of Projects within Bioregion	1.1	18.5	5.8

10. CONCLUSIONS

The project area supports a relatively diverse range of vegetation communities and terrestrial flora and fauna species. While large parts of the project area are cleared, key areas of remnant vegetation are associated with the Suttor River in the west, Kangaroo Creek and surrounding areas in the north, and the east-west band of terrestrial vegetation associated with elevated areas in the centre of the project area. Including the previously unmapped 581 ha of RE 11.5.16 recorded during ground-truthing, the project area supports approximately 15% of the remaining RE 11.5.16 (*Acacia harpophylla* and/or *Casuarina cristata* open forest in depressions on Cainozoic sand plains/remnant surfaces) mapped in the Brigalow Belt North bioregion. The project area also supports important areas of the brigalow, semi-evergreen thicket and natural grasslands TECs.

Remnant vegetation in the project area has linkages to recognised State-significant biodiversity corridors but does not itself form part of these corridors. Overall, the site sits on the eastern edge of large, contiguous tracts of vegetation to the west of the project area, with more intact landscape-scale linkages in the north. Key habitat resources for fauna identified through the assessment include permanent water sources associated with farm dams, riparian corridors associated with the Suttor River and Kangaroo Creek, gilgai habitats in the south of the project area and large tracts of contiguous remnant vegetation in the northern and central parts of the project area.

In particular, the dam located at site H2 was observed to support a high diversity of wetland and small passerine birds and is considered to provide a habitat resource for a number of threatened and migratory species. Further fauna surveys may confirm the presence and distribution of the black throated finch in the project area. The ornamental snake was also observed within gilgai habitats and riparian corridors along the Suttor River.

The project area is also known to support two threatened flora species (*Bertya pedicellata* and *Cerbera dumicola*) and one previously undescribed genus in the family Amaranthaceae (*Kelita uncinella*) which was discovered during field surveys (this species is not impacted by the project).

Land clearance and habitat loss associated with the establishment of open cut pits and supporting infrastructure are the main impacts on the terrestrial flora and fauna values of the project area. The project will result in the loss of approximately 2391.1 ha of remnant native vegetation from within the footprint. This will result in an overall reduction in the extent of endangered (313.9 ha) and of concern (465.2 ha) vegetation communities in the project area. Of note is the disturbance of 190.4 ha (approximately 5% of the remaining RE 11.5.16 (brigalow TEC) in the Brigalow Belt North Bioregion) predominantly from the northern extent of the West Pit footprint. This is mainly due to the restricted extent of this RE, with only 3187 ha mapped by DERM for the bioregion, although it is noted that an additional 581 ha over and above that mapped by DEHP was recorded as a result of vegetation mapping undertaken for the project. This finding is significant as it suggests that there may also be a considerably greater extent of this

RE within the Brigalow Belt Bioregion. It also considered likely that this area contains populations of *Cerbera dumicola*, which is listed as near threatened under the NC Act.

Removal of permanent water sources associated with farm dams may also result in the loss of a habitat resource for a suite of threatened and migratory species. Impacts on terrestrial flora and fauna values have been mitigated by concentrating development in cleared areas in the south of the project area. Other specific considerations to be addressed through future project design and development include:

- Maintaining adequate buffers from the Suttor River riparian corridor, and providing appropriate scour and erosion protection to maintain the integrity of vegetation and ecological function.
- Provision for fauna movement along riparian corridors associated with Kangaroo Creek and the appropriate design of waterway crossings where this intersects the central infrastructure corridor.
- Measures to limit vegetation loss and impacts on connectivity where the central infrastructure corridor intersects laterite 'jump-ups' in the central part of the project area.
- Management of edge effects and habitat for less mobile species in areas of terrestrial vegetation which will be isolated by the establishment of the West Pit.

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ATTACHMENT A – TERRESTRIAL FLORA AND FAUNA SURVEY METHODOLOGY

Flora Methodology

University of Central Queensland 2009 Survey Methodology

A total of 27 vegetation sites were assessed within EPC 614. Vegetation communities were identified on site with reference to Regional Ecosystem Mapping (Environmental Protection Agency, 2005), aerial photographs and ground truthing. Sites were established within all major vegetation communities, where access permitted, and were assessed for species richness and abundance, topography, substrate, and faunal habitat values. Where possible at least one site was established in each vegetation type and up to five in vegetation types with sufficiently large areas. Vegetation sites were concentrated in the EPC 614 Study Area, and where landholders permitted access. Sites were 2,500 m² and the shape varied from squares on broad vegetation patches to rectangular in riparian zone and drainage lines. The large flat areas and low hills of the study area meant that there was no particular orientation of sites except in the riparian zone and drainage lines where the rectangular plots ran in the direction of the waterway.

Field proformas consistent with the DERM system for the collection of site-based flora and habitat data (Melzer, 2004) were used to assess vegetation sites. Specific data collected included:

- landform pattern codes, landform element codes, soil codes, field texture codes, land surface features, disturbance type and foliage cover class (CORVEG) & (McDonald et al., 1990);
- vegetation classification (Specht, 1970);
- height of tree and shrub layers (m);
- dominant tree species in each tree or shrub layer (1-4 scale);
- abundance of species in each tree or shrub layer (1-7 scale);
- basal area of tree species in overstorey layers at two points 50 m apart using a basal area wedge.

Species abundance and basal areas were averaged for the vegetation Sites within a vegetation type. Plant species were identified on site where possible and other specimens collected for confirmation in the laboratory (Harden et al., 2006; Melzer and Plumb, 2007; Milson, 2002a; Milson, 2002b; Stanley and Ross, 1983). Species identification of unidentified collected samples was confirmed by the Queensland Herbarium. Weed species were named and classified according to the Queensland Government (Henderson, 2002; Land Protection, 2004).

Vegetation units were identified from 1:40,000 scale colour photographs (taken in 2000) of Byerwen 8455 Run 4 p112-4, Run 5 p164-7, Run 6 p184-7 and Run 7 p238-40 and from scale photographs at 20 000 ft (taken in 2001) Byerwen 2 Runs 1-4 p1-46, from Google Earth satellite imagery (Map Data Sciences Pty Ltd, 2009) and from ground truthing. Plant community classifications were derived from Walker and Hopkins (1990)¹. Vegetation mapping was then produced by digitising the polygons from the rectified aerial photographs using ArcMap Version 9.3 software. The map was projected into the current Australian standard of the Geocentric Datum of Australia 1994 (GDA94)

AMEC (Formerly Unidel) 2010 and 2012 Survey Methodology

Field survey methods followed Queensland Herbarium standards as identified in Neldner *et al.* (2005) using a combination of formalised secondary, tertiary and quaternary level sampling procedures, as well as informal site observation. Secondary sites consisted of a 50m x 10m plot located along contour with attempts made to avoid sampling across Vegetation Community (VC) boundaries. Crown intercept transects were extended to 100m for the purpose of providing sufficient data for reference sites as required for map amendment procedures. Bitterlich measurements, as described

¹ Walker J. & Hopkins M.S. 1990, 'Vegetation', in R.C. McDonald, R.F. Isbell, J.G. Speight, J. Walker & M.S. Hopkins, *Australian soil and land survey. Field handbook*, 2nd edition, Melbourne, Inkata Press.

in Grosenbaugh (1952), were used to record community basal area at all sites except in highly linear communities where the method proved inappropriate.

Full species lists for all strata were established during the secondary sampling procedure wherein the 500m² plot was intensively sampled followed by a detailed search of the vicinity. The abundance of all species within each plot was recorded by stem counts and by a visual assessment using a ranking of 1 to 5 cover-abundance based on the Braun-Blanquet method.

In grassland vegetation units, the groundcover assessments were extended along a 100 m transect to provide ten 1 m x 1 m subplots at 10 m intervals. Within each of these 1 m x 1 m subplots or quadrats, number of grass tussocks (or individual plants for non-grass species) by species was assessed in addition to the visual cover estimations. This approach was adopted to assess whether grasslands met the condition thresholds for the EPBC Threatened Ecological Community Natural Grasslands of the Queensland Central Highlands and the northern Fitzroy Basin.

Tertiary sites were completed in a similar fashion to secondary procedure, although non-woody species were not recorded. Quaternary sites comprised a description of floristic structure, composition, and associated landform. Wherever a VC was considered to be potential critical habitat for EVNT species, the search area was broadened and a more extensive species list was established from an extended search area. Flora species were also recorded on walking traverses, again with particular attention toward known and potential habitats of EVNT species as well as declared weeds and locally significant taxa.

Botanical voucher specimens were collected throughout the field survey to verify site floristics and enable identification of those species that were problematic.

Fauna Methodology

Fauna trapping methodologies are outlined below with a summary of survey effort provided in Table 2.

University of Central Queensland Fauna Methodology, 2009

Six vertebrate fauna sampling sites were established within the major regional ecosystems and habitat types within the study area. Each site surveyed was 3 ha in area (approximately a 100 m radius around each trap site within the same habitat, or a linear shape in the case of riparian habitats) and was surveyed using standard techniques over a five day survey period in two seasons. The techniques employed at each site consisted of:

- a 30 m drift fence incorporating 3 shaded 20 litre buckets and eight reptile traps placed on either side of the drift fence at each end and between the buckets;
- twenty-three Elliot A and two Elliot B traps for small mammals baited with a mixture of peanut butter, rolled oats and pet jerky were placed at 5 to 20 m intervals depending on the terrain;
- 3 large Mawbey Traps for possums, quolls and bandicoots baited with jam coated apple and pet jerky were placed at the base of trees in woodland sites and under grass clumps at the grassland site;
- intensive diurnal searches for reptiles and animal traces such as scats, tracks, skeletal remains, scratch marks on trees and carcasses (2 person hours during the middle part of the day at each site);
- intensive nocturnal searches for nocturnal mammals, birds, geckos, snakes and frogs (1 person hour at each site) and spotlighting from vehicles along the roads and tracks of the property for nocturnal mammals and birds;
- diurnal bird observations based on a minimum of two searches in the early morning (totalling 2 person hours at each site);
- owl audio observations using recorded calls to elicit calls from nearby birds (3 minutes replay of relevant species calls and two minutes listening time); and insectivorous bats were recorded for an entire night at each site using ANABAT equipment. These were analysed by Greg Ford using the appropriate referencing (Churchill, 1998; Reinhold et al., 2001).

All traps were checked twice daily to avoid trap losses of fauna. In addition, opportunistic sightings were made during the day and night from the vehicle or on foot transects while traversing the study area.

AMEC (formerly Unidel) Fauna Methodology, 2010

Fieldwork was conducted over a 12 day period from 14th October to 25th October 2010. Fauna survey techniques were standardised across each of the trapping sites and also targeted additional supplementary sites. Based on RE mapping for the study area, there are six unique fauna habitat types to be sampled (see **Table 2**). Based on the likely mine footprint, four of these habitats were surveyed using detailed trapping methodologies. Other habitat types were surveyed using general habitat assessment methodologies.

Table 1. Fauna habitat types within the study area and number of trapping sites

Fauna Habitat Type	Associated Regional Ecosystems	Wetlands Present	Trapping Sites
Brigalow Open Forest and Woodlands	11.3.1, 11.4.9, 11.9.1	No	1
Semi-evergreen Vine Thicket	11.5.15, 11.8.13	No	1
Riparian Woodland	11.3.25, 11.3.4, 11.3.2	Riverine and Floodplain Wetlands	1
Eucalyptus and/or Acacia Dominated Woodlands	11.3.10, 11.8.5, 11.7.4, 11.9.2, 11.5.3, 11.5.2, 11.5.9b, 11.7.2, 11.5.9c, 11.7.3, 11.7.4, 11.9.10	No	1

As a result of site access difficulties (including limited access to north-western sections of the study area due to lack of access tracks and black soil areas along the north-east boundary of the study area that became untrafficable after rain) several modifications to the planned survey effort were made including:

- A fauna trapping site was established outside the study area in vegetation directly to the west of the Laterite jump-ups in the north-west of the study area. This site is representative of fauna contained within the north-west portion of the study area.
- As a surrogate for black soil areas in the north-east of the study area fauna habitat searches were undertaken further north in areas that contained similar brigalow dominated woodlands and open grazing areas associated with riparian vegetation

General Habitat Assessment

Fauna habitat assessments were completed across most parts of the study area. Habitat assessments involved observing species present and included undertaking general observations of the following fauna habitat values:

- Landform;
- Structural vegetation characteristics;
- Presence / abundance of hollow-bearing trees;
- Level of disturbance (including vehicular, grazing or agricultural activities);

- Degree of environmental weed infestation;
- Evidence of, and estimated time since last bushfire;
- Density and nature of groundcover (e.g. rocks, logs, vegetation and leaf litter); and
- Presence / absence of permanent or ephemeral freshwater resources and distance to riparian areas and free standing water.

Survey Methodology

Survey methodologies are described below

- Pitfall trapping - consisted of PVC tubes of approximately 25cm in diameter and 45cm deep. Five pitfall traps, located at approximately 5m apart, were placed in each sampling site along a plastic fence line.
- Elliott trapping - one set of 20 Type A Elliott traps were deployed at each site for a period of four consecutive nights. Traps were positioned in a line and spaced at 10m intervals. They were baited using a mixture of peanut butter and rolled oats.
- Funnel Traps - six funnel traps were used at each site in conjunction with pitfall traps and were positioned along the plastic fence line.
- Camera Traps - two camera traps deployed for four nights were placed in sites that were likely to experience frequent use by fauna. One site was at the edge of a large dam in the southern portion of the survey area (Site 2) and the other was along a fence line on a vehicle track with frequent signs of animal movement (Site 3).
- Mist Netting was conducted along a creek line to the north of the study area in order to confirm the identity of bat species recorded with the Ultrasonic recording system.
- Ultrasonic Recording was undertaken at / in the vicinity of each site using a time expanded recording system from Binary Acoustic Technology. This system provides a complete recording of all acoustic parameters including data on harmonics and energy distribution within the call and differs from the Anabat system in this regard. Anabat provides a simple frequency against time readout and in some cases, the additional data from the full recordings is thought to provide better opportunities for reliable identification.
- Spotlighting- nocturnal spotlighting was undertaken in vegetated areas, open ground and roadways throughout the study area. Spotlighting was undertaken for two hours on two different nights at each trapping site.
- Searches and structured observations - birds and larger mammals were surveyed for one hour at dawn or dusk by both sight and vocalisations. Species were recorded as present within the site, flying overhead, outside the site in the same habitat or outside the site in different habitat. Diurnal active searches were undertaken in a variety of sites including the main survey sites, and involved surveying of fallen logs, litter, decorticating and fallen bark and rock outcrops.
- Opportunistic observations -opportunistic observations for tracks, scats and scratches left by animals were made throughout the study area.

AMEC (formerly Unidel) Fauna Methodology, 2012

The following was undertaken (as identified by the Gap Analysis):

- Fauna trapping sites within the lateric jump-ups to the northwest of the Project area and black soil habitat (potential habitat for ornamental snake) to the north east of the Project area.
- The fauna survey included a survey trapping site within State significant corridor. Additionally, a fauna trapping site in a large tract of vegetation that crosses the proposed Project footprint. Fauna trapping sites within these areas allowed identification of those fauna species that utilise the corridors.
- Fauna trapping site located in potential habitat of threatened ornamental snake (*Denisonia maculata*). Incidental surveys identified areas of potential habitat of conservation significant species and included conducting habitat assessments and searches.

- Incidental surveys throughout the study area identified the location of potential breeding places present.
- Surveys targeted potential habitat for EPBC listed reptiles.

Two fauna trapping sites located within higher quality habitat:

- One site was established on the escarpment in the north-west of the Project area, which was inaccessible previously.
- One in open woodland in proximity to the cracking clay soils to the north east of the study area (ornamental snake habitat and State Corridor Vegetation).

All sites were sampled over a five day and five night period by two fauna ecologists. These site surveys utilised a number of trapping and observation techniques including the following equipment with the durations of use detailed in Table 2:

- Elliott A traps (two lines of 10 Elliott A traps at each site covering all habitat types);
- Elliott B traps (two lines of five Elliott B traps at each site covering all habitat types);
- Pitfall Traps (five pitfall traps at each site with fencing);
- Funnel traps (ten funnel traps along the pitfall fencing and throughout the site);
- Harp traps (harp traps at each site with an appropriate flyway);
- Four fixed motion activated cameras;
- Small wrecking bars for active herpetofauna searching;
- Anabat SD2 bat detection units (data analysed in Analook for Windows);
- Spotlighting equipment and binoculars; and
- Megaphone for call playback surveys

The following activities were undertaken, with the durations of each technique detailed in Table 2:

- Transects and point observations at key sites such as water points and flowering Eucalyptus species.
- Call recognition for wetland birds and other cryptic species (including nocturnal birds).
- Opportunistic survey for the duration of the field assessment.
- Call playback opportunistically during both diurnal and nocturnal periods
- Ultrasonic recording and harp trapping at watering points and other preferred habitat
- Night investigation of flowering Eucalyptus species (for grey-headed flying-fox (*Pteropus poliocephalus*)) with binoculars and spotlights.
- Collections of snails following targeted surveys of preferred habitats along creek and drainage lines.
- Placement of Elliott traps and camera traps within preferred and non-preferred habitat for the northern quoll (*Dasyurus hallucatus*). Non-invasive latrine searches in suitable habitat
- Elliott traps set up in areas where yakka skink (*Egernia rugosa*) burrows were identified or had potential to occur.
- Pitfall and funnel trap lines set up along fence lines.
- Transect surveys involving litter raking, turning of rocks, logs and bark debris.
- Observations during night driving for snakes
- Spotlight and hand searches in debris and under logs at each survey site.
- Call playback of known frog species during nocturnal periods at each survey site and nearby habitat.

Surveys involved the following:

- 0630-0930: Trap checking and incidental bird observations, call playback;
- 0930-1230: Bird and reptile observations, habitat assessments;
- 1400-1700: Bird and reptile observations, habitat assessments;
- 1700-1800: Trap checking, re-setting of traps, bird observations, call playback;
- 1800-2100: Spotlighting, hand-held Anabat recording, call playback; and
- 1800-0630: Unattended Anabat recordings in waterway/flyway areas.

Table 2: Summary of Fauna Methodology Undertaken for the Byerwen Study Area

Details	CQU Fauna Survey	2010 AMEC (Formerly Unidel) Fauna Survey	2012 AMEC Fauna Survey
Month/ year	April 2009, August 2009	October 2010	April 2012
Season	Autumn wet, Winter dry	Spring- dry	(Late) wet season, summer
Rainfall	500-1000mm rainfall more than average over three year leading up to survey in April, heavy wet season falls in months leading up to April	Heavy rains experienced just prior to survey period	Periods of heavy rainfall in lead up to survey
Survey Period	2 survey of 5 days/5 nights	1 survey of 5 days/5 nights	1 survey of 5 days/5 nights
Number of Survey Sites	6 sites	4 sites	2 trapping sites.
Habitats surveyed	Riparian, brigalow, poplar box, mountain coolibah and ironbark	Brigalow, SEVT, riparian woodland, eucalyptus/acacia woodland	Vegetation on escarpment and Woodland on cracking clays, brigalow, SEVT, riparian woodland, eucalyptus/acacia woodland and wetlands
Diurnal surveys which include: bird surveys, transects and point observations at key sites such as water points and flowering eucalypts, transect surveys, area surveys, targeted surveys involving litter raking, turning rocks, logs, bark, debris, targeted searches along creeks and drainage lines and opportunistic surveys	2 hrs x 6 sites x 2 times x 2 survey = <u>48 person hours</u>	Approx. 3 hrs x 5 days x 2 people plus bird survey 1 hr x 5 days x 2 people = <u>40 person hours</u>	2 x trapping sites @ 3 hrs per day for 4 days x 2 people + 22 habitat assessment sites @ 1 hour x 2 people + 8 hours of driving/meander/incidental per day x 2 people = <u>172 person hours</u>

Details	CQU Fauna Survey	2010 AMEC (Formerly Unidel) Fauna Survey	2012 AMEC Fauna Survey
Call play backs, opportunistically and during diurnal and nocturnal periods	30 min x 6 sites= <u>3 hrs</u> (Nocturnal owl calls)	None	As part of nocturnal and diurnal searches
Ultrasonic bat recording	6 sites x 1 night x 2 surveys = <u>12 nights (144 hrs)</u>	4 sites x 1 detector x 5 nights = <u>20 nights (240 hrs)</u>	2 sites x 1 detector x 5 nights = <u>10 nights (120 hrs)</u>
Harp Trapping	None	None	2 sites x 4 trap x 5 nights = <u>40 nights</u>
Mistnetting	None	Along a creek for 5 nights	None
Nocturnal surveys, including spotlighting	As per Nocturnal call play backs and Spotlighting: 6 sites x 1 hr x 2 surveys =	4 sites x 2 hrs x 2 people = <u>16 person hours</u>	3 hrs x 6 nights x 2 people = <u>36 person hours</u>



Details	CQU Fauna Survey	2010 AMEC (Formerly Unidel) Fauna Survey	2012 AMEC Fauna Survey
	<u>12 hours</u>		
Elliot A traps	6 sites x 23 traps x 5 nights x 2 surveys = <u>1,380 trapping nights</u>	4 sites x 20 traps x 5 nights = <u>400 trapping nights</u>	2 sites x 20 traps x 5 nights = <u>200 trapping nights</u>
Elliot B traps	6 sites x 2 traps x 4 nights x 2 surveys = <u>96 trap nights</u>	None	2 sites x 10traps x 5 nights = <u>100 trapping nights</u>
Mawbey traps	6 sites x 3 traps x 4 nights x 2 surveys = <u>144 trapping nights</u>	None	None

Details	CQU Fauna Survey	2010 AMEC (Formerly Unidel) Fauna Survey	2012 AMEC Fauna Survey
Motion Cameras	None	2 cameras x 5 nights = <u>10 camera nights</u>	4 cameras x 5 nights @ 2 sites = <u>40 camera nights</u>
Pitfall traps	6 sites x 3 traps x 5 nights x 2 surveys= <u>180 trapping nights and days</u>	4 sites x 5 traps x 5 nights = <u>100 trapping nights and days</u>	2 sites x 5 traps x 10 nights = <u>100 trapping nights and days</u>
Funnel traps	6 sites x 6 traps x 5 nights x 2 surveys= <u>480 trapping nights and days</u>	4 sites x 6 traps x 5 nights = <u>120 trapping nights and days</u>	2 sites x 10 x 5 days and 5 nights = <u>100 trapping nights and days</u>
Species detected	158 vertebrate species recorded during the field survey. This includes 12 amphibians, 19 reptiles, 95 birds and 32 mammals (including 14 bat species)	95 vertebrate species were recorded during the field survey. This includes five amphibians, 16 reptiles, 57 birds and 17 mammals (including six bat taxa)	175 vertebrate species were recorded during the field survey. This includes six amphibians, 18 reptiles, 132 birds and 19 mammals (including five bat taxa)

ATTACHMENT B – FLORA SURVEY SITE DATA

VEGETATION SURVEY
Microphyll vine thicket on laterite jump up (T 01)



Regional Ecosystem Profile	
Regional Ecosystem Type:	RE 11.7.1x1
EPBC Status:	n / a
VM Status:	Least Concern
BD Status:	Of Concern
DERM Mapped as:	11.8.3 (EPBC / VMA Endangered)
Width of RE:	Not linear
Site Level	Tertiary

Site Description	
Location:	3km West of Newlands Mine
Site Description:	Low flat topped hill west of the main access road
Orientation of Transect:	300°
Datum:	GDA94
Latitude / Longitude:	-21.2164; 146.8486

Vegetation Community Description												
Microphyll vine thicket with canopy (S1) 3 – 6m and emergents to 15m.												
Dominant Species (50 m x 10 m area)												
Botanical Species	Status*	Average Height (m)							Abundance (m ² / ha)			
		E	T1	T2	T3	S1	S2	G	E	T1	T2	T3
<i>Flindersia australis</i>	D	12				6			2			
<i>Croton insularis</i>						6						
<i>Ehretia grahamii</i>						6						
<i>Grevillea helmslii</i>						4						
<i>Phyllanthus</i> sp.						3						
<i>Acalypha eremorum</i>						4						
<i>Erythroxylon australe</i>						5						
<i>Psyrax</i> sp.						5						
<i>Hovea</i> sp.						4						
<i>Pouteria myrsinoides</i>						5						

Vegetation Community Description											
<i>Carissa ovata</i>						4		0.5			
<i>Alectryon conatus</i>						6					
<i>Bursaria spinosa</i>						3					
<i>Alphitonia excels</i>						5					
<i>Geijera salicifolia</i>						4					
<i>Alstonia constricta</i>						4					
<i>Diospyros humilis</i>						6					
<i>Aristida</i> sp								0.2			
<i>Brachychiton australis</i> (o)											
<i>Opuntia stricta</i> # (o)											
<i>Parsonsia</i> sp. (o)											
<i>Corchorus</i> sp.(o)											
<i>Capparis arborea</i> (o)											
<i>Drypetes deplanchei</i> (o)											
60% Rock Rubble	15% <i>Aristida</i> sp	10% <i>Carissa</i>	5-10% Leaf litter								
Status: D = dominant, C = Codominant, S = subdominant, A = associate, EVNT = significant species, # = weed, ## = declared plant O = outside plot											

Cover % PCC					Species	Stem Count(500m ²)					
E	T1	T2	T3	S1		E	T1	T2	T3	S1	S2
<5				<2	<i>Flindersia australis</i>						
				11	<i>Croton</i> sp.					14	
				5	<i>Ehretia grahamii</i>					5	
				<5	<i>Grevillea helmsii</i>					3	
				<2	<i>Phyllanthus</i> sp.					11	
				5	<i>Acalypha eremorum</i>					18	
				<5	<i>Erythroxylon australe</i>					7	
				<1	<i>Psyrdrax</i> sp.					1	
				<5	<i>Hovea</i> sp.					8	
				<5	<i>Pouteria myrsinoides</i>					4	
				<1	<i>Carissa ovata</i>					3	
				<1	<i>Alectryon connatus</i>					2	
				<1	<i>Bursaria spinosa</i>					2	
				<1	<i>Alphitonia excelsa</i>					1	
				<1	<i>Geijera salicifolia</i>					1	
				<1	<i>Alstonia constricta</i>					1	
				<1	<i>Diospyros humilis</i>					2	
				<1	<i>Everistia vacciniifolia</i>					2	

Community Health and Condition	
Overall Health:	Very Good
Potential EVNT Flora Species Habitat:	<i>Croton magneticus</i> , <i>Cerbera dumicola</i>
EVNT Flora Species Recorded:	No
Weed Species:	<i>Opuntia tomentosa</i>
Weed Cover (%):	< 2
Disturbance:	Minor introduced flora
Disturbance Cover (%):	< 2

Topography and Landform	
Landform Situation:	Laterite mesa
Altitude:	320 m
Relief:	Very low
Slope:	Flat
Slope Class:	Very Gently Inclined (1 – 3 %)
Erosional Landform Pattern:	Located above erosional scarp
Soils:	Rudosol (rocky soils)
Soil Colour:	Red-browns
Soil Texture:	Rock rubble
Geology:	Laterite / ironstone cap

Survey Details	
Recorder / s:	David Stanton/ Wayne Harris
Field Site Number:	T 01
Date / Time:	16 / 10 / 2010; 11.30 am

A photograph of a dense forest with many tall, thin, vertical tree trunks and a thick layer of green grass and low vegetation on the ground. The trees have dark bark and some have small, light-colored flowers or leaves at the top. The ground is covered in a mix of green grass and brown, dry-looking vegetation.

Site Description	
Location:	3km West of Newlands Mine
Site Description:	Erosional valley with colluvial/alluvial clay and gravel soils
Orientation of Transect:	330
Datum:	GDA94
Latitude / Longitude:	-21.2174; 147.8418

Vegetation Community Description													
Low woodland/ open forest to shrubland													
Dominant Species (50 m x 10 m area)													
Botanical Species		Status*	Average Height (m)							Abundance (m ² / ha)			
			E	T1	T2	T3	S1	S2	G	E	T1	T2	T3
Acacia harpophylla		D		8							10		
Lysiphyllum carronii		A		8							1		
Erythroxylum australe		A					2				0		
Alectryon diversifolius		A					1.5				0		
60% Grass (Aristida)	20% Leaf litter	20% Bare Ground											
Status: D = dominant, C = Codominant, S = subdominant, A = associate, EVNT = significant species, # = weed. ## = declared plant Q = outside plot													

Cover % PCC					Species	Stem Count(500m ²)					
E	T1	T2	T3	S1		E	T1	T2	T3	S1	S2
<5	60%			<2	<i>Acacia harpophylla</i>		32	8			
					<i>Lysiphyllum carroni</i>		1				
					<i>Alectryon diversifolius</i>					2	

Community Health and Condition	
Overall Health:	Poor – Regrowth from past clearing (>15yrs)
Potential EVNT Flora Species Habitat:	<i>Limited</i>
EVNT Flora Species Recorded:	No
Weed Species:	<i>Opuntia stricta</i> (outside plot) <i>Parthenium hysterophorus</i> <i>Pennisetum ciliare</i> (buffel grass)
Weed Cover (%):	< 2
Disturbance:	20% Ground cover comprising of buffel with minor cover of other exotic species
Disturbance Cover (%):	Entire community has been previously disturbed

Topography and Landform	
Landform Situation:	Erosional valley between laterite mesas
Altitude:	300 m
Relief:	Very low
Slope:	Flat
Slope Class:	Very Gently Inclined (1 – 3 %)
Erosional Landform Pattern:	Located within erosional valley between scarps
Soils:	Silt/ gravel and clay with minor gilgai development
Soil Colour:	Red-brown
Soil Texture:	Silty clay loam
Geology:	Colluvial/ alluvial wash derived from eroding laterite scarps

Survey Details	
Recorder / s:	David Stanton/ Wayne Harris
Field Site Number:	T 02
Date / Time:	16 / 10 / 2010; 11.30 am

VEGETATION SURVEY
***Eucalyptus orgadophila* woodland and sparse woodland (Q 3)**



Regional Ecosystem Profile	
Regional Ecosystem Type:	RE 11.8.5
EPBC Status:	n / a
VM Status:	Least Concern
BD Status:	Endangered
DERM Mapped as:	11.4.9/11.5.15 (EPBC Endangered)
Width of RE:	Not linear
Survey Level	Quaternary

Site Description	
Location:	3km West of Newlands Mine
Site Description:	Low basalt rise within broader alluvial plain
Orientation of Transect:	No Transect
Datum:	GDA94
Latitude / Longitude:	-21.2125; 147.85173

Vegetation Community Description								
Structural Description		Open woodland						
Canopy Height		15 -23m						
Canopy Cover (%)		20%						
Botanical Species	Status*	Average Height (m)						
		E	T1	T2	T3	S1	S2	G
<i>Eucalyptus orgadophila</i>			18	12				
<i>Terminalia oblongifolia</i>						5		
<i>Corymbia erythrophloia</i>				12				
<i>Alphitonia excelsa</i>						3		
<i>Bothriochloa</i> sp.								0.25
<i>Pennisetum ciliaris</i>	#							0.25
<i>Parthenium hysterophorus</i>	# class 2 LPA							0.25
80% Grass (buffel)	10% Leaf litter	10% Bare Ground						

Community Health and Condition	
Overall Health:	Poor – heavily fragmented with ground cover dominated by exotic pasture grass (>15yrs)
Potential EVNT Flora Species Habitat:	Limited
EVNT Flora Species Recorded:	No
Weed Species:	<i>Opuntia stricta</i> <i>Parthenium hysterophorus</i> <i>Pennisetum ciliare</i> (buffel grass)
Weed Cover (%):	80% dominantly buffel
Disturbance:	Heavy fragmentation and degradation of ground
Disturbance Cover (%):	-

Topography and Landform	
Landform Situation:	Basalt rise within broad erosional valley
Altitude:	320 m
Relief:	Very low
Slope:	Flat
Slope Class:	Very Gently Inclined (1 – 3 %)
Erosional Landform Pattern:	Located within erosional valley between scarps
Soils:	Heavy clay (gilgai) with basalt corestone
Soil Colour:	Grey - dark
Soil Texture:	Clay loam
Geology:	Clay soil derived insitu from basalt

Survey Details	
Recorder / s:	David Stanton/ Wayne Harris
Field Site Number:	Q 3
Date / Time:	16 / 10 / 2010; 2.30 pm

VEGETATION SURVEY

Microphyll Vine Thicket on laterite jump up (Q 4)



Regional Ecosystem Profile

Regional Ecosystem Type:	RE 11.7.1x1
EPBC Status:	n / a
VM Status:	Least Concern
BD Status:	Of Concern
DERM Mapped as:	11.8.3 (EPBC / VMA Endangered).
Width of RE:	Not linear
Site Level	Quaternary

Site Description

Location:	3.5km West of Newlands Mine
Site Description:	Low flat topped hill west of the main access road
Orientation of Transect:	No transect
Datum:	GDA94
Latitude / Longitude:	-21.1999; 147.859

Vegetation Community Description									
Structural Description		Microphyll thicket / shrubland							
Canopy Height		3-6m							
Canopy Cover (%)		40%							
Botanical Species	Status*	Average Height (m)							
		E	T1	T2	T3	S1	S2	G	
<i>Alphitonia excelsa</i>			5						
<i>Brachychiton australis</i>		15							
<i>Croton insularis</i>			5						
<i>Drypetes deplanchei</i>			4						
<i>Ehretia grahamii</i>			3						
<i>Grevillea helmsii</i>			d						
<i>Acalypha eremorum</i>									
<i>Erythroxylum australe</i>			5						
<i>Diospyros geminata</i>									
<i>Ricinocarpus ledifolius</i>									
<i>Carissa ovata</i>									0.5
<i>Bursaria spinosa</i>									
<i>Diospyros humilis</i>									
<i>Aristida</i> sp									0.2
60% Rock Rubble	15% <i>Aristida</i> sp	10% <i>Carissa</i>		5-10% Leaf litter					

Community Health and Condition	
Overall Health:	Very Good
Potential EVNT Flora Species Habitat:	<i>Croton magneticus</i> , <i>Cerbera dumicola</i>
EVNT Flora Species Recorded:	Nil
Weed Species:	<i>Pennisetum ciliare</i> , <i>Opuntia stricta</i>
Weed Cover (%):	< 2
Disturbance:	Minor introduced flora
Disturbance Cover (%):	< 2

Topography and Landform	
Landform Situation:	Laterite mesa
Altitude:	333 m
Relief:	Very low

VEGETATION SURVEY

Brigalow (*Acacia harpophylla*) Woodland on colluvial wash (T 5)



Regional Ecosystem Profile	
Regional Ecosystem Type:	RE 11.5.16
EPBC Status:	Endangered (Brigalow ecological community)
VM Status:	Endangered dominant
BD Status:	Endangered
DERM Mapped as:	11.4.8/11.5.15
Width of RE:	Not linear
Survey Level:	Tertiary

Site Description	
Location:	4km West of Newlands Mine
Site Description:	Erosional valley with colluvial/alluvial clay and gravel soils
Orientation of Transect:	310
Datum:	GDA94
Latitude / Longitude:	-21.22422; 146.85097

Vegetation Community Description													
Low woodland/ open forest to shrubland (6-10m height)													
Dominant Species (50 m x 10 m area)													
Botanical Species		Status*	Average Height (m)							Abundance (m ² / ha)			
			E	T1	T2	T3	S1	S2	G	E	T1	T2	T3
Acacia harpophylla		D		8							13		
Terminalia oblongata		A					6						
Alectryon diversifolius		A					1.5						
Capparis arborea		A						1					
Carissa ovata		A						1					
Sida sp.		A							0.5				
Aristida sp.		D							0.5				
Pennisetum ciliare		A							0.5				
Parthenium hysterophorus		A							0.25				
60% Grass (Aristida)	20% Leaf litter	20% Bare Ground											
Status: D = dominant, C = Codominant, S = subdominant, A = associate, EVNT = significant species, # = weed, ## = declared plant O = outside plot													

Cover % PCC					Species	Stem Count(500m ²)					
E	T1	T2	T3	S1		E	T1	T2	T3	S1	S2
<5	60%			<2	<i>Terminalia oblongata</i>		81	8			
					<i>Alectryon diversifolius</i>		3				
					<i>Capparis arborea</i>					2	
					<i>Carissa ovata</i>						7
					<i>Sida</i> sp.						
					<i>Aristida</i> sp.						
					<i>Pennisetum ciliare</i>						
					<i>Parthenium hysterophorus</i>						

Community Health and Condition	
Overall Health:	Poor – Regrowth from past clearing (>15yrs)
Potential EVNT Flora Species Habitat:	Limited
EVNT Flora Species Recorded:	No
Weed Species:	<i>Parthenium hysterophorus</i> <i>Pennisetum ciliare</i> (pasture grass) <i>Opuntia stricta</i>
Weed Cover (%):	< 2
Disturbance:	20% Ground cover comprising of buffel with minor cover of other exotic species
Disturbance Cover (%):	Entire community has been previously disturbed

Topography and Landform	
Landform Situation:	Erosional valley between laterite mesas
Altitude:	314m
Relief:	Very low
Slope:	Flat
Slope Class:	Very Gently Inclined (1 – 3 %)
Erosional Landform Pattern:	Located within erosional valley between scarps
Soils:	Silt/ gravel and clay with minor gilgai development
Soil Colour:	Red-brown
Soil Texture:	Silty clay loam
Geology:	Colluvial/ alluvial wash derived from eroding laterite scarps

Survey Details	
Recorder / s:	David Stanton/ Wayne Harris
Field Site Number:	T 5
Date / Time:	16 / 10 / 2010; 4.30 pm

VEGETATION SURVEY

Acacia shirleyi low open forest and shrubland (Q 6)



Regional Ecosystem Profile	
Regional Ecosystem Type:	RE 11.7.2
EPBC Status:	n / a
VM Status:	Least Concern
BD Status:	No Concern at Present
DERM Mapped as:	11.7.2/11.5.15
Width of RE:	Not linear
Survey Level:	Quaternary

Site Description	
Location:	3km West of Newlands Mine
Site Description:	Upper margins of laterite breakaway – north facing slope
Orientation of Transect:	No Transect
Datum:	GDA94
Latitude / Longitude:	-21.2068; 147.8608

Vegetation Community Description								
Structural Description	Low open forest to tall shrubland							
Canopy Height	8-12m							
Canopy Cover (%)	60%							
Botanical Species	Status*	Structural Representation (average height m)						
		E	T1	T2	T3	S1	S2	G
<i>Acacia shirleyi</i>	D		8					
<i>Alphitonia excelsa</i>	A					1.5		
<i>Everistia vacciniifolia</i>	A					1.5m		
<i>Grevillea helmsiae</i>	A							
<i>Acalypha eremorum</i>	A							
<i>Erythroxylum australe</i>	A							
<i>Melodorum leichhardtii</i>	A							
<i>Bridelia leichhardtii</i>	A							
<i>Kelita uncinella</i>	A							<5%
Ground Cover	70% Bare Ground			10% <i>Aristida</i> sp.		10% Leaf litter		

Community Health and Condition	
Overall Health:	Good – limited disturbance and weed invasion
Potential EVNT Flora Species Habitat:	Low
EVNT Flora Species Recorded:	No
Weed Species:	Nil
Weed Cover (%):	0
Disturbance:	Minor canopy breaks-woodland fringes cleared grazing lands to the south.
Disturbance Cover (%):	<10%

Topography and Landform	
Landform Situation:	Toe of laterite breakaway
Altitude:	330m
Aspect	North facing slope
Relief:	Steep breakaway
Slope:	Breakaway at top of slope
Slope Class:	Steeplly Inclined (25%)
Erosional Landform Pattern:	Mesa breakaway
Soils:	Ironstone gravel and rock
Soil Colour:	Red-brown
Soil Texture:	Rudosol
Geology:	Colluvium / scree derived from eroding laterite scarp

Survey Details	
Recorder / s:	David Stanton/ Wayne Harris
Field Site Number:	Q 6
Date / Time:	17/ 10 / 2010; 11.30 am

VEGETATION SURVEY
***Acacia shirleyi* low open forest and shrubland (Q 7)**



Regional Ecosystem Profile	
Regional Ecosystem Type:	RE 11.7.2
EPBC Status:	n / a
VM Status:	Least Concern
BD Status:	No Concern at Present
DERM Mapped as:	11.7.2/11.5.15
Width of RE:	100m
Survey Level:	Quaternary

Site Description	
Location:	3km West of Newlands Mine
Site Description:	Mid to upper slope of laterite breakaway
	No Transect
Datum:	GDA94
Latitude / Longitude:	-21.2057; 146.8528

Vegetation Community Description								
Structural Description	Low open forest to tall shrubland							
Canopy Height	8-12m							
Canopy Cover (%)	60%							
Botanical Species	Status*	Structural Representation (average height m)						
		E	T1	T2	T3	S1	S2	G
<i>Acacia shirleyi</i>	D		8					
<i>Drypetes deplanchei</i>						2		
<i>Gossia bidwillii</i>						3		
<i>Ricinocarpos ledifolius</i>						1.5		
<i>Tabernaemontana pandacqui</i>						2		
<i>Carissa ovata</i>						0.5		
<i>Acalypha .eremorum</i>						1		
<i>Aristida</i> sp.								0.5
<i>Erythroxylon australe</i>						1		
<i>Grevillea helmsii</i>						2		
<i>Murraya ovatifoliolata</i>						1		
<i>Croton insularis</i>						3		
<i>Hovea</i> sp.						2		
<i>Ancistrachne uncinulata</i>								0.5
<i>Kelita uncinella</i>								0.25
Ground Cover	60% Bare Ground			10% <i>Aristida</i> sp.		20% Leaf litter		

Community Health and Condition	
Overall Health:	Good – limited disturbance and weed invasion (>15yrs)
Potential EVNT Flora Species Habitat:	<i>Kelita uncinella</i> common ground cover (new genus)
EVNT Flora Species Recorded:	No
Weed Species:	No weeds
Weed Cover (%):	< 2
Disturbance:	Margins of clearing on upper slope. Small pockets of clearing within (10%)
Disturbance Cover (%):	

Topography and Landform	
Landform Situation:	Midslope on laterite breakaway
Altitude:	292m
Aspect	South facing slope
Relief:	Very low
Slope:	Midslope
Slope Class:	Moderately Inclined (15)
Erosional Landform Pattern:	Mesa / valley
Soils:	Red brown clay loam with gravel and rock
Soil Colour:	Red-brown
Soil Texture:	Silty clay loam
Geology:	Colluvium / scree derived from eroding laterite scarp

Survey Details	
Recorder / s:	David Stanton/ Wayne Harris
Field Site Number:	Q 7
Date / Time:	17/ 10 / 2010; 8.00 pm

VEGETATION SURVEY
***Acacia shirleyi* low open forest and shrubland (Q 8)**



Regional Ecosystem Profile	
Regional Ecosystem Type:	RE 11.7.2
EPBC Status:	n / a
VM Status:	Least Concern
BD Status:	No Concern at Present
DERM Mapped as:	11.7.2/11.5.15
Width of RE:	100m
Survey Level:	Quaternary

Site Description	
Location:	3km West of Newlands Mine
Site Description:	Upper slope of laterite breakaway
`	No Transect
Datum:	GDA94
Latitude / Longitude:	-21.2037; 146.8566

Vegetation Community Description								
Structural Description	Low open forest to tall shrubland							
Canopy Height	8-12m							
Canopy Cover (%)	60%							
Botanical Species	Status*	Structural Representation (average height m)						
		E	T1	T2	T3	S1	S2	G
<i>Acacia shirleyi</i>	D		8					
<i>Dodonaea triangularis</i>							0.5	
<i>Carissa ovata</i>						0.5		
<i>Croton insularis</i>						3		
<i>Hovea</i> sp.						2		
<i>Ancistrachne uncinulata</i>								0.5
Ground Cover	20% Bare Ground			60% <i>Aristida</i> sp. Grasses		20% Leaf litter		

Community Health and Condition	
Overall Health:	Good – limited disturbance and weed invasion (>15yrs)
Potential EVNT Flora Species Habitat:	No significant species noted
EVNT Flora Species Recorded:	No
Weed Species:	No weeds
Weed Cover (%):	< 2
Disturbance:	Minimum although some exposure to cleared margin has created some impact
Disturbance Cover (%):	0

Topography and Landform	
Landform Situation:	Upperslope on laterite breakaway
Altitude:	319m
Aspect	South facing slope
Relief:	Very low
Slope:	Gently inclined upper slope
Slope Class:	Moderately Inclined (15)
Erosional Landform Pattern:	Mesa / valley
Soils:	Red brown loam with gravel and rock
Soil Colour:	Red-brown
Soil Texture:	Silty clay loam
Geology:	Rocky / scree derived from eroding laterite scarp

Survey Details	
Recorder / s:	David Stanton/ Wayne Harris
Field Site Number:	Q 8
Date / Time:	18/ 10 / 2010; 8.00 pm

VEGETATION SURVEY
***Eucalyptus crebra* woodland on laterite jump up (T 9)**



Regional Ecosystem Profile	
Regional Ecosystem Type:	RE 11.7.6
EPBC Status:	n / a
VM Status:	Least concern
BD Status:	No concern at present
DERM Mapped as:	11.7.2/11.5.15 (endangered sub-dominant)
Width of RE:	Not linear
Survey Level:	Tertiary

Site Description	
Location:	3km West of Newlands Mine
Site Description:	Top of laterite jump up
Orientation of Transect:	270
Datum:	GDA94
Latitude / Longitude:	-21.2012; 147.8602

Vegetation Community Description													
Woodland with canopy 15 to 23m													
Dominant Species (50 m x 10 m area)													
Botanical Species		Status*	Average Height (m)							Abundance (m ² / ha)			
			E	T1	T2	T3	S1	S2	G	E	T1	T2	T3
<i>Eucalyptus crebra</i>		D		21							4		
<i>Corymbia dallachiana</i>		A		1	1						1	2	
<i>Acacia excelsa</i>		A					6						
<i>Bursaria spinosa</i>		A					1.5						
<i>Alstonia constricta</i>							2						
<i>Cassia brewsteri</i>							1.5						
<i>Acacia</i> sp.							2						
<i>Dodonaea</i> sp.							1.5						
<i>Dodonaea triangularis</i>							1						
<i>Grewia latifolia</i>							1						
<i>Breynia oblongifolia</i>							1						
<i>Ehretia grahamii</i>							1						
<i>Euphorbiaceae</i> sp.							1						
<i>Acacia shirleyi</i>							2						
<i>Aristida</i> sp.									0.75				
<i>Fimbristylis</i> sp.									0.25				
<i>Pennisetum ciliaris</i>									0.75				
60% Grass (Aristida)	20% Leaf litter	20% Bare Ground											
Status: D = dominant, C = Codominant, S = subdominant, A = associate, EVNT = significant species, # = weed, ## = declared plant O = outside plot													

Cover % PCC					Species	Stem Count(500m ²)					
E	T1	T2	T3	S1		E	T1	T2	T3	S1	S2
	30%			<	<i>Eucalyptus crebra</i>		32	8			
	6				<i>Corymbia dallachiana</i>		1				
				8	<i>Acacia excelsa</i>					2	
					<i>Bursaria spinosa</i>						
					<i>Alstonia constricta</i>						
					<i>Cassia brewsteri</i>						
					<i>Acacia</i> sp.						
					<i>Dodonaea</i> sp.						
					<i>Dodonaea triangularis</i>						
					<i>Grewia latifolia</i>						
					<i>Breynia oblongifolia</i>						
					<i>Ehretia grahamii</i>						
					<i>Euphorbiaceae</i> sp.						
				12	<i>Acacia shirleyi</i>						
					<i>Aristida</i> sp.						
					<i>Fimbristylis</i> sp.						
					<i>Pennisetum ciliare</i>						

Community Health and Condition	
Overall Health:	Excellent – dominated by native ground covers
Potential EVNT Flora Species Habitat:	Limited
EVNT Flora Species Recorded:	No
Weed Species:	<i>Pennisetum ciliare</i> (buffel grass)
Weed Cover (%):	< 2%
Disturbance:	Nil
Disturbance Cover (%):	Nil

Topography and Landform	
Landform Situation:	Top of laterite mesa
Altitude:	340m
Relief:	Very low
Slope:	Flat
Slope Class:	Very Gently Inclined (1 – 3 %)
Erosional Landform Pattern:	Located on top of laterite plateau
Soils:	Rocky indurated gravel
Soil Colour:	Red-brown
Soil Texture:	Rudosol
Geology:	Tertiary age laterite plateau

Survey Details	
Recorder / s:	David Stanton/ Wayne Harris
Field Site Number:	T 9
Date / Time:	17 / 10 / 2010; 10.30 am

VEGETATION SURVEY
***Acacia shirleyi* low open forest and shrubland (Q 10)**



Regional Ecosystem Profile	
Regional Ecosystem Type:	RE 11.7.2
EPBC Status:	n / a
VM Status:	Least Concern
BD Status:	No Concern at Present
DERM Mapped as:	11.7.2/11.5.15
Width of RE:	100m
Survey Level:	Quaternary

Site Description	
Location:	3.5km West N/W of Newlands Mine
Site Description:	Mid to upper slope of laterite breakaway
Transect orientation	No Transect
Datum:	GDA94
Latitude / Longitude:	-21.1999; 146.8579

Vegetation Community Description								
Structural Description	Low open forest to tall shrubland							
Canopy Height	8-12m							
Canopy Cover (%)	50%							
Botanical Species	Status *	Structural Representation (average height m)						
		E	T1	T2	T3	S1	S2	G
<i>Acacia shirleyi</i>	D		8					
<i>Acalypha eremorum</i>						2		
<i>Everistia vacciniifolia</i>						1		
<i>Alphitonia excelsa</i>						1.5		
<i>Aristida</i> sp.								0.25
Ground Cover	70% Bare Ground			10% <i>Aristida</i> sp.		20% Leaf litter		

Community Health and Condition	
Overall Health:	Good – limited disturbance and weed invasion (>15yrs)
Potential EVNT Flora Species Habitat:	Unlikely
EVNT Flora Species Recorded:	No
Weed Species:	No weeds
Weed Cover (%):	< 2
Disturbance:	Clearing of community margins on toe of breakaway
Disturbance Cover (%):	0

Topography and Landform	
Landform Situation:	Upper slope on laterite breakaway
Altitude:	333m
Aspect	North facing slope
Relief:	Very low
Slope:	Upper slope
Slope Class:	Steeply Inclined (30°)
Erosional Landform Pattern:	Mesa / valley
Soils:	Rudosol
Soil Colour:	Red-brown
Soil Texture:	Rock / gravel rich with minimum soil development
Geology:	Upper margins of breakaway on laterite scarp

Survey Details	
Recorder / s:	David Stanton/ Wayne Harris
Field Site Number:	Q 10
Date / Time:	17/ 10 / 2010; 11.00 am

VEGETATION SURVEY
Non-remnant grassland with shrubby regrowth (Q 11)



Regional Ecosystem Profile	
Regional Ecosystem Type:	Non remnant
EPBC Status:	n / a
VM Status:	Non remnant
BD Status:	Non remnant
DERM Mapped as:	Non remnant
Width of RE:	Non-linear
Survey Level:	Quaternary

Site Description	
Location:	3.5km West N/W of Newlands Mine
Site Description:	Broad valley between laterite breakaways
Transect direction	No Transect
Datum:	GDA94
Latitude / Longitude:	-21.1977; 146.8572

Vegetation Community Description								
Structural Description	Grassland with shrubs							
Cover Height	0.5m							
Ground Cover (%)	80%							
Botanical Species	Status *	Structural Representation (average height m)						
		E	T1	T2	T3	S1	S2	G
<i>Pennisetum ciliare</i>	D							0.5
<i>Acacia harpophylla</i>	D	1.5						
<i>Archidendropsis basaltica</i>	A	1						
<i>Terminalia oblongata</i>	D	2						
<i>Alectryon diversifolius</i>	A	1						
<i>Carissa ovata</i>	A	1						
<i>Parthenium hysterophorus</i>	A							0.25
<i>Opuntia stricta</i>	A							0.5
<i>Eriocereus martinii</i>	A							0.5
Ground Cover	10% Bare Ground			80% Buffel (<i>Pennisetum ciliare</i>)		10% Leaf litter		

Community Health and Condition	
Overall Health:	Very poor – Ground cover dominated by exotic pasture grass (buffel)
Potential EVNT Flora Species Habitat:	Unlikely
EVNT Flora Species Recorded:	No
Weed Species:	<i>Eriocereus martinii</i> (class 2 LPA), <i>Parthenium hysterophorus</i> (class 2 LPA), <i>Opuntia stricta</i> (Class 3 LPA), <i>Pennisetum ciliare</i>
Weed Cover (%):	>80%
Disturbance:	Area has been previously cleared
Disturbance Cover (%):	100

Topography and Landform	
Landform Situation:	Colluvial plain between laterite breakaways
Altitude:	333m
Aspect	-
Relief:	Very low
Slope:	plain
Slope Class:	gently Inclined (<1%)
Erosional Landform Pattern:	Mesa / valley
Soils:	Silty clay loam with gravel
Soil Colour:	Red-brown
Soil Texture:	Rock / gravel rich silty clay loam
Geology:	Colluvial wash derived from ironstone

Survey Details	
Recorder / s:	David Stanton/ Wayne Harris
Field Site Number:	Q 11
Date / Time:	17/ 10 / 2010; 11.30 am

VEGETATION SURVEY
Non-remnant shrubland of brigalow (*Acacia harpophylla*) (Q 12)



Regional Ecosystem Profile	
Regional Ecosystem Type:	Non remnant
EPBC Status:	n / a
VM Status:	Non remnant
BD Status:	Non remnant
DERM Mapped as:	Non remnant
Width of RE:	Non-linear
Survey Level:	Quaternary

Site Description	
Location:	3.6km West N/W of Newlands Mine
Site Description:	Broad valley between laterite breakaways
Transect direction	No Transect
Datum:	GDA94
Latitude / Longitude:	-21.1967; 146.85524

Vegetation Community Description								
Structural Description	Shrubland (regrowth)							
Cover Height	2m							
Canopy Cover (%)	40%							
Botanical Species	Status *	Structural Representation (average height m)						
		E	T1	T2	T3	S1	S2	G
<i>Acacia harpophylla</i>	D	1.5						
<i>Brachychiton australis</i>	E	15						
<i>Terminalia oblongata</i>	D	2						
<i>Alectryon diversifolius</i>	A	1						
<i>Carissa ovata</i>	A	1						
<i>Parthenium hysterophorus</i>	#							0.25
<i>Senecio madagascariensis</i>	#							0.25
<i>Pennisetum ciliare</i>	#							0.5
Ground Cover	10% Bare Ground			60% Buffel (<i>Pennisetum ciliare</i>), <i>Parthenium hysterophorus</i>		10% Leaf litter		

Community Health and Condition	
Overall Health:	Very poor – Ground cover dominated by exotic pasture grass (buffel)
Potential EVNT Flora Species Habitat:	Unlikely
EVNT Flora Species Recorded:	No
Weed Species:	<i>Senecio madagascariensis</i> , <i>Opuntia stricta</i> (Class 3 LPA), <i>Pennisetum ciliare</i> , <i>Parthenium hysterophorus</i>
Weed Cover (%):	>80%
Disturbance:	Area has been previously cleared
Disturbance Cover (%):	100

Topography and Landform	
Landform Situation:	Colluvial plain between laterite breakaways
Altitude:	333m
Aspect	-
Relief:	Very low
Slope:	plain
Slope Class:	Gently Inclined (<1%)
Erosional Landform Pattern:	Mesa / valley
Soils:	Silty clay loam with gravel
Soil Colour:	Red-brown
Soil Texture:	Rock / gravel rich silty clay loam
Geology:	Colluvial wash derived from ironstone

Survey Details	
Recorder / s:	David Stanton/ Wayne Harris
Field Site Number:	Q 12
Date / Time:	17/ 10 / 2010; 11.40 am

VEGETATION SURVEY
***Acacia shirleyi* low open forest and shrubland (Q 13)**



Regional Ecosystem Profile	
Regional Ecosystem Type:	RE 11.7.2
EPBC Status:	n / a
VM Status:	Least Concern
BD Status:	No Concern at Present
DERM Mapped as:	11.7.2/11.5.15
Width of RE:	Non - linear
Survey Level:	Quaternary

Site Description	
Location:	4km West of Newlands Mine
Site Description:	Mid to upper slope of laterite breakaway
Transect orientation	No Transect
Datum:	GDA94
Latitude / Longitude:	-21.2057; 146.8528

Vegetation Community Description								
Structural Description	Low open forest to tall shrubland							
Canopy Height	8m							
Canopy Cover (%)	40%							
Botanical Species	Status	Structural Representation (average height m)						
	*	E	T1	T2	T3	S1	S2	G
<i>Acacia shirleyi</i>	D		8					
<i>Capparis arborea</i>	A					2		
<i>Ricinocarpus ledifolius</i>	A					2		
<i>Erythroxylum australe</i>	A					2		
<i>Carissa ovata</i>						0.5		
<i>Acalypha eremorum</i>						1		
<i>Aristida</i> sp.								0.5
<i>Alphitonia excelsa</i>						2		
<i>Tabernaemontana pandacqui</i>						2		
<i>Everistia vacciniifolia</i>						1		
<i>Ancistrache uncinulata</i>								0.5
<i>Kelita uncinella</i>								0.25
Ground Cover	60% Bare Ground			10% <i>Aristida</i> sp.		20% Leaf litter		

Community Health and Condition	
Overall Health:	Good – limited disturbance and weed invasion (>15yrs)
Potential EVNT Flora Species Habitat:	<i>Kelita uncinella</i> common ground cover (recently described new genus)
EVNT Flora Species Recorded:	No
Weed Species:	<i>Parthenium hysterophorus</i>
Weed Cover (%):	< 2
Disturbance:	Margins of clearing on lower footslopes. Small pockets of clearing
Disturbance Cover (%):	20%

Topography and Landform	
Landform Situation:	Footslope on laterite breakaway
Altitude:	292m
Aspect	South facing slope
Relief:	gentle
Slope:	Footslope
Slope Class:	Moderately Inclined (15)
Erosional Landform Pattern:	Mesa / valley
Soils:	Red brown clay loam with gravel and rock
Soil Colour:	Red-brown
Soil Texture:	Silty clay loam
Geology:	Colluvium / scree derived from eroding laterite scarp

Survey Details	
Recorder / s:	David Stanton/ Wayne Harris
Field Site Number:	Q 13
Date / Time:	17/ 10 / 2010; 12.00 am

VEGETATION SURVEY
Eucalyptus persistens woodland (regrowth) on colluvial lower slopes (Q 14)

Regional Ecosystem Profile	
Regional Ecosystem Type:	RE 11.5.1
EPBC Status:	n / a
VM Status:	Least concern
BD Status:	No concern at present
DERM Mapped as:	11.5.3
Width of RE:	Not linear
Survey Level:	Quaternary

Site Description	
Location:	Byerwen - 12km WNW of Newlands Mine
Site Description:	Colluvial footslope at base of laterite
Orientation of Transect:	No transect
Datum:	GDA94
Latitude / Longitude:	-21.1949; 147.8199

Vegetation Community Description													
Woodland with canopy 15 to 23m													
Dominant Species (50 m x 10 m area)													
Botanical Species		Status*	Average Height (m)							Abundance (m ² / ha)			
			E	T1	T2	T3	S1	S2	G	E	T1	T2	T3
<i>Eucalyptus persistens</i>		D		15									
<i>Eucalyptus crebra</i>		A		16							4		
<i>Acacia excelsa</i>		A					6						
<i>Terminalia oblongifolia</i>		A					1.5						
<i>Alstonia constricta</i>		A					2						
<i>Cassia brewsteri</i>		A					1.5						
<i>Acacia harpophylla</i>		A					2						
<i>Grewia latifolia</i>		A					1						
<i>Breynia oblongifolia</i>		A					1						
<i>Aristida</i> sp.		A							0.75				
<i>Pennisetum ciliaris</i>		#							0.75				
60% Grass (Aristida)	20% Leaf litter	20% Bare Ground											
Status: D = dominant, C = Codominant, S = subdominant, A = associate, EVNT = significant species, # = weed, ## = declared plant O = outside plot													

Community Health and Condition	
Overall Health:	Moderate– Regrowth from prior disturbance although dominated by native species in upper and lower stratum
Potential EVNT Flora Species Habitat:	Limited
EVNT Flora Species Recorded:	No
Weed Species:	<i>Pennisetum ciliare</i> (pasture grass)
Weed Cover (%):	< 2%
Disturbance:	Habitat is regrowth from former severe physical disturbance
Disturbance Cover (%):	Nil

Topography and Landform	
Landform Situation:	Colluvial slope below laterite mesa
Altitude:	300m
Relief:	Very low
Slope Class:	Very Gently Inclined (1 – 3 %)
Erosional Landform Pattern:	Colluvial outwash
Soils:	Silty and gravel
Soil Colour:	Brown
Soil Texture:	Silty loam
Geology:	Colluvial outwash plain

Survey Details	
Recorder / s:	David Stanton/ Wayne Harris

Field Site Number:	Q14
Date / Time:	17 / 10 / 2010; 12.30 am

A photograph of a grassy field with scattered trees under a clear blue sky. The foreground is filled with tall, dry, light-brown grass. In the middle ground, there are several trees with green foliage and some bare, dark trunks. The background shows a line of trees and a clear blue sky.

Site Description	
Location:	5km West of Newlands Mine adjacent to main road.
Site Description:	Low basalt rise within broader alluvial plain
Orientation of Transect:	No Transect
Datum:	GDA94
Latitude / Longitude:	-21.2125; 147.85173

[illegible]

Vegetation Community Description												
	2 LPA											
<i>Heteropogon contortus</i>	A											
Ground Cover	10% Bare Ground				10% leaf litter				80% Grass			
Status: D = dominant, C = Codominant, S = subdominant, A = associate, EVNT = significant species, # = weed, ## = declared plant O = outside plot												

Cover % PCC					Species	Stem Count(500m ²)					
E	T1	T2	T3	S1		E	T1	T2	T3	S1	S2
	20%			<	<i>Eucalyptus orgadophila</i>		4	1			
				<2	<i>Carissa ovata</i>		1				
				<2	<i>Acacia holosericea</i>					2	
				<2	<i>Lysiphyllum carronii</i>						
				<2	<i>Bothriochloa</i> sp.						
				<2	<i>Grewia latifolia</i>						
				<2	<i>Parthenium hysterophorus</i>						
				<2	<i>Pennisetum ciliare</i>						
				<2	<i>Sarga</i> sp.						
				<2	<i>Opuntia stricta</i>						
				<2	<i>Heteropogon contortus</i>						

Community Health and Condition	
Overall Health:	Moderate– Strata dominated by native species although heavily fragmented on margins with incursion of exotic ground cover.
Potential EVNT Flora Species Habitat:	Potential for <i>Dichanthium queenslandicum</i> (Vulnerable NCA, Vulnerable EPBC)
EVNT Flora Species Recorded:	No
Weed Species:	<i>Opuntia stricta</i> <i>Parthenium hysterophorus</i> <i>Pennisetum ciliare</i> (buffel grass)
Weed Cover (%):	10%
Disturbance:	Minor dieback of canopy with heavy fragmentation of community on margins
Disturbance Cover (%):	-

Topography and Landform	
Landform Situation:	Basalt rise within broad erosional valley
Altitude:	320m
Relief:	Very low
Slope:	Flat
Slope Class:	Very Gently Inclined (1 – 3 %)
Erosional Landform Pattern:	Located within erosional valley between laterite scarps
Soils:	Heavy clay (gilgai) with basalt corestone
Soil Colour:	Grey - dark
Soil Texture:	Clay loam
Geology:	Clay soil derived insitu from basalt

Survey Details	
Recorder / s:	David Stanton/ Wayne Harris
Field Site Number:	T 15
Date / Time:	17 / 10 / 2010; 1.30 pm

A wide-angle photograph of a savanna landscape. The foreground is dominated by tall, dry, yellowish-brown grass. In the middle ground, several scattered trees with green foliage are visible against a clear blue sky. The background shows a distant treeline and hills.

Site Description	
Location:	5km West of Newlands Mine adjacent to main road.
Site Description:	Low basalt rise within broader alluvial plain
Orientation of Transect:	No Transect
Datum:	GDA94
Latitude / Longitude:	-21.2125; 147.85173

[illegible]

Vegetation Community Description												
	2 LPA											
<i>Heteropogon contortus</i>	A											
Ground Cover	10% Bare Ground				10% leaf litter				80% Grass			
Status: D = dominant, C = Codominant, S = subdominant, A = associate, EVNT = significant species, # = weed, ## = declared plant O = outside plot												

Cover % PCC					Species	Stem Count(500m ²)					
E	T1	T2	T3	S1		E	T1	T2	T3	S1	S2
	20%			<	<i>Eucalyptus orgadophila</i>		4	1			
				<2	<i>Carissa ovata</i>		1				
				<2	<i>Acacia holosericea</i>					2	
				<2	<i>Lysiphyllum carronii</i>						
				<2	<i>Bothriochloa</i> sp.						
				<2	<i>Grewia latifolia</i>						
				<2	<i>Parthenium hysterophorus</i>						
				<2	<i>Pennisetum ciliare</i>						
				<2	<i>Sarga</i> sp.						
				<2	<i>Opuntia stricta</i>						
				<2	<i>Heteropogon contortus</i>						

Community Health and Condition	
Overall Health:	Moderate– Strata dominated by native species although heavily fragmented on margins with incursion of exotic ground cover.
Potential EVNT Flora Species Habitat:	Potential for <i>Dichanthium queenslandicum</i> (Vulnerable NCA, Vulnerable EPBC)
EVNT Flora Species Recorded:	No
Weed Species:	<i>Opuntia stricta</i> <i>Parthenium hysterophorus</i> <i>Pennisetum ciliare</i> (buffel grass)
Weed Cover (%):	10%
Disturbance:	Minor dieback of canopy with heavy fragmentation of community on margins
Disturbance Cover (%):	-

Topography and Landform	
Landform Situation:	Basalt rise within broad erosional valley
Altitude:	320 m
Relief:	Very low
Slope:	Flat
Slope Class:	Very Gently Inclined (1 – 3 %)
Erosional Landform Pattern:	Located within erosional valley between laterite scarps
Soils:	Heavy clay (gilgai) with basalt corestone
Soil Colour:	Grey - dark
Soil Texture:	Clay loam
Geology:	Clay soil derived insitu from basalt

Survey Details	
Recorder / s:	David Stanton/ Wayne Harris
Field Site Number:	T 16
Date / Time:	17 / 10 / 2010; 1.30 pm

VEGETATION SURVEY
Mixed shrubland on margins of laterite escarpment (T 17)



Regional Ecosystem Profile	
Regional Ecosystem Type:	RE 11.7.1x1
EPBC Status:	n / a
VM Status:	Least Concern
BD Status:	Of Concern
DERM Mapped as:	11.8.3 (EPBC Endangered)
Width of RE:	Not linear
Survey Level	Tertiary

Site Description	
Location:	Footslopes of flat topped hill west of the main access road
Site Description:	290°
Orientation of Transect:	GDA94
Datum:	-21.2222; 146.8669
Latitude / Longitude:	Low flat topped hill west of the main access road

Vegetation Community Description								
Structural Description	Shrubland							
Canopy Height	6-10m							
Canopy Cover (%)	50%							
Botanical Species	Status*	Average Height (m)						
		E	T1	T2	T3	S1	S2	G
<i>Acacia harpophylla</i>	D		8					
<i>Croton insularis</i>						4		
<i>Eucalyptus persistens</i>			8					
<i>Lysiphyllum carronii</i>			6			4		
<i>Acalypha eremorum</i>						4		
<i>Erythroxylon australe</i>						7		
<i>Acacia shirleyi</i>						4		
<i>Jasminum didymum</i>						4		
<i>Carissa ovata</i>						4		0.5
<i>Alphitonia excelsa</i>						3		

Vegetation Community Description								
<i>Opuntia stricta</i> # (o)						4		
<i>Drypetes deplanchei</i> (o)						3		
<i>Grevillea helmsiae</i>						7		
<i>Eremophila mitchellii</i>								
<i>Aristida</i> sp.(calycina)								0.5
Ground Cover	10% Leaf litter			75% Rock			15% grasses	

Cover % PCC					Species	Stem Count(500m ²)					
E	T1	T2	T3	S1		E	T1	T2	T3	S1	S2
	<5%				<i>A. harpophylla</i>		2			1	
	<5%				<i>Croton insularis</i>					5	
	5%				<i>Eucalyptus persistens</i>		2			2	
	<15%				<i>Lysiphyllum carronii</i>		2			3	
	<5%				<i>Acalypha eremorum</i>						
	<5%				<i>Erythroxylon australe</i>						
	<2%				<i>Acacia shirleyi</i>		2				
	<2%				<i>Jasminum didymum</i>					2	
	<10%				<i>Carissa ovata</i>					9	
	<2%				<i>Eremophila mitchellii</i>					7	
	<2%				<i>Grevillea helmsiae</i>					2	
	<2%				<i>Opuntia stricta</i> # (o)					1	
	<2%				<i>Drypetes deplanchei</i> (o)					2	

Community Health and Condition	
Overall Health:	Good - Very Good
Potential EVNT Flora Species Habitat:	<i>Croton magneticus</i> , <i>Cerbera dumicola</i>
EVNT Flora Species Recorded:	No
Weed Species:	<i>Opuntia tomentosa</i>
Weed Cover (%):	< 2
Disturbance:	No introduced flora identified
Disturbance Cover (%):	< 2%

Topography and Landform	
Landform Situation:	Colluvial scree slope at base of laterite mesa
Altitude:	305 m
Relief:	Very low
Slope Class:	Moderately Inclined (5-10 %)
Erosional Landform Pattern:	Located on scree slope of laterite scarp
Soils:	Rudosol (rocky soils)
Soil Colour:	Red-browns
Soil Texture:	Rock rubble
Geology:	Laterite / ironstone cap

Survey Details	
Recorder / s:	David Stanton/ Wayne Harris
Field Site Number:	T 17
Date / Time:	17 / 10 / 2010; 3.30 pm

A photograph of a dense forest with tall, thin trees and a thick canopy of green leaves, viewed from a low angle looking up. The sky is visible through the branches, and the foreground is filled with lush green foliage.

Site Description	
Location:	3km West of Newlands Mine
Site Description:	Top of laterite jump up
Orientation of Transect:	340°
Datum:	GDA94
Latitude / Longitude:	-21.2232; 147.8664

[illegible]

Vegetation Community Description			
Ground Cover	40% Grass (Aristida)	40% rock	20% grass
Status: D = dominant, C = Codominant, S = subdominant, A = associate, EVNT = significant species, # = weed, ## = declared plant O = outside plot			

Cover % PCC					Species	Stem Count(500m ²)					
E	T1	T2	T3	S1		E	T1	T2	T3	S1	S2
	30%			<	<i>Eucalyptus crebra</i>		5	8			
	<5%				<i>Eucalyptus melanophloia</i>		1				
	5%	<5%			<i>Corymbia dallachiana</i>		1	1		2	
		10%			<i>Acacia excelsa</i>					15	
		5%			<i>Dodonaea stenophylla</i>					18	
		<5%			<i>Grewia latifolia</i>					7	
		<5%			<i>Geijera salicifolia</i>					1	
		<2%			<i>Acacia shirleyi</i>					1	
		<5%			<i>Sida</i> sp.					4	

Community Health and Condition	
Overall Health:	Excellent – dominated by native ground covers with no disturbance of upper structural layers
Potential EVNT Flora Species Habitat:	Limited
EVNT Flora Species Recorded:	No
Weed Species:	Nil
Weed Cover (%):	Nil
Disturbance:	Nil
Disturbance Cover (%):	Nil

Topography and Landform	
Landform Situation:	Top of laterite mesa
Altitude:	330m
Relief:	Very low
Slope:	Flat
Slope Class:	Very Gently Inclined (1 – 3 %)
Erosional Landform Pattern:	Located on top of laterite plateau
Soils:	Rudosol
Soil Colour:	Red-brown
Soil Texture:	Rocky indurated gravel
Geology:	Tertiary age laterite plateau

Survey Details	
Recorder / s:	David Stanton
Field Site Number:	T 18
Date / Time:	17 / 10 / 2010; 4.30 pm

VEGETATION SURVEY
Brigalow (*Acacia harpophylla*) woodland on colluvial plain (T 19)



Regional Ecosystem Profile	
Regional Ecosystem Type:	RE 11.5.16
EPBC Status:	Endangered (Brigalow ecological community)
VM Status:	Endangered dominant
BD Status:	Endangered
DERM Mapped as:	11.4.8/11.5.15
Width of RE:	Not linear
Survey Level:	Tertiary

Site Description	
Location:	3km West of Newlands Mine
Site Description:	Erosional valley with colluvial/alluvial clay and gravel soils
Orientation of Transect:	270
Datum:	GDA94
Latitude / Longitude:	-21.22067; 147.8670

Vegetation Community Description												
Open forest												
Dominant Species (50 m x 10 m area)												
Botanical Species	Status*	Average Height (m)							Abundance (m ² / ha)			
		E	T1	T2	T3	S1	S2	G	E	T1	T2	T3
<i>Acacia harpophylla</i>	D		13			1.5				15		
<i>Lysiphylum carronii</i>	A					1.5					3	
<i>Erythroxylon australe</i>	A					1.5						
<i>Alectryon diversifolius</i>	A					1.5						
<i>Ehretia grahamii</i>	A					1.5						
<i>Eremophila mitchellii</i>	A					1.5						
<i>Bursaria spinosa</i>	A					1.5						
<i>Carissa ovata</i>	A					1.5						
<i>Parthenium hysterophorus</i>	#					0.25						
<i>Poaceae</i> spp	A					0.25						
Ground Cover	30% Bare Ground			20% Leaf Litter					50% Grass (<i>Aristida</i> sp.)			

Vegetation Community Description											
Status: D = dominant, C = Codominant, S = subdominant, A = associate, EVNT = significant species, # = weed, ## = declared plant O = outside plot											

Cover % PCC					Species	Stem Count(500m ²)					
E	T1	T2	T3	S1		E	T1	T2	T3	S1	S2
<5	60%			<2	<i>Acacia harpophylla</i>		64	8			
				<2	<i>Lysiphyllum carronii</i>					2	
				<2	<i>Erythroxylon australe</i>					7	
				<2	<i>Alectryon diversifolius</i>					10	
				<2	<i>Ehretia grahamii</i>						
				<2	<i>Eremophila mitchellii</i>					3	
				<2	<i>Grevillea parallela</i>					1	
				<2	<i>Carissa ovata</i>					7	
				<2	<i>Bursaria spinosa</i>					1	

Community Health and Condition	
Overall Health:	Moderate– Evidence of prior physical disturbance (>15yrs)
Potential EVNT Flora Species Habitat:	Limited
EVNT Flora Species Recorded:	No
Weed Species:	<i>Opuntia stricta</i> (outside plot) <i>Eriocereus martinii</i> (outside plot) <i>Pennisetum ciliare</i> (pasture grass) <i>Parthenium hysterophorus</i>
Weed Cover (%):	< 5%
Disturbance:	Minor incursion of exotic species into ground covers. Evidence of prior physical disturbance
Disturbance Cover (%):	Unknown

Topography and Landform	
Landform Situation:	Erosional valley between laterite mesas
Altitude:	290 m
Relief:	Very low
Slope:	Flat
Slope Class:	Very Gently Inclined (1 – 3 %)
Erosional Landform Pattern:	Located within erosional valley between scarps
Soils:	Silt/ gravel and clay with minor gilgai development
Soil Colour:	Red-brown
Soil Texture:	Silty clay loam
Geology:	Colluvial/alluvial wash derived from eroding laterite scarps

Survey Details	
Recorder / s:	David Stanton/ Wayne Harris
Field Site Number:	T 19
Date / Time:	17 / 10 / 2010; 4.30 pm

VEGETATION SURVEY
Riparian woodland and open forest (Q 20)



Regional Ecosystem Profile	
Regional Ecosystem Type:	RE 11.3.25
EPBC Status:	n / a
VM Status:	Least Concern
BD Status:	Of Concern
DERM Mapped as:	11.9.2/11.9.3/8.5
Width of RE:	25
Survey Level:	Quaternary

Site Description	
Location:	3km SSW of Byerwen Station
Site Description:	Riparian channel passing through grazed woodland
Transect	No Transect
Datum:	GDA94
Latitude / Longitude:	-21.0985; 147.9150

Vegetation Community Description								
Structural Description	Woodland to open forest							
Canopy Height	16-25m							
Canopy Cover (%)	40%							
Botanical Species	Status *	Structural Representation (average height m)						
		E	T1	T2	T3	S1	S2	G
<i>Corymbia erythrophloia</i>			15	10				
<i>Melaleuca fluviatilis</i>			18					
<i>Casuarina cunninghamiana</i>			20					
<i>Flindersia australis</i>						5		
<i>Lysiphyllum carronii</i>						5		
<i>Melaleuca bracteata</i>						5		
<i>Ficus coronata</i>						3		
<i>Owenia acidula</i>						2		
<i>Acacia salicina</i>						5		
Ground Cover	10% Parthenium		40% Poaceae			50% Leaf litter and bare		

Vegetation Community Description			
		spp.	ground

Community Health and Condition	
Overall Health:	Moderate – Heavily grazed to stream margins with prominent cover of exotic species
Potential EVNT Flora Species Habitat:	<i>Eucalyptus raveretiana</i>
EVNT Flora Species Recorded:	No
Weed Species:	<i>Parthenium hysterophorus</i> (Class 2 LPA) <i>Cryptostegia grandiflora</i> (Class 2 LPA)
Weed Cover (%):	10%
Disturbance:	Heavy grazing with subsequent invasion of exotic species
Disturbance Cover (%):	-

Topography and Landform	
Landform Situation:	Drainage line
Altitude:	229m
Aspect	0
Relief:	Very low
Slope:	0
Slope Class:	0
Erosional Landform Pattern:	Channel between basalt ridgelines
Soils:	Tenosol
Soil Colour:	Grey brown
Soil Texture:	Sand and gravel
Geology:	Fluvial sand

Survey Details	
Recorder / s:	David Stanton
Field Site Number:	Q 20
Date / Time:	18/ 10 / 2010; 8.00 am

A photograph of a savanna landscape. The foreground is covered in dry, yellowish-brown grass with some green patches. Several trees are scattered across the scene, including a prominent one in the center-right with a thick, dark trunk and a large, rounded canopy of green leaves. Other trees with thinner trunks and varying canopy densities are visible in the background. The sky is a clear, bright blue. The overall scene depicts a typical savanna environment.

Regional Ecosystem Profile	
Regional Ecosystem Type:	RE 11.3.1
EPBC Status:	Endangered (Brigalow ecological community)
VM Status:	Endangered dominant
BD Status:	Endangered
DERM Mapped as:	11.9.2/11.9.3/11.3.25
Width of RE:	100
Survey Level:	Tertiary

Site Description	
Location:	Byerwen Station
Site Description:	Grazed upper alluvial terrace near feed lots
Orientation of Transect:	270
Datum:	GDA94
Latitude / Longitude:	-21.0991; 147.91527

Vegetation Community Description												
Open forest												
Dominant Species (50 m x 10 m area)												
Botanical Species	Status*	Average Height (m)							Abundance (m ² / ha)			
		E	T1	T2	T3	S1	S2	G	E	T1	T2	T3
<i>Acacia harpophylla</i>	D		8			3				7		
<i>Corymbia dallachiana</i>	A		8									
<i>Lysiphyllum carronii</i>	A					1.5						
<i>Eremophila mitchellii</i>	A					1.5						
<i>Grevillea parallela</i>	A					1.5						
<i>Carissa ovata</i>	A					1.5						
<i>Parthenium hysterophorus</i>	#					0.25						
<i>Poaceae</i> spp	A					0.25						
Ground Cover	50% Bare Ground			20% Leaf Litter					30% Grass (<i>Aristida</i> sp.)			

Status: D = dominant, C = Codominant, S = subdominant, A = associate, EVNT = significant species, # = weed. ## = declared plant O = outside plot

Cover % PCC					Species	Stem Count(500m ²)					
E	T1	T2	T3	S1		E	T1	T2	T3	S1	S2
<5	40%			<2	<i>Acacia harpophylla</i>		11	3			
				<2	<i>Corymbia dallachiana</i>		1				
				<2	<i>Lysiphyllum carronii</i>					7	
				<2	<i>Eremophila mitchellii</i>					2	
				<2	<i>Grevillea parallela</i>						
				<2	<i>Carissa ovata</i>					4	
				<2	<i>Parthenium hysterophorus</i>						
				<2	<i>Poaceae spp</i>						

Community Health and Condition	
Overall Health:	Moderate to Poor - Evidence of severe physical disturbance (>15yrs old)
Potential EVNT Flora Species Habitat:	Limited
EVNT Flora Species Recorded:	No
Weed Species:	<i>Opuntia stricta</i> (outside plot) <i>Eriocereus martinii</i> (Class 2 LPA) <i>Parthenium hysterophorus</i>
Weed Cover (%):	< 5%
Disturbance:	Minor incursion of exotic species into ground covers. Evidence of prior extreme physical disturbance. Site is heavily grazed
Disturbance Cover (%):	Unknown

Topography and Landform	
Landform Situation:	Upper alluvial terrace of major drainage line
Altitude:	290 m
Relief:	Very low
Slope Class:	Very Gently Inclined (1 – 3 %)
Erosional Landform Pattern:	Located within erosional valley between scarps
Soils:	Silt
Soil Colour:	Grey-brown
Soil Texture:	Silty clay loam
Geology:	Alluvial wash derived occasional overbank flow

Survey Details	
Recorder / s:	David Stanton
Field Site Number:	T 21
Date / Time:	18 / 10 / 2010; 8.30 am

VEGETATION SURVEY
Native Grasslands on basalt (S 22)



Regional Ecosystem Profile	
Regional Ecosystem Type:	Non- remnant
EPBC Status:	n/a
VMA Status:	n/a
EPA Status:	n/a
DNRW Mapped as:	11.8.11/11.8.5/ 11.8.13
Width of RE:	n / a
Survey Level:	Secondary

Site Description	
Location:	4km west of Byerwen Station
Site Description:	Raised basalt plain
Orientation of Transect:	360
Datum:	GDA94
Latitude / Longitude:	-21.08827; 147.8913

Vegetation Community Description												
Grassland with emergent shrubs and trees												
Dominant Species (50 m x 10 m area)												
Botanical Species	Status*	Average Height (m)							Abundance (m ² / ha)			
		E	T1	T2	T3	S1	S2	G	E	T1	T2	T3
<i>Corymbia erythrophloia</i>	A	5						0.5				
<i>Planchonia careya</i>	A	7						0.5				
<i>Bothriochloa pertusa.</i>	D							0.5				
<i>Sida</i> sp.	A							0.5				
<i>Heteropogon contortus</i>	A							1.5				
<i>Opuntia</i> sp.	#							0.5				
<i>Indigofera pratensis</i>	A							0.5				
<i>Indigofera linnaei</i>	A							0.5				
<i>Hybanthus stellarioides</i>	A							0.5				
<i>Crotalaria montana</i>	A							0.5				
<i>Glycine tomentella</i>	A							0.5				

Vegetation Community Description												
<i>Eriachne</i> sp.	A							0.5				
<i>Bursaria incana</i>	A							0.5				
<i>Sida</i> sp.	A							0.5				
<i>Rostellularia adscendens</i>	A							0.5				
Ground Cover	90% Grass			5% Leaf Litter					5% Rock			
Status: D = dominant, C = Codominant, S = subdominant, A = associate, EVNT = significant species, # = weed, ## = declared plant O = outside plot												

Cover %	E	G
<i>Corymbia erythrophloia</i>	5	
<i>Planchonia careya</i>	<2	
<i>Bothriochloa pertusa</i>		90
<i>Sida</i> sp.		5
<i>Heteropogon contortus</i>		3
<i>Planchonia careya</i>		<2
<i>Opuntia</i> sp.		<2
<i>Indigofera pratensis</i>		<2
<i>Indigofera linnaei</i>		<2
<i>Hybanthus stellarioides</i>		<2
<i>Crotalaria montana</i>		<2
<i>Glycine tomentella</i>		<2
<i>Eriachne obtusa</i>		<2
<i>Bursaria incana</i>		<2

Community Health and Condition	
Overall Health:	Excellent - Lightly grazed with limited incursion of exotic species.
Potential EVNT Flora Species Habitat:	Potential habitat for <i>Dicanthium queenslandicum</i> , <i>Digitaria porrecta</i>
EVNT Flora Species Recorded:	No
Weed Species:	<i>Opuntia stricta</i> (Class 2 LPA)
Weed Cover (%):	< 1%
Disturbance:	Minor impacts from light grazing
Disturbance Cover (%):	0

Topography and Landform	
Landform Situation:	Raised basalt plain
Altitude:	340 m
Relief:	Very low
Slope Class:	Gently Inclined (5 %)
Erosional Landform Pattern:	Underlying stratigraphic unit below Tertiary age cap rock
Soil Colour:	Grey brown
Soil Texture:	Clay with Gilgai
Geology:	Weathered basalt plain

Survey Details	
Recorder / s:	Wayne Harris
Field Site Number:	S 22
Date / Time:	18 / 10 / 2010; 11.00 am

VEGETATION SURVEY
***Acacia shirleyi* low open forest and shrubland (Q 23)**



Regional Ecosystem Profile	
Regional Ecosystem Type:	RE 11.7.2
EPBC Status:	n / a
VM Status:	Least Concern
BD Status:	No Concern at Present
DERM Mapped as:	11.8.3 (Endangered EPBC)
Width of RE:	Not linear
Survey Level:	Quaternary

Site Description	
Location:	7km west of Byerwen Station
Site Description:	Lower footslope of laterite breakaway
Orientation of Transect:	No Transect
Datum:	GDA94
Latitude / Longitude:	-21.0881; 147.8718

Vegetation Community Description								
Structural Description	Low open forest to tall shrubland							
Canopy Height	8-12m							
Canopy Cover (%)	50%							
Botanical Species	Status *	Structural Representation (average height m)						
		E	T1	T2	T3	S1	S2	G
<i>Acacia shirleyi</i>	D		10			3		
<i>Alphitonia excelsa</i>						1.5		
<i>Everistia vacciniifolia</i>						1.5m		
<i>Acalypha eremorum</i>						1.5		
<i>Eucalyptus persistens</i>		15						
<i>Erythroxylon australe</i>						2		
<i>Carissa ovata</i>						1.5		
<i>Flindersia collina</i>						1.5		
Ground Cover	80% Bare Ground/ Rock			10% Aristida sp.		10% Leaf litter		

Community Health and Condition

Overall Health:	Good – limited disturbance and weed invasion
Potential EVNT Flora Species Habitat:	Low
EVNT Flora Species Recorded:	No
Weed Species:	Nil
Weed Cover (%):	0
Disturbance:	No obvious disturbance
Disturbance Cover (%):	

Topography and Landform	
Landform Situation:	Toe of laterite breakaway
Altitude:	334m
Aspect	East facing slope
Relief:	Steep breakaway
Slope Class:	Moderately Inclined (10%)
Erosional Landform Pattern:	Mesa breakaway
Soils:	Ironstone gravel and rock
Soil Colour:	Red-brown
Soil Texture:	Rudosol
Geology:	Colluvium / scree derived from eroding laterite scarp

Survey Details	
Recorder / s:	David Stanton
Field Site Number:	Q 23
Date / Time:	17/ 10 / 2010; 12.30 am

VEGETATION SURVEY
Eucalyptus persistens low sparse woodland (Q 24)



Regional Ecosystem Profile	
Regional Ecosystem Type:	RE 11.7.4
EPBC Status:	n / a
VM Status:	Least Concern
BD Status:	No Concern at Present
DERM Mapped as:	11.8.3 (Endangered EPBC)
Width of RE:	Not linear
Survey Level:	Quaternary

Site Description	
Location:	7km west of Byerwen Station
Site Description:	Lower footslope of laterite breakaway
Orientation of Transect:	No Transect
Datum:	GDA94
Latitude / Longitude:	-21.0887; 147.8725

Vegetation Community Description								
Structural Description	Low sparse woodland							
Canopy Height	10-15m							
Canopy Cover (%)	50%							
Botanical Species	Status *	Structural Representation (average height m)						
		E	T1	T2	T3	S1	S2	G
<i>Eucalyptus persistens</i>	D	17	10					
<i>Acacia shirleyi</i>	D		10			3		
<i>Alphitonia excelsa</i>						1.5		
<i>Everistia vacciniifolia</i>						1.5m		
<i>Acalypha eremorum</i>						1.5		
<i>Eucalyptus persistens</i>		15						
<i>Erythroxylum australe</i>						2		
<i>Carissa ovata</i>						1.5		
<i>Flindersia collina</i>						1.5		
Ground Cover	80% Bare Ground/ Rock			10% <i>Aristida</i> sp.		10% Leaf litter		

Community Health and Condition	
Overall Health:	Good – limited disturbance and weed invasion
Potential EVNT Flora Species Habitat:	Low
EVNT Flora Species Recorded:	No
Weed Species:	Nil
Weed Cover (%):	0
Disturbance:	No obvious disturbance – natural erosion at base of scarp
Disturbance Cover (%):	unknown

Topography and Landform	
Landform Situation:	Toe of laterite breakaway
Altitude:	334m
Aspect	East facing slope
Relief:	Steep breakaway
Slope Class:	Gently Inclined (<5%)
Erosional Landform Pattern:	Mesa breakaway
Soils:	Ironstone gravel and rock
Soil Colour:	Red-brown
Soil Texture:	Rudosol
Geology:	Colluvium / scree derived from eroding laterite scarp

Survey Details	
Recorder / s:	David Stanton
Field Site Number:	Q 24
Date / Time:	18/ 10 / 2010; 12.40 am

VEGETATION SURVEY
***Acacia harpophylla* low open forest and shrubland (T 25)**



Regional Ecosystem Profile	
Regional Ecosystem Type:	RE 11.7.1
EPBC Status:	n / a
VM Status:	Least Concern
BD Status:	Of Concern
DERM Mapped as:	11.8.3 (Endangered EPBC)
Width of RE:	Not linear
Survey Level:	Tertiary

Site Description	
Location:	7km west of Byerwen Station
Site Description:	Footslope of laterite breakaway formed on weathered coarse grained sandstone
Orientation of Transect:	No Transect
Datum:	GDA94
Latitude / Longitude:	-21.0888; 147.8733

Vegetation Community Description												
Open forest												
Dominant Species (50 m x 10 m area)												
Botanical Species	Status*	Average Height (m)							Abundance (m ² / ha)			
		E	T1	T2	T3	S1	S2	G	E	T1	T2	T3
<i>Acacia harpophylla</i>	D		13			1.5				7		
<i>Erythroxylon australe</i>	A					1.5						
<i>Alectryon diversifolius</i>	A					1.5						
<i>Ehretia grahamii</i>	A					1.5						
<i>Bursaria spinosa</i>	A					1.5						
<i>Geijera salicifolia</i>	A					1.5						
<i>Terminalia oblongata</i>	A					4						
<i>Eremophila mitchellii</i>	A					4						
<i>Carissa ovata</i>	A					1.5						
<i>Flindersia maculosa</i>	A					5						
<i>Poaceae</i> spp	A					0.25						

Vegetation Community Description			
Ground Cover	30% Bare Ground	20% Leaf Litter	50% Grass (<i>Aristida</i> sp.)
Status: D = dominant, C = Codominant, S = subdominant, A = associate, EVNT = significant species, # = weed, ## = declared plant O = outside plot			

Cover % PCC					Species	Stem Count(500m ²)					
E	T1	T2	T3	S1		E	T1	T2	T3	S1	S2
<5	40%			<5	<i>Acacia harpophylla</i>		9	2			
				<5	<i>Erythroxylon australe</i>					2	
				<5	<i>Acalypha eremorum</i>					11	
				<5	<i>Bursaria spinosa</i>					2	
				<5	<i>Geijera salicifolia</i>					2	
				<5	<i>Terminalia oblongata</i>					1	
				<5	<i>Eremophila mitchellii</i>					7	
				<5	<i>Carissa ovata</i>					9	
					<i>Flindersia maculosa</i>					3	
					<i>Poaceae</i> spp						

Topography and Landform	
Landform Situation:	Shallow colluvial apron around ironstone mesa
Altitude:	320m
Aspect	East facing slope
Relief:	Gentle
Slope Class:	Gently Inclined (2.5%)
Erosional Landform Pattern:	Mesa breakaway – product of scarp retreat
Soils:	Coarse gravel and sand
Soil Colour:	Red-brown
Soil Texture:	Gravel and silt
Geology:	Colluvium / scree derived from eroding laterite scarp shallowly overlying sandstone basement

Survey Details	
Recorder / s:	David Stanton
Field Site Number:	T 25
Date / Time:	18/ 10 / 2010; 12.45 pm

VEGETATION SURVEY
***Eucalyptus orgadophila* woodland and sparse woodland (T 26)**



Regional Ecosystem Profile	
Regional Ecosystem Type:	RE 11.8.5
EPBC Status:	n / a
VM Status:	Least Concern
BD Status:	No Concern at Present
DERM Mapped as:	11.8.11/11.8.5/ 11.8.13 (EPBC Endangered)
Width of RE:	Not linear
Survey Level	Tertiary

Site Description	
Location:	8km West of Byerwen Station
Site Description:	Low basalt rise within broader alluvial plain
Orientation of Transect:	No Transect
Datum:	GDA94
Latitude / Longitude:	-21.0884; 147.8768

Vegetation Community Description								
Structural Description	Open woodland							
Canopy Height	15 -23m							
Canopy Cover (%)	20%							
Botanical Species	Status*	Average Height (m)						
		E	T1	T2	T3	S1	S2	G
<i>Eucalyptus orgadophila</i>	D		18	12				
<i>Corymbia erythrophloia</i>	A			10				
<i>Cassia brewsteri</i>	A					1		
<i>Bothriochloa</i> sp.	A					1		
<i>Sida</i> sp.	A					2		
90% Grass	05% Leaf litter			5% Bare Ground				

Cover % PCC					Species	Stem Count(500m ²)					
E	T1	T2	T3	S1		E	T1	T2	T3	S1	S2
	15%			<	<i>Eucalyptus orgadophila</i>		4	1			
				<2	<i>Corymbia erythrophloia</i>		1				

				<2	<i>Cassia brewsteri</i>					2	
				<2	<i>Bothriochloa</i> sp.						
				<2	<i>Sida</i> sp.						

Community Health and Condition

Overall Health:	Excellent – Minor disturbance from grazing
Potential EVNT Flora Species Habitat:	Potential for <i>Dichanthium queenslandicum</i> (Vulnerable NCA, Vulnerable EPBC)
EVNT Flora Species Recorded:	No
Weed Species:	<i>Opuntia stricta</i> (outside plot) <i>Parthenium hysterophorus</i> (outside plot)
Weed Cover (%):	10%
Disturbance:	Minor grazing pressure
Disturbance Cover (%):	-

Topography and Landform

Landform Situation:	Basalt rise within broad erosional valley
Altitude:	320m
Relief:	Very low
Slope Class:	Very Gently Inclined (1 – 3 %)
Erosional Landform Pattern:	Basalt plain amongst broader ironstone mesa dominated landscape
Soils:	Heavy clay (gilgai) with basalt corestone
Soil Colour:	Grey - dark
Soil Texture:	Clay loam
Geology:	Clay soil derived insitu from basalt

Survey Details

Recorder / s:	David Stanton
Field Site Number:	T 26
Date / Time:	17 / 10 / 2010; 1.40 pm

A wide-angle photograph of a savanna landscape. The foreground is filled with tall, dry, golden-brown grass. Several scattered trees with green foliage are visible across the middle ground. In the background, there are rolling hills under a clear blue sky.

Site Description	
Location:	4km west of Byerwen Station
Site Description:	Raised basalt plain
Orientation of Transect:	No transect
Datum:	GDA94
Latitude / Longitude:	-21.0873; 147.8807

Vegetation Community Description												
Grassland with emergent shrubs and trees												
Dominant Species (50 m x 10 m area)												
Botanical Species	Status*	Average Height (m)							Abundance (m ² / ha)			
		E	T1	T2	T3	S1	S2	G	E	T1	T2	T3
<i>Corymbia erythrophloia</i>	A	5						0.5				
<i>Planchonia careya</i>	A	7						0.5				
<i>Bothriochloa pertusa.</i>	D							0.5				
<i>Sida</i> sp.	A							0.5				
<i>Heteropogon contortus</i>	A							1.5				
<i>Indigofera pratensis</i>	A							0.5				
<i>Sida</i> sp.	A							0.5				
Ground Cover	90% Grass		5% Leaf Litter					5% Rock				
Status: D = dominant, C = Codominant, S = subdominant, A = associate, EVNT = significant species, # = weed. ## = declared plant Q = outside plot												

Community Health and Condition	
Overall Health:	Moderate - Lightly grazed with limited incursion of exotic species.
Potential EVNT Flora Species Habitat:	Potential habitat for <i>Dichanthium queenslandicum</i> , <i>Digitaria porrecta</i>
EVNT Flora Species Recorded:	No
Weed Species:	<i>Opuntia stricta</i> (Class 2 LPA)
Weed Cover (%):	< 1%
Disturbance:	Minor impacts from light grazing
Disturbance Cover (%):	0

Topography and Landform	
Landform Situation:	Raised basalt plain
Altitude:	340m
Relief:	Very low
Slope Class:	Gently Inclined (5 %)
Erosional Landform Pattern:	Underlying stratigraphic unit below Tertiary age cap rock
Soil Colour:	Grey brown
Soil Texture:	Clay with Gilgai
Geology:	Weathered basalt plain

Survey Details	
Recorder / s:	David Stanton
Field Site Number:	Q 27
Date / Time:	18 / 10 / 2010; 1.00 pm

VEGETATION SURVEY
***Corymbia erythrophloia* dominant low sparse woodland (Q 28)**



Regional Ecosystem Profile	
Regional Ecosystem Type:	RE 11.8.4
EPBC Status:	n / a
VM Status:	Least Concern
BD Status:	No Concern at Present
DERM Mapped as:	11.8.11/11.8.5/ 11.8.13 (EPBC Endangered)
Width of RE:	Not linear
Survey Level:	Quaternary

Site Description	
Location:	7km west of Byerwen Station
Site Description:	Footslope of basalt interbed
Orientation of Transect:	No Transect
Datum:	GDA94
Latitude / Longitude:	-21.0843; 147.8940

Vegetation Community Description								
Structural Description	Open woodland							
Canopy Height	10-15m							
Canopy Cover (%)	50%							
Botanical Species	Status*	Structural Representation (average height m)						
		E	T1	T2	T3	S1	S2	G
<i>Corymbia erythrophloia</i>	D		12			3		
<i>Corymbia dallachiana</i>	A		12			3		
<i>Eucalyptus orgadophila</i>	A		12					
<i>Planchonia careya</i>	A					3		
<i>Bursaria tenuifolia</i>	A					2		
<i>Bothriochloa</i> sp.	D							0.5
Ground Cover	90% Grass			5% Bare Ground		5% Leaf litter		

Community Health and Condition	
Overall Health:	Excellent – limited disturbance and weed invasion

Potential EVNT Flora Species Habitat:	<i>Dichanthium queenslandicum</i>
EVNT Flora Species Recorded:	No
Weed Species:	<i>Parthenium hysterophorus</i> (outside plot)
Weed Cover (%):	0
Disturbance:	No obvious disturbance – minor grazing
Disturbance Cover (%):	unknown

Topography and Landform	
Landform Situation:	Basalt rubble slope
Altitude:	320m
Aspect	east
Relief:	Low
Slope Class:	Gently Inclined (1 – 3 %)
Erosional Landform Pattern:	Basalt plain amongst broader ironstone dominated landscape
Soils:	Heavy clay (gilgai) with basalt corestone
Soil Colour:	Grey - dark
Soil Texture:	Clay loam
Geology:	Clay soil derived insitu from basalt

Survey Details	
Recorder / s:	David Stanton
Field Site Number:	Q 28
Date / Time:	18/ 10 / 2010; 12.50 pm

VEGETATION SURVEY
***Acacia harpophylla* dominant woodland (Q 29)**



Regional Ecosystem Profile	
Regional Ecosystem Type:	RE 11.8.13
EPBC Status:	Endangered
VM Status:	Endangered
BD Status:	Endangered
DERM Mapped as:	11.8.11/11.8.5/ 11.8.13 (EPBC Endangered)
Width of RE:	Not linear
Survey Level:	Quaternary

Site Description	
Location:	5km west of Byerwen Station
Site Description:	Basaltic terrain near powerline
Orientation of Transect:	No Transect
Datum:	GDA94
Latitude / Longitude:	-21.08369; 147.8958

Vegetation Community Description								
Structural Description	Low open forest							
Canopy Height	14-18m							
Canopy Cover (%)	50%							
Botanical Species	Status *	Structural Representation (average height m)						
		E	T1	T2	T3	S1	S2	G
<i>Acacia harpophylla</i>	D		10					
<i>Lysiphyllum carronii</i>	A					2		
<i>Carissa ovata</i>	A					1.5		
Ground Cover	90% Grass			5% Bare Ground		5% Leaf litter		

Community Health and Condition	
Overall Health:	Moderate – Community has been impacted by grazing and prior mechanical disturbance
Potential EVNT Flora Species Habitat:	Unlikely
EVNT Flora Species Recorded:	No

Weed Species:	<i>Parthenium hysterophorus</i>
Weed Cover (%):	<1%
Disturbance:	Grazing – prior mechanical disturbance
Disturbance Cover (%):	unknown

Topography and Landform	
Landform Situation:	Basalt hills
Altitude:	277m
Aspect	-ENE
Slope Class:	Gently inclined – 5%
Soils:	Rocky
Soil Colour:	Grey - dark
Soil Texture:	Clay loam
Geology:	Clay soil derived insitu from basalt

Survey Details	
Recorder / s:	David Stanton
Field Site Number:	Q 29
Date / Time:	18/ 10 / 2010; 1.50. pm

VEGETATION SURVEY
***Corymbia erythrophloia* dominant woodland on basalt (Q 30)**



Regional Ecosystem Profile	
Regional Ecosystem Type:	RE 11.8.4
EPBC Status:	n / a
VM Status:	Least Concern
BD Status:	No Concern at Present
DERM Mapped as:	11.8.11/11.8.5/ 11.8.13 (EPBC Endangered dominant)
Width of RE:	Not linear
Survey Level:	Quaternary

Site Description	
Location:	5.5km WSW of Byerwen Station
Site Description:	Basaltic terrain near powerline
Orientation of Transect:	No Transect
Datum:	GDA94
Latitude / Longitude:	-21.1093; 147.9036

Vegetation Community Description								
Structural Description	Open woodland							
Canopy Height	10-15m							
Canopy Cover (%)	50%							
Botanical Species	Status *	Structural Representation (average height m)						
		E	T1	T2	T3	S1	S2	G
<i>Corymbia erythrophloia</i>	D		18	12				
<i>Eucalyptus crebra</i>	A		18					
<i>Planchonia careya</i>	A					3		
<i>Bursaria spinosa</i>	A							
<i>Themeda triandra</i>	D							0.5
<i>Heteropogon triticeus</i>	D							1.5
<i>Pogonolobus reticulatus</i>	A					1.5		

Vegetation Community Description			
Ground Cover	70% Grass	20% <i>Basalt talus</i>	10% Leaf litter

Community Health and Condition	
Overall Health:	Excellent – limited disturbance and weed invasion
Potential EVNT Flora Species Habitat:	Limited potential
EVNT Flora Species Recorded:	Nil
Weed Species:	Nil
Weed Cover (%):	0
Disturbance:	No obvious disturbance
Disturbance Cover (%):	0

Topography and Landform	
Landform Situation:	Basalt rubble slope
Altitude:	264m
Aspect	North -East
Relief:	Moderate
Slope Class:	Gently Inclined (10 %)
Erosional Landform Pattern:	Exposed basalt interbed
Soils:	Rudosol
Soil Colour:	Red-brown
Soil Texture:	Rock mixed with loamy clay
Geology:	Basalt talus

Survey Details	
Recorder / s:	David Stanton
Field Site Number:	Q 30
Date / Time:	18/ 10 / 2010; 2.00 pm

VEGETATION SURVEY
Brigalow (*Acacia harpophylla*) open forest on basalt (T 31)



Regional Ecosystem Profile	
Regional Ecosystem Type:	RE 11.8.13
EPBC Status:	Endangered (Brigalow ecological community)
VM Status:	Endangered dominant
BD Status:	Endangered
DERM Mapped as:	11.4.8/11.5.15
Width of RE:	Not linear
Survey Level:	Tertiary

Site Description	
Location:	5km SSW of Byerwen, Byerwen Station
Site Description:	Footslope on rocky basalt hillside
Orientation of Transect:	270
Datum:	GDA94
Latitude / Longitude:	-21.1156; 147.9071

Vegetation Community Description												
Open forest												
Dominant Species (50 m x 10 m area)												
Botanical Species	Status*	Average Height (m)							Abundance (m ² / ha)			
		E	T1	T2	T3	S1	S2	G	E	T1	T2	T3
<i>Acacia harpophylla</i>	D		15				1.5			14	3	
<i>Lysiphyllum carronii</i>	A					5	1.5				3	
<i>Erythroxylum australe</i>	A						1.5					
<i>Acalypha eremorum</i>	A						1.5					
<i>Alectryon diversifolius</i>	A						1.5					
<i>Eremophila mitchellii</i>	A						1.5					
<i>Bursaria spinosa</i>	A						1.5					
<i>Carissa ovata</i>	A						1.5					
<i>Denhamia oleaster</i>	A					6						
<i>Terminalia oblongata</i>	A					6						
<i>Poaceae</i> spp	A						1.5					
<i>Eriocereus martinii</i>	A							0.5				

Vegetation Community Description												
<i>Opuntia stricta</i>								1				
Ground Cover	40% Bare Ground		10% Leaf Litter		40% <i>Carissa ovata</i>				10% Grass (<i>Aristida</i> sp.)			
Status: D = dominant, C = Codominant, S = subdominant, A = associate, EVNT = significant species, # = weed, ## = declared plant O = outside plot												

Cover % PCC					Species	Stem Count(500m ²)					
E	T1	T2	T3	S1		E	T1	T2	S1	S2	G
	50%			<2	<i>Acacia harpophylla</i>		31	7			
				<2	<i>Lysiphyllum carronii</i>					1	
				<2	<i>Erythroxylum australe</i>					3	
				<5	<i>Acalypha eremorum</i>					7	
				<5	<i>Alectryon diversifolius</i>					2	
				<5	<i>Eremophila mitchellii</i>					1	
				<2	<i>Bursaria spinosa</i>					3	
				40	<i>Carissa ovata</i>					16	
				<2	<i>Denhamia oleaster</i>				2		
					<i>Terminalia oblongifolia</i>				5		
					<i>Poaceae</i> spp						
					<i>Eriocereus martinii</i>					5	
					<i>Opuntia stricta</i>					3	

Community Health and Condition	
Overall Health:	Excellent– No evidence of prior physical disturbance and minor invasion of exotic species (>15yrs)
Potential EVNT Flora Species Habitat:	<i>Cerbera dumicola</i> <i>Croton magneticus</i>
EVNT Flora Species Recorded:	No
Weed Species:	<i>Opuntia stricta</i> (outside plot) <i>Eriocereus martinii</i> (outside plot)
Weed Cover (%):	< 5%
Disturbance:	Minor incursion of exotic species into ground covers. No evidence of prior physical disturbance
Disturbance Cover (%):	Unknown

Topography and Landform	
Landform Situation:	Footslope of basalt hillside
Altitude:	253m
Relief:	Moderate
Slope Class:	Moderately Inclined (5-10 %)
Soils:	Rocky
Soil Colour:	Red-brown
Soil Texture:	Silty clay loam with basalt corestone
Geology:	Basalt scree slope

Survey Details	
Recorder / s:	David Stanton/ Wayne Harris
Field Site Number:	T 31
Date / Time:	18 / 10 / 2010; 4.30 pm

VEGETATION SURVEY
***Eucalyptus orgadophila* woodland and sparse woodland (T 32)**



Regional Ecosystem Profile	
Regional Ecosystem Type:	RE 11.8.5
EPBC Status:	n / a
VM Status:	Least Concern
BD Status:	No Concern at Present
DERM Mapped as:	11.8.5/11.8.13 (EPBC Endangered Sub-dominant)
Width of RE:	Not linear
Survey Level	Tertiary

Site Description	
Location:	6km SSW of Byerwen, Byerwen
Site Description:	Grassy woodland on colluvial apron derived from basalt
Orientation of Transect:	00
Datum:	GDA94
Latitude / Longitude:	-21.1156; 147.9066

Vegetation Community Description												
Woodland with canopy 15 to 23m												
Dominant Species (50 m x 10 m area)												
Botanical Species	Status*	Average Height (m)							Abundance (m ² / ha)			
		E	T1	T2	T3	S1	S2	G	E	T1	T2	T3
<i>Eucalyptus orgadophila</i>	D		18	12						4	1	
<i>Carissa ovata</i>	A						1					
<i>Acacia harpophylla</i>	A					5						
<i>Cassia brewsteri</i>	A						1.5					
<i>Grevillea parallela</i>	D					2						
<i>Parthenium hysterophorus</i>	# class 2 LPA							0.25				
<i>Pennisetum ciliare</i>	#											
<i>Bothriochloa</i> sp.	A							0.5				

Vegetation Community Description												
<i>Opuntia stricta</i>	# class 2 LPA							0.5				
<i>Heteropogon contortus</i>	A							2				
Ground Cover	10% Bare Ground				10% leaf litter				80% Grass			
Status: D = dominant, C = Codominant, S = subdominant, A = associate, EVNT = significant species, # = weed, ## = declared plant O = outside plot												

Cover % PCC					Species	Stem Count(500m ²)					
E	T1	T2	T3	S1		E	T1	T2	T3	S1	S2
	20%			<	<i>Eucalyptus orgadophila</i>		4	1			
				<2	<i>Carissa ovata</i>					4	
				<2	<i>Acacia harpophylla</i>					1	
				<2	<i>Cassia brewsteri</i>						3
				<2	<i>Grevillea parallela</i>					1	
					<i>Parthenium hysterophorus</i>						
					<i>Pennisetum ciliare</i>						
					<i>Bothriochloa</i> sp.						
					<i>Opuntia stricta</i>						2
					<i>Heteropogon contortus</i>						

Community Health and Condition	
Overall Health:	Moderate–Poor: Community is suffering from canopy dieback and ground cover subject to heavy grazing regime.
Potential EVNT Flora Species Habitat:	Potential for <i>Dichanthium queenslandicum</i> (Vulnerable NCA, Vulnerable EPBC)
EVNT Flora Species Recorded:	No
Weed Species:	<i>Opuntia stricta</i> (Class 2 LPA) <i>Parthenium hysterophorus</i> (Class 2 LPA) <i>Pennisetum ciliare</i> (buffel grass)
Weed Cover (%):	<5%
Disturbance:	Minor dieback of canopy with heavy fragmentation of community on margins
Disturbance Cover (%):	-

Topography and Landform	
Landform Situation:	Colluvial footslope derived from basalt
Altitude:	252 m
Relief:	Low
Slope Class:	Gently Inclined (5 %)
Soils:	Heavy clay (gilgai) with basalt corestone
Soil Colour:	Grey - dark
Soil Texture:	Clay loam
Geology:	Clay soil derived from basalt mixed with basalt talus

Survey Details	
Recorder / s:	David Stanton/ Wayne Harris
Field Site Number:	T 32
Date / Time:	18 / 10 / 2010; 4.30 pm

VEGETATION SURVEY
***Eucalyptus crebra* woodland on Coarse grained sandstone (T 33)**



Regional Ecosystem Profile	
Regional Ecosystem Type:	RE 11.5.1
EPBC Status:	n / a
VM Status:	Least concern
BD Status:	No concern at present
DERM Mapped as:	11.7.2/ 11.5.3 (endangered sub-dominant)
Width of RE:	Not Linear
Survey Level:	Tertiary

Site Description	
Location:	12km WNW of Newlands Mine
Site Description:	Woodland on sandy wash derived from coarse grained sandstone
Orientation of Transect:	300
Datum:	GDA94
Latitude / Longitude:	-21.1716; 147.8284

[illegible]

Vegetation Community Description												
<i>Breynia oblongifolia</i>	A					2						
<i>Acacia leiocalyx</i>	A											
<i>Larsenaikia ochreatea</i>	A											
<i>Stylosanthes scabra</i>	A											
<i>Pterocaulon sphacelatus</i>	A											
<i>Senecio brigalowensis</i>	A											
<i>Evolvulus alsinoides</i>	A											
<i>Hybanthus stellarioides</i>	A											
<i>Wahlenbergia gracilis</i>	A											
<i>Corymbia dallachiana</i>	A											
<i>Crotalaria montana</i>	A											
<i>Calotis cuneifolia</i>	A											
<i>Dianella</i> sp.	A											
<i>Bursaria spinosa</i>	A											
<i>Glycine</i> sp.	A											
<i>Digitaria</i> sp.	A											
<i>Platysace</i> sp.	A											
Ground Cover	5% bare ground			Leaf Litter 60%						Grass 35% (<i>Aristida</i> sp.)		
Status: D = dominant, C = Codominant, S = subdominant, A = associate, EVNT = significant species, # = weed, ## = declared plant O = outside plot												

Cover % PCC					Species	Stem Count(500m ²)						
E	T1	T2	T3	S1		E	T1	T2	T3	S1	S2	
	15%			<	<i>Eucalyptus crebra</i>		32	8				
	15%				<i>Corymbia clarksoniana</i>		1					
	10%			8	<i>Eucalyptus platyphylla</i>					2		
					<i>Alphitonia excelsa</i>							
					<i>Petalostigma pubescens</i>							
					<i>Planchonia careya</i>							
					<i>Pogonolobus reticulatus</i>							
					<i>Breynia oblongifolia</i>							
					<i>Acacia leiocalyx</i>							
					<i>Larsenaikia ochreatea</i>							
					<i>Stylosanthes scabra</i>							
					<i>Pterocaulon sphacelatus</i>							
					<i>Senecio bristolowensis</i>							
				12	<i>Evolvulus alsinoides</i>							
					<i>Hybanthus stellarioides</i>							
					<i>Wahlenbergia gracilis</i>							
					<i>Corymbia dallachiana</i>							
					<i>Crotalaria montana</i>							
					<i>Calotis cuneifolia</i>							
					<i>Dianella</i> sp.							
					<i>Bursaria spinosa</i>							
					<i>Glycine</i> sp.							
					<i>Digitaria</i> sp.							
					<i>Platysace</i> sp.							
					<i>Crotalaria montana</i>							
					<i>Calotis cuneifolia</i>							
					<i>Dianella</i> sp.							

Community Health and Condition	
Overall Health:	Excellent – no evidence of major physical disturbance and dominated by native ground covers
Potential EVNT Flora Species Habitat:	Limited
EVNT Flora Species Recorded:	Nil
Weed Species:	Nil
Weed Cover (%):	Nil
Disturbance:	Nil
Disturbance Cover (%):	Unknown

Topography and Landform	
Landform Situation:	Flat adjacent to watercourse. Shallow layer of coarse sand overlying coarse grained sandstone
Altitude:	278m
Relief:	Very low
Slope Class:	Very Gently Inclined (1 – 3 %)
Erosional Landform Pattern:	Coarse grained sandstone exposed by retreating laterite scarp
Soils:	Tenosol
Soil Colour:	Grey-white
Soil Texture:	Coarse sand
Geology:	Shallow veneer of coarse sand over coarse grained sandstone

Survey Details	
Recorder / s:	Wayne Harris
Field Site Number:	T 33
Date / Time:	19 / 10 / 2010; 9.00 am

VEGETATION SURVEY
***Eucalyptus populnea* woodland on alluvial plain (T 34)**



Regional Ecosystem Profile	
Regional Ecosystem Type:	RE 11.3.2
EPBC Status:	n / a
VM Status:	Of Concern
BD Status:	Of concern
DERM Mapped as:	11..8.5
Width of RE:	Not Linear
Survey Level:	Tertiary

Site Description	
Location:	11km WNW of Newlands Mine
Site Description:	Woodland on alluvial outwash plain
Orientation of Transect:	270
Datum:	GDA94
Latitude / Longitude:	-21.17161; 147.8418

Vegetation Community Description												
Woodland with canopy 14-18m												
Dominant Species (50 m x 10 m area)												
Botanical Species	Status*	Average Height (m)							Abundance (m ² / ha)			
		E	T1	T2	T3	S1	S2	G	E	T1	T2	T3
<i>Eucalyptus populnea</i>	D		16							7		
<i>Eucalyptus orgadophila</i>	A		16							1		
<i>Owenia acidula</i>	A					3						
<i>Cassia brewsteri</i>	A					3						
<i>Acacia salicina</i>	A					6						
<i>Lysiphyllum carronii</i>						5						
<i>Atalaya hemiglauca</i>						3						
<i>Bothriochloa</i> sp.								0.25				
<i>Parthenium hysterophorus</i>								0.25				
<i>Mimosa pudica</i>								0.25				

Vegetation Community Description			
Ground Cover	60% bare ground	Leaf Litter 5%	Grass 35% (<i>Aristida</i> sp.)
Status: D = dominant, C = Codominant, S = subdominant, A = associate, EVNT = significant species, # = weed, ## = declared plant O = outside plot			

Cover % PCC					Species	Stem Count(500m ²)					
E	T1	T2	T3	S1		E	T1	T2	T3	S1	S2
	15%			<	<i>Eucalyptus populnea</i>		5	2			
	15%				<i>Eucalyptus orgadophila</i>		1				
	10%			8	<i>Owenia acidula</i>					7	
					<i>Cassia brewsteri</i>					2	
					<i>Acacia salicina</i>					2	
					<i>Lysiphyllum carronii</i>					1	
					<i>Atalaya hemiglauc</i>					2	
					<i>Bothriochloa</i> sp.						
					<i>Parthenium hysterophorus</i>						
					<i>Mimosa pudica</i>						

Community Health and Condition	
Overall Health:	Moderate – Ground cover is heavily grazed with <i>Parthenium</i> infesting ground layers
Potential EVNT Flora Species Habitat:	Limited
EVNT Flora Species Recorded:	Nil
Weed Species:	<i>Parthenium hysterophorus</i> <i>Mimosa pudica</i>
Weed Cover (%):	5%
Disturbance:	Heavy grazing of ground cover and minor canopy dieback
Disturbance Cover (%):	Unknown

Topography and Landform	
Landform Situation:	Alluvial outwash plain
Altitude:	267m
Relief:	Very low
Slope Class:	Very Gently Inclined (1 – 3 %)
Soils:	Alluvial
Soil Colour:	Grey
Soil Texture:	Sandy loam
Geology:	Alluvial outwash plain joining flood plain of major drainage channel

Survey Details	
Recorder / s:	David Stanton
Field Site Number:	T 34
Date / Time:	19/ 10 / 2010; 9.30 am

A photograph of a dense forest of tall, thin trees with green foliage, likely eucalyptus, under a clear blue sky. The ground is covered in dry grass and fallen branches.

Regional Ecosystem Profile	
Regional Ecosystem Type:	RE 11.3.1
EPBC Status:	Endangered (Brigalow ecological community)
VM Status:	Endangered dominant
BD Status:	Endangered
DERM Mapped as:	11.8.5
Width of RE:	100m
Survey Level:	Tertiary

Site Description	
Location:	11km WNW of Newlands Mine
Site Description:	Broad alluvial flat with mosaic of woodland and Brigalow
Orientation of Transect:	280
Datum:	GDA94
Latitude / Longitude:	-21.1686; 147.8433

Vegetation Community Description												
Open forest												
Dominant Species (50 m x 10 m area)												
Botanical Species	Status*	Average Height (m)							Abundance (m ² / ha)			
		E	T1	T2	T3	S1	S2	G	E	T1	T2	T3
<i>Acacia harpophylla</i>	D		13			1.5				12		
<i>Owenia acidula</i>	A					5					3	
<i>Erythroxylon australe</i>	A					2						
<i>Alectryon diversifolius</i>	A					3						
<i>Carissa ovata</i>	A					1.5						
<i>Lysiphyllum carronii</i>	A					2						
<i>Poaceae</i> spp.	A					0.25						
<i>Opuntia stricta</i>	#					0.5						
Ground Cover	50% Bare Ground			20% Leaf Litter					30% Grass (<i>Aristida</i> sp.)			
Status: D = dominant, C = Codominant, S = subdominant, A = associate, EVNT = significant species, #												

Vegetation Community Description											
= weed, ## = declared plant O = outside plot											

Cover % PCC					Species	Stem Count(500m ²)					
E	T1	T2	T3	S1		E	T1	T2	T3	S1	S2
<5	60%			<2	<i>Acacia harpophylla</i>		47			5	
				<2	<i>Owenia acidula</i>					2	
				<2	<i>Erythroxylon australe</i>					2	
				<2	<i>Carissa ovata</i>					5	
				<2	<i>Lysiphyllum carronii</i>					3	
				<2	<i>Poaceae</i> spp.					7	
				<2	<i>Opuntia stricta</i>					1	

Community Health and Condition	
Overall Health:	Moderate– Evidence of prior physical disturbance (>15yrs)
Potential EVNT Flora Species Habitat:	Limited
EVNT Flora Species Recorded:	No
Weed Species:	<i>Opuntia stricta</i> (outside plot) <i>Parthenium hysterophorus</i> (outside plot)
Weed Cover (%):	< 5%
Disturbance:	Minor incursion of exotic species into ground covers. Evidence of prior physical disturbance
Disturbance Cover (%):	Unknown

Topography and Landform	
Landform Situation:	Alluvial outwash plain joining floodplain of major drainage line
Altitude:	260m
Relief:	0
Slope:	Very low
Slope Class:	0
Erosional Landform Pattern:	0
Soils:	Alluvial
Soil Colour:	Grey
Soil Texture:	Silty clay loam
Geology:	Alluvial plain

Survey Details	
Recorder / s:	David Stanton
Field Site Number:	T 35
Date / Time:	19 / 10 / 2010; 10.30 am

VEGETATION SURVEY
Riparian woodland and open forest (Q 36)



Regional Ecosystem Profile	
Regional Ecosystem Type:	RE 11.3.4
EPBC Status:	n / a
VM Status:	Of Concern
BD Status:	Of Concern
DERM Mapped as:	11.8.5
Width of RE:	30
Survey Level:	Quaternary

Site Description	
Location:	11.5 km North of Newlands Mine, Byerwen Station
Site Description:	Alluvial flood plain of major creek (T2 terrace)
Transect	No Transect
Datum:	GDA94
Latitude / Longitude:	-21.16713; 147.84491

Vegetation Community Description								
Structural Description	Woodland							
Canopy Height	18-25m							
Canopy Cover (%)	40%							
Botanical Species	Status *	Structural Representation (average height m)						
		E	T1	T2	T3	S1	S2	G
<i>Eucalyptus</i>			23					
<i>orgadophila</i>								
<i>Eucalyptus crebra</i>			18					
<i>Corymbia dallachiana</i>			18					
<i>Eucalyptus populnea</i>			18					
<i>Cassia brewsteri</i>						4		
<i>Owenia acidula</i>						6		
Ground Cover	40% <i>Poaceae</i> spp			10% <i>Parthenium</i>		50% bare ground and minor leaf litter		

Community Health and Condition

Overall Health:	Moderate – Heavily grazed to stream margins with dieback of canopy species
Potential EVNT Flora Species Habitat:	Nil
EVNT Flora Species Recorded:	No
Weed Species:	<i>Parthenium hysterophorus</i> (Class 2 LPA)
Weed Cover (%):	5%
Disturbance:	Heavy grazing and canopy dieback
Disturbance Cover (%):	Nil

Topography and Landform

Landform Situation:	Alluvial outwash plain joining floodplain of major drainage line
Altitude:	260m
Aspect	0
Relief:	Very low
Slope:	0
Slope Class:	0
Soils:	Alluvial
Soil Colour:	Grey
Soil Texture:	Silty clay loam
Geology:	Alluvial plain

Survey Details

Recorder / s:	David Stanton
Field Site Number:	Q 36
Date / Time:	19/ 10 / 2010; 10.00 am

VEGETATION SURVEY
***Corymbia erythrophloia* dominant woodland (Q 37)**



Regional Ecosystem Profile	
Regional Ecosystem Type:	RE 11.8.4
EPBC Status:	n / a
VM Status:	Least Concern
BD Status:	No Concern at Present
DERM Mapped as:	11.8.5
Width of RE:	Not linear
Survey Level:	Quaternary

Site Description	
Location:	12km WNW of Newlands Mine
Site Description:	Footslope of basalt interbed
Orientation of Transect:	No Transect
Datum:	GDA94
Latitude / Longitude:	-21.1654; 147.8469

Vegetation Community Description								
Structural Description	Open woodland							
Canopy Height	10-15m							
Canopy Cover (%)	50%							
Botanical Species	Status *	Structural Representation (average height m)						
		E	T1	T2	T3	S1	S2	G
<i>Corymbia erythrophloia</i>	D		18	12				
<i>Eucalyptus crebra</i>	A		18					
<i>Planchonia careya</i>	A					3		
<i>Bursaria spinosa</i>	A							
<i>Themeda triandra</i>	D							0.5
<i>Heteropogon triticeus</i>	D							1.5
Ground Cover	70% Grass			20 Basalt talus		10% Leaf litter		

Community Health and Condition	
Overall Health:	Excellent – limited disturbance and weed invasion
Potential EVNT Flora Species Habitat:	Limited potential
EVNT Flora Species Recorded:	Nil
Weed Species:	Nil
Weed Cover (%):	0
Disturbance:	No obvious disturbance
Disturbance Cover (%):	0

Topography and Landform	
Landform Situation:	Basalt rubble slope
Altitude:	264m
Aspect	South-east
Relief:	Moderate
Slope Class:	Gently Inclined (20 %)
Erosional Landform Pattern:	Exposed basalt interbed
Soils:	Rudosol
Soil Colour:	Red-brown
Soil Texture:	Rock mixed with loamy clay
Geology:	Basalt talus

Survey Details	
Recorder / s:	David Stanton
Field Site Number:	Q 37
Date / Time:	19/ 10 / 2010; 11.00 am

VEGETATION SURVEY
Riparian woodland and open forest (Q 38)



Regional Ecosystem Profile	
Regional Ecosystem Type:	RE 11.3.25
EPBC Status:	n / a
VM Status:	Least Concern
BD Status:	Of Concern
DERM Mapped as:	11.8.5
Width of RE:	25m
Survey Level:	Quaternary

Site Description	
Location:	12km WNW of Newlands Mine, Byerwen Station
Site Description:	Riparian channel passing flood plain woodland
Transect	No Transect
Datum:	GDA94
Latitude / Longitude:	-21.1674; 147.8480

Vegetation Community Description								
Structural Description	Woodland to open forest							
Canopy Height	16-25m							
Canopy Cover (%)	40%							
Botanical Species	Status	Structural Representation (average height m)						
	*	E	T1	T2	T3	S1	S2	G
<i>Eucalyptus tereticornis</i>			20					
<i>Eucalyptus coolabah</i> <i>subsp. coolabah</i>			15					
<i>Acacia salicina</i>			20					
Ground Cover	10% Parthenium			40% <i>Poaceae</i> spp.		50% Leaf litter and bare ground		

Community Health and Condition	
Overall Health:	Moderate – Heavily grazed to stream margins with prominent cover of exotic species
Potential EVNT Flora Species Habitat:	<i>Eucalyptus raveretiana</i>

EVNT Flora Species Recorded:	No
Weed Species:	<i>Parthenium hysterophorus</i> (Class 2 LPA)
Weed Cover (%):	10%
Disturbance:	Heavy grazing with subsequent invasion of exotic species
Disturbance Cover (%):	-

Topography and Landform	
Landform Situation:	Drainage line
Altitude:	259m
Aspect	0
Relief:	Very low
Slope:	0
Slope Class:	0
Erosional Landform Pattern:	Channel between basalt ridgelines
Soils:	Tenosol
Soil Colour:	Grey brown
Soil Texture:	Sand and gravel
Geology:	Fluvial sand

Survey Details	
Recorder / s:	David Stanton
Field Site Number:	Q 38
Date / Time:	19/ 10 / 2010; 11.30 am

VEGETATION SURVEY
***Eucalyptus tereticornis* dominant woodland on alluvial plain (T 39)**



Regional Ecosystem Profile	
Regional Ecosystem Type:	RE 11.3.4
EPBC Status:	n / a
VM Status:	Of Concern
BD Status:	Of concern
DERM Mapped as:	11.8.5
Width of RE:	Not Linear
Survey Level:	Tertiary

Site Description	
Location:	11km WNW of Newlands Mine
Site Description:	Woodland on alluvial flood plain (T1 terrace)
Orientation of Transect:	300
Datum:	GDA94
Latitude / Longitude:	-21.1638; 147.8486

Vegetation Community Description												
Woodland on alluvial flood plain												
Dominant Species (50 m x 10 m area)												
Botanical Species	Status*	Average Height (m)							Abundance (m ² / ha)			
		E	T1	T2	T3	S1	S2	G	E	T1	T2	T3
<i>Eucalyptus tereticornis</i>	D		25							6		
<i>Corymbia tessellaris</i>	A		18	12						1	1	
<i>Eucalyptus coolabah</i>	A		23							1		
<i>Owenia acidula</i>	A					3						
<i>Acacia salicina</i>	A					5						
<i>Cassia brewsteri</i>	A					3						
<i>Lysiphyllum carronii</i>						5						
<i>Atalaya hemiglauca</i>						3						
<i>Brachychiton australis</i>						2						
<i>Carissa ovata</i>						2						
<i>Terminalia oblongata</i>						3						

Vegetation Community Description												
<i>Parthenium hysterophorus</i>								0.25				
<i>Eustrephus latifolius</i>								0.5				
<i>Cassia brewsteri</i>						1.5						
<i>Bothriochloa</i> sp.								0.5				
<i>Heteropogon contortus</i>								1				
<i>Grewia retusifolia</i>								1				
<i>Mimosa pudica</i>								0.25				
Ground Cover	60% bare ground			Leaf Litter 5%					Grass 35% (<i>Aristida</i> sp.)			
Status: D = dominant, C = Codominant, S = subdominant, A = associate, EVNT = significant species, # = weed, ## = declared plant O = outside plot												

Cover % PCC					Species	Stem Count(500m ²)					
E	T1	T2	T3	S1		E	T1	T2	T3	S1	S2
	15%			<	<i>Eucalyptus tereticornis</i>		5	2			
	15%				<i>Corymbia tessellaris</i>		1				
	10%	5%			<i>Eucalyptus coolabah</i>					7	
					<i>Owenia acidula</i>					2	
					<i>Acacia salicina</i>					2	
					<i>Cassia brewsteri</i>					1	
					<i>Lysiphyllum carronii</i>					2	
					<i>Atalaya hemiglauca</i>					1	
					<i>Brachychiton australis</i>					1	
					<i>Carissa ovata</i>					2	
					<i>Terminalia oblongata</i>					1	
					<i>Parthenium hysterophorus</i>						
					<i>Eustrephus latifolius</i>						
					<i>Cassia brewsteri</i>					1	
					<i>Bothriochloa</i> sp.						
					<i>Heteropogon contortus</i>						
					<i>Grewia retusifolia</i>					3	
					<i>Mimosa pudica</i>						

Community Health and Condition	
Overall Health:	Good to Moderate – Canopy is intact and ground cover is dominated by native spp.
Potential EVNT Flora Species Habitat:	Limited
EVNT Flora Species Recorded:	Nil
Weed Species:	<i>Parthenium hysterophorus</i>
Weed Cover (%):	<2%
Disturbance:	Grazing and associated weed invasion
Disturbance Cover (%):	Unknown

Topography and Landform	
Landform Situation:	Alluvial flood plain
Altitude:	257m
Relief:	Very low
Slope Class:	Flat
Soils:	Alluvial
Soil Colour:	Grey
Soil Texture:	Sandy loam
Geology:	Alluvial flood plain

Survey Details	
Recorder / s:	David Stanton
Field Site Number:	T 39
Date / Time:	19/ 10 / 2010; 11.45 am

A photograph of a woodland landscape. In the foreground, a fallen log lies horizontally across the frame. To the left, a thin, light-colored tree trunk stands upright. The ground is covered in dry, brownish vegetation and fallen leaves. The background is filled with numerous tall, thin trees with green foliage, creating a dense canopy. The sky is visible through the branches, appearing blue with some white clouds.

Vegetation Community Description												
Woodland to 16m with emergent eucalypts												
Dominant Species (50 m x 10 m area)												
Botanical Species	Status*	Average Height (m)							Abundance (m ² / ha)			
		E	T1	T2	T3	S1	S2	G	E	T1	T2	T3
<i>Acacia harpophylla</i>	D		16	10		1.5				9		
<i>Grevillea parallela</i>	A		16							2		
<i>Owenia acidula</i>	A					5					3	
<i>Eremophila mitchellii</i>						5						
<i>Flindersia maculosa</i>						6						
<i>Bursaria spinosa</i>						3						
<i>Cassia brewsteri</i>						4						
<i>Carissa ovata</i>							2					
Ground Cover	50% Bare Ground			30% Leaf Litter					20% Grass (<i>Aristida</i> sp.)			

Status: D = dominant, C = Codominant, S = subdominant, A = associate, EVNT = significant species, # = weed, ## = declared plant O = outside plot

Cover % PCC					Species	Stem Count(500m ²)					
E	T1	T2	T3	S1		E	T1	T2	T3	S1	S2
<5	40%				<i>Acacia harpophylla</i>		21	5		3	
	10%				<i>Grevillea parallela</i>					2	
				<5	<i>Owenia acidula</i>					1	
				10	<i>Eremophila mitchellii</i>					17	
				<5	<i>Flindersia maculosa</i>					2	
				<5	<i>Bursaria spinosa</i>					1	
				<5	<i>Cassia brewsteri</i>					5	
				<5	<i>Carissa ovata</i>						3

Community Health and Condition	
Overall Health:	Moderate – Evidence of prior physical disturbance (>15yrs) and severe grazing regime
Potential EVNT Flora Species Habitat:	Limited
EVNT Flora Species Recorded:	No
Weed Species:	<i>Opuntia stricta</i> (outside plot) <i>Eriocereus martinii</i> (outside plot)
Weed Cover (%):	< 2%
Disturbance:	Minor incursion of exotic species into ground covers. Evidence of prior physical disturbance
Disturbance Cover (%):	Unknown

Topography and Landform	
Landform Situation:	Margins of alluvial flood plain with overlapping sediments derived from colluvial wash
Altitude:	260m
Relief:	Very low
Slope Class:	Gentle (1-3%)
Erosional Landform Pattern:	0
Soils:	Alluvial
Soil Colour:	Grey
Soil Texture:	Silty clay loam mixed with gravel
Geology:	Alluvial plain/ slope wash deposit

Survey Details	
Recorder / s:	David Stanton
Field Site Number:	T 40
Date / Time:	19 / 10 / 2010; 12.00 pm

VEGETATION SURVEY
Microphyll Vine Thicket on laterite jump up (Q 41)



Regional Ecosystem Profile	
Regional Ecosystem Type:	RE 11.7.1x1
EPBC Status:	n / a
VM Status:	Least Concern
BD Status:	Of Concern
DERM Mapped as:	11.8.3 (EPBC / VMA Endangered).
Width of RE:	Not linear
Site Level	Quaternary

Site Description	
Location:	12km NW of Newlands Mine
Site Description:	Scree slope on laterite mesa
Orientation of Transect:	No transect
Datum:	GDA94
Latitude / Longitude:	-21.1623, 146.8559

Vegetation Community Description								
Structural Description	Microphyll thicket / shrubland							
Canopy Height	3-6m							
Canopy Cover (%)	40%							
Botanical Species	Status*	Average Height (m)						
		E	T1	T2	T3	S1	S2	G
<i>Alphitonia excelsa</i>	A		5					
<i>Brachychiton australis</i>	A	10						
<i>Croton insularis</i>	A		5					
<i>Drypetes deplanchei</i>	A		4					
<i>Ehretia grahamii</i>	A					3		
<i>Grevillea helmsiae</i>	A		5					
<i>Acalypha eremorum</i>	A					4		
<i>Erythroxylum australe</i>	A		5			4		
<i>Ricinocarpos ledifolius</i>	A					2		
<i>Carissa ovata</i>	A					1		0.5
<i>Bursaria spinosa</i>	A					2		

Vegetation Community Description								
<i>Pouteria myrsinifolia</i>	A		5					
<i>Aristida sp</i>	A							0.2
<i>Diospyros humilis</i>			4					
Ground Cover:	60% Rock Rubble		20% Aristida		20% Leaf litter			

Community Health and Condition	
Overall Health:	Very Good
Potential EVNT Flora Species Habitat:	<i>Croton magneticus</i> , <i>Cerbera dumicola</i>
EVNT Flora Species Recorded:	Nil
Weed Species:	Nil
Weed Cover (%):	Nil
Disturbance:	Nil
Disturbance Cover (%):	0

Topography and Landform	
Landform Situation:	Scree slope on laterite mesa
Altitude:	302 m
Relief:	Moderate
Slope Class:	Moderately Inclined (20- 25%)
Erosional Landform Pattern:	Retreating scarp face
Soils:	Rudosol (rocky soils)
Soil Colour:	Red-browns
Soil Texture:	Rock rubble
Geology:	Laterite / ironstone cap

Survey Details	
Recorder / s:	David Stanton
Field Site Number:	Q 41
Date / Time:	19/ 10 / 2010; 12.30 pm

VEGETATION SURVEY
***Eucalyptus crebra* woodland on laterite (Q 42)**



Regional Ecosystem Profile	
Regional Ecosystem Type:	RE 11.7.6
EPBC Status:	n / a
VM Status:	Of Concern
BD Status:	Of Concern
DERM Mapped as:	11.8.13
Width of RE:	Non-linear
Survey Level:	Quaternary

Site Description	
Location:	12 km NW of Newlands Mine, Byerwen Station
Site Description:	Top of Tertiary Plateau
Transect	No Transect
Datum:	GDA94
Latitude / Longitude:	-21.1646; 147.8572

Vegetation Community Description								
Structural Description	Woodland							
Canopy Height	18-25m							
Canopy Cover (%)	40%							
Botanical Species	Status	Structural Representation (average height m)						
	*	E	T1	T2	T3	S1	S2	G
<i>Eucalyptus crebra</i>			16					
<i>Corymbia dallachiana</i>			14					
<i>Cassia brewsteri</i>						4		
<i>Grewia latifolia</i>								
<i>Acacia</i> sp.								
<i>Dodonaea stenophylla</i>								
Ground Cover	40% Poaceae spp			40% Rock		20% leaf litter		

Community Health and Condition	
Overall Health:	Excellent – dominated by native ground covers with no disturbance of upper structural layers
Potential EVNT Flora Species Habitat:	Limited
EVNT Flora Species Recorded:	No
Weed Species:	Nil
Weed Cover (%):	Nil
Disturbance:	Nil
Disturbance Cover (%):	Nil

Topography and Landform	
Landform Situation:	Top of laterite mesa
Altitude:	330m
Aspect	Very low
Relief:	Flat
Slope:	Very Gently Inclined (1 – 3 %)
Slope Class:	Located on top of laterite plateau
Soils:	Rudosol
Soil Colour:	Red-brown
Soil Texture:	Rocky indurated gravel
Geology:	Alluvial plain

Survey Details	
Recorder / s:	David Stanton
Field Site Number:	Q 42
Date / Time:	19/ 10 / 2010; 1.00 pm

VEGETATION SURVEY
***Acacia shirleyi* low open forest and shrubland (Q 43)**



Regional Ecosystem Profile	
Regional Ecosystem Type:	RE 11.7.2
EPBC Status:	n / a
VM Status:	Least Concern
BD Status:	No Concern at Present
DERM Mapped as:	11.8.13 (Endangered EPBC)
Width of RE:	Non-linear
Survey Level:	Quaternary

Site Description	
Location:	12km NW of Newlands Mine
Site Description:	Mid slope of laterite breakaway
Transect orientation	No Transect
Datum:	GDA94
Latitude / Longitude:	-21.1634; 146.85519

Vegetation Community Description								
Structural Description	Low open forest to tall shrubland							
Canopy Height	6-10m							
Canopy Cover (%)	50%							
Botanical Species	Status	Structural Representation (average height m)						
	*	E	T1	T2	T3	S1	S2	G
<i>Acacia shirleyi</i>	D		8					
<i>Acalypha eremorum</i>						2		
<i>Aristida</i> sp.								0.25
Ground Cover	70% Bare Ground			10% <i>Aristida</i> sp.		20% Leaf litter		

Community Health and Condition	
Overall Health:	Good – limited disturbance and weed invasion (>15yrs)
Potential EVNT Flora Species Habitat:	Unlikely
EVNT Flora Species Recorded:	No
Weed Species:	No weeds
Weed Cover (%):	< 2
Disturbance:	Non observed
Disturbance Cover (%):	0

Topography and Landform	
Landform Situation:	Mid slope on laterite breakaway
Altitude:	326m
Aspect	North facing slope
Relief:	Moderate
Slope Class:	Moderately Inclined (20°)
Erosional Landform Pattern:	Mesa breakaway slope
Soils:	Rudosol
Soil Colour:	Red-brown
Soil Texture:	Rock / gravel rich with minimum soil development
Geology:	Upper margins of breakaway on laterite scarp

Survey Details	
Recorder / s:	David Stanton/ Wayne Harris
Field Site Number:	Q 43
Date / Time:	19/ 10 / 2010; 1.00 pm

VEGETATION SURVEY
***Corymbia erythrophloia* dominant woodland (Q 44)**



Regional Ecosystem Profile	
Regional Ecosystem Type:	RE 11.8.4
EPBC Status:	n / a
VM Status:	Least Concern
BD Status:	No Concern at Present
DERM Mapped as:	11.8.5
Width of RE:	Not linear
Survey Level:	Quaternary

Site Description	
Location:	12km WNW of Newlands Mine
Site Description:	Footslope of basalt interbed
Orientation of Transect:	No Transect
Datum:	GDA94
Latitude / Longitude:	-21.1634; 147.8552

Vegetation Community Description								
Structural Description	Open woodland							
Canopy Height	10-15m							
Canopy Cover (%)	50%							
Botanical Species	Status *	Structural Representation (average height m)						
		E	T1	T2	T3	S1	S2	G
<i>Corymbia erythrophloia</i>	D		18	12				
<i>Eucalyptus crebra</i>	A		18					
<i>Carissa ovata</i>	A					3		
<i>Bursaria spinosa</i>	A					2		
<i>Themeda triandra</i>	D							0.5
<i>Heteropogon triticeus</i>	D							1.5
Ground Cover	70% Grass			20 Basalt talus		10% Leaf litter		

Community Health and Condition	
Overall Health:	Excellent – limited disturbance and weed invasion
Potential EVNT Flora Species Habitat:	Limited potential
EVNT Flora Species Recorded:	Nil
Weed Species:	Nil
Weed Cover (%):	0
Disturbance:	No obvious disturbance
Disturbance Cover (%):	0

Topography and Landform	
Landform Situation:	Basalt rubble slope
Altitude:	264m
Aspect	South-east
Relief:	Moderate
Slope Class:	Gently Inclined (20 %)
Erosional Landform Pattern:	Exposed basalt interbed
Soils:	Rudosol
Soil Colour:	Red-brown
Soil Texture:	Rock mixed with loamy clay
Geology:	Basalt talus

Survey Details	
Recorder / s:	David Stanton
Field Site Number:	Q 44
Date / Time:	19/ 10 / 2010; 1.30 pm

VEGETATION SURVEY
Non-remnant woodland on colluvial slope (Q 45)



Regional Ecosystem Profile	
Regional Ecosystem Type:	Non-remnant
EPBC Status:	n / a
VM Status:	Non-remnant
BD Status:	Non-remnant
DERM Mapped as:	11.8.5
Width of RE:	Not linear
Survey Level:	Quaternary

Site Description	
Location:	11.5km WNW of Newlands Mine
Site Description:	Colluvial slope which has been heavily utilised for grazing
Orientation of Transect:	No Transect
Datum:	GDA94
Latitude / Longitude:	-21.1655; 147.8545

Vegetation Community Description								
Structural Description	Sparse secondary woodland							
Canopy Height	10-15m							
Canopy Cover (%)	<10%							
Botanical Species	Status *	Structural Representation (average height m)						
		E	T1	T2	T3	S1	S2	G
<i>Corymbia erythrophloia</i>	D		12	12				
<i>Eucalyptus crebra</i>	A		12					
<i>Eucalyptus persistens</i>	A		10			3		
<i>Corymbia dallachiana</i>	A		8			2		
<i>Themeda triandra</i>	D							0.5
<i>Heteropogon triticeus</i>	D							1.5
<i>Acacia harpophylla</i>	A					5		
<i>Carissa ovata</i>	A					3		
<i>Atalaya hemiglauca</i>	A					3		
<i>Cryptostegia grandiflora</i>	#							
Ground Cover	70% exposed soil			10 leaf litter		20% grass (<i>Aristida</i> sp.)		

Community Health and Condition	
Overall Health:	Poor – Severe canopy disturbance with heavy grazing regime
Potential EVNT Flora Species Habitat:	Limited potential
EVNT Flora Species Recorded:	Nil
Weed Species:	<i>Cryptostegia grandiflora</i> (Class 2 LPA)
Weed Cover (%):	0
Disturbance:	Severe canopy disturbance with heavy grazing regime
Disturbance Cover (%):	>50%

Topography and Landform	
Landform Situation:	Colluvial slope wash
Altitude:	284m
Aspect	South-west
Relief:	Low
Slope Class:	Gently Inclined (5 %)
Erosional Landform Pattern:	Gully erosion channels developed in places
Soils:	
Soil Colour:	Red-brown
Soil Texture:	Gravelly loam
Geology:	Colluvial apron

Survey Details	
Recorder / s:	David Stanton
Field Site Number:	Q 45
Date / Time:	19/ 10 / 2010; 2.00 pm

VEGETATION SURVEY
Microphyll Vine Thicket on basalt pile (Q 46)



Regional Ecosystem Profile	
Regional Ecosystem Type:	RE 11.8.13
EPBC Status:	Endangered
VM Status:	Endangered
BD Status:	Endangered
DERM Mapped as:	11.8.5
Width of RE:	< 1ha area in total
Site Level	Quaternary

Site Description	
Location:	11km NW of Newlands Mine
Site Description:	Basalt rock pile protruding above alluvial plain
Orientation of Transect:	No transect
Datum:	GDA94
Latitude / Longitude:	-21.1688; 147.8483

Vegetation Community Description								
Structural Description	Microphyll thicket							
Canopy Height	4-8m							
Canopy Cover (%)	60% (broken by rock rubble)							
Botanical Species	Status*	Average Height (m)						
		E	T1	T2	T3	S1	S2	G
<i>Diospyros humilis</i>			5					
<i>Brachychiton australis</i>			6					
<i>Croton insularis</i>			5					
<i>Drypetes deplanchei</i>			4					
<i>Alyxia ruscifolia</i>			3			2		
<i>Alectryon connatus</i>			6					
<i>Acalypha eremorum</i>								
<i>Erythroxylon australe</i>			5					
<i>Denhamia oleaster</i>			6					
<i>Trema tomentosa</i>						2		
<i>Carissa ovata</i>						2		0.5
<i>Plectranthus sp.</i>								0.5
Ground Cover:	80% Rock Rubble			10% Plectranthus			10% Leaf litter	

Community Health and Condition	
Overall Health:	Very Good although occurrence is limited in size and surrounded by fragmented vegetation.
Potential EVNT Flora Species Habitat:	<i>Croton magneticus</i> , <i>Cerbera dumicola</i>
EVNT Flora Species Recorded:	Nil
Weed Species:	Nil
Weed Cover (%):	Nil
Disturbance:	Nil
Disturbance Cover (%):	0

Topography and Landform	
Landform Situation:	Basalt boulder pile sitting above alluvial plain
Altitude:	283 m
Relief:	Moderate
Slope Class:	Moderately Inclined (10-15%)
Soils:	Rudosol – limited soil development
Soil Colour:	Red-browns
Soil Texture:	Rock rubble
Geology:	Basalt boulder pile

Survey Details	
Recorder / s:	David Stanton
Field Site Number:	Q 46
Date / Time:	19 / 10 / 2010; 2.00 pm

VEGETATION SURVEY

Microphyll Vine Thicket on coarse grained sandstone (Q 47)- Margins of Study Area



Regional Ecosystem Profile	
Regional Ecosystem Type:	RE 11.10.8
EPBC Status:	n / a
VM Status:	Of Concern
BD Status:	Of Concern
DERM Mapped as:	11.7.2
Width of RE:	25m
Site Level	Quaternary

Site Description	
Location:	3km West of Newlands Mine
Site Description:	Incised drainage line – crevasse in coarse grained sedimentary rocks
Orientation of Transect:	No Transect
Datum:	GDA94
Latitude / Longitude:	-21.0700; 147.8120

Vegetation Community Description								
Structural Description	Microphyll vine forest and thicket							
Canopy Height	4-8m							
Canopy Cover (%)	60% (broken by rock rubble)							
Botanical Species	Status*	Average Height (m)						
		E	T1	T2	T3	S1	S2	G
<i>Pleiogynium timorense</i>			15					
<i>Terminalia</i> sp.			12					
<i>Acacia shirleyi</i>			14					
<i>Acronychia oblongifolia</i>						6		
<i>Drypetes deplanchei</i>			4			6		
<i>Alyxia ruscifolia</i>			3				2	
<i>Canthium oleosum</i>						5		
<i>Melodorum leichhardtii</i>						5		
<i>Gossia bidwillii</i>						6		
<i>Ehretia grahamii</i>						4		
<i>Carissa ovata</i>							2	0.5
Ground Cover:	70% Rock Rubble			20% Leaf Litter			10% <i>Aristida</i> sp.	

Community Health and Condition	
Overall Health:	Very Good
Potential EVNT Flora Species Habitat:	<i>Croton magneticus</i> , <i>Cerbera dumicola</i>
EVNT Flora Species Recorded:	No
Weed Species:	Nil
Weed Cover (%):	Nil
Disturbance:	Cleared easement for power line 50m down creek line.
Disturbance Cover (%):	Nil

Topography and Landform	
Landform Situation:	Incised coarse grained sandstone crevasse
Altitude:	350 m
Relief:	Low
Slope:	50% to vertical
Erosional Landform Pattern:	Incised drainage line
Soils:	Rudosol (rocky soils)
Soil Colour:	Grey-brown
Soil Texture:	Rock rubble
Geology:	Coarse grained sandstone

Survey Details	
Recorder / s:	David Stanton/ Wayne Harris
Field Site Number:	Q 47
Date / Time:	16 / 10 / 2010; 2.00 pm

VEGETATION SURVEY
Microphyll Vine Thicket on basalt slope (T 48)



Regional Ecosystem Profile	
Regional Ecosystem Type:	RE 11.8.13
EPBC Status:	Endangered
VM Status:	Endangered
BD Status:	Endangered
DERM Mapped as:	11.8.13 (EPBC / VMA Endangered).
Width of RE:	Not linear
Site Level	Tertiary

Site Description	
Location:	5km SSW of Byerwen, Byerwen Station
Site Description:	South facing hillslope above alluvial plain
Orientation of Transect:	270°
Datum:	GDA94
Latitude / Longitude:	-21.0700; 147.8120

Vegetation Community Description												
Microphyll vine thicket with canopy (S1) 3 – 6m and emergents to 15m.												
Dominant Species (50 m x 10 m area)												
Botanical Species	Status*	Average Height (m)							Abundance (m ² / ha)			
		E	T1	T2	T3	S1	S2	G	E	T1	T2	T3
<i>Croton insularis</i>			5									
<i>Gossia bidwillii</i>			5									
<i>Pleiogynium timorense</i>			6									
<i>Ficus platypoda</i>			5									
<i>Cleistanthus xerophilus</i>			3									
<i>Alectryon diversifolius</i>			3									
<i>Melodorum leichhardtii</i>						2						
<i>Denhamia oleaster</i>			6									
<i>Ricinocarpos ledifolius</i>			3									
<i>Ehretia grahamii</i>			3									
<i>Breynia oblongifolia</i>						2						
<i>Psydrax odorata</i>			4									
<i>Lysiphyllum carronii</i>			3									
<i>Phyllanthus</i> sp.						2						
<i>Acalypha eremorum</i>			4									
<i>Erythroxylon australe</i>			4									
<i>Pouteria cotinifolia</i>			5									
<i>Pouteria myrsinoides</i>			5									
<i>Carissa ovata</i>								0.5				
<i>Alectryon connatus</i>			5									
<i>Bursaria spinosa</i>			4									
<i>Alphitonia excelsa</i>			5									
<i>Geijera salicifolia</i>			5									
<i>Alstonia constricta</i>			4									
<i>Diospyros humilis</i>			5									
<i>Aristida</i> sp								0.2				
<i>Brachychiton australis</i> (o)		15							1			
<i>Opuntia stricta</i> # (o)						3						
<i>Drypetes deplanchei</i> (o)			5									
<i>Maclura cochinchinensis</i>			5									
<i>Owenia acidula</i>			4									
<i>Notelaea microcarpa</i>			5									
<i>Cissus</i> sp.						2						
Ground Cover:	20% Leaf litter				30% <i>Aristida</i> sp.				50% bare ground			
Status: D = dominant, C = Codominant, S = subdominant, A = associate, EVNT = significant species, # = weed, ## = declared plant O = outside plot												

Cover % PCC					Species	Stem Count(500m ²)					
E	T1	T2	T3	S1		E	T1	T2	T3	S1	S2
	4				<i>Croton insularis</i>		11		2		
	<2				<i>Gossia bidwillii</i>		1				
	<2				<i>Pleiogynium timorense</i>		1				
	<2				<i>Ficus rubiginosa</i>		1				
	<2				<i>Cleistanthus</i> sp.		2				
	<2				<i>Alectryon diversifolius</i>		3		3		
	<2				<i>Melodorum leichhardtii</i>				1		
	<2				<i>Denhamia oleaster</i>		2				
	<2				<i>Ricinocarpos ledifolius</i>		3		7		
	10				<i>Ehretia grahamii</i>		3		4		
	<2				<i>Breynia oblongifolia</i>				1		
	<2				<i>Psydrax odorata</i>		1				
	<2				<i>Lysiphyllum carronii</i>		3				
	<2				<i>Phyllanthus</i> sp.				2		
	<2				<i>Acalypha eremorum</i>		32		17		
	<2				<i>Erythroxylon australe</i>		4				
	10				<i>Pouteria cotinifolia</i>		7				
	<2				<i>Pouteria myrsinoides</i>		3				

	<2				<i>Carissa ovata</i>		2		7		
	<2				<i>Alectryon connatus</i>		1				
	4				<i>Bursaria spinosa</i>		8		2		
	<2				<i>Alphitonia excelsa</i>						
	<2				<i>Geijera salicifolia</i>		5				
	10				<i>Diospyros humilis</i>		4		2		
<5	<2				<i>Brachychiton australis</i> (o)	1					
	<2				<i>Opuntia stricta</i> # (o)				1		
	<2				<i>Drypetes deplanchei</i> (o)		1				
	<2				<i>Maclura cochinchinensis</i>		3				
	<2				<i>Owenia acidula</i>		9				
	4				<i>Notelaea microcarpa</i>		1				
	<2				<i>Cissus</i> sp.				2		

Community Health and Condition

Overall Health:	Moderate – some evidence of fire incursion and grazing on footslopes
Potential EVNT Flora Species Habitat:	<i>Croton magneticus</i> , <i>Cerbera dumicola</i>
EVNT Flora Species Recorded:	No
Weed Species:	<i>Opuntia stricta</i> (outside plot)
Weed Cover (%):	< 2
Disturbance:	Minor introduced flora
Disturbance Cover (%):	< 2

Topography and Landform

Landform Situation:	Footslope
Altitude:	227 m
Relief:	Low
Slope Class:	Moderately Inclined (10-15 %)
Soils:	Rudosol (rocky soils)
Soil Colour:	Red-browns
Soil Texture:	Silty loam mixed with rock rubble
Geology:	Weathered footslope

Survey Details

Recorder / s:	David Stanton/ Wayne Harris
Field Site Number:	T 48
Date / Time:	20 / 10 / 2010; 8.00 am

VEGETATION SURVEY
Microphyll Vine Thicket on basalt slope (Q 49)



Regional Ecosystem Profile	
Regional Ecosystem Type:	RE 11.8.13
EPBC Status:	Endangered
VM Status:	Endangered
BD Status:	Endangered
DERM Mapped as:	11.8.13 (EPBC / VMA Endangered).
Width of RE:	Not linear
Site Level	Quaternary

Site Description	
Location:	4.5km SSW of Byerwen, Byerwen Station
Site Description:	South-west facing hillslope above alluvial plain
Orientation of Transect:	270°
Datum:	GDA94
Latitude / Longitude:	-21.1246 147.8880

Vegetation Community Description								
Structural Description	Microphyll vine thicket with emergents							
Canopy Height	3-6m							
Canopy Cover (%)	40%							
Botanical Species	Status*	Average Height (m)						
		E	T1	T2	T3	S1	S2	G
<i>Croton insularis</i>	A		5					
<i>Gossia bidwillii</i>	A		5					
<i>Pleiogynium timorense</i>	A		5					
<i>Ficus platypoda</i>	A		4					
<i>Bridelia leichhardtii</i>	A					3		
<i>Melodorum leichhardtii</i>	A					4		
<i>Ricinocarpos ledifolius</i>	A					2		
<i>Ehretia grahamii</i>	A					1		0.5
<i>Breynia oblongifolia</i>	A					2		
<i>Psydrax odorata</i>	A		5					
<i>Lysiphyllum carronii</i>	A							0.2
<i>Phyllanthus</i> sp.	A							
<i>Acalypha eremorum</i>	A							
<i>Erythroxylon australe</i>	A							
<i>Pouteria cotinifolia</i>	A							
<i>Pouteria myrsinoides</i>	A							
<i>Carissa ovata</i>	A							
<i>Alectryon connatus</i>	A							
<i>Bursaria spinosa</i>	A							
<i>Geijera salicifolia</i>	A							
<i>Diospyros humilis</i>	A							
<i>Brachychiton australis</i> (o)	E	16						
<i>Drypetes deplanchei</i> (o)	A							
<i>Notelaea microcarpa</i>	A							
<i>Cissus</i> sp.	A							
<i>Croton insularis</i>	A							
<i>Gossia bidwillii</i>	A							
<i>Pleiogynium timorense</i>	A							
<i>Ficus platypoda</i>	A		4					
<i>Dioscorea transversa</i>	A							
Ground Cover:	60% Rock Rubble		20% Aristida		20% Leaf litter			

Community Health and Condition	
Overall Health:	Moderate – some evidence of fire incursion and grazing on footslopes
Potential EVNT Flora Species Habitat:	<i>Croton magneticus</i> , <i>Cerbera dumicola</i>
EVNT Flora Species Recorded:	No
Weed Species:	Nil
Weed Cover (%):	Nil
Disturbance:	Nil
Disturbance Cover (%):	Nil

Topography and Landform	
Landform Situation:	Footslope
Altitude:	227m
Relief:	Low
Slope Class:	Moderately Inclined (10-15 %)
Soils:	Rudosol (rocky soils)
Soil Colour:	Red-browns
Soil Texture:	Silty loam mixed with rock rubble
Geology:	Weathered footslope

Survey Details	
Recorder / s:	David Stanton/ Wayne Harris
Field Site Number:	Q 49
Date / Time:	20 / 10 / 2010; 8.00 am

VEGETATION SURVEY
***Corymbia erythrophloia* with developing vine thicket shrub layer (Q 50)**



Regional Ecosystem Profile	
Regional Ecosystem Type:	RE 11.8.4
EPBC Status:	n / a
VM Status:	Least concern
BD Status:	No concern at present
DERM Mapped as:	11.8.13 (EPBC / VMA Endangered).
Width of RE:	Not linear
Site Level	Quaternary

Site Description	
Location:	4.5km SSW of Byerwen, Byerwen Station
Site Description:	South-west facing hillslope above alluvial plain
Orientation of Transect:	No transect
Datum:	GDA94
Latitude / Longitude:	-21.1258 147.8903

Vegetation Community Description								
Structural Description	Corymbia woodland with developing vine thicket sub-canopy							
Canopy Height	18m							
Canopy Cover (%)	40% (40% shrub cover)							
Botanical Species	Status*	Average Height (m)						
		E	T1	T2	T3	S1	S2	G
<i>Corymbia erythrophloia</i>	A		16					
<i>Bursaria incana</i>						3		
<i>Acalypha eremorum</i>						3		
<i>Erythroxylum australe</i>						3		
<i>Lysiphyllum carronii</i>						5		
Ground Cover:	60% Rock Rubble /talus				40% Leaf litter			

Community Health and Condition	
Overall Health:	Excellent – no evidence of canopy disturbance. Community is the result of long term fire exclusion
Potential EVNT Flora Species Habitat:	<i>Cerbera dumicola</i>
EVNT Flora Species Recorded:	No
Weed Species:	Nil
Weed Cover (%):	Nil
Disturbance:	Nil
Disturbance Cover (%):	Nil

Topography and Landform	
Landform Situation:	Footslope
Altitude:	234m
Relief:	Moderate
Slope Class:	Steeply Inclined (20-30 %)
Soils:	Rudosol (rocky soils)
Soil Colour:	Red-brown
Soil Texture:	Silty loam mixed with rock rubble
Geology:	Basalt talus

Survey Details	
Recorder / s:	David Stanton
Field Site Number:	Q 50
Date / Time:	20 / 10 / 2010; 11.30 am

VEGETATION SURVEY

Grasslands on basalt (S 51)



Regional Ecosystem Profile	
Regional Ecosystem Type:	Non-remnant
EPBC Status:	NA
VM Status:	NA
BD Status:	NA
DERM Mapped as:	11.8.11/11.8.5/ 11.8.13
Width of RE:	N/A
Survey Level:	Secondary

Site Description	
Location:	3.61km west of Byerwen Station
Site Description:	Raised basalt plain
Orientation of Transect:	360
Datum:	GDA94
Latitude / Longitude:	-21.087066; 147.894748

Vegetation Community Description												
Grassland with emergent shrubs and trees												
Dominant Species (50 m x 10 m area)												
Botanical Species	Status*	Average Height (m)							Abundance (m ² / ha)			
		E	T1	T2	T3	S1	S2	G	E	T1	T2	T3
<i>Corymbia erythrophloia</i>	A	6										
<i>Planchonia careya</i>	A					2.5						
<i>Bothriochloa pertusa</i>	D							0.5				
<i>Bothriochloa ewartiana</i>	A							0.5				
<i>Waltheria indica</i>	A					0.2						
<i>Carissa ovata</i>	A					0.5						
<i>Sida sp.</i>	A					0.3						

Vegetation Community Description													
<i>Asteraceae</i>	A					0.3							
<i>Pennisetum ciliaris</i>	#							0.4					
<i>Trichodesma zeylanicum</i>	A					0.7							
<i>Panicum sp.</i>	A							0.6					
<i>Sorghum sp.</i>	A							1.2					
<i>Santalum lanceolatum</i>	A					1.2							
<i>Opuntia sp.</i>	#					0.3							
<i>Heteropogon contortus</i>	A							0.5					
<i>Bidens bipinnata</i>	A					0.4							
Ground Cover	90% Grass				10% herbs/shrubs <1m								
Status: D = dominant, C = Codominant, S = subdominant, A = associate, EVR = significant species, # = weed, ## = declared plant O = outside plot													

Cover %	Tree	Herb/Shrub	Grass
<i>Corymbia erythrophloia</i>	10		
<i>Planchonia careya</i>		1	
<i>Bothriochloa pertusa</i>			90
<i>Bothriochloa ewartiana</i>			5
<i>Waltheria indica</i>		<2	
<i>Carissa ovata</i>		<2	
<i>Sida sp.</i>		<2	
<i>Asteraceae</i>		<2	
<i>Pennisetum ciliaris</i>			<2
<i>Trichodesma zeylanicum</i>		<2	
<i>Panicum sp.</i>			<2
<i>Sorghum sp.</i>			<2
<i>Santalum lanceolatum</i>		<2	
<i>Opuntia sp.</i>		<2	
<i>Heteropogon contortus</i>			<2
<i>Bidens bipinnata</i>		<2	

Community Health and Condition	
Overall Health:	Lightly grazed, however, dominated by exotic species.
Potential EVR Flora Species Habitat:	Potential habitat for <i>Dichanthium queenslandicum</i> , <i>Digitaria porrecta</i>
EVR Flora Species Recorded:	No
Weed Species:	<i>Opuntia stricta</i> (Class 2 LPA)
Weed Cover (%):	< 2%
Disturbance:	Minor impacts from light grazing
Disturbance Cover (%):	0

Topography and Landform	
Landform Situation:	Basalt slope
Altitude:	280 m
Relief:	Very low
Slope Class:	Gently Inclined (5 %)
Erosional Landform Pattern:	Underlying stratigraphic unit below Tertiary age cap rock
Soil Colour:	Grey brown
Soil Texture:	Clay with Gilgai
Geology:	Weathered basalt

Survey Details	
Recorder / s:	Bruce Thomson/ Sandrine Martinez
Field Site Number:	S 51
Date / Time:	02/06/2011 10.32am

VEGETATION SURVEY

Grasslands on basalt (S 52)



Regional Ecosystem Profile	
Regional Ecosystem Type:	Non-remnant
EPBC Status:	NA
VM Status:	NA
BD Status:	NA
DERM Mapped as:	11.8.11/11.8.5/ 11.8.13
Width of RE:	N/A
Survey Level:	Secondary

Site Description	
Location:	4.13km west of Byerwen Station
Site Description:	Raised basalt plain
Orientation of Transect:	360
Datum:	GDA94
Latitude / Longitude:	-21.08740; 147.89008

Vegetation Community Description												
Grassland with emergent shrubs and trees												
Dominant Species (50 m x 10 m area)												
Botanical Species	Status*	Average Height (m)							Abundance (m ² / ha)			
		E	T1	T2	T3	S1	S2	G	E	T1	T2	T3
<i>Corymbia erythrophloia</i>	A	6										
<i>Bothriochloa pertusa</i>	D							0.5				
<i>Eriochloa procera</i>	A							0.6				
<i>Bothriochloa ewartiana</i>	A							0.6				
<i>Iseilema macratherum</i>	A							0.2				
<i>Heteropogon contortus</i>	A							0.5				
<i>Cyperus sp.</i>	A							1.1				
<i>Rhynchelytrum repens</i>	#							0.4				

Vegetation Community Description													
<i>Tephrosia sp.</i>	A					0.2							
<i>Waltheria indica</i>	A					0.5							
<i>Phyllanthus sp.</i>	A					0.1							
<i>Polymeria ambigua</i>	A					0.1							
<i>Opuntia sp.</i>	A					0.2							
<i>Sida sp.</i>	A					0.2							
<i>Neptunia sp.</i>	A					0.1							
<i>Crotalaria sp.</i>	A					0.3							
<i>Panicum sp.</i>	A							0.4					
Ground Cover	90% Grass			10% herbs/shrubs <1m									
Status: D = dominant, C = Codominant, S = subdominant, A = associate, EVR = significant species, # = weed, ## = declared plant O = outside plot													

Cover %	Tree	Herb/Shrub	Grass
<i>Corymbia erythrophloia</i>	5		
<i>Bothriochloa pertusa</i>			90
<i>Eriochloa procera</i>			<2
<i>Bothriochloa ewartiana</i>			<2
<i>Iseilema macrathetum</i>			<2
<i>Heteropogon contortus</i>			<2
<i>Cyperus</i> sp.			<2
<i>Rhynchelytrum repens</i>			<2
<i>Tephrosia</i> sp.			<2
<i>Waltheria indica</i>		<2	
<i>Phyllanthus</i> sp.		<2	
<i>Polymeria ambigua</i>		<2	
<i>Opuntia</i> sp.		<2	
<i>Sida</i> sp.		<2	
<i>Neptunia</i> sp.		<2	
<i>Crotalaria</i> sp.		<2	
<i>Panicum</i> sp.			<2

Community Health and Condition	
Overall Health:	Lightly grazed, however, dominated by exotic species.
Potential EVR Flora Species Habitat:	Potential habitat for <i>Dichanthium queenslandicum</i> , <i>Digitaria porrecta</i>
EVR Flora Species Recorded:	No
Weed Species:	<i>Opuntia</i> sp. (Class 2 LPA)
Weed Cover (%):	< 2%
Disturbance:	Nil
Disturbance Cover (%):	0

Topography and Landform	
Landform Situation:	Raised Basalt Plain
Altitude:	310 m
Relief:	Very low
Slope Class:	Gently Inclined (2 %)
Erosional Landform Pattern:	Underlying stratigraphic unit below Tertiary age cap rock
Soil Colour:	Grey brown
Soil Texture:	Clay with Gilgai
Geology:	Weathered basalt

Survey Details	
Recorder / s:	Bruce Thomson/ Sandrine Martinez
Field Site Number:	S 52
Date / Time:	02/06/2011 11.25am

VEGETATION SURVEY

Grasslands on basalt (S 53)



Regional Ecosystem Profile	
Regional Ecosystem Type:	Non-remnant
EPBC Status:	NA
VM Status:	NA
BD Status:	NA
DERM Mapped as:	11.8.11/11.8.5/ 11.8.13
Width of RE:	N/A
Survey Level:	Secondary

Site Description	
Location:	5.1km west of Byerwen Station
Site Description:	Raised basalt plain
Orientation of Transect:	360
Datum:	GDA94
Latitude / Longitude:	-21.08834; 147.88066

Vegetation Community Description												
Grassland with emergent shrubs and trees												
Dominant Species (50 m x 10 m area)												
Botanical Species	Status*	Average Height (m)							Abundance (m ² / ha)			
		E	T1	T2	T3	S1	S2	G	E	T1	T2	T3
<i>Corymbia erythrophloia</i>	A	6										
<i>Eucalyptus sp.</i>	A	6										
<i>Grewia retusifolia</i>	A					0.4						
<i>Parthenium</i>	#					0.2						
<i>Heteropogon contortus</i>	A							0.7				
<i>Bothriochloa pertusa</i>	D							0.5				
<i>Themeda avenaceus</i>	A							1.2				
<i>Bothriochloa ewartiana</i>	A							0.7				
<i>Eriochloa procera</i>	A							0.6				

Vegetation Community Description													
<i>Sida</i> sp.	A					0.2							
<i>Iseilema macrathenum</i>	A							0.3					
<i>Neptunia</i> sp.	A					0.1							
<i>Hibiscus</i> sp.	A					0.2							
<i>Fabaceae</i>	A					0.1							
<i>Polymeria ambigua</i>	A					0.1							
Ground Cover	60% Grass				10% herbs/shrubs <1m					30% Bare Ground			
Status: D = dominant, C = Codominant, S = subdominant, A = associate, EVR = significant species, # = weed, ## = declared plant O = outside plot													

Cover %	Tree	Herb/Shrub	Grass
<i>Corymbia erythrophloia</i>	5		
<i>Eucalyptus</i> sp.	2		
<i>Grewia retusifolia</i>		<2	
<i>Parthenium</i>		<2	
<i>Heteropogon contortus</i>		<2	
<i>Bothriochloa pertusa</i>			90
<i>Themeda avenaceus</i>			<2
<i>Bothriochloa ewartiana</i>			<2
<i>Eriochloa procera</i>			<2
<i>Sida</i> sp.		<2	
<i>Iseilema macrathenum</i>			<2
<i>Neptunia</i> sp.		<2	
<i>Hibiscus</i> sp.		<2	
<i>Fabaceae</i>		<2	
<i>Polymeria ambigua</i>		<2	

Community Health and Condition	
Overall Health:	Lightly grazed, however, dominated by exotic species. Some <i>Parthenium</i> in cattle grazed area - very minor.
Potential EVR Flora Species Habitat:	Potential habitat for <i>Dichanthium queenslandicum</i> , <i>Digitaria porrecta</i>
EVR Flora Species Recorded:	No
Weed Species:	<i>Parthenium</i> (Class 1 LPA)
Weed Cover (%):	< 2%
Disturbance:	Minor impacts from light grazing
Disturbance Cover (%):	<2%

Topography and Landform	
Landform Situation:	Raised Basalt Plain
Altitude:	307 m
Relief:	Very low
Slope Class:	Gently Inclined (2 %)
Erosional Landform Pattern:	Underlying stratigraphic unit below Tertiary age cap rock
Soil Colour:	Grey brown
Soil Texture:	Clay with Gilgai
Geology:	Weathered basalt

Survey Details	
Recorder / s:	Bruce Thomson/ Sandrine Martinez
Field Site Number:	S 53
Date / Time:	02/06/2011 12.35pm

VEGETATION SURVEY

Grasslands on basalt (S 54)



Regional Ecosystem Profile	
Regional Ecosystem Type:	Non-remnant
EPBC Status:	NA
VM Status:	NA
BD Status:	NA
DERM Mapped as:	11.8.11/11.8.5/ 11.8.13
Width of RE:	NA
Survey Level:	Secondary

Site Description	
Location:	4.6km west of Byerwen Station
Site Description:	Raised basalt plain
Orientation of Transect:	360
Datum:	GDA94
Latitude / Longitude:	-21.09177; 147.88574

Vegetation Community Description												
Grassland with emergent shrubs and trees												
Dominant Species (50 m x 10 m area)												
Botanical Species	Status*	Average Height (m)							Abundance (m ² / ha)			
		E	T1	T2	T3	S1	S2	G	E	T1	T2	T3
<i>Corymbia erythrophloia</i>	A	5										
<i>Bothriochloa pertusa</i>	D							0.5				
<i>Eriochloa procera</i>	A							0.6				
<i>Bothriochloa ewartiana</i>	A							0.6				
<i>Iseilema macratherrum</i>	A							0.2				
<i>Heteropogon contortus</i>	A							0.5				
<i>Cyperus sp.</i>	A							1.1				

Vegetation Community Description												
<i>Rhynchelytrum repens</i>	#							0.4				
<i>Tephrosia sp.</i>	A					0.2						
<i>Waltheria indica</i>	A					0.5						
<i>Phyllanthus sp.</i>	A					0.1						
<i>Polymeria ambigua</i>	A					0.1						
<i>Opuntia sp.</i>	A					0.2						
<i>Sida sp.</i>	A					0.2						
<i>Neptunia sp.</i>	A					0.1						
<i>Crotalaria sp.</i>	A					0.3						
<i>Panicum sp.</i>	A							0.4				
Ground Cover	90% Grass			10% herbs/shrubs <1m								
Status: D = dominant, C = Codominant, S = subdominant, A = associate, EVR = significant species, # = weed, ## = declared plant O = outside plot												

Cover %	Tree	Herb/Shrub	Grass
<i>Corymbia erythrophloia</i>	5		
<i>Bothriochloa pertusa</i>			90
<i>Eriochloa procera</i>			<2
<i>Bothriochloa ewartiana</i>			<2
<i>Iseilema macrathetum</i>			<2
<i>Heteropogon contortus</i>			<2
<i>Cyperus sp.</i>			<2
<i>Rhynchelytrum repens</i>			<2
<i>Tephrosia sp.</i>			<2
<i>Waltheria indica</i>		<2	
<i>Phyllanthus sp.</i>		<2	
<i>Polymeria ambigua</i>		<2	
<i>Opuntia sp.</i>		<2	
<i>Sida sp.</i>		<2	
<i>Neptunia sp.</i>		<2	
<i>Crotalaria sp.</i>		<2	
<i>Panicum sp.</i>			<2

Community Health and Condition	
Overall Health:	Lightly grazed, however, dominated by exotic species.
Potential EVR Flora Species Habitat:	Potential habitat for <i>Dichanthium queenslandicum</i> , <i>Digitaria porrecta</i>
EVR Flora Species Recorded:	No
Weed Species:	<i>Opuntia sp.</i> (Class 2 LPA)
Weed Cover (%):	< 2%
Disturbance:	Nil
Disturbance Cover (%):	0

Topography and Landform	
Landform Situation:	Raised Basalt Plain
Altitude:	292 m
Relief:	Very low
Slope Class:	Gently Inclined (2 %)
Erosional Landform Pattern:	Underlying stratigraphic unit below Tertiary age cap rock
Soil Colour:	Grey brown
Soil Texture:	Clay with Gilgai
Geology:	Weathered basalt

Survey Details	
Recorder / s:	Bruce Thomson/ Sandrine Martinez
Field Site Number:	S 54
Date / Time:	02/06/2011 2.14pm

VEGETATION SURVEY

Grasslands on basalt (S 55)



Regional Ecosystem Profile	
Regional Ecosystem Type:	Non-remnant
EPBC Status:	NA
VM Status:	NA
BD Status:	NA
DERM Mapped as:	11.8.11/11.8.5/ 11.8.13
Width of RE:	N/A
Survey Level:	Secondary

Site Description	
Location:	4.9km west south west of Byerwen Station
Site Description:	Raised basalt plain
Orientation of Transect:	360
Datum:	GDA94
Latitude / Longitude:	-21.09633; 147.88349

Vegetation Community Description												
Grassland with emergent shrubs and trees												
Dominant Species (50 m x 10 m area)												
Botanical Species	Status*	Average Height (m)							Abundance (m ² / ha)			
		E	T1	T2	T3	S1	S2	G	E	T1	T2	T3
<i>Corymbia erythrophloia</i>	A	4										
<i>Bothriochloa pertusa</i>	D							0.5				
<i>Eriochloa procera</i>	A							0.6				
<i>Sorghum sp.</i>	A							1.2				
<i>Cymbopogon sp.</i>	A							1.0				
<i>Bothriochloa ewartiana</i>	A							0.5				
<i>Iseilema macratherum</i>	A							0.1				

Vegetation Community Description												
<i>Heteropogon contortus</i>	A							0.4				
<i>Cyperus sp.</i>	A							1.1				
<i>Rhynchelytrum repens</i>	#							0.3				
<i>Tephrosia sp.</i>	A					0.2						
<i>Waltheria indica</i>	A					0.3						
<i>Phyllanthus sp.</i>	A					0.1						
<i>Polymeria ambigua</i>	A					0.1						
<i>Opuntia sp.</i>	A					0.2						
<i>Sida sp.</i>	A					0.2						
<i>Neptunia sp.</i>	A					0.1						
<i>Crotalaria sp.</i>	A					0.3						
<i>Panicum sp.</i>	A							0.4				
Ground Cover	90% Grass				10% herbs/shrubs <1m							
Status: D = dominant, C = Codominant, S = subdominant, A = associate, EVR = significant species, # = weed, ## = declared plant O = outside plot												

Cover %	Tree	Herb/Shrub	Grass
<i>Corymbia erythrophloia</i>	5		
<i>Bothriochloa pertusa</i>			90
<i>Eriochloa procera</i>			<2
<i>Sorghum sp.</i>			<2
<i>Cymbopogon sp.</i>			<2
<i>Bothriochloa ewartiana</i>			<2
<i>Iseilema macrathetrum</i>			<2
<i>Heteropogon contortus</i>			<2
<i>Cyperus sp.</i>			<2
<i>Rhynchelytrum repens</i>			<2
<i>Tephrosia sp.</i>		<2	
<i>Waltheria indica</i>		<2	
<i>Phyllanthus sp.</i>		<2	
<i>Polymeria ambigua</i>		<2	
<i>Opuntia sp.</i>		<2	
<i>Sida sp.</i>		<2	
<i>Neptunia sp.</i>		<2	
<i>Crotalaria sp.</i>		<2	
<i>Panicum sp.</i>			<2

Community Health and Condition	
Overall Health:	Lightly grazed, however, dominated by exotic species.
Potential EVR Flora Species Habitat:	Potential habitat for <i>Dicanthium queenslandicum</i> , <i>Digitaria porrecta</i>
EVR Flora Species Recorded:	No
Weed Species:	<i>Opuntia sp.</i> (Class 2 LPA)
Weed Cover (%):	< 2%
Disturbance:	Nil
Disturbance Cover (%):	0

Topography and Landform	
Landform Situation:	Raised Basalt Plain
Altitude:	291 m
Relief:	Very low
Slope Class:	Undulating (2 -15%)
Erosional Landform Pattern:	Underlying stratigraphic unit below Tertiary age cap rock
Soil Colour:	Grey brown
Soil Texture:	Clay with Gilgai
Geology:	Weathered basalt

Survey Details

Recorder / s:	Bruce Thomson/ Sandrine Martinez
Field Site Number:	S 55
Date / Time:	02/06/2011 3.10pm

VEGETATION SURVEY

Grasslands on basalt (S 56)



Regional Ecosystem Profile	
Regional Ecosystem Type:	Non-remnant
EPBC Status:	NA
VMA Status:	NA
EPA Status:	NA
DNRW Mapped as:	11.8.11/11.8.5/ 11.8.13
Width of RE:	N/A
Survey Level:	Secondary

Site Description	
Location:	4.36km west south west of Byerwen Station
Site Description:	Undulating basalt hills
Orientation of Transect:	360
Datum:	GDA94
Latitude / Longitude:	-21.104805; 147.892005

Vegetation Community Description												
Grassland with emergent shrubs and trees												
Dominant Species (50 m x 10 m area)												
Botanical Species	Status*	Average Height (m)							Abundance (m ² / ha)			
		E	T1	T2	T3	S1	S2	G	E	T1	T2	T3
<i>Eucalyptus sp.</i>	A	3										
<i>Bothriochloa pertusa</i>	D							0.5				
<i>Heteropogon contortus</i>	A							0.4				
<i>Tephrosia sp.</i>	D					1.0						
<i>Cymbopogon sp.</i>	A							1.0				
<i>Tephrosia rosea</i>	A					1.0						
<i>Pterocaulon sp.</i>	A					1.3						
<i>Sida sp.</i>	A					0.1						
<i>Trichodesma</i>	A					0.6						

Vegetation Community Description												
zeylanicum												
Indigofera linnaei	A					0.1						
Grewia retusifolia	A					0.2						
Waltheria indica	A					0.3						
Rhynchelytrum repens	#					0.3						
Ground Cover	60% Grass			20% herbs/shrubs <1m					20% Rock/Bare Ground			
Status: D = dominant, C = Codominant, S = subdominant, A = associate, EVR = significant species, # = weed, ## = declared plant O = outside plot												

Cover %	Tree	Herb/Shrub	Grass
<i>Eucalyptus sp.</i>	10		
<i>Bothriochloa pertusa</i>			70
<i>Heteropogon contortus</i>			<2
<i>Tephrosia sp.</i>		20	
<i>Cymbopogon sp.</i>		<2	
<i>Tephrosia rosea</i>		<2	
<i>Pterocaulon sp.</i>		<2	
<i>Sida sp.</i>		<2	
<i>Trichodesma zeylanicum</i>		<2	
<i>Indigofera linnaei</i>		<2	
<i>Grewia retusifolia</i>		<2	
<i>Waltheria indica</i>		<2	
<i>Rhynchelytrum repens</i>			<2

Community Health and Condition	
Overall Health:	Lightly grazed, however, dominated by exotic species.
Potential EVR Flora Species Habitat:	Potential habitat for <i>Dichanthium queenslandicum</i> , <i>Digitaria porrecta</i>
EVR Flora Species Recorded:	No
Weed Species:	<i>Rhynchelytrum repens</i> (Env. weed only)
Weed Cover (%):	<2%
Disturbance:	Nil
Disturbance Cover (%):	0

Topography and Landform	
Landform Situation:	Undulating basalt hills
Altitude:	290 m
Relief:	Very low
Slope Class:	Undulating (2 - 30%)
Erosional Landform Pattern:	Underlying stratigraphic unit below Tertiary age cap rock
Soil Colour:	Grey brown
Soil Texture:	Clay with Gilgai
Geology:	Weathered basalt

Survey Details	
Recorder / s:	Bruce Thomson/ Sandrine Martinez
Field Site Number:	S 56
Date / Time:	02/06/2011 4.20pm

Grasslands on basalt (S 57)



Regional Ecosystem Profile	
Regional Ecosystem Type:	Non-remnant
EPBC Status:	NA
VM Status:	NA
BD Status:	NA
DERM Mapped as:	11.8.11/11.8.5/ 11.8.13
Width of RE:	N/A
Survey Level:	Secondary

Site Description	
Location:	3.6km west of Byerwen Station
Site Description:	Raised basalt plain
Orientation of Transect:	360
Datum:	GDA94
Latitude / Longitude:	-21.087066; 147.894748

[illegible]

Vegetation Community Description												
<i>Sporobolus sp.</i>	A							0.2				
<i>Melaleuca sp.</i>	A					3.0						
<i>Grewia retusifolia</i>	A					0.3						
<i>Waltheria indica</i>	A					0.3						
<i>Carissa ovata</i>	A					0.4						
<i>Sida sp.</i>	A					0.2						
<i>Trichodesma zeylanicum</i>	A					0.7						
<i>Panicum sp.</i>	A							0.6				
<i>Sorghum sp.</i>	A							1.1				
<i>Santalum lanceolatum</i>	A					1.0						
<i>Opuntia sp.</i>	#					0.3						
<i>Heteropogon contortus</i>	A							0.5				
Ground Cover	80% Grass				10% herbs/shrubs <1m				10% Rock/Bare Ground			
Status: D = dominant, C = Codominant, S = subdominant, A = associate, EVR = significant species, # = weed, ## = declared plant O = outside plot												

Cover %	Tree	Herb/Shrub	Grass
<i>Corymbia erythrophloia</i>	10		
<i>Planchonia careya</i>		2	
<i>Bothriochloa pertusa</i>			90
<i>Bothriochloa ewartiana</i>			<2
<i>Erythrina vespertilio</i>		<2	
<i>Eriachne benthami</i>			<2
<i>Brachychiton sp.</i>	<2		
<i>Sporobolus sp.</i>			<2
<i>Melaleuca sp.</i>		<2	
<i>Grewia retusifolia</i>		<2	
<i>Waltheria indica</i>		<2	
<i>Carissa ovata</i>		<2	
<i>Sida sp.</i>		<2	
<i>Trichodesma zeylanicum</i>		<2	
<i>Panicum sp.</i>			<2
<i>Sorghum sp.</i>			<2
<i>Santalum lanceolatum</i>		<2	
<i>Opuntia sp.</i>		<2	
<i>Heteropogon contortus</i>			<2

Community Health and Condition	
Overall Health:	Lightly grazed, however, dominated by exotic species.
Potential EVR Flora Species Habitat:	Potential habitat for <i>Dichanthium queenslandicum</i> , <i>Digitaria porrecta</i>
EVR Flora Species Recorded:	No
Weed Species:	<i>Opuntia</i> (Class 2 LPA)
Weed Cover (%):	< 2%
Disturbance:	Minor impacts from light grazing
Disturbance Cover (%):	0

Topography and Landform	
Landform Situation:	Basalt slope
Altitude:	281 m
Relief:	Very low
Slope Class:	Gently Inclined (5 %)
Erosional Landform Pattern:	Underlying stratigraphic unit below Tertiary age cap rock
Soil Colour:	Grey brown
Soil Texture:	Clay with Gilgai
Geology:	Weathered basalt

Survey Details	
Recorder / s:	Bruce Thomson/ Sandrine Martinez
Field Site Number:	S 57
Date / Time:	02/06/2011 3.30pm

VEGETATION SURVEY

Grasslands on basalt (S 58)



Regional Ecosystem Profile	
Regional Ecosystem Type:	Non-remnant
EPBC Status:	NA
VM Status:	NA
BD Status:	NA
DERM Mapped as:	11.8.11/11.8.5/ 11.8.13
Width of RE:	N/A
Survey Level:	Secondary

Site Description	
Location:	9.2km south west of Byerwen Station
Site Description:	Undulating basalt hills
Orientation of Transect:	360
Datum:	GDA94
Latitude / Longitude:	-21.13744; 147.85754

Vegetation Community Description												
Grassland with emergent shrubs and trees												
Dominant Species (50 m x 10 m area)												
Botanical Species	Status*	Average Height (m)							Abundance (m ² / ha)			
		E	T1	T2	T3	S1	S2	G	E	T1	T2	T3
<i>Corymbia erythrophloia</i>	A	4										
<i>Bothriochloa pertusa</i>	D							0.5				
<i>Heteropogon contortus</i>	A							0.4				
<i>Petalostigma sp.</i>	A					2.0						
<i>Tephrosia rosea</i>	A					1.0						
<i>Pterocaulon sp.</i>	A					1.0						
<i>Sida sp.</i>	A					0.3						

Vegetation Community Description													
<i>Trichodesma zeylanicum</i>	A					0.3							
<i>Indigofera linnaei</i>	A					0.1							
<i>Grewia retusifolia</i>	A					1.4							
<i>Erythrina vespertilio</i>	A					2.0							
<i>Waltheria indica</i>	A					0.2							
<i>Euphorbia hirta</i>	#					0.2							
<i>Rhynchelytrum repens</i>	#					0.3							
<i>Eriachne benthami</i>	A							0.6					
<i>Asteraceae</i>	A					0.3							
<i>Gossypium sp.</i>	A					1.0							
Ground Cover	70% Grass				10% herbs/shrubs <1m				20% Rock/Bare Ground				
Status: D = dominant, C = Codominant, S = subdominant, A = associate, EVR = significant species, # = weed, ## = declared plant O = outside plot													

Cover %	Tree	Herb/Shrub	Grass
<i>Corymbia erythrophloia</i>	10		
<i>Bothriochloa pertusa</i>			90
<i>Heteropogon contortus</i>			<2
<i>Petalostigma sp.</i>		<2	
<i>Tephrosia rosea</i>		<2	
<i>Pterocaulon sp.</i>		<2	
<i>Sida sp.</i>		<2	
<i>Trichodesma zeylanicum</i>		<2	
<i>Indigofera linnaei</i>		<2	
<i>Grewia retusifolia</i>		<2	
<i>Erythrina vespertilio</i>		<2	
<i>Waltheria indica</i>		<2	
<i>Euphorbia hirta</i>		<2	
<i>Rhynchelytrum repens</i>			<2
<i>Eriachne benthami</i>			<2
Asteraceae		<2	
<i>Gossypium sp.</i>		<2	

Community Health and Condition	
Overall Health:	Lightly grazed, however, dominated by exotic species.
Potential EVR Flora Species Habitat:	Potential habitat for <i>Dichanthium queenslandicum</i> , <i>Digitaria praepecta</i>
EVR Flora Species Recorded:	No
Weed Species:	Nil
Weed Cover (%):	0
Disturbance:	Nil
Disturbance Cover (%):	0

Topography and Landform	
Landform Situation:	Undulating basalt hills
Altitude:	288 m
Relief:	Very low
Slope Class:	Undulating (2 - 30%)
Erosional Landform Pattern:	Underlying stratigraphic unit below Tertiary age cap rock
Soil Colour:	Grey brown
Soil Texture:	Clay with Gilgai
Geology:	Weathered basalt

Survey Details	
Recorder / s:	Bruce Thomson/ Sandrine Martinez
Field Site Number:	S 58
Date / Time:	03/06/2011 10.32am

VEGETATION SURVEY

Grasslands on basalt (S 59)



Regional Ecosystem Profile	
Regional Ecosystem Type:	Non-remnant
EPBC Status:	NA
VM Status:	NA
BD Status:	NA
DERM Mapped as:	11.8.11/11.8.5/ 11.8.13
Width of RE:	N/A
Survey Level:	Secondary

Site Description	
Location:	8.75km south west of Byerwen Station
Site Description:	Undulating basalt hills
Orientation of Transect:	360
Datum:	GDA94
Latitude / Longitude:	-21.13273; 147.85983

Vegetation Community Description												
Grassland with emergent shrubs and trees												
Dominant Species (50 m x 10 m area)												
Botanical Species	Status*	Average Height (m)							Abundance (m ² / ha)			
		E	T1	T2	T3	S1	S2	G	E	T1	T2	T3
<i>Corymbia erythrophloia</i>	A	5										
<i>Bothriochloa pertusa</i>	D							0.5				
<i>Themeda avenaceus</i>	A							0.7				
<i>Heteropogon contortus</i>	A							0.6				
<i>Grewia retusifolia</i>	A					1.0						
<i>Bursaria incana</i>	A					2.0						
<i>Petalostigma sp.</i>	A					3.0						

Vegetation Community Description													
<i>Carissa ovata</i>	A					1.0							
<i>Psydrax oleifolia</i>	A					1.4							
<i>Hibiscus sp.</i>	A					0.3							
<i>Santalum lanceolatum</i>	A					2.0							
<i>Erythrina vespertilio</i>	A					0.6							
<i>Alternanthera sp.</i>	A					0.1							
<i>Waltheria indica</i>	A					0.2							
<i>Opuntia sp.</i>	#					0.2							
<i>Pterocaulon sp</i>	A					1.3							
Ground Cover	80% Grass			10% herbs/shrubs <1m					10% Trees/tall shrubs				
Status: D = dominant, C = Codominant, S = subdominant, A = associate, EVR = significant species, # = weed, ## = declared plant O = outside plot													

Cover %	Tree	Herb/Shrub	Grass
<i>Corymbia erythrophloia</i>	5		
<i>Bothriochloa pertusa</i>			90
<i>Themeda avenaceus</i>			<2
<i>Heteropogon contortus</i>			<2
<i>Grewia retusifolia</i>		<2	
<i>Bursaria incana</i>		<2	
<i>Petalostigma sp.</i>		<2	
<i>Carissa ovata</i>		<2	
<i>Psydrax oleifolia</i>		<2	
<i>Hibiscus sp.</i>		<2	
<i>Santalum lanceolatum</i>		<2	
<i>Erythrina vespertilio</i>		<2	
<i>Alternanthera sp.</i>		<2	
<i>Waltheria indica</i>		<2	
<i>Opuntia sp.</i>		<2	
<i>Pterocaulon sp.</i>		<2	

Community Health and Condition	
Overall Health:	Lightly grazed, however, dominated by exotic species.
Potential EVR Flora Species Habitat:	Potential habitat for <i>Dichanthium queenslandicum</i> , <i>Digitaria porrecta</i>
EVR Flora Species Recorded:	No
Weed Species:	<i>Opuntia sp.</i> (Class 2 LPA)
Weed Cover (%):	< 2%
Disturbance:	Nil
Disturbance Cover (%):	0

Topography and Landform	
Landform Situation:	Undulating basalt hills
Altitude:	297 m
Relief:	Very low
Slope Class:	Undulating (2 - 30%)
Erosional Landform Pattern:	Underlying stratigraphic unit below Tertiary age cap rock
Soil Colour:	Grey brown
Soil Texture:	Clay with Gilgai
Geology:	Weathered basalt

Survey Details	
Recorder / s:	Bruce Thomson/ Sandrine Martinez
Field Site Number:	S 59
Date / Time:	03/06/2011 2.00pm

VEGETATION SURVEY
***Eucalyptus crebra* woodland on Laterite Jump Up (T 60)**



UTC 2012:03:05 05:18:52
 324° NW tru
 E:147° 50' 10.074"
 S:021° 16' 39.312"

Regional Ecosystem Profile	
Regional Ecosystem Type:	RE 11.7.6
EPBC Status:	NA
VM Status:	Least concern
BD Status:	No concern at present
DERM Mapped as:	11.7.4
Width of RE:	Not linear
Survey Level:	Tertiary

Site Description	
Location:	3km SW West of Newlands Mine
Site Description:	Top of laterite jump up
Orientation of Transect:	270
Datum:	GDA94
Latitude / Longitude:	-21.2776; 147.83611

Vegetation Community Description												
Woodland with canopy 14 to 18m												
Dominant Species (50 m x 10 m area)												
Botanical Species	Status*	Average Height (m) 14 (13 – 17m)							Abundance (m ² / ha)			
		E	T1	T2	T3	S1	S2	G	E	T1	T2	S1
<i>Eucalyptus crebra</i>	D		17	12						4		
<i>Alectryon diversifolius</i>	A					3						
<i>Petalostigma pubescens</i>						6						1
<i>Acacia excelsa</i>	A					6						
<i>Cassia brewsteri</i>	A					5						
<i>Capparis canescens</i>	A					1.5						
<i>Carissa ovatifolia</i>	A					1.5						
<i>Ventilago viminalis</i>	A					2						

Vegetation Community Description													
<i>Ehretia membranifolia</i>	A					3							
<i>Erythroxylum australe</i>	A					3							
<i>Denhamia parvifolia</i>	A					5							
<i>Breynia oblongifolia</i>	A					1							
<i>Ehretia grahamii</i>	A					1							
<i>Diospyros humilis</i>	A					1							
<i>Alectryon connatus</i>	A					3							
<i>Brachychiton australe</i>	A					2							
<i>Heteropogon contortus</i>	A							0.75					
<i>Pennisetum ciliare</i>	D							0.75					
<i>Grewia retusifolia</i>	A							0.75					
<i>Bothriochloa bladhii</i>	A							0.75					
<i>Desmodium sp.</i>	A							0.50					
<i>Panicum sp.</i>	A							0.75					
Status: D = dominant, C = Codominant, S = subdominant, A = associate, EVR = significant species, # = weed, ## = declared plant O = outside plot													

Cover % PCC					Species	Stem Count(500m ²)					
E	T1	T2	T3	S1		E	T1	T2	T3	S1	S2
	40%			<	<i>Eucalyptus crebra</i>						
					<i>Cassia brewsteri</i>					3	
				4%	<i>Denhamia parvifolia</i>						
					<i>Carissa ovata</i>					3	
					<i>Diospyros humilis</i>					4	
					<i>Ventilago viminalis</i>					2	
					<i>Ehretia membranifolia</i>					2	
					<i>Acacia sp.</i>					1	
					<i>Erythroxylum australe</i>					4	
					<i>Alectryon connatus</i>					3	
					<i>Petalostigma pubescens</i>					6	
					<i>Brachychiton australis</i>					1	
					<i>Alectryon diversifolius</i>					5	
					<i>Capparis canescens</i>					1	
					<i>Capparis lasiantha</i>					2	

Community Health and Condition	
Overall Health:	Moderate – Minor canopy disturbance with ground cover dominated by exotic grass.
Potential EVR Flora Species Habitat:	Limited
EVR Flora Species Recorded:	No
Weed Species:	<i>Pennisetum ciliare</i> (pasture grass)
Weed Cover (%):	Not recorded
Disturbance:	Minor canopy incursion
Disturbance Cover (%):	Not recorded

Topography and Landform	
Landform Situation:	Top of low rise on indurated sediments (laterite)
Altitude:	304m
Relief:	Very low
Slope:	Flat
Slope Class:	Very Gently Inclined (1 – 3 %)
Erosional Landform Pattern:	Located on top of suppressed ironstone jump-up
Soils:	Rocky indurated gravel
Soil Colour:	Red-brown
Soil Texture:	Rudosol
Geology:	Tertiary age laterite plateau

Survey Details	
Recorder / s:	David Stanton/ Stephen Catchpoole
Field Site Number:	T 60
Date / Time:	5 / 03 / 2011; 3.30 pm

VEGETATION SURVEY

Eucalyptus populnea woodland on Colluvial Footslope (Q 61)



Regional Ecosystem Profile	
Regional Ecosystem Type:	RE 11.5.3
EPBC Status:	NA
VM Status:	Least concern
BD Status:	No concern at present
DERM Mapped as:	11.7.4/ 11.8.5
Width of RE:	Not linear
Survey Level:	Quaternary

Site Description	
Location:	3km SW West of Newlands Mine
Site Description:	Top of laterite jump up
Orientation of Transect:	No transect
Datum:	GDA94
Latitude / Longitude:	-21.27056; 147.84056

Vegetation Community Description												
Woodland with canopy 14 to 18m												
Dominant Species (50 m x 10 m area)												
Botanical Species	Status*	Average Height (m) 16m (13 – 18m)							Abundance (m2 / ha)			
		E	T1	T2	T3	S1	S2	G	E	T1	T2	S1
<i>Eucalyptus populnea</i>	D		17							Not Measured		
<i>Erythroxylum australe</i>	A					4						
<i>Petalostigma pubescens</i>						3						1
<i>Acacia excelsa</i>	A			8		3						

Vegetation Community Description												
<i>Pennisetum ciliare</i>	D							0.75				
<i>Grewia retusifolia</i>	A							0.75				
<i>Bothriochloa bladhii</i>	A							0.75				
<i>Desmodium sp.</i>	A							0.50				
<i>Panicum sp.</i>	A							0.75				
Status: D = dominant, C = Codominant, S = subdominant, A = associate, EVR = significant species, # = weed, ## = declared plant O = outside plot												

Community Health and Condition	
Overall Health:	Moderate – Poor. Highly fragmented with numerous canopy gaps and dominance of exotic grass in ground cover/
Potential EVR Flora Species Habitat:	Limited
EVR Flora Species Recorded:	No
Weed Species:	<i>Pennisetum ciliare</i> (pasture grass)
Weed Cover (%):	Not recorded
Disturbance:	Evidence of moderate disruption to canopy.
Disturbance Cover (%):	Not recorded

Topography and Landform	
Landform Situation:	Colluvial slopewash on the interface between clay plain (LZ4) and laterite (LZ7)
Altitude:	310m
Relief:	Very low
Slope:	Flat to gently inclined
Slope Class:	Very Gently Inclined (1 – 3 %)
Erosional Landform Pattern:	Scarp retreat zone
Soils:	Red loamy soils mixed with gravel derived from tertiary sediments
Soil Colour:	Red-brown
Soil Texture:	Kandosol
Geology:	Loamy colluvial outwash plain

Survey Details	
Recorder / s:	David Stanton/ Stephen Catchpoole
Field Site Number:	Q 61
Date / Time:	5 / 03 / 2011; 4.00 pm

***Eucalyptus crebra* woodland on Laterite Jump Up (Q 62)**



Regional Ecosystem Profile	
Regional Ecosystem Type:	RE 11.7.6
EPBC Status:	NA
VM Status:	Least concern
BD Status:	No concern at present
DERM Mapped as:	11.7.4
Width of RE:	Not linear
Survey Level:	Quaternary

Site Description	
Location:	3km SW West of Newlands Mine
Site Description:	Margins of laterite jump up
Elevation	289m
Datum:	GDA94
Latitude / Longitude:	-21.2642; 147.8237

Vegetation Community Description												
Woodland with canopy 14 to 20m												
Dominant Species (50 m x 10 m area)												
Botanical Species	Status*	Average Height (m) 14 (13 – 17m)							Abundance (m2 / ha)			
		E	T1	T2	T3	S1	S2	G	E	T1	T2	S1
<i>Eucalyptus crebra</i>	D		17	12					Not measured			
<i>Corymbia dallachiana</i>	A		14									
<i>Cassia brewsteri</i>	A					6						1
<i>Bursaria tenuifolia</i>	A					6						
<i>Erythroxylum australe</i>	A					5						

Status: D = dominant, C = Codominant, S = subdominant, A = associate, EVR = significant species, # = weed, ## = declared plant O = outside plot

Community Health and Condition	
Overall Health:	Moderate – Minor canopy disturbance with ground cover dominated by exotic grass.
Potential EVR Flora Species Habitat:	Limited
EVR Flora Species Recorded:	No
Weed Species:	<i>Pennisetum ciliare</i> (pasture grass)
Weed Cover (%):	Not recorded
Disturbance:	Minor canopy incursion
Disturbance Cover (%):	Not recorded

Topography and Landform	
Landform Situation:	Margins of tertiary jump up (laterite)
Altitude:	289m
Relief:	Very low
Slope:	Gently inclined
Slope Class:	1 – 3 %
Erosional Landform Pattern:	Located on margins of suppressed ironstone jump-up
Soils:	Rocky indurated gravel
Soil Colour:	Red-brown
Soil Texture:	Rudosol
Geology:	Tertiary age laterite plateau

Survey Details	
Recorder / s:	David Stanton/ Stephen Catchpoole
Field Site Number:	Q 82
Date / Time:	6 / 03 / 2012; 8.00 am

VEGETATION SURVEY

Eucalyptus populnea woodland on Colluvial Outwash (S 63)



Regional Ecosystem Profile	
Regional Ecosystem Type:	RE 11.5.3
EPBC Status:	NA
VM Status:	Least concern
BD Status:	No concern at present
DERM Mapped as:	11.8.13
Width of RE:	Not linear
Survey Level:	Secondary

Site Description	
Location:	6.7km West of Newlands Mine
Site Description:	Woodland on gently sloping plain
Orientation of Transect:	270
Datum:	GDA94
Latitude / Longitude:	-21.2642; 147.8237

Vegetation Community Description												
Woodland with canopy 14 to 18m												
Dominant Species (50 m x 10 m area)												
Botanical Species	Status*	Average Height (m) 14 (13 – 19m)							Abundance (m2 / ha)			
		E	T1	T2	T3	S1	S2	G	E	T1	T2	S1
<i>Eucalyptus populnea</i>	D		16	10						6		
<i>Corymbia dallachiana</i>	A			8								
<i>Alectryon diversifolius</i>	A					3	1.5					
<i>Alectryon oleifolius</i>	A											
<i>Bursaria tenuifolia</i>	A					3						
<i>Terminalia oblongata</i>	A					5					1	1
<i>Petalostigma pubescens</i>	A					6						1
<i>Eremophila mitchellii</i>	A					5						

Vegetation Community Description												
<i>Acacia excels</i>	A					6						
<i>Cassia brewsteri</i>	A					5						
<i>Denhamia parvifolia</i>	A					1.5						
<i>Carissa ovata</i>	A					1.5						
<i>Ventilago viminalis</i>	A					2						
<i>Ehretia membranifolia</i>	A					3						
<i>Erythroxylum australe</i>	A					3						
<i>Denhamia parvifolia</i>	A					5						
<i>Bursaria spinosa</i>	A					1.5						
<i>Atalaya hemiglauc</i>	A					3						
<i>Heteropogon contortus</i>	A							0.75				
<i>Bothriochloa pertusa</i>	A							0.75				
<i>Pennisetum ciliare</i>	D							0.75				
<i>Grewia retusifolia</i>	A							0.75				
<i>Eriochloa crebra</i>	A							0.75				
<i>Jasminum didymum</i>	A							0.75				
<i>Alloterospis sp.</i>	A							0.75				
<i>Sida sp.</i>	A							0.75				
<i>Rhynchosia acuminatissima</i>	A							0.75				
<i>Glycine sp.</i>	A							0.75				
<i>Evolvulus sp.</i>	A							0.75				
<i>Aristida jerichoensis var. subspinulifera</i>	A							0.75				
<i>Senna alata</i>	A							0.75				
<i>Heteropogon contortus</i>	A							0.75				
<i>Commelina benghalensis</i>	A							0.25				
<i>Dichanthium sericeum</i>	A							0.75				
<i>Conyza bonariensis</i>	A							1				
<i>Stylosanthes humilis</i>								1				
Status: D = dominant, C = Codominant, S = subdominant, A = associate, EVR = significant species, # = weed, ## = declared plant O = outside plot												

Cover % PCC					Species	Stem Count(500m ²)					
E	T1	T2	T3	S1		E	T1	T2	T3	S1	S2
	40%			<	<i>Eucalyptus crebra</i>						
					<i>Cassia brewsteri</i>					3	
				4%	<i>Denhamia parvifolia</i>						
					<i>Carissa ovata</i>					3	
					<i>Diospyros humilis</i>					4	
					<i>Ventilago viminalis</i>					2	
					<i>Ehretia membranifolia</i>					2	
					<i>Acacia sp.</i>					1	
					<i>Erythroxylum australe</i>					4	
					<i>Alectryon connatus</i>					3	
					<i>Petalostigma pubescens</i>					6	
					<i>Brachychiton australe</i>					1	
					<i>Alectryon diversifolius</i>					5	
					<i>Capparis canescens</i>					1	
					<i>Capparis lasiantha</i>					2	

Cover %		
	E	G
<i>Bothriochloa pertusa.</i>		33
<i>Evolvulus sp.</i>		<2
<i>Jasminum didymum</i>		<2
<i>Eriochloa crebra</i>		<2
<i>Leaf Litter</i>		42
<i>Carissa ovata</i>		6
<i>Pennisetum ciliaris</i>		5
<i>Alloteropsis (semialata) sp?</i>		<2
<i>Rhynchosia minima</i>		<2
<i>Glycine tomentella</i>		<2
<i>Cyperus fulvus</i>		<2
<i>Jacquemontia paniculata var. tomentosa</i>		<2
Bare Ground		<2

Community Health and Condition	
Overall Health:	Moderate – Minor canopy disturbance ground cover partially occupied by exotic species with ground cover dominated by exotic grass.
Potential EVR Flora Species Habitat:	Limited
EVR Flora Species Recorded:	No
Weed Species:	<i>Pennisetum ciliare</i> (pasture grass)
Weed Cover (%):	Not recorded
Disturbance:	Minor canopy incursion
Disturbance Cover (%):	Not recorded

Topography and Landform	
Landform Situation:	Colluvial outwash sediments overlapping clay plain. Scarp retreat zone with colluvial wash derived from weather laterite overlapping clay plain.
Altitude:	304m
Relief:	Very low
Slope:	5%
Slope Class:	Gently Inclined
Erosional Landform Pattern:	Scarp retreat zone
Soils:	Clay loam
Soil Colour:	Red-brown
Soil Texture:	Kandosol
Geology:	Footslope of eroding laterite scarp

Survey Details	
Recorder / s:	David Stanton/ Stephen Catchpoole
Field Site Number:	S 63
Date / Time:	6 / 03 / 2012; 8.00 am

VEGETATION SURVEY

Acacia harpophylla regrowth shrubland (Q 64)



Regional Ecosystem Profile	
Regional Ecosystem Type:	Non-remnant
EPBC Status:	NA
VM Status:	Non-remnant
BD Status:	Non-remnant
DERM Mapped as:	Non-remnant
Width of RE:	Not linear
Survey Level:	Quaternary

Site Description	
Location:	6.6km SW West of Newlands Mine
Site Description:	Clay plain on margins of colluvial slope wash
Orientation of Transect:	No transect
Datum:	GDA94
Latitude / Longitude:	-21.2676; 147.8284

Vegetation Community Description												
Low regrowth shrubland with canopy from 3- 6m. PCC of 30%												
Dominant Species (50 m x 10 m area)												
Botanical Species	Status*	Average Height (m) 16m (13 – 18m)							Abundance (m2 / ha)			
		E	T1	T2	T3	S1	S2	G	E	T1	T2	S1
<i>Acacia harpophylla</i>	D					5				Not Measured		
<i>Alectryon diversifolius</i>	A					3						
Status: D = dominant, C = Codominant, S = subdominant, A = associate, EVR = significant species, # = weed, ## = declared plant O = outside plot												

Community Health and Condition	
Overall Health:	Poor. Regrowth from total clearing. Ground cover dominated by exotic species

Potential EVR Flora Species Habitat:	Limited
EVR Flora Species Recorded:	No
Weed Species:	<i>Harrisia martini</i> (Class 2) <i>Pennisetum ciliare</i> (pasture grass)
Weed Cover (%):	Not recorded
Disturbance:	Regrowth from total clearing
Disturbance Cover (%):	Not recorded

Topography and Landform	
Landform Situation:	Clay plain with minor influence from colluvial sediments
Altitude:	300m
Relief:	Very low
Slope:	Flat to gently inclined
Slope Class:	Very Gently Inclined (1 – 3 %)
Erosional Landform Pattern:	Clay plain on margins of Scarp retreat zone
Soils:	Red loamy soils mixed with gravel derived from tertiary sediments
Soil Colour:	Grey-brown
Soil Texture:	Vertosol
Geology:	Clay plain

Survey Details	
Recorder / s:	David Stanton/ Stephen Catchpoole
Field Site Number:	Q 64
Date / Time:	5 / 03 / 2011; 10.00 am

VEGETATION SURVEY

Eucalyptus cambageana + *Acacia harpophylla* woodland (Q 65)

Regional Ecosystem Profile	
Regional Ecosystem Type:	11.4.8 (fragmented remnant)
EPBC Status:	Endangered
VM Status:	Endangered
BD Status:	Endangered
DERM Mapped as:	11.7.4
Width of RE:	Not linear
Survey Level:	Quaternary

Site Description	
Location:	7.3km SW West of Newlands Mine
Site Description:	Clay plain / depression
Orientation of Transect:	No transect
Datum:	GDA94
Latitude / Longitude:	-21.27081; 147.82718

Vegetation Community Description												
Woodland to open forest with canopy from 17 – 25m. PCC of 50%												
Dominant Species (50 m x 10 m area)												
Botanical Species	Status*	Average Height (m) 16m (13 – 18m)							Abundance (m2 / ha)			
		E	T1	T2	T3	S1	S2	G	E	T1	T2	S1
<i>Eucalyptus cambageana</i>	D		15	10						Not Measured		
<i>Acacia harpophylla</i>	D			10		5						
<i>Terminalia oblongata</i>	A					5						
<i>Cassia brewsteri</i>	A					5						
<i>Pennisetum ciliare</i> #	D							0.5				
<i>Harrisia martini</i> ##	A							0.5				
<i>Urochloa mosambicensis</i> *	A							0.5				
<i>Bothriochloa pertusa</i>	A							0.5				
Status: D = dominant, C = Codominant, S = subdominant, A = associate, EVR = significant species, # = weed, ## = declared plant O = outside plot												

Community Health and Condition	
Overall Health:	Poor. Regrowth from partial clearing. Marginal remnant.
Potential EVR Flora Species Habitat:	Limited
EVR Flora Species Recorded:	No
Weed Species:	<i>Harrisia martini</i> (Class 2) <i>Pennisetum ciliare</i> (pasture grass), <i>Bothriochloa pertusa</i>
Weed Cover (%):	Not recorded
Disturbance:	Regrowth from partial clearing. Large canopy gaps.
Disturbance Cover (%):	Not recorded

Topography and Landform	
Landform Situation:	Clay plain - depression
Altitude:	292 m
Relief:	Very low
Slope:	Flat / depression
Slope Class:	Very Gently Inclined (1 – 3 %)
Erosional Landform Pattern:	Clay plain
Soils:	Vertosol
Soil Colour:	Grey-brown
Soil Texture:	Heavy clay loam
Geology:	Clay plain

Survey Details	
Recorder / s:	David Stanton/ Stephen Catchpoole
Field Site Number:	Q 65
Date / Time:	5 / 03 / 2011; 10.00 am

VEGETATION SURVEY

***Eucalyptus cambageana* + *Acacia harpophylla* woodland (Q 66)**



Regional Ecosystem Profile	
Regional Ecosystem Type:	11.4.8 (disturbed/ marginal remnant)
EPBC Status:	Endangered
VM Status:	Endangered
BD Status:	Endangered
DERM Mapped as:	11.8.13
Width of RE:	Not linear
Survey Level:	Quaternary

Site Description	
Location:	7.3km SW West of Newlands Mine
Site Description:	Clay plain / depression
Orientation of Transect:	No transect
Datum:	GDA94
Latitude / Longitude:	-21.2840; 147.83337

Vegetation Community Description												
Woodland to open forest with canopy from 14 – 23m. PCC of 30%												
Dominant Species (50 m x 10 m area)												
Botanical Species	Status*	Average Height (m) 16m (13 – 18m)							Abundance (m2 / ha)			
		E	T1	T2	T3	S1	S2	G	E	T1	T2	S1
<i>Eucalyptus cambageana</i>	D		15	10						Not Measured		
<i>Acacia harpophylla</i>	D			10		5						
<i>Terminalia oblongata</i>	A					5						
<i>Cassia brewsteri</i>	A					5						
<i>Pennisetum ciliare</i> #	D							0.5				
<i>Harrisia martini</i> ##	A							0.5				
Status: D = dominant, C = Codominant, S = subdominant, A = associate, EVR = significant species, # = weed, ## = declared plant O = outside plot												

Community Health and Condition	
Overall Health:	Poor to Moderate. Highly fragmented although original canopy is largely intact.
Potential EVR Flora Species Habitat:	Limited
EVR Flora Species Recorded:	No
Weed Species:	<i>Harrisia martini</i> (Class 2) <i>Pennisetum ciliare</i> (pasture grass)
Weed Cover (%):	Not recorded
Disturbance:	Fragmented and ground covers dominated by exotic species
Disturbance Cover (%):	Not recorded

Topography and Landform	
Landform Situation:	Clay plain with minor influence from colluvial sediments
Altitude:	290 m
Relief:	Very low
Slope:	Flat / depression
Slope Class:	Very Gently Inclined (1 – 3 %)
Erosional Landform Pattern:	Clay plain
Soils:	Vertosol
Soil Colour:	Grey-brown
Soil Texture:	Heavy clay loam
Geology:	Clay plain

Survey Details	
Recorder / s:	David Stanton/ Stephen Catchpoole
Field Site Number:	Q 66
Date / Time:	5 / 03 / 2011; 11.00 am

VEGETATION SURVEY
***Eucalyptus cambageana* + *Acacia harpophylla* woodland (Q 67)**



Regional Ecosystem Profile	
Regional Ecosystem Type:	Non-remnant (remnant of RE11.7.1)
EPBC Status:	Non-remnant
VMA Status:	Non-remnant
EPA Status:	Non-remnant
DNRW Mapped as:	Non-remnant
Width of RE:	Not linear
Survey Level:	Quaternary

Site Description	
Location:	7.7km SW West of Newlands Mine
Site Description:	Clay plain / depression
Orientation of Transect:	No transect
Datum:	GDA94
Latitude / Longitude:	-21.28315; 147.83298

Vegetation Community Description												
Low woodland to open forest with canopy from 8 – 14m. PCC of 50%												
Dominant Species (50 m x 10 m area)												
Botanical Species	Status*	Average Height (m) 16m (13 – 18m)							Abundance (m2 / ha)			
		E	T1	T2	T3	S1	S2	G	E	T1	T2	S1
<i>Acacia harpophylla</i>	D		12									
Status: D = dominant, C = Codominant, S = subdominant, A = associate, EVR = significant species, # = weed, ## = declared plant O = outside plot												

Community Health and Condition	
Overall Health:	Poor. Highly fragmented non-remnant.
Potential EVR Flora Species Habitat:	Limited
EVR Flora Species Recorded:	No

Weed Species:	<i>Harrisia martini</i> (Class 2)
Weed Cover (%):	Not recorded
Disturbance:	Minor fragment of original canopy.
Disturbance Cover (%):	Not recorded

Topography and Landform	
Landform Situation:	Small rise/ knoll on Tertiary jump-up.
Altitude:	295 m
Relief:	Sharp rise
Slope:	50%
Slope Class:	Steep slope (1 – 3 %)
Erosional Landform Pattern:	Scarp retreat zone
Soils:	Rudosol
Soil Colour:	Grey-white
Soil Texture:	Rock- gravel
Geology:	Tertiary rise

Survey Details	
Recorder / s:	David Stanton/ Stephen Catchpoole
Field Site Number:	Q 67
Date / Time:	5 / 03 / 2011; 11.15 am

VEGETATION SURVEY
***Eucalyptus tereticornis* dominant palustrine wetland (Q 68)**



Regional Ecosystem Profile	
Regional Ecosystem Type:	RE11.3.27
EPBC Status:	Non-EPBC
VM Status:	Of Concern
BD Status:	Of Concern
DERM Mapped as:	11.3.27
Width of RE:	Not linear
Survey Level:	Quaternary

Site Description	
Location:	7.5km West of Newlands Mine
Site Description:	Alluvial depression
Orientation of Transect:	No transect
Datum:	GDA94
Latitude / Longitude:	-21.27461; 147.81964

Vegetation Community Description												
Low woodland to open forest with canopy from 15 – 25m. PCC of 30%												
Dominant Species (50 m x 10 m area)												
Botanical Species	Status*	Average Height (m) 16m (13 – 18m)							Abundance (m2 / ha)			
		E	T1	T2	T3	S1	S2	G	E	T1	T2	S1
<i>Eucalyptus tereticornis</i>	D		23	12								
<i>Eucalyptus cambageana</i>	A		23									
<i>Sesbania canabina</i> #	A							1				
<i>Echinochloa colona</i> #	A							0.5				
<i>Schoenoplectus littoralis</i>	C							1				
<i>Cynodon dactylon</i>	A							<0.25				
<i>Nymphaea</i> sp.	A							<.25				
<i>Panicum</i> sp.#	C							1				

Vegetation Community Description	
Status: D = dominant, C = Codominant, S = subdominant, A = associate, EVR = significant species, # = weed, ## = declared plant O = outside plot	

Community Health and Condition	
Overall Health:	Poor. Highly fragmented non-remnant.
Potential EVR Flora Species Habitat:	None known
EVR Flora Species Recorded:	No
Weed Species:	None recorded
Weed Cover (%):	Not recorded
Disturbance:	Minor incursion of exotic grasses into ground cover
Disturbance Cover (%):	Not recorded

Topography and Landform	
Landform Situation:	Drainage depression
Altitude:	288 m
Relief:	flat
Slope:	0%
Slope Class:	No slope
Erosional Landform Pattern:	
Soils:	Hydrosol (humic)
Soil Colour:	Grey – dark grey
Soil Texture:	Silty clay loam
Geology:	Quaternary alluvium

Survey Details	
Recorder / s:	David Stanton/ Stephen Catchpoole
Field Site Number:	BQ 68
Date / Time:	6 / 03 / 2011; 11.45 am

VEGETATION SURVEY
***Acacia harpophylla* regrowth shrubland (Q69)**

Regional Ecosystem Profile	
Regional Ecosystem Type:	Non-remnant
EPBC Status:	NA
VM Status:	Non-remnant
BD Status:	Non-remnant
DERM Mapped as:	Non-remnant
Width of RE:	Not linear
Survey Level:	Quaternary

Site Description	
Location:	6.6km SW West of Newlands Mine
Site Description:	Clay plain on margins of colluvial slope wash
Orientation of Transect:	No transect
Datum:	GDA94
Latitude / Longitude:	-21.2748; 147.82213

Vegetation Community Description													
Low regrowth shrubland with canopy from 3- 6m. PCC of 25%													
Dominant Species (50 m x 10 m area)													
Botanical Species	Status*	Average Height (m) 16m (13 – 18m)								Abundance (m2 / ha)			
		E	T1	T2	T3	S1	S2	G	E	T1	T2	S1	
<i>Acacia harpophylla</i>	D					5				Not Measured			
<i>Bothriochloa pertusa</i> #	D							0.5					
Status: D = dominant, C = Codominant, S = subdominant, A = associate, EVR = significant species, # = weed, ## = declared plant O = outside plot													

Community Health and Condition	
Overall Health:	Poor. Regrowth from total clearing. Habitat is pulled on a regular basis and regrowth is estimated to be <6yrs old. Ground cover dominated by exotic species
Potential EVR Flora Species Habitat:	Limited
EVR Flora Species Recorded:	No
Weed Species:	<i>Bothriochloa pertusa</i> , <i>Pennisetum ciliare</i> (pasture grasses)
Weed Cover (%):	60% ground cover
Disturbance:	Regrowth from total clearing
Disturbance Cover (%):	Not recorded

Topography and Landform	
Landform Situation:	Clay plain
Altitude:	294m
Relief:	Very low
Slope:	Flat
Slope Class:	Flat
Erosional Landform Pattern:	Clay plain
Soils:	Vertosol
Soil Colour:	Grey-brown
Soil Texture:	Clay loam
Geology:	Cainozoic clay plain

Survey Details	
Recorder / s:	David Stanton/ Stephen Catchpoole
Field Site Number:	Q 69
Date / Time:	6 / 03 / 2011; 12.00 pm

VEGETATION SURVEY
***Eucalyptus cambageana* + *Acacia harpophylla* woodland (T 70)**



Regional Ecosystem Profile	
Regional Ecosystem Type:	11.4.8
EPBC Status:	Endangered
VM Status:	Endangered
BD Status:	Endangered
DERM Mapped as:	11.9.6
Width of RE:	Not linear
Survey Level:	Tertiary

Site Description	
Location:	7.3km SW West of Newlands Mine
Site Description:	Flat topped rise formed of gravel and silt clay loam soils
Orientation of Transect:	110°
Datum:	GDA94
Latitude / Longitude:	-21.27856; 147.82634

Vegetation Community Description												
Woodland to open forest with canopy from 16 – 23m. PCC of 46%												
Dominant Species (50 m x 10 m area)												
Botanical Species	Status*	Average Height (m) 16m (13 – 18m)							Abundance (m2 / ha)			
		E	T1	T2	T3	S1	S2	G	E	T1	T2	S1
<i>Eucalyptus cambageana</i>	D		19	10						10		
<i>Paspalidium caespitosum</i>	A							0.5				
<i>Aristida sp.</i>	A							0.5				
<i>Bothriochloa pertusa</i> #	C							0.5				
<i>Pennisetum ciliare</i> #	A							0.5				
<i>Harrisia martini</i> ##	A							0.5				
<i>Cyperus sp.</i>	A							0.5				

Vegetation Community Description												
<i>Eragrostis sp.</i>	A							0.5				
<i>Cymbopogon sp.</i>	A							0.5				
<i>Panicum decompositum</i>	A							0.5				
<i>Alloteropsis semialata</i>	A							0.5				
<i>Dodonaea viscosa</i>	A					1.5						
<i>Melinis repens</i> #	A							0.5				
<i>Dactyloctenium radulans</i>	A							0.5				
<i>Erythroxylum australe</i>	A					1.5						
<i>Grewia retusifolia</i>	A							0.5				
Status: D = dominant, C = Codominant, S = subdominant, A = associate, EVR = significant species, # = weed, ## = declared plant O = outside plot												

Cover % PCC					Species	Stem Count(500m ²)					
E	T1	T2	T3	S1		E	T1	T2	T3	S1	S2
	46%			<	<i>Eucalyptus Cambageana</i>		5				
					<i>Cassia brewsteri</i>					3	
				4%	<i>Dodonaea viscosa</i>					2	
					<i>Erythroxylum australe</i>					1	
					<i>Breynia oblongifolia</i>					2	

Community Health and Condition	
Overall Health:	Good to moderate. Intact canopy with incursion of exotic species into ground covers
Potential EVR Flora Species Habitat:	Limited
EVR Flora Species Recorded:	No
Weed Species:	<i>Harrisia martini</i> (Class 2) <i>Pennisetum ciliare</i> (pasture grass), <i>Bothriochloa pertusa</i>
Weed Cover (%):	Not recorded
Disturbance:	Partial disturbance to canopy
Disturbance Cover (%):	Not recorded

Topography and Landform	
Landform Situation:	Rise on clay plain
Altitude:	295 m
Relief:	Very low
Slope:	Flat
Slope Class:	Flat
Erosional Landform Pattern:	Former surface of loamy clay plain
Soils:	Dermosol
Soil Colour:	Grey-brown
Soil Texture:	Silty clay loam with gravel
Geology:	Cainozoic rise formed on clay / clay loam

Survey Details	
Recorder / s:	David Stanton/ Stephen Catchpoole
Field Site Number:	T 70
Date / Time:	6 / 03 / 2011; 12.30 pm

VEGETATION SURVEY
***Acacia harpophylla* regrowth shrubland (Q71)**



Regional Ecosystem Profile	
Regional Ecosystem Type:	Non-remnant
EPBC Status:	NA
VM Status:	Non-remnant
BD Status:	Non-remnant
DERM Mapped as:	Non-remnant
Width of RE:	Not linear
Survey Level:	Quaternary

Site Description	
Location:	7.5km WSW of Newlands Mine
Site Description:	Clay plain on margins of broader clay rise
Orientation of Transect:	No transect
Datum:	GDA94
Latitude / Longitude:	-21.28607; 147.82672

Vegetation Community Description												
Low regrowth shrubland with canopy from 3- 8m. PCC of 30%												
Dominant Species (50 m x 10 m area)												
Botanical Species	Status*	Average Height (m) 5m (4 –8m)							Abundance (m2 / ha)			
		E	T1	T2	T3	S1	S2	G	E	T1	T2	S1
<i>Acacia harpophylla</i>	D					6				Not Measured		
<i>Terminalia oblongata</i>	A					5						
<i>Eucalyptus cambageana</i>	A	12										
<i>Bothriochloa pertusa</i> #	D											
Status: D = dominant, C = Codominant, S = subdominant, A = associate, EVR = significant species, # = weed, ## = declared plant O = outside plot												

Community Health and Condition	
Overall Health:	Poor. Regrowth from total clearing. Habitat is pulled on a regular basis and regrowth is estimated to be 10yrs old. Ground cover dominated by exotic species
Potential EVR Flora Species Habitat:	Limited
EVR Flora Species Recorded:	No
Weed Species:	<i>Bothriochloa pertusa</i> , <i>Pennisetum ciliare</i> (pasture grasses)
Weed Cover (%):	60% ground cover
Disturbance:	Regrowth from total clearing
Disturbance Cover (%):	Not recorded

Topography and Landform	
Landform Situation:	Clay plain
Altitude:	294m
Relief:	Very low
Slope:	Flat
Slope Class:	Flat to Gently Inclined (<3%)
Erosional Landform Pattern:	Clay plain – eroded surface of Cainozoic clay rise
Soils:	Vertosol
Soil Colour:	Grey-brown
Soil Texture:	Clay loam
Geology:	Cainozoic clay plain

Survey Details	
Recorder / s:	David Stanton/ Stephen Catchpoole
Field Site Number:	Q 71
Date / Time:	6 / 03 / 2011; 1.30 pm

VEGETATION SURVEY
***Acacia harpophylla* low open forest and woodland (Q 72)**



Regional Ecosystem Profile	
Regional Ecosystem Type:	11.4.9
EPBC Status:	Endangered
VMA Status:	Endangered
EPA Status:	Endangered
DNRW Mapped as:	11.8.13
Width of RE:	Not linear
Survey Level:	Quaternary

Site Description	
Location:	7.7km WSW of Newlands Mine
Site Description:	Clay plain on margins of broader Cainozoic rise
Orientation of Transect:	No transect
Datum:	GDA94
Latitude / Longitude:	-21.28826; 147.82805

Vegetation Community Description												
Low open forest with canopy from 6- 10m. PCC of 40%												
Dominant Species (50 m x 10 m area)												
Botanical Species	Status*	Average Height (m) 5m (4 –8m)							Abundance (m2 / ha)			
		E	T1	T2	T3	S1	S2	G	E	T1	T2	S1
<i>Acacia harpophylla</i>	D		8							10		
<i>Terminalia oblongata</i>	A					5						
<i>Eucalyptus cambageana</i>	A	12										
<i>Bothriochloa pertusa</i> #	D							0.5				
<i>Carissa ovata</i>	A						1					
<i>Paspalidium caespitosum</i>	C							0.5				
<i>Salsola kali</i>	A							0.5				

Vegetation Community Description												
<i>Pennisetum ciliaris</i> #	C							0.5				
<i>Sporobolus caroli</i>	A							05				
Status: D = dominant, C = Codominant, S = subdominant, A = associate, EVR = significant species, # = weed, ## = declared plant O = outside plot												

Community Health and Condition	
Overall Health:	Moderate. Original canopy is partially cleared and habitat comprises mixed regrowth and original canopy trees. Ground cover dominated by exotic species
Potential EVR Flora Species Habitat:	Limited
EVR Flora Species Recorded:	No
Weed Species:	<i>Bothriochloa pertusa</i> , <i>Pennisetum ciliare</i> (pasture grasses)
Weed Cover (%):	60% ground cover
Disturbance:	Regrowth from total clearing
Disturbance Cover (%):	Not recorded

Topography and Landform	
Landform Situation:	Clay plain
Altitude:	292m
Relief:	Very low
Slope:	Flat
Slope Class:	Flat to Gently Inclined (<3%)
Erosional Landform Pattern:	Clay plain – eroded surface of Cainozoic clay rise
Soils:	Vertosol
Soil Colour:	Grey-brown
Soil Texture:	Clay loam
Geology:	Cainozoic clay plain

Survey Details	
Recorder / s:	David Stanton/ Stephen Catchpoole
Field Site Number:	Q 72
Date / Time:	6 / 03 / 2011; 1.30 pm

VEGETATION SURVEY
***Eucalyptus populnea* woodland on Cainozoic clay plain (S 73)**



Regional Ecosystem Profile	
Regional Ecosystem Type:	RE 11.4.2
EPBC Status:	NA
VMA Status:	Of concern
EPA Status:	Of concern
DNRW Mapped as:	11.8.13
Width of RE:	Not linear
Survey Level:	Secondary

Site Description	
Location:	7.7km West South West of Newlands Mine
Site Description:	Woodland on gently sloping plain
Orientation of Transect:	270
Datum:	GDA94
Latitude / Longitude:	-21.29103; 147.82950

Vegetation Community Description												
Woodland with canopy 15 to 19m												
Dominant Species (50 m x 10 m area)												
Botanical Species	Status*	Average Height (m) 14 (13 – 19m)							Abundance (m2 / ha)			
		E	T1	T2	T3	S1	S2	G	E	T1	T2	S1
<i>Eucalyptus populnea</i>	D		17	11						9	2	
<i>Acacia holosericea</i>	A					3						
<i>Alectryon diversifolius</i>	A					3	1.5					
<i>Eragrostis sp.</i>	A							0.5				
<i>Cyperus sp.</i>	A							0.5				
<i>Zornia dyctiocarpa</i>	A							0.5				
<i>Indigofera sp.</i>	A							0.5				
<i>Cassia brewsteri</i>	A					2						

Vegetation Community Description												
<i>Sida sp.</i>	A							0.5				
<i>Carissa ovata</i>	A							0.75				
<i>Urochloa mosambicensis</i> #	A							0.5				
<i>Ehretia membranifolia</i>	A					2						
<i>Glycine tomentella</i>	A							0.5				
<i>Atalaya hemiglauca</i>	A					2						
<i>Heteropogon contortus</i>	A							0.5				
<i>Bothriochloa pertusa</i> #	D							0.5				
Status: D = dominant, C = Codominant, S = subdominant, A = associate, EVR = significant species, # = weed, ## = declared plant O = outside plot												

Cover % PCC					Species	Stem Count(500m ²)					
E	T1	T2	T3	S1		E	T1	T2	T3	S1	S2
	26%			<	<i>Eucalyptus populnea</i>		9	1			7
					<i>Acacia holosericea</i>					1	
				4%	<i>Alectryon diversifolius</i>					1	
					<i>Cassia brewsteri</i>					1	1
					<i>Ehretia membranifolia</i>						2
					<i>Atalaya hemiglauca</i>						1

Cover % (Ground)	
<i>Bothriochloa pertusa.</i>	44
<i>Eragrostis sp.</i>	4
<i>Cyperus sp.</i>	6
<i>Indigofera sp.</i>	4
<i>Zornia dyctiocarpa</i>	<2
Leaf Litter	12
<i>Heteropogon contortus</i>	8
<i>Pennisetum ciliaris</i>	5
<i>Sida sp.</i>	<2
<i>Urochloa mosambicensis</i>	<2
<i>Glycine tomentella</i>	<2
Bare Ground	10

Community Health and Condition	
Overall Health:	Moderate – Minor canopy disturbance ground cover dominated by exotic species.
Potential EVR Flora Species Habitat:	Limited
EVR Flora Species Recorded:	No
Weed Species:	<i>Bothriochloa pertusa</i> (pasture grass)
Weed Cover (%):	44% (Ground)
Disturbance:	Minor canopy disturbance
Disturbance Cover (%):	Not recorded

Topography and Landform	
Landform Situation:	Clay plain on margins of drainage line
Altitude:	293m
Relief:	Very low
Slope:	Flat
Slope Class:	Flat
Erosional Landform Pattern:	Incised clay plain
Soils:	Vertosol
Soil Colour:	Grey-brown
Soil Texture:	Clay loam
Geology:	Incised Cainozoic clay plain

Survey Details	
Recorder / s:	David Stanton/ Stephen Catchpoole
Field Site Number:	S 73
Date / Time:	6 / 03 / 2012; 13.30 am

VEGETATION SURVEY
***Acacia harpophylla* dominant woodland (Q74)**



Regional Ecosystem Profile	
Regional Ecosystem Type:	11.4.9
EPBC Status:	Endangered
VM Status:	Endangered
BD Status:	Endangered
DERM Mapped as:	11.8.13
Width of RE:	Not linear
Survey Level:	Quaternary

Site Description	
Location:	7.86 km SW West of Newlands Mine
Site Description:	Narrow flood channel on broad watercourse. Fragmented grazing land
Orientation of Transect:	No transect
Datum:	GDA94
Latitude / Longitude:	-21.29355; 147.82976

Vegetation Community Description												
Low open forest with canopy from 6– 10m. PCC of 40%												
Dominant Species (50 m x 10 m area)												
Botanical Species	Status*	Average Height (m)							Abundance (m2 / ha)			
		E	T1	T2	T3	S1	S2	G	E	T1	T2	S1
<i>Acacia harpophylla</i>	D		9			5						
<i>Eucalyptus cambageana</i>	A	11										
Status: D = dominant, C = Codominant, S = subdominant, A = associate, EVR = significant species, # = weed, ## = declared plant O = outside plot												

Community Health and Condition

Overall Health:	Moderate. Disturbed habitat with dead emergent canopy trees. Regrowth from partial clearing.
Potential EVR Flora Species Habitat:	Limited
EVR Flora Species Recorded:	No
Weed Species:	Not recorded
Weed Cover (%):	Not recorded
Disturbance:	Disturbance to original canopy and occasional dead remnant trees
Disturbance Cover (%):	Not recorded

Topography and Landform	
Landform Situation:	Narrow flood plain in broader clay plain.
Altitude:	288 m
Relief:	Very low
Slope:	Flat
Slope Class:	Flat
Erosional Landform Pattern:	Clay plain
Soils:	Vertosol
Soil Colour:	Grey-brown
Soil Texture:	Heavy clay loam
Geology:	Cainozoic Clay Plain

Survey Details	
Recorder / s:	David Stanton/ Stephen Catchpoole
Field Site Number:	Q 74
Date / Time:	6 / 03 / 2011; 1.30 pm

VEGETATION SURVEY
***Eucalyptus cambageana* + *Acacia harpophylla* woodland (Q 75)**



Regional Ecosystem Profile	
Regional Ecosystem Type:	11.4.8 (fragmented remnant)
EPBC Status:	Endangered
VM Status:	Endangered
BD Status:	Endangered
DERM Mapped as:	Non-remnant
Width of RE:	Not linear
Survey Level:	Quaternary

Site Description	
Location:	8.3km SW West of Newlands Mine
Site Description:	Clay plain
Orientation of Transect:	No transect
Datum:	GDA94
Latitude / Longitude:	-21.30427; 147.8281

Dominant Species (50 m x 10 m area)												
Botanical Species	Status*	Average Height (m) 16m (13 – 18m)							Abundance (m2 / ha)			
		E	T1	T2	T3	S1	S2	G	E	T1	T2	S1
<i>Eucalyptus cambageana</i>	D		15	10						Not Measured		
<i>Acacia harpophylla</i>	D			10		5						
<i>Terminalia oblongata</i>	C					5						
<i>Eremophila mitchellii</i>	C					5						
<i>Pennisetum ciliare</i> #	D							0.5				
<i>Carissa ovata</i>	A						1	0.5				
<i>Urochloa mosambicensis</i> *	A							0.5				
<i>Stylosanthes scabra</i>	A							0.5				

<i>Bothriochloa pertusa</i>	A							0.5				
Status: D = dominant, C = Codominant, S = subdominant, A = associate, EVR = significant species, # = weed, ## = declared plant O = outside plot												

Community Health and Condition	
Overall Health:	Moderate. Regrowth from partial clearing. Marginal remnant.
Potential EVR Flora Species Habitat:	Limited
EVR Flora Species Recorded:	No
Weed Species:	<i>Pennisetum ciliare</i> (pasture grass), <i>Bothriochloa pertusa</i>
Weed Cover (%):	Not recorded
Disturbance:	Regrowth from partial clearing with a few remnant original trees. Large canopy gaps.
Disturbance Cover (%):	Not recorded

Topography and Landform	
Landform Situation:	Clay plain. Heavy clay soils
Altitude:	291 m
Relief:	Very low
Slope Class:	Very Gently Inclined (1 – 3 %)
Erosional Landform Pattern:	Clay plain
Soils:	Vertosol
Soil Colour:	Grey-brown
Soil Texture:	Heavy clay loam
Geology:	Clay plain

Survey Details	
Recorder / s:	David Stanton/ Stephen Catchpoole
Field Site Number:	Q 75
Date / Time:	6 / 03 / 2011; 15.00 pm

VEGETATION SURVEY
***Eucalyptus populnea* woodland on colluvial footslope (Q 76)**



Regional Ecosystem Profile	
Regional Ecosystem Type:	RE 11.4.2
EPBC Status:	NA
VM Status:	Of Concern
BD Status:	Of Concern
DERM Mapped as:	Non-remnant
Width of RE:	Not linear
Survey Level:	Quaternary

Site Description	
Location:	9.3km SW West of Newlands Mine
Site Description:	Broad plain heavily fragmented through land clearing for grazing
Orientation of Transect:	No transect
Datum:	GDA94
Latitude / Longitude:	-21.3285; 147.8313

Vegetation Community Description												
Woodland with canopy 12 to 19m												
Dominant Species (50 m x 10 m area)												
Botanical Species	Status*	Average Height (m) 16m (13 – 18m)							Abundance (m2 / ha)			
		E	T1	T2	T3	S1	S2	G	E	T1	T2	S1
<i>Eucalyptus populnea</i>	D		17							Not Measured		
<i>Acacia harpophylla</i>	A			10		4						
<i>Pennisetum ciliare</i>	D							0.75				
<i>Bothriochloa pertusa</i>	A							0.75				
Status: D = dominant, C = Codominant, S = subdominant, A = associate, EVR = significant species, # = weed, ## = declared plant O = outside plot												

Community Health and Condition

Overall Health:	Moderate – Poor. Highly fragmented with dominance of exotic grass in ground cover.
Potential EVR Flora Species Habitat:	Limited
EVR Flora Species Recorded:	No
Weed Species:	<i>Pennisetum ciliare</i> (pasture grass), <i>Bothriochloa pertusa</i>
Weed Cover (%):	Not recorded – dominate ground covers
Disturbance:	Evidence of moderate disruption to canopy.
Disturbance Cover (%):	Not recorded

Topography and Landform	
Landform Situation:	Low loamy rise on broader clay plane
Altitude:	305m
Relief:	Very low
Slope:	Flat to gently inclined
Slope Class:	Very Gently Inclined (1 – 3 %)
Erosional Landform Pattern:	Residual loamy rise on clay plane
Soils:	Dermosol
Soil Colour:	Red-brown
Soil Texture:	Silty clay loam
Geology:	Cainozoic clays and silts

Survey Details	
Recorder / s:	David Stanton/ Stephen Catchpoole
Field Site Number:	Q 76
Date / Time:	6 / 03 / 2011; 3.30 pm

VEGETATION SURVEY
***Eucalyptus populnea* woodland on colluvial footslope (Q 77)**



Regional Ecosystem Profile	
Regional Ecosystem Type:	RE 11.4.2
EPBC Status:	NA
VM Status:	Of Concern
BD Status:	Of Concern
DERM Mapped as:	Non-remnant
Width of RE:	Not linear
Survey Level:	Quaternary

Site Description	
Location:	9.6km SW West of Newlands Mine
Site Description:	Broad plain heavily fragmented through land clearing for grazing
Orientation of Transect:	No transect
Datum:	GDA94
Latitude / Longitude:	-21.3363; 147.8435

Vegetation Community Description												
Woodland with canopy 15 to 18m												
Dominant Species (50 m x 10 m area)												
Botanical Species	Status*	Average Height (m) 16m (13 – 18m)							Abundance (m2 / ha)			
		E	T1	T2	T3	S1	S2	G	E	T1	T2	S1
<i>Eucalyptus populnea</i>	D		16							5	2	
<i>Acacia harpophylla</i>	A			10		4						
<i>Archidendropsis basaltica</i>	A											
<i>Capparis lasiantha</i>	A						2					
<i>Atalaya hemiglauc</i>	A					3						
<i>Cassia brewsteri</i>	A					3						
<i>Ventilago viminalis</i>	A					3						

Vegetation Community Description												
<i>Grevillea parallela</i>	A					5						
<i>Capparis canescens</i>	A						1.5					
<i>Grewia retusifolia</i>	A							0.75				
<i>Ehretia grahamii</i>	A						1.5					
<i>Acacia excelsa</i>	A					3						
<i>Maytenus cunninghamii</i>	A					2						
<i>Aristida sp.</i>	C							0.75				
<i>Themeda triandra</i>	A							0.75				
<i>Urochloa mosambicensis</i> #	A							0.75				
<i>Pennisetum ciliare</i> #	C							0.75				
Status: D = dominant, C = Codominant, S = subdominant, A = associate, EVR = significant species, # = weed, ## = declared plant O = outside plot												

Community Health and Condition	
Overall Health:	Moderate. Highly fragmented although canopy largely intact. Co-dominance of exotic grass species in the ground cover.
Potential EVR Flora Species Habitat:	Limited
EVR Flora Species Recorded:	No
Weed Species:	<i>Pennisetum ciliare</i> (pasture grass), <i>Bothriochloa pertusa</i>
Weed Cover (%):	Not recorded
Disturbance:	Evidence of minor disruption to canopy.
Disturbance Cover (%):	Not recorded

Topography and Landform	
Landform Situation:	Loamy soils overlying a broader clay plane
Altitude:	298m
Relief:	Very low
Slope:	Flat
Slope Class:	Flat
Erosional Landform Pattern:	Residual rise overlying a broader clay plane
Soils:	Dermosol
Soil Colour:	Grey-brown
Soil Texture:	Silty clay loam
Geology:	Cainozoic clays and silts

Survey Details	
Recorder / s:	David Stanton/ Stephen Catchpoole
Field Site Number:	Q 77
Date / Time:	6 / 03 / 2011; 4.00 pm

VEGETATION SURVEY
***Eucalyptus populnea* woodland on colluvial footslope (Q 78)**

Regional Ecosystem Profile	
Regional Ecosystem Type:	RE 11.4.2
EPBC Status:	NA
VM Status:	Of Concern
BD Status:	Of Concern
DERM Mapped as:	Non-remnant
Width of RE:	Not linear
Survey Level:	Quaternary

Site Description	
Location:	8.5 km SW West of Newlands Mine
Site Description:	Broad plain heavily fragmented through land clearing for grazing
Orientation of Transect:	No transect
Datum:	GDA94
Latitude / Longitude:	-21.3311; 147.8501

Vegetation Community Description													
Woodland with canopy 16 to 20m													
Dominant Species (50 m x 10 m area)													
Botanical Species	Status*	Average Height (m)								Abundance (m2 / ha)			
		E	T1	T2	T3	S1	S2	G		E	T1	T2	S1
<i>Eucalyptus populnea</i>	D		16								5	2	
<i>Hakea laurina</i>	A					4							
<i>Lysiphyllum carronii</i>	A												
<i>Capparis lasiantha</i>	A						2						
<i>Atalaya hemiglauc</i>	A					3							
<i>Cassia brewsteri</i>	A					3							
<i>Ventilago viminalis</i>	A					3							
<i>Carissa ovata</i>	A												
<i>Breynia oblongifolia</i>	A						1.5						
<i>Grewia retusifolia</i>	A							0.75					
<i>Ehretia membranifolia</i>	A						1.5						
<i>Citrus glauca</i>	A												
<i>Acacia excelsa</i>	A					3							
<i>Aristida sp.</i>	C							0.75					
<i>Themeda triandra</i>	C							0.75					
<i>Heteropogon contortus</i>	C							0.75					
<i>Cyperus sp.</i>	A							0.75					
<i>Pennisetum ciliare</i> #	C							0.75					
<i>Jasminum didymum</i>	A						1.5						
Status: D = dominant, C = Codominant, S = subdominant, A = associate, EVR = significant species, # = weed, ## = declared plant O = outside plot													

Community Health and Condition	
Overall Health:	Moderate. Fragmented although canopy largely intact. Minor incursion of exotic grass species in the ground cover.
Potential EVR Flora Species Habitat:	Limited
EVR Flora Species Recorded:	No
Weed Species:	<i>Pennisetum ciliare</i> (pasture grass),
Weed Cover (%):	Not recorded
Disturbance:	Evidence of minor disruption to canopy.
Disturbance Cover (%):	Not recorded

Topography and Landform	
Landform Situation:	Loamy soils overlying a broader clay plane
Altitude:	289m
Relief:	Very low
Slope:	Flat
Slope Class:	Flat

Erosional Landform Pattern:	Residual rise overlying a broader clay plane
Soils:	Dermosol
Soil Colour:	Grey-red
Soil Texture:	Silty clay loam
Geology:	Cainozoic clays and silts

Survey Details	
Recorder / s:	David Stanton/ Stephen Catchpoole
Field Site Number:	Q 78
Date / Time:	6 / 03 / 2011; 4.15 pm

VEGETATION SURVEY
***Eucalyptus populnea* woodland on colluvial footslope (Q 79)**



Regional Ecosystem Profile	
Regional Ecosystem Type:	RE 11.4.2
EPBC Status:	NA
VM Status:	Of Concern
BD Status:	Of Concern
DERM Mapped as:	Non-remnant
Width of RE:	Not linear
Survey Level:	Quaternary

Site Description	
Location:	8.5 km SW West of Newlands Mine
Site Description:	Broad plain heavily fragmented through land clearing for grazing
Orientation of Transect:	No transect
Datum:	GDA94
Latitude / Longitude:	-21.3321; 147.8519

Vegetation Community Description												
Woodland with canopy 16 to 20m												
Dominant Species (50 m x 10 m area)												
Botanical Species	Status*	Average Height (m) 16m (13 – 18m)							Abundance (m2 / ha)			
		E	T1	T2	T3	S1	S2	G	E	T1	T2	S1
<i>Eucalyptus populnea</i>	D		16							5		
<i>Acacia harpophylla</i>	A			10		4					1	
<i>Lysiphyllum carronii</i>	A					6						1
<i>Ventilago viminalis</i>	A			10		6					2	
<i>Alectryon oleifolius</i>	A					3						
<i>Ventilago viminalis</i>	A					3						
<i>Carissa ovata</i>	A						1.5					
<i>Themeda arguens</i>	C							0.75				

Vegetation Community Description												
<i>Heteropogon contortus</i>	C							0.75				
<i>Bothriochloa ewartiana</i>	A							0.75				
<i>Pennisetum ciliare</i> #	C							0.75				
<i>Capparis lasiantha</i>	A							1.5				
Status: D = dominant, C = Codominant, S = subdominant, A = associate, EVR = significant species, # = weed, ## = declared plant O = outside plot												

Community Health and Condition	
Overall Health:	Moderate. Fragmented although canopy largely intact. Minor incursion of exotic grass species in the ground cover.
Potential EVR Flora Species Habitat:	Limited
EVR Flora Species Recorded:	No
Weed Species:	<i>Pennisetum ciliare</i> (pasture grass),
Weed Cover (%):	Not recorded
Disturbance:	Evidence of minor disruption to canopy.
Disturbance Cover (%):	Not recorded

Topography and Landform	
Landform Situation:	Loamy soils overlying a broader clay plane
Altitude:	290m
Relief:	Very low
Slope:	Flat
Slope Class:	Flat
Erosional Landform Pattern:	Residual rise overlying a broader clay plane
Soils:	Dermosol (??)
Soil Colour:	Grey-red
Soil Texture:	Silty clay loam
Geology:	Cainozoic clays and silts

Survey Details	
Recorder / s:	David Stanton/ Stephen Catchpoole
Field Site Number:	Q 79
Date / Time:	6 / 03 / 2011; 4.45 pm

VEGETATION SURVEY
***Acacia harpophylla* dominant woodland (Q 80)**

Regional Ecosystem Profile	
Regional Ecosystem Type:	11.3.1
EPBC Status:	Endangered
VMA Status:	Endangered
EPA Status:	Endangered
DNRW Mapped as:	11.8.13
Width of RE:	Not linear
Survey Level:	Quaternary

Site Description	
Location:	7.86 km SW West of Newlands Mine
Site Description:	Narrow flood channel on broad watercourse. Fragmented grazing land
Orientation of Transect:	No transect
Datum:	GDA94
Latitude / Longitude:	-21.32255; 147.84615

Vegetation Community Description												
Low open forest with canopy from 8 – 12m. PCC of 60%												
Dominant Species (50 m x 10 m area)												
Botanical Species	Status*	Average Height (m) 16m (13 – 18m)							Abundance (m2 / ha)			
		E	T1	T2	T3	S1	S2	G	E	T1	T2	S1
<i>Acacia harpophylla</i>	D		9			5						
<i>Terminalia oblongifolia</i>	A		9									
<i>Eucalyptus cambageana</i>	A	11										
Status: D = dominant, C = Codominant, S = subdominant, A = associate, EVR = significant species, # = weed, ## = declared plant O = outside plot												

Community Health and Condition	
Overall Health:	Moderate. Disturbed habitat with dead emergent canopy trees. Regrowth from partial clearing.
Potential EVR Flora Species Habitat:	Limited
EVR Flora Species Recorded:	No
Weed Species:	Not recorded
Weed Cover (%):	Not recorded
Disturbance:	Disturbance to original canopy and occasional dead remnant trees
Disturbance Cover (%):	Not recorded

Topography and Landform	
Landform Situation:	Narrow flood plain in broader clay plain.
Altitude:	285 m
Relief:	Very low
Slope:	Flat
Slope Class:	Flat
Erosional Landform Pattern:	Clay plain
Soils:	Vertosol
Soil Colour:	Grey-brown
Soil Texture:	Heavy clay loam
Geology:	Alluvial channel with associated narrow flood plain

Survey Details	
Recorder / s:	David Stanton/ Stephen Catchpoole
Field Site Number:	Q 80
Date / Time:	6 / 03 / 2011; 4.45 pm

VEGETATION SURVEY
***Eucalyptus cambageana* + *Acacia harpophylla* woodland (Q 81)**



Regional Ecosystem Profile	
Regional Ecosystem Type:	11.4.8
EPBC Status:	Endangered
VM Status:	Endangered
BD Status:	Endangered
DERM Mapped as:	11.4.9 / 11.5.3
Width of RE:	Not linear
Survey Level:	Quaternary

Site Description	
Location:	9.6km SSW West of Newlands Mine
Site Description:	Tract of intact remnant vegetation surrounding by heavily fragmented grazing land.
Orientation of Transect:	No transect
Datum:	GDA94
Latitude / Longitude:	-21.34462; 147.85583

Vegetation Community Description												
Woodland to 18 – 24m. PCC of 30%												
Dominant Species (50 m x 10 m area)												
Botanical Species	Status*	Average Height (m) 16m (13 – 18m)							Abundance (m2 / ha)			
		E	T1	T2	T3	S1	S2	G	E	T1	T2	S1
<i>Eucalyptus cambageana</i>	D		21	12						5		
<i>Brachychiton rupestris</i>	A			14							1	
<i>Acacia harpophylla</i>	A			12							1	
<i>Psyrax attenuata</i>	A					8	3					
<i>Erythroxylum australe</i>	A					5	2					
<i>Ehretia membranifolia</i>	A					5	3					
<i>Alphitonia excelsa</i>	A					7						
<i>Hovea sp.</i>	A						3					
<i>Carissa ovata</i>							1.5					

Vegetation Community Description												
<i>Eragrostis sp.</i>								0.5				
<i>Paspalidium caespitosum</i>	A							0.5				
<i>Aristida sp.</i>	A							0.5				
<i>Pennisetum ciliare</i> #	D							0.5				
<i>Harrisia martini</i> ##	A							0.5				
<i>Cyperus sp.</i>	A							0.5				
<i>Urochloa mosambicensis</i> #	A							0.5				
Status: D = dominant, C = Codominant, S = subdominant, A = associate, EVR = significant species, # = weed, ## = declared plant O = outside plot												

Community Health and Condition	
Overall Health:	Good to moderate. Intact canopy with incursion of exotic species into ground covers
Potential EVR Flora Species Habitat:	Limited
EVR Flora Species Recorded:	No
Weed Species:	<i>Harrisia martini</i> (Class 2) <i>Pennisetum ciliare</i> (pasture grass),
Weed Cover (%):	Up to 60% of ground cover occupied by buffel grass.
Disturbance:	Partial disturbance to canopy
Disturbance Cover (%):	Not recorded

Topography and Landform	
Landform Situation:	Strongly hummocked clay plain
Altitude:	306 m
Relief:	Very low
Slope:	Flat
Slope Class:	Flat
Erosional Landform Pattern:	Residual clay plain
Soils:	Vertosol
Soil Colour:	Grey-brown
Soil Texture:	Clay
Geology:	Cainozoic clay plain

Survey Details	
Recorder / s:	David Stanton/ Stephen Catchpoole
Field Site Number:	Q 81
Date / Time:	7 / 03 / 2011; 8.00 am

VEGETATION SURVEY
***Acacia harpophylla* dominant woodland (S 82)**



Regional Ecosystem Profile	
Regional Ecosystem Type:	11.4.9
EPBC Status:	Endangered
VM Status:	Endangered
BD Status:	Endangered
DERM Mapped as:	11.4.9 / 11.5.3
Width of RE:	Not linear
Survey Level:	Secondary

Site Description	
Location:	9.7 km SSW West of Newlands Mine
Site Description:	Intact tract of remnant vegetation
Orientation of Transect:	No transect
Datum:	GDA94
Latitude / Longitude:	-21.34617; 147.8538

Vegetation Community Description												
Low open forest with canopy from 11 – 14m. PCC of 56%												
Dominant Species (50 m x 10 m area)												
Botanical Species	Status*	Average Height (m) 16m (13 – 18m)							Abundance (m2 / ha)			
		E	T1	T2	T3	S1	S2	G	E	T1	T2	S1
<i>Acacia harpophylla</i>	D		12			5				9		
<i>Eucalyptus cambageana</i>	A		13									
<i>Terminalia oblongifolia</i>	A					8						
<i>Paspalidium caespitosum</i>	C							0.5				
<i>Enchylaena tomentosa</i>	A							0.5				
<i>Pennisetum ciliare</i>	C							0.5				
<i>Solanum ellipticum</i>	A							0.5				
<i>Panicum effusum</i>	A							0.5				
<i>Cyperus gracilis</i>	A							0.5				

Vegetation Community Description													
<i>Sida</i> sp. (Aramac E.J. Thompson+JER 192)	A								0.5				
<i>Carissa ovata</i>	A							1					
<i>Eremophila mitchellii</i>	A						5						
<i>Casuarina cristata</i>	A				8								
<i>Megathyrsus maximus</i> var. <i>pubiglume</i>	A								1				
<i>Aristida</i> sp.	A								0.5				
<i>Capparis lasiantha</i>	A							1					
<i>Harrisia martini</i> ##	A								0.5				
Status: D = dominant, C = Codominant, S = subdominant, A = associate, EVR = significant species, # = weed, ## = declared plant O = outside plot													

Cover % PCC					Species	Stem Count(500m ²)					
E	T1	T2	T3	S1		E	T1	T2	T3	S1	S2
	46				<i>Acacia harpophylla</i>		26				
	5			<	<i>Eucalyptus Cambageana</i>		1				

Cover % (Ground)	
<i>Paspalidium caespitosum</i>	21
Leaf litter	33
Bare Ground	20
brigalow (seedlings)	2
<i>Enchylaena tomentosa</i>	2
<i>Pennisetum ciliare</i>	16
<i>Solanum ellipticum</i>	<2
<i>Panicum effusum</i>	<2
<i>Cyperus gracilis</i>	<1
<i>Sida</i> sp.	<1

Community Health and Condition	
Overall Health:	Good condition. Canopy intact. Some incursion of exotic species into ground cover.
Potential EVR Flora Species Habitat:	Limited
EVR Flora Species Recorded:	No
Weed Species:	<i>Harrisia martini</i> (class 2), <i>Pennisetum ciliare</i>
Weed Cover (%):	
Disturbance:	Minimal disturbance to original canopy.
Disturbance Cover (%):	Not recorded

Topography and Landform	
Landform Situation:	Hummocked clay plain
Altitude:	306 m
Relief:	Very low
Slope:	Flat
Slope Class:	Flat
Erosional Landform Pattern:	Clay plain
Soils:	Vertosol
Soil Colour:	Grey-brown
Soil Texture:	Heavy clay loam
Geology:	Cainozoic clay plain.

Survey Details	
Recorder / s:	David Stanton/ Stephen Catchpoole
Field Site Number:	S 82
Date / Time:	7 / 03 / 2011; 9.30 am

VEGETATION SURVEY
***Eucalyptus populnea* woodland on Cainozoic clay plain (T 83)**



Regional Ecosystem Profile	
Regional Ecosystem Type:	RE 11.4.2
EPBC Status:	NA
VM Status:	Of concern
BD Status:	Of concern
DERM Mapped as:	11.4.9/11.5.3
Width of RE:	Not linear
Survey Level:	Tertiary

Site Description	
Location:	9.7km SSW of Newlands Mine
Site Description:	Woodland on gently sloping plain
Orientation of Transect:	270
Datum:	GDA94
Latitude / Longitude:	-21.3462; 147.85083

Vegetation Community Description												
Woodland with canopy 15 to 20m												
Dominant Species (50 m x 10 m area)												
Botanical Species	Status*	Average Height (m) 14 (13 – 19m)							Abundance (m2 / ha)			
		E	T1	T2	T3	S1	S2	G	E	T1	T2	S1
<i>Eucalyptus populnea</i>	D		17	11						5		
<i>Ventilago viminalis</i>	A			11		5					3	
<i>Psyrdrax attenuata</i>	A					5	1.5					
<i>Eremophila mitchellii</i>	A					7						
<i>Erythroxylum australe</i>	A					3						
<i>Alstonia constricta</i>	A					3						
<i>Urochloa mosambicensis</i> #	A							0.5				
<i>Pennisetum ciliare</i>	A							0.5				
<i>Sida sp.</i>	A							0.5				

Vegetation Community Description												
<i>Eragrostis sp.</i>	A							0.5				
<i>Convolvulaceae sp.</i>	A							0.5				
<i>Bothriochloa pertusa</i> #	D							0.5				
Status: D = dominant, C = Codominant, S = subdominant, A = associate, EVR = significant species, # = weed, ## = declared plant O = outside plot												

Community Health and Condition	
Overall Health:	Good. Minor canopy disturbance and minor incursion of exotic species into ground cover.
Potential EVR Flora Species Habitat:	Limited
EVR Flora Species Recorded:	No
Weed Species:	<i>Bothriochloa pertusa</i> . <i>Pennisetum ciliare</i> (pasture grasses)
Weed Cover (%):	25% (Ground)
Disturbance:	Minor canopy disturbance
Disturbance Cover (%):	Not recorded

Topography and Landform	
Landform Situation:	Loamy soils over clay.
Altitude:	306m
Relief:	Very low
Slope:	Flat to gently inclined
Slope Class:	Flat to gently inclined (1 – 3%)
Erosional Landform Pattern:	Clay plain
Soils:	Dermosol
Soil Colour:	Grey-brown
Soil Texture:	Clay loam
Geology:	Incised Cainozoic clay plain

Survey Details	
Recorder / s:	David Stanton/ Stephen Catchpoole
Field Site Number:	T 83
Date / Time:	7 / 03 / 2012; 11.00 am

VEGETATION SURVEY
***Eucalyptus cambageana* + *Acacia harpophylla* woodland (Q 84)**

Regional Ecosystem Profile	
Regional Ecosystem Type:	Non-remnant
EPBC Status:	Non-remnant
VMA Status:	Non-remnant
EPA Status:	Non-remnant
DNRW Mapped as:	Non-remnant
Width of RE:	Not linear
Survey Level:	Quaternary

Site Description	
Location:	8.4 km SSW West of Newlands Mine
Site Description:	Tract of highly disturbed vegetation of 2ha. Scattered remnant trees.
Orientation of Transect:	120 (100m transect for canopy cover)
Datum:	GDA94
Latitude / Longitude:	-21.3355; 147.8655

Vegetation Community Description												
Disturbed Woodland to 12 – 24m. PCC of 23% (disturbed regrowth) and 5% remnant canopy trees												
Dominant Species (50 m x 10 m area)												
Botanical Species	Status*	Average Height (m) 16m (13 – 18m)							Abundance (m2 / ha)			
		E	T1	T2	T3	S1	S2	G	E	T1	T2	S1
<i>Eucalyptus cambageana</i>	D		21	10						5		
<i>Pennisetum ciliare</i> #	C							0.5				
<i>Bothriochloa pertusa</i>	D							0.5				
Status: D = dominant, C = Codominant, S = subdominant, A = associate, EVR = significant species, # = weed, ## = declared plant O = outside plot												

Community Health and Condition	
Overall Health:	Poor. Larger remnant trees are widely spaced. Ground cover dominated by exotic species.
Potential EVR Flora Species Habitat:	Limited
EVR Flora Species Recorded:	No
Weed Species:	<i>Harrisia martini</i> (Class 2) <i>Pennisetum ciliare</i> (pasture grass),
Weed Cover (%):	60% of ground cover occupied by exotic grasses
Disturbance:	Major canopy disturbance
Disturbance Cover (%):	Not recorded

Topography and Landform	
Landform Situation:	Loamy rise on clay plain
Altitude:	307 m
Relief:	Very low
Slope:	Flat
Slope Class:	Flat
Erosional Landform Pattern:	Residual clay plain
Soils:	Dermosol?
Soil Colour:	Red-grey
Soil Texture:	Clay loam
Geology:	Cainozoic plain

Survey Details	
Recorder / s:	David Stanton/ Stephen Catchpoole
Field Site Number:	Q 84
Date / Time:	7 / 03 / 2011; 12.00 pm

UIC: 2012-03-07 03:57:32
 268 W tru
 E: 147° 53' 00.342"
 S: 021° 17' 45.702"

Site Description	
Location:	7.86 km SW West of Newlands Mine
Site Description:	Small copse (0.5ha) of regrowth brigalow associated with a broader fragment of remnant vegetation
Orientation of Transect:	No transect
Datum:	GDA94
Latitude / Longitude:	-21.29602; 147.883154

Vegetation Community Description												
Low open forest with canopy from 6– 10m. PCC of 40%												
Dominant Species (50 m x 10 m area)												
Botanical Species	Status*	Average Height (m) 16m (13 – 18m)							Abundance (m2 / ha)			
		E	T1	T2	T3	S1	S2	G	E	T1	T2	S1
<i>Acacia harpophylla</i>	D		9			5						
<i>Eucalyptus populnea</i>	A	11										
<i>Megathyrsus maximum</i> <i>var. trichoglume</i>	D							0.5				
<i>Echinochloa colona</i>	A							0.5				

Status: D = dominant, C = Codominant, S = subdominant, A = associate, EVR = significant species, # = weed, ## = declared plant O = outside plot

Community Health and Condition	
Overall Health:	Moderate. Disturbed habitat comprising a mix of remnant and regrowth trees
Potential EVR Flora Species Habitat:	Limited
EVR Flora Species Recorded:	No
Weed Species:	Not recorded
Weed Cover (%):	Not recorded
Disturbance:	Disturbance to original canopy and occasional dead remnant trees
Disturbance Cover (%):	Not recorded

Topography and Landform	
Landform Situation:	Minor depression on broader clay plain.
Altitude:	308 m
Relief:	Very low
Slope:	Flat
Slope Class:	Flat
Erosional Landform Pattern:	Clay plain
Soils:	Vertosol
Soil Colour:	Grey-brown
Soil Texture:	Heavy clay loam
Geology:	Cainozoic Clay Plain

Survey Details	
Recorder / s:	David Stanton/ Stephen Catchpoole
Field Site Number:	Q 85
Date / Time:	7 / 03 / 2011; 1.30 pm

VEGETATION SURVEY
***Eucalyptus populnea* woodland on Colluvial Footslope (Q 86)**



Regional Ecosystem Profile	
Regional Ecosystem Type:	RE 11.4.2
EPBC Status:	NA
VM Status:	Of Concern
BD Status:	Of Concern
DERM Mapped as:	Non-remnant
Width of RE:	Not linear
Survey Level:	Quaternary

Site Description	
Location:	3.17km SW West of Newlands Mine
Site Description:	Broad plain heavily fragmented through land clearing for grazing
Orientation of Transect:	No transect
Datum:	GDA94
Latitude / Longitude:	-21.2954; 147.8841

Vegetation Community Description												
Woodland with canopy 15 to 18m												
Dominant Species (50 m x 10 m area)												
Botanical Species	Status*	Average Height (m) 16m (13 – 18m)							Abundance (m2 / ha)			
		E	T1	T2	T3	S1	S2	G	E	T1	T2	S1
<i>Eucalyptus populnea</i>	D		16							4	2	
<i>Acacia harpophylla</i>	A			10		4						
<i>Alphitonia excelsa</i>	A					4						
<i>Erythroxylum australe</i>	A					3						
<i>Capparis lasiantha</i>	A						2					
<i>Cassia brewsteri</i>	A					3						
<i>Grevillea parallela</i>	A					5						
<i>Capparis arborea</i>	A						1.5					

Vegetation Community Description												
<i>Grewia retusifolia</i>	A							0.75				
<i>Ehretia grahamii</i>	A						1.5					
<i>Acacia excelsa</i>	A					3						
<i>Maytenus cunninghamii</i>	A					2						
<i>Carissa ovata</i>							1	0.75				
<i>Eulalia aurea</i>	A											
<i>Alloteropsis semialata</i>												
<i>Urochloa mosambicensis</i> #	A							0.75				
<i>Bothriochloa pertusa</i> #	A							0.75				
<i>Pennisetum ciliare</i> #	C							0.75				
Status: D = dominant, C = Codominant, S = subdominant, A = associate, EVR = significant species, # = weed, ## = declared plant O = outside plot												

Community Health and Condition	
Overall Health:	Moderate. Highly fragmented although canopy largely intact. Co-dominance of exotic grass species in the ground cover.
Potential EVR Flora Species Habitat:	Limited
EVR Flora Species Recorded:	No
Weed Species:	<i>Pennisetum ciliare</i> (pasture grass), <i>Bothriochloa pertusa</i>
Weed Cover (%):	Not recorded
Disturbance:	Evidence of minor disruption to canopy.
Disturbance Cover (%):	Not recorded

Topography and Landform	
Landform Situation:	Loamy soils overlying a broader clay plane
Altitude:	308m
Relief:	Very low
Slope:	Gentle slope (1- 3°)
Erosional Landform Pattern:	Residual rise overlying a broader clay plane
Soils:	Dermosol
Soil Colour:	Grey-brown
Soil Texture:	Silty clay loam
Geology:	Cainozoic clays and silts

Survey Details	
Recorder / s:	David Stanton/ Stephen Catchpoole
Field Site Number:	Q 86
Date / Time:	7 / 03 / 2011; 2.00 pm

VEGETATION SURVEY
***Eucalyptus crebra* woodland on Laterite Jump Up (Q 87)**



Regional Ecosystem Profile	
Regional Ecosystem Type:	RE 11.7.6
EPBC Status:	NA
VM Status:	Least concern
BD Status:	No concern at present
DERM Mapped as:	11.7.4
Width of RE:	Not linear
Survey Level:	Quaternary

Site Description	
Location:	3km SW West of Newlands Mine
Site Description:	Margins of laterite jump up
Elevation	289m
Datum:	GDA94
Latitude / Longitude:	-21.2628; 147.8539

Vegetation Community Description												
Woodland with canopy 14 to 20m												
Dominant Species (50 m x 10 m area)												
Botanical Species	Status*	Average Height (m) 14 (13 – 17m)							Abundance (m2 / ha)			
		E	T1	T2	T3	S1	S2	G	E	T1	T2	S1
<i>Eucalyptus crebra</i>	D		17	12					Not measured			
<i>Bursaria spinescens</i>	A		14									
<i>Bursaria tenuifolia</i>	A					6						
<i>Erythroxylum australe</i>	A					5						
<i>Petalostigma pubescens</i>	A					3						
<i>Pennisetum ciliare</i> #	D						0.5					
<i>Themeda australis</i>	A						0.5					

Status: D = dominant, C = Codominant, S = subdominant, A = associate, EVR = significant species, # = weed, ## = declared plant O = outside plot

Community Health and Condition	
Overall Health:	Moderate – Minor canopy disturbance with ground cover dominated by exotic grass.
Potential EVR Flora Species Habitat:	Limited
EVR Flora Species Recorded:	No
Weed Species:	<i>Pennisetum ciliare</i> (pasture grass)
Weed Cover (%):	Not recorded
Disturbance:	Minor canopy incursion
Disturbance Cover (%):	Not recorded

Topography and Landform	
Landform Situation:	Margins of tertiary jump up (laterite)
Altitude:	289m
Relief:	Very low
Slope:	Gently inclined
Slope Class:	1 – 3 %
Erosional Landform Pattern:	Located on margins of suppressed ironstone jump-up
Soils:	Rocky indurated gravel
Soil Colour:	Red-brown
Soil Texture:	Rudosol
Geology:	Tertiary age laterite plateau

Survey Details	
Recorder / s:	David Stanton/ Stephen Catchpoole
Field Site Number:	Q 87
Date / Time:	7 / 03 / 2012; 2.45 pm

VEGETATION SURVEY
***Eucalyptus crebra* woodland on Laterite Jump Up (Q 88)**



Regional Ecosystem Profile	
Regional Ecosystem Type:	RE 11.5.3
EPBC Status:	NA
VM Status:	Least concern
BD Status:	No concern at present
DERM Mapped as:	11.7.4
Width of RE:	Not linear
Survey Level:	Quaternary

Site Description	
Location:	3km SW West of Newlands Mine
Site Description:	Margins of laterite jump up
Elevation	289m
Datum:	GDA94
Latitude / Longitude:	-21.2651; 147.8550

Vegetation Community Description												
Woodland with canopy 12 to 18m												
Dominant Species (50 m x 10 m area)												
Botanical Species	Status*	Average Height (m) 14 (13 – 17m)							Abundance (m2 / ha)			
		E	T1	T2	T3	S1	S2	G	E	T1	T2	S1
<i>Eucalyptus populnea</i>	D		17	12					Not measured			
<i>Ehretia membranifolia</i>	A					3						
<i>Acacia excelsa</i>	A					6						
<i>Erythroxylum australe</i>	A					5						
Status: D = dominant, C = Codominant, S = subdominant, A = associate, EVR = significant species, # = weed, ## = declared plant O = outside plot												

Community Health and Condition	
Overall Health:	Moderate – Minor canopy disturbance with ground

	cover dominated by exotic grass.
Potential EVR Flora Species Habitat:	Limited
EVR Flora Species Recorded:	No
Weed Species:	<i>Pennisetum ciliare</i> (pasture grass)
Weed Cover (%):	Not recorded
Disturbance:	Minor canopy incursion
Disturbance Cover (%):	Not recorded

Topography and Landform	
Landform Situation:	Gently sloping margins of tertiary jump up (laterite)
Altitude:	289m
Relief:	Low
Slope:	Gently inclined
Slope Class:	3 – 5 %
Erosional Landform Pattern:	Located on apron of suppressed ironstone jump-up
Soils:	Kandosol
Soil Colour:	Red-brown
Soil Texture:	Silty clay loam.
Geology:	Tertiary age laterite plateau

Survey Details	
Recorder / s:	David Stanton/ Stephen Catchpoole
Field Site Number:	Q 88
Date / Time:	7 / 03 / 2012; 3.55 pm

VEGETATION SURVEY
***Acacia harpophylla* regrowth shrubland (Q 89)**



Regional Ecosystem Profile	
Regional Ecosystem Type:	Non-remnant
EPBC Status:	NA
VM Status:	Non-remnant
BD Status:	Non-remnant
DERM Mapped as:	Non-remnant
Width of RE:	Not linear
Survey Level:	Quaternary

Site Description	
Location:	3.3km W West of Newlands Mine
Site Description:	Clay plain on margins of colluvial slope wash
Orientation of Transect:	No transect
Datum:	GDA94
Latitude / Longitude:	-21.2641; 147.8606

Vegetation Community Description												
Low regrowth shrubland with canopy from 3- 6m. PCC of 25%												
Dominant Species (50 m x 10 m area)												
Botanical Species	Status*	Average Height (m) 16m (13 – 18m)							Abundance (m2 / ha)			
		E	T1	T2	T3	S1	S2	G	E	T1	T2	S1
<i>Acacia harpophylla</i>	D					5						Not Measured
<i>Santalum lanceolatum</i>	D					3						
<i>Alectryon diversifolius</i>	A					3						
<i>Pennisetum ciliare</i>	D							0.75				
Status: D = dominant, C = Codominant, S = subdominant, A = associate, EVR = significant species, # = weed, ## = declared plant O = outside plot												

Community Health and Condition	
Overall Health:	Poor. Regrowth from total clearing. Ground cover

	dominated by exotic species
Potential EVR Flora Species Habitat:	Limited
EVR Flora Species Recorded:	No
Weed Species:	<i>Harrisia martini</i> (Class 2) <i>Pennisetum ciliare</i> (pasture grass)
Weed Cover (%):	Not recorded
Disturbance:	Regrowth from total clearing
Disturbance Cover (%):	Not recorded

Topography and Landform	
Landform Situation:	Clay plain with minor influence from colluvial sediments
Altitude:	300m
Relief:	Very low
Slope:	Flat to gently inclined
Slope Class:	Very Gently Inclined (1 – 3 %)
Erosional Landform Pattern:	Clay plain on margins of Scarp retreat zone
Soils:	Kandosol / merging with vertosol.
Soil Colour:	Red-brown
Soil Texture:	Clay
Geology:	Clay plain

Survey Details	
Recorder / s:	David Stanton/ Stephen Catchpoole
Field Site Number:	Q 89
Date / Time:	7 / 03 / 2012; 4.00 pm

***Eucalyptus crebra* woodland on colluvial margins of laterite jump up (Q 90)**



Site Description	
Location:	3.5km W West of Newlands Mine
Site Description:	Margins of laterite jump up
Elevation	293m
Datum:	GDA94
Latitude / Longitude:	-21.2641; 147.8604

Vegetation Community Description												
Woodland with canopy 12 to 17m												
Dominant Species (50 m x 10 m area)												
Botanical Species	Status*	Average Height (m) 14 (13 – 17m)							Abundance (m2 / ha)			
		E	T1	T2	T3	S1	S2	G	E	T1	T2	S1
<i>Eucalyptus persiciens</i>	D		17	12					Not measured			
<i>Eucalyptus crebra</i>	A		15	12								
<i>Ehretia membranifolia</i>	A					3						
<i>Denhamia parviflora</i>	A					5						
<i>Petalostigma pubescens</i>	A					5						
<i>Acacia excelsa</i>	A					6						
<i>Erythroxylum australe</i>	A					5						

Status: D = dominant, C = Codominant, S = subdominant, A = associate, EVR = significant species, # = weed, ## = declared plant O = outside plot

Community Health and Condition	
Overall Health:	Moderate – Minor canopy disturbance with ground cover dominated by exotic grass.
Potential EVR Flora Species Habitat:	Limited
EVR Flora Species Recorded:	No
Weed Species:	<i>Pennisetum ciliare</i> (pasture grass)
Weed Cover (%):	Not recorded
Disturbance:	Minor canopy incursion
Disturbance Cover (%):	Not recorded

Topography and Landform	
Landform Situation:	Gently sloping margins of tertiary jump up (laterite)
Altitude:	289m
Relief:	Low
Slope:	Gently inclined
Slope Class:	3 – 5 %
Erosional Landform Pattern:	Located on apron of suppressed ironstone jump-up
Soils:	Kandosol
Soil Colour:	Red-brown
Soil Texture:	Silty clay loam.
Geology:	Tertiary age laterite plateau

Survey Details	
Recorder / s:	David Stanton/ Stephen Catchpoole
Field Site Number:	Q 90
Date / Time:	7 / 03 / 2012; 3.55 pm

VEGETATION SURVEY
***Eucalyptus crebra* woodland on Laterite Jump Up (Q 91)**



Regional Ecosystem Profile	
Regional Ecosystem Type:	RE 11.5.1
EPBC Status:	NA
VM Status:	Least concern
BD Status:	No concern at present
DERM Mapped as:	11.7.4
Width of RE:	Not linear
Survey Level:	Quaternary

Site Description	
Location:	3.6km W West of Newlands Mine
Site Description:	Margins of laterite jump up
Elevation	293m
Datum:	GDA94
Latitude / Longitude:	-21.2621; 147.8584

Vegetation Community Description												
Woodland with canopy 12 to 17m												
Dominant Species (50 m x 10 m area)												
Botanical Species	Status*	Average Height (m) 14 (13 – 17m)							Abundance (m2 / ha)			
		E	T1	T2	T3	S1	S2	G	E	T1	T2	S1
<i>Eucalyptus persistens</i>	A		17	12					Not measured			
<i>Eucalyptus crebra</i>	D		15	12								
<i>Ehretia membranifolia</i>	A					3						
<i>Petalostigma pubescens</i>	A					5						
<i>Erythroxylum australe</i>	A					5						
Status: D = dominant, C = Codominant, S = subdominant, A = associate, EVR = significant species, # = weed, ## = declared plant O = outside plot												

Community Health and Condition

Overall Health:	Moderate – Minor canopy disturbance with ground cover a mix of exotic and native grass.
Potential EVR Flora Species Habitat:	Limited
EVR Flora Species Recorded:	No
Weed Species:	<i>Pennisetum ciliare</i> (pasture grass)
Weed Cover (%):	Not recorded
Disturbance:	Minor canopy incursion
Disturbance Cover (%):	Not recorded

Topography and Landform	
Landform Situation:	Gently sloping margins of tertiary jump up (laterite)
Altitude:	289m
Relief:	Low
Slope:	Gently inclined
Slope Class:	3 – 5 %
Erosional Landform Pattern:	Located on apron of suppressed ironstone jump-up
Soils:	Kandosol
Soil Colour:	Red-brown
Soil Texture:	Silty clay loam.
Geology:	Tertiary age laterite plateau

Survey Details	
Recorder / s:	David Stanton/ Stephen Catchpoole
Field Site Number:	Q 91
Date / Time:	7 / 03 / 2012; 4.15 pm

VEGETATION SURVEY
***Acacia harpophylla* regrowth shrubland (Q 92)**



Regional Ecosystem Profile	
Regional Ecosystem Type:	Non-remnant
EPBC Status:	NA
VM Status:	Non-remnant
BD Status:	Non-remnant
DERM Mapped as:	Non-remnant
Width of RE:	Not linear
Survey Level:	Quaternary

Site Description	
Location:	2.38km WSW West of Newlands Mine
Site Description:	Clay plain on margins of colluvial slope wash
Orientation of Transect:	No transect
Datum:	GDA94
Latitude / Longitude:	-21.2649; 147.8730

Vegetation Community Description												
Small patch (0.25ha) of remnant brigalow with canopy from 8 to 12m. PCC of 40%												
Dominant Species (50 m x 10 m area)												
Botanical Species	Status*	Average Height (m) 16m (13 – 18m)							Abundance (m2 / ha)			
		E	T1	T2	T3	S1	S2	G	E	T1	T2	S1
<i>Acacia harpophylla</i>	D		9			5				Not Measured		
Status: D = dominant, C = Codominant, S = subdominant, A = associate, EVR = significant species, # = weed, ## = declared plant O = outside plot												

Community Health and Condition	
Overall Health:	Poor. Fragmented remnant surrounded by cleared grazing land.
Potential EVR Flora Species Habitat:	Limited
EVR Flora Species Recorded:	No

Weed Species:	<i>Harrisia martini</i> (Class 2) <i>Pennisetum ciliare</i> (pasture grass)
Weed Cover (%):	Not recorded
Disturbance:	Regrowth from total clearing
Disturbance Cover (%):	Not recorded

Topography and Landform	
Landform Situation:	Clay plain
Altitude:	305m
Relief:	Very low
Slope:	Flat
Slope Class:	Flat
Erosional Landform Pattern:	Clay plain approx. 1km from margins of Tertiary plateau
Soils:	Vertisol
Soil Colour:	Grey-brown
Soil Texture:	Silty clay
Geology:	Cainozoic clay plain

Survey Details	
Recorder / s:	David Stanton/ Stephen Catchpoole
Field Site Number:	Q 92
Date / Time:	7 / 03 / 2011; 4.30 pm

VEGETATION SURVEY
***Eucalyptus crebra* woodland on colluvial margins of laterite jump up (Q 93)**

Regional Ecosystem Profile	
Regional Ecosystem Type:	RE 11.5.1
EPBC Status:	NA
VM Status:	Least concern
BD Status:	No concern at present
DERM Mapped as:	Non-remnant
Width of RE:	Not linear
Survey Level:	Quaternary

Site Description	
Location:	1.6km SSW of Newlands Mine
Site Description:	Low rise on clay plain - margins of laterite jump up
Elevation	304m
Datum:	GDA94
Latitude / Longitude:	-21.2757; 147.8881

Vegetation Community Description												
Woodland with canopy 12 to 17m												
Dominant Species (50 m x 10 m area)												
Botanical Species	Status*	Average Height (m) 15 (13 – 18m)							Abundance (m2 / ha)			
		E	T1	T2	T3	S1	S2	G	E	T1	T2	S1
<i>Corymbia dallachiana</i>	A		13	10								
<i>Eucalyptus crebra</i>	D		15	12								
<i>Cassia brewsteri</i>	A					3						
<i>Carissa ovata</i>	A					5						
<i>Erythroxylum australe</i>	A					5						
Status: D = dominant, C = Codominant, S = subdominant, A = associate, EVR = significant species, # = weed, ## = declared plant O = outside plot												

Community Health and Condition	
Overall Health:	Moderate – Minor canopy disturbance with ground cover dominated by exotic grass.
Potential EVR Flora Species Habitat:	Limited
EVR Flora Species Recorded:	No
Weed Species:	<i>Pennisetum ciliare</i> (pasture grass)
Weed Cover (%):	Not recorded
Disturbance:	Minor canopy incursion
Disturbance Cover (%):	Not recorded

Topography and Landform	
Landform Situation:	Low rise above broader clay plain
Altitude:	304m
Relief:	Low
Slope:	Flat to very gently inclined
Slope Class:	1-3 %
Erosional Landform Pattern:	Unknown
Soils:	Kandosol??
Soil Colour:	Red-brown
Soil Texture:	Silty clay loam.
Geology:	Tertiary age laterite plateau

Survey Details	
Recorder / s:	David Stanton/ Stephen Catchpoole
Field Site Number:	Q 93
Date / Time:	7 / 03 / 2012; 3.55 pm

UTC: 2012:03:07 23:11:46
 81° E 1ru
 E:147° 54' 04.182"
 S:021° 20' 42.306"

Site Description	
Location:	10.6km S of Newlands Mine
Site Description:	Cleared grazing land adjacent to Suttor North Coal Mine
Orientation of Transect:	No transect
Datum:	GDA94
Latitude / Longitude:	-21.3452; 147.9012

Vegetation Community Description												
Low regrowth shrubland with canopy to 3m. PCC of 30%												
Dominant Species (50 m x 10 m area)												
Botanical Species	Status*	Average Height (m) 16m (13 – 18m)							Abundance (m2 / ha)			
		E	T1	T2	T3	S1	S2	G	E	T1	T2	S1
<i>Acacia harpophylla</i>	D					3				Not Measured		
<i>Alectryon diversifolius</i>	A					2						
<i>Terminalia oblongifolia</i>	A					3						
<i>Lysiphyllum carronii</i>	A					3						
<i>Sesbania cannabina</i>	A							1.5				
<i>Panicum</i> sp.	A							1				
<i>Bothriochloa pertusa</i> #	D							1				
Status: D = dominant, C = Codominant, S = subdominant, A = associate, EVR = significant species, # = weed, ##												

Vegetation Community Description	
= declared plant O = outside plot	

Community Health and Condition	
Overall Health:	Poor. Recent regrowth from total clearing. Ground cover dominated by exotic species
Potential EVR Flora Species Habitat:	Limited
EVR Flora Species Recorded:	No
Weed Species:	<i>Harrisia martini</i> (Class 2) <i>Bothriochloa pertusa</i>
Weed Cover (%):	Not recorded
Disturbance:	Regrowth from total clearing
Disturbance Cover (%):	Not recorded

Topography and Landform	
Landform Situation:	Heavy clay on margins of broader rise formed on basalt.
Altitude:	310m
Relief:	Very low
Slope:	Flat to gently inclined
Slope Class:	Very Gently Inclined (1 – 3 %)
Erosional Landform Pattern:	Margins of broader rise on basalt
Soils:	Vertosol
Soil Colour:	Grey-brown
Soil Texture:	Clay loam
Geology:	Cainozoic basalt plain

Survey Details	
Recorder / s:	David Stanton/ Stephen Catchpoole
Field Site Number:	Q 94
Date / Time:	8 / 03 / 2011; 8.30 am

Site Description	
Location:	10.1km S of Newlands Mine
Site Description:	Cleared grazing land adjacent to Suttor North Coal Mine
Orientation of Transect:	No transect
Datum:	GDA94
Latitude / Longitude:	-21.3410; 147.9041

Vegetation Community Description												
Low regrowth shrubland with canopy to 5m. PCC of 40%												
Dominant Species (50 m x 10 m area)												
Botanical Species	Status*	Average Height (m) 16m (13 – 18m)							Abundance (m2 / ha)			
		E	T1	T2	T3	S1	S2	G	E	T1	T2	S1
<i>Acacia harpophylla</i>	D					5				Not Measured		
<i>Alectryon diversifolius</i>	A					2						
<i>Terminalia oblongifolia</i>	A					3						
<i>Lysiphyllum carronii</i>	A					3						
<i>Pennisetum ciliare</i>	A							1				
<i>Bothriochloa pertusa</i> #	D							1				
Status: D = dominant, C = Codominant, S = subdominant, A = associate, EVR = significant species, # = weed, ## = declared plant O = outside plot												

Community Health and Condition	
Overall Health:	Poor. Recent regrowth from total clearing. Ground cover dominated by exotic species
Potential EVR Flora Species Habitat:	Limited
EVR Flora Species Recorded:	No
Weed Species:	<i>Harrisia martini</i> (Class 2) <i>Pennisetum ciliare</i> , <i>Bothriochloa pertusa</i>
Weed Cover (%):	Not recorded
Disturbance:	Regrowth from total clearing
Disturbance Cover (%):	Not recorded

Topography and Landform	
Landform Situation:	Heavy clay on margins of broader rise formed on basalt.
Altitude:	310m
Relief:	Very low
Slope:	Flat to gently inclined
Slope Class:	Very Gently Inclined (1 – 3 %)
Erosional Landform Pattern:	Margins of broader rise on basalt
Soils:	Vertosol
Soil Colour:	Grey-brown
Soil Texture:	Clay loam
Geology:	Cainozoic basalt plain

Survey Details	
Recorder / s:	David Stanton/ Stephen Catchpoole
Field Site Number:	Q 95
Date / Time:	8 / 03 / 2011; 8.50 am

VEGETATION SURVEY
***Acacia harpophylla* regrowth shrubland (Q 96)**



Regional Ecosystem Profile	
Regional Ecosystem Type:	Non-remnant
EPBC Status:	NA
VM Status:	Non-remnant
BD Status:	Non-remnant
DERM Mapped as:	RE11.8.13
Width of RE:	Not linear
Survey Level:	Quaternary

Site Description	
Location:	8.1km S of Newlands Mine
Site Description:	Cleared grazing land adjacent to Suttor North Coal Mine
Orientation of Transect:	No transect
Datum:	GDA94
Latitude / Longitude:	-21.3327; 147.9027

Vegetation Community Description												
Low regrowth shrubland with canopy to 3m. PCC of 25%												
Dominant Species (50 m x 10 m area)												
Botanical Species	Status*	Average Height (m) 16m (13 – 18m)							Abundance (m2 / ha)			
		E	T1	T2	T3	S1	S2	G	E	T1	T2	S1
<i>Acacia harpophylla</i>	D					3				Not Measured		
<i>Terminalia oblongifolia</i>	A					3						
<i>Pennisetum ciliare</i>	A							1				
<i>Bothriochloa pertusa</i> #	D							1				
Status: D = dominant, C = Codominant, S = subdominant, A = associate, EVR = significant species, # = weed, ## = declared plant O = outside plot												

Community Health and Condition

Overall Health:	Poor. Recent regrowth from total clearing. Ground cover dominated by exotic species
Potential EVR Flora Species Habitat:	Limited
EVR Flora Species Recorded:	No
Weed Species:	<i>Harrisia martini</i> (Class 2) <i>Pennisetum ciliare</i> , <i>Bothriochloa pertusa</i>
Weed Cover (%):	Not recorded
Disturbance:	Regrowth from total clearing
Disturbance Cover (%):	Not recorded

Topography and Landform	
Landform Situation:	Heavy clay on margins of broader rise formed on basalt.
Altitude:	310m
Relief:	Very low
Slope:	Flat to gently inclined
Slope Class:	Very Gently Inclined (1 – 3 %)
Erosional Landform Pattern:	Margins of broader rise on basalt
Soils:	Vertosol
Soil Colour:	Grey-brown
Soil Texture:	Clay loam
Geology:	Cainozoic basalt plain

Survey Details	
Recorder / s:	David Stanton/ Stephen Catchpoole
Field Site Number:	Q 96
Date / Time:	8 / 03 / 2011; 9.00 am

VEGETATION SURVEY
Native grassland on basalt (S 97)



Regional Ecosystem Profile	
Regional Ecosystem Type:	RE 11.8.11
EPBC Status:	Endangered (Grassland) ecological community
VM Status:	Of Concern
BD Status:	Of Concern
DERM Mapped as:	11.8.11/11.8.5
Width of RE:	NA
Survey Level:	Secondary

Site Description	
Location:	8.5km SSE of Newlands Mine
Site Description:	Raised basalt plain
Orientation of Transect:	110°
Datum:	GDA94
Latitude / Longitude:	-21.33127; 147.9202

Vegetation Community Description												
Grassland												
Dominant Species (50 m x 20 m area)												
Botanical Species	Status*	Average Height (m)							Abundance (m2 / ha)			
		E	T1	T2	T3	S1	S2	G	E	T1	T2	T3
<i>Panicum</i> sp. (<i>larcomianum/laevinode</i>)	C							0.75	Not applicable			
<i>Panicum queenslandicum</i>	C							0.75				
<i>Aristida leptopoda</i>	C							0.75				
<i>Desmodium</i> sp.	A							0.75				
<i>Iseilema membranaceum</i>	A							0.5				
<i>Oxalis radicata</i>	A							0.75				

Vegetation Community Description												
<i>Glycine latifolia</i>	A							0.75				
<i>Desmodium muelleri</i>	A							0.75				
<i>Eriochloa procera</i>	A							0.75				
<i>Bothriochloa erianthoides</i>	A							0.75				
<i>Neptunia sp.</i>	A							0.75				
<i>Bothriochloa pertusa</i> #.	A							0.75				
<i>Melinis minutiflora</i>	A							0.75				
<i>Verbena macrostachya</i>	A							0.75				
<i>Abelmoschus ficulneus</i>	A							0.75				
<i>Sida trichopoda</i>	A							1.5				
<i>Parthenium hysterophorus</i> #	A							0.5				
<i>Flinders poppy</i> .(<i>Pimelea haemostachya</i>)	A							0.5				
<i>Conyza bonariensis</i> #	A							0.5				
<i>Centrosema molle</i>	A							0.5				
<i>Cyperus sp.</i>	A							0.5				
<i>Galactic tenuiflora</i>	A							0.5				
<i>Phyllanthus virgatus</i>	A							0.5				
<i>Crotalaria sp.</i>	A							0.5				
<i>Neptunia gracilis</i>	A							0.5				
<i>Indigofera linnaei</i>	A							0.5				
<i>Dichanthium aristatum</i>	A							0.5				
<i>Dichanthium sericeum</i> Subsp. <i>sericeum</i>	A							0.5				
<i>Hybanthus stellarioides</i>	A							0.5				
<i>Glycine tomentella</i>	A							0.5				
<i>Eriachne sp.</i>	A							0.5				
<i>Rostellularia adscendens</i>	A							0.5				
Ground Cover	77% Grass and Herb						15% Leaf Litter				10% Bare Ground	
Status: D = dominant, C = Codominant, S = subdominant, A = associate, EVR = significant species, # = weed, ## = declared plant O = outside plot												

Species	Cover %	Native Grass Tussocks / 1000m2
<i>Panicum sp. (larcomianum/laevinode)</i>	36	3400
<i>Panicum queenslandicum</i>	6	100
<i>Aristida leptopoda</i>	12	600
<i>Desmodium sp.</i>	1	NA
<i>Iseilema membranaceum</i>	4	1800
<i>Oxalis radicata</i>	<1	NA
<i>Glycine latifolia</i>	1	NA
<i>Desmodium muelleri</i>	1	NA
<i>Aristida leptopoda</i>	2	100
<i>Bothriochloa erianthoides</i>	2	100
<i>Neptunia sp.</i>	<1	NA
<i>Bothriochloa pertusa</i> #.	3	NA
<i>Melinis minutiflora</i> #	<1	NA
<i>Verbena macrostachya</i>	<1	NA
<i>Abelmoschus ficulneus</i>	<1	NA
<i>Sida trichopoda</i>	<1	NA
<i>Aristida jerichoensis</i> var. <i>subspinulifera</i>	<1	NA
<i>Parthenium hysterophorus</i> #	<1	NA
<i>Flinders poppy</i> .(<i>Pimelea haemostachya</i>)	<1	NA
Leaf Litter	15	NA
Bare Ground	10	NA
Totals / 100m2 Plot	100	6100

Community Health and Condition	
Overall Health:	Excellent - Lightly grazed with limited incursion of exotic species.
Potential EVR Flora Species Habitat:	Potential habitat for <i>Dichanthium queenslandicum</i> , <i>Digitaria porrecta</i>
EVR Flora Species Recorded:	No
Weed Species:	Opuntia stricta (Class 2 LPA)
Weed Cover (%):	< 5%
Disturbance:	Minor impacts from light grazing. Edge effects along access track with a 10m wide strip of grassland dominated by <i>Bothriochloa pertusa</i>
Disturbance Cover (%):	0

Topography and Landform	
Landform Situation:	Raised basalt plain
Altitude:	320 m
Relief:	Very low
Slope Class:	Very Gently Inclined (1 = 3 %)
Erosional Landform Pattern:	Underlying stratigraphic unit below Tertiary age cap rock
Soil Colour:	Grey brown
Soil Texture:	Clay with Gilgai
Geology:	Weathered basalt plain

Survey Details	
Recorder / s:	David Stanton / Stephen Catchpoole
Field Site Number:	S 97
Date / Time:	9 / 03 / 2012; 10.30 am

VEGETATION SURVEY
Native grassland on basalt (Q 98)



Regional Ecosystem Profile	
Regional Ecosystem Type:	RE 11.8.11
EPBC Status:	Endangered (Grassland) ecological community
VM Status:	Of Concern
BD Status:	Of Concern
DERM Mapped as:	11.8.11/11.8.5
Width of RE:	NA
Survey Level:	Quaternary

Site Description	
Location:	8km west of SSE of Newlands Mine
Site Description:	Raised basalt plain
Orientation of Transect:	No transect
Datum:	GDA94
Latitude / Longitude:	-21.3297; 147.9198

Vegetation Community Description												
Grassland with emergent eucalypts (<5% Cover)												
Dominant Species (50 m x 20 m area)												
Botanical Species	Status*	Average Height (m)							Abundance (m2 / ha)			
		E	T1	T2	T3	S1	S2	G	E	T1	T2	T3
<i>Eucalyptus orgadophila</i>	A	18m										
<i>Paspalidium</i> sp. (<i>larcomianum</i> / <i>laevinode</i>)	D							0.75	Not applicable			
<i>Panicum queenslandicum</i>	C							0.75				
<i>Aristida leptopoda</i>	C							0.75				
<i>Desmodium</i> sp.	A							0.75				
<i>Iseilema membranaceum</i>	A							0.5				

Vegetation Community Description												
<i>Neptunia</i> sp.	A							0.75				
<i>Bothriochloa pertusa</i> #.	A							0.75				
<i>Verbena macrostachya</i>	A							0.75				
<i>Parthenium hysterophorus</i> #	A							0.5				
<i>Flinders poppy</i> .(<i>Pimelea haemostachya</i>	A							0.5				
<i>Conyza bonariensis</i>	A							0.5				
<i>Cyperus</i> sp.	A							0.5				
<i>Galactic tenuiflora</i>	A							0.5				
<i>Dichanthium sericeum</i> subsp. <i>sericeum</i>	A							0.5				
<i>Hybanthus stellarioides</i>	A							0.5				
Ground Cover	80% Grass and Herb			10% Leaf Litter					10% Bare Ground			
Status: D = dominant, C = Codominant, S = subdominant, A = associate, EVR = significant species, # = weed, ## = declared plant O = outside plot												

Species	Cover % (Estimated)
<i>Paspalidium</i> sp. (<i>larcomianum/laevinode</i>)	20
<i>Panicum queenslandicum</i>	10
<i>Aristida leptopoda</i>	5
<i>Desmodium</i> sp.	<1
<i>Iseilema membranaceum</i>	5
<i>Oxalis radicata</i>	<1
<i>Bothriochloa pertusa</i> ##	15
<i>Melinis minutiflora</i> ##	5
<i>Verbena macrostachya</i>	<1
<i>Abelmoschus ficulneus</i>	<1
<i>Sida trichopoda</i>	<1
<i>Parthenium hysterophorus</i> ##	5
<i>Flinders poppy</i> .(<i>Pimelea haemostachya</i>)	<1
Leaf Litter	10
Bare Ground	10
Totals / 100m2 Plot	100

Community Health and Condition	
Overall Health:	Good to Moderate - Lightly grazed with minor incursion of exotic species into ground covers.
Potential EVR Flora Species Habitat:	Potential habitat for <i>Dichanthium queenslandicum</i> , <i>Digitaria porrecta</i>
EVR Flora Species Recorded:	No
Weed Species:	<i>Opuntia stricta</i> (Class 2 LPA)
Weed Cover (%):	< 25%
Disturbance:	Minor impacts from light grazing. Edge effects along access track with a 10m wide strip of grassland dominated by <i>Bothriochloa pertusa</i>
Disturbance Cover (%):	0

Topography and Landform	
Landform Situation:	Raised basalt plain
Altitude:	320 m
Relief:	Very low
Slope Class:	Very Gently Inclined (1 - 3 %)
Erosional Landform Pattern:	Underlying stratigraphic unit below Tertiary age cap rock
Soil Colour:	Grey brown
Soil Texture:	Clay with Gilgai
Geology:	Weathered basalt plain

Survey Details	
Recorder / s:	David Stanton / Stephen Catchpoole
Field Site Number:	Q 98

Date / Time:	9 / 03 / 2012; 11.30 am
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VEGETATION SURVEY
***Eucalyptus orgadophila* woodland (droughted) on basalt (Q 99)**



Regional Ecosystem Profile	
Regional Ecosystem Type:	RE 11.8.5
EPBC Status:	NA
VM Status:	Least Concern
BD Status:	Endangered
DERM Mapped as:	11.8.11/11.8. 5 (EPBC Endangered)
Width of RE:	Not linear
Survey Level	Quaternary

Site Description	
Location:	8.2km SSE of Newlands Mine
Site Description:	Low basalt rise above broader clay plain
Orientation of Transect:	No Transect
Datum:	GDA94
Latitude / Longitude:	-21.3307; 147.9144

Structural Description		Open woodland						
Canopy Height		15 -23m						
Canopy Cover (%)		20% (90% of the original canopy cover has been killed by drought)						
Botanical Species	Status*	Average Height (m)						
		E	T1	T2	T3	S1	S2	G
<i>Eucalyptus orgadophila</i> (original canopy droughted)			18 (droughted)	12				
<i>Corymbia erythrophloia</i>				12				
<i>Bothriochloa pertusa</i> ##	D							0.25
<i>Parthenium hysterophorus</i> ##	A							0.25
<i>Dichanthium sericeum</i>	A							0.25
<i>Paspalidium globoideum</i>	A							
80% Grass (Bothriochloa pertusa)	10% Leaf litter	10% Bare Ground						

Community Health and Condition	
Overall Health:	Poor – Drought has killed original canopy trees and ground cover is dominated by exotic species. Assigned remnant status due to senescence caused by natural process.
Potential EVR Flora Species Habitat:	Limited
EVR Flora Species Recorded:	No
Weed Species:	<i>Bothriochloa pertusa</i> <i>Parthenium hysterophorus</i>
Weed Cover (%):	80% dominated by <i>Bothriochloa pertusa</i>
Disturbance:	Canopy droughting and degradation of ground cover.
Disturbance Cover (%):	80% cover of exotic species in ground cover

Topography and Landform	
Landform Situation:	Basalt rise within broad erosional valley
Altitude:	320 m
Relief:	Very low
Slope:	Flat
Slope Class:	Very Gently Inclined (1 – 3 %)
Erosional Landform Pattern:	Located within erosional valley between scarps
Soils:	Heavy clay (gilgai) with basalt corestone
Soil Colour:	Grey - dark
Soil Texture:	Clay loam
Geology:	Clay soil derived insitu from basalt

Survey Details	
Recorder / s:	David Stanton/ Stephen Catchpoole
Field Site Number:	Q 99
Date / Time:	9 / 3 / 2012; 11.30 am

VEGETATION SURVEY
***Eucalyptus orgadophila* woodland on basalt (Q 100)**

Regional Ecosystem Profile	
Regional Ecosystem Type:	RE 11.8.5
EPBC Status:	NA
VM Status:	Least Concern
BD Status:	Endangered
DERM Mapped as:	11.8.11/11.8. 5 (EPBC Endangered)
Width of RE:	Not linear
Survey Level	Quaternary

Site Description	
Location:	6 km SSE of Newlands Mine
Site Description:	Low basalt rise above broader clay plain
Orientation of Transect:	No Transect
Datum:	GDA94
Latitude / Longitude:	-21.3188; 147.9124

Structural Description		Open woodland							
Canopy Height		15 -20m							
Canopy Cover (%)		20%							
Botanical Species	Status*	Average Height (m)							
		E	T1	T2	T3	S1	S2	G	
<i>Eucalyptus orgadophila</i> (original canopy droughted)	D		18	12					
<i>Corymbia erythrophloia</i>	A			10					
<i>Dichanthium sericeum</i>	C								0.75
<i>Paspalidium globoideum</i>	C								0.75
<i>Panicum queenslandicum</i>	C								0.75
<i>Bothriochloa pertusa</i> ##	C								0.75
<i>Parthenium hysterophorus</i> ##	A								0.75
<i>Melinis repens</i>	A								0.75
<i>Paspalidium globoideum</i>	A								0.75
80% grass and herb	10% Leaf litter	10% Bare Ground							

Community Health and Condition	
Overall Health:	Moderate – Drought has killed a portion of the original canopy trees and ground cover partially occupied by exotic species.
Potential EVR Flora Species Habitat:	<i>Dichanthium queenslandicum</i> , <i>Digitaria porrecta</i>
EVR Flora Species Recorded:	No
Weed Species:	<i>Bothriochloa pertusa</i> <i>Parthenium hysterophorus</i>
Weed Cover (%):	20% ground cover occupied by <i>Bothriochloa pertusa</i>
Disturbance:	Canopy droughting and degradation of ground cover.
Disturbance Cover (%):	Not recorded

Topography and Landform	
Landform Situation:	Basalt rise within broader clay landscape
Altitude:	320 m
Relief:	Very low
Slope:	Flat
Slope Class:	Very Gently Inclined (1 – 3 %)
Erosional Landform Pattern:	Located within erosional valley between scarps
Soils:	Heavy clay (gilgai) with basalt corestone
Soil Colour:	Grey - dark
Soil Texture:	Clay loam
Geology:	Clay soil derived insitu from basalt

Survey Details	
Recorder / s:	David Stanton/ Stephen Catchpoole
Field Site Number:	Q 100
Date / Time:	9 / 3 / 2012; 12.00 am

VEGETATION SURVEY
Exotic grassland on basalt (Q 101)



Regional Ecosystem Profile	
Regional Ecosystem Type:	Non-remnant
EPBC Status:	Non-remnant
VM Status:	Non-remnant
BD Status:	Non-remnant
DERM Mapped as:	11.8.11/11.8. 5 (EPBC Endangered)
Width of RE:	Not linear
Survey Level	Quaternary

Site Description	
Location:	6.2 km SSE of Newlands Mine
Site Description:	Low basalt rise above broader clay plain
Orientation of Transect:	No Transect
Datum:	GDA94
Latitude / Longitude:	-21.31748; 147.9169

Structural Description		Exotic grassland						
Botanical Species	Status*	Average Height (m)						
		E	T1	T2	T3	S1	S2	G
<i>Pennisetum ciliare</i>	D							1
80% grass and herb	10% Leaf litter	10% Bare Ground						

Community Health and Condition	
Overall Health:	Poor – 100% of ground cover occupied by exotic species
Potential EVR Flora Species Habitat:	<i>Dichanthium queenslandicum</i> , <i>Digitaria porrecta</i>
EVR Flora Species Recorded:	No
Weed Species:	<i>Pennisetum ciliare</i>
Weed Cover (%):	80%

Disturbance:	Ploughed buffel paddock
Disturbance Cover (%):	100%

Topography and Landform	
Landform Situation:	Basalt rise within broader clay landscape
Altitude:	320 m
Relief:	Very low
Slope:	Flat
Slope Class:	Very Gently Inclined (1 – 3 %)
Erosional Landform Pattern:	Basalt plain
Soils:	Vertosol derived from basalt.
Soil Colour:	Grey – dark
Soil Texture:	Clay loam
Geology:	Clay soil derived insitu from basalt

Survey Details	
Recorder / s:	David Stanton/ Stephen Catchpoole
Field Site Number:	Q 101
Date / Time:	9 / 3 / 2012; 12.30 pm

VEGETATION SURVEY
Native grassland on basalt (S 102)



Regional Ecosystem Profile	
Regional Ecosystem Type:	RE 11.8.11
EPBC Status:	Endangered (Grassland)
VM Status:	Of Concern
BD Status:	Of Concern
DERM Mapped as:	11.8.11/11.8.5
Width of RE:	NA
Survey Level:	Secondary

Site Description	
Location:	6.4km SSE of Newlands Mine
Site Description:	Raised basalt plain
Orientation of Transect:	80°
Datum:	GDA94
Latitude / Longitude:	-21.3166; 147.9134

Vegetation Community Description												
Grassland												
Dominant Species (50 m x 20 m area)												
Botanical Species	Status*	Average Height (m)							Abundance (m2 / ha)			
		E	T1	T2	T3	S1	S2	G	E	T1	T2	T3
<i>Dichanthium sericeum</i>	C								Not applicable			
<i>Panicum</i> sp. (<i>larcominatum</i> or <i>laevinode</i>)	C							0.75				
<i>Panicum queenslandicum</i>	C							0.75				
<i>Aristida leptopoda</i>	C							0.75				
<i>Desmodium</i> sp.	C							0.75				
<i>Iseilema</i>	A							0.5				

Vegetation Community Description												
<i>membranaceum</i>												
<i>Oxalis radicata</i>	A							0.75				
<i>Eriochloa procera</i>	A							0.75				
<i>Neptunia</i> sp.	A							0.75				
<i>Bothriochloa pertusa</i> #.	A							0.75				
<i>Melinis minutiflora</i>	A							0.75				
<i>Verbena macrostachya</i>	A							0.75				
<i>Abelmoschus ficulneus</i>	A							0.75				
<i>Grewia retusifolia</i>												
<i>Sida trichopoda</i>	A							1.5				
<i>Aristida jerichoensis</i> var. <i>subspinulifera</i>	A							0.5				
<i>Adriana urticoides</i> var. <i>urticoides</i>	A											
<i>Parthenium hysterophorus</i> #	A							0.5				
<i>Flinders poppy</i> . (<i>Pimelea haemostachya</i>)	A							0.5				
<i>Galactic tenuiflora</i>	A							0.5				
<i>Phyllanthus virgatus</i>	A							0.5				
<i>Neptunia gracilis</i>	A							0.5				
<i>Indigofera linnaei</i>	A							0.5				
<i>Hybanthus stellarioides</i>	A							0.5				
<i>Glycine tomentella</i>	A							0.5				
Ground Cover	69% Grass and Herb						15% Leaf Litter				16% Bare Ground	
Status: D = dominant, C = Codominant, S = subdominant, A = associate, EVR = significant species, # = weed, ## = declared plant O = outside plot												

Species	Cover %	Native Grass Tussocks / 1000m2
<i>Dichanthium sericeum</i>	20	1200
<i>Panicum</i> sp. (<i>larcominatum</i> or <i>laevinode</i>)	25	100
<i>Panicum queenslandicum</i>	2	200
<i>Aristida leptopoda</i>	10	800
<i>Dichanthium sericeum</i> subsp. <i>sericeum</i>	2	100
<i>Desmodium</i> sp.	25	NA
<i>Iseilema membranaceum</i>	2	300
<i>Eriochloa procera</i>	2	100
<i>Bothriochloa pertusa</i> #.	5	NA
<i>Verbena macrostachya</i>	1	NA
<i>Grewia retusifolia</i>	<1	NA
<i>Neptunia gracilis</i>	1	NA
<i>Pennisetum ciliare</i>	2	NA
<i>Parthenium hysterophorus</i> #	2	NA
Totals / 100m2 Plot	100	2800

Community Health and Condition	
Overall Health:	Excellent - Lightly grazed with limited incursion of exotic species.
Potential EVR Flora Species Habitat:	Potential habitat for <i>Dichanthium queenslandicum</i> , <i>Digitaria porrecta</i>
EVR Flora Species Recorded:	No
Weed Species:	<i>Opuntia stricta</i> (Class 2 LPA)
Weed Cover (%):	< 5%
Disturbance:	Minor impacts from light grazing. Edge effects along access track with a 1m wide strip of grassland dominated by <i>Bothriochloa pertusa</i> and <i>Pennisetum ciliare</i>
Disturbance Cover (%):	5

Topography and Landform

Landform Situation:	Raised basalt plain
Altitude:	320 m
Relief:	Very low
Slope Class:	Very Gently Inclined (1 = 3 %)
Erosional Landform Pattern:	Underlying stratigraphic unit below Tertiary age cap rock
Soil Colour:	Grey brown
Soil Texture:	Clay with Gilgai
Geology:	Weathered basalt plain

Survey Details	
Recorder / s:	David Stanton / Stephen Catchpoole
Field Site Number:	S 102
Date / Time:	9 / 03 / 2012; 12.30 am

VEGETATION SURVEY
Eucalyptus crebra woodland on sandy residual soils (Q 103)

Regional Ecosystem Profile	
Regional Ecosystem Type:	RE 11.5.9
EPBC Status:	NA
VM Status:	Least concern
BD Status:	No concern at present
DERM Mapped as:	11.7.2/ 11.5.3 (endangered sub-dominant)
Width of RE:	Not Linear
Survey Level:	Quaternary

Site Description	
Location:	5.7km W of Newlands Mine
Site Description:	Woodland on coarse sandy wash derived from coarse grained sandstone
Orientation of Transect:	No Transect
Datum:	GDA94
Latitude / Longitude:	-21.1963; 147.8269

Vegetation Community Description												
Woodland with canopy 18 to 25m												
Dominant Species (50 m x 10 m area)												
Botanical Species	Status*	Average Height (m)							Abundance (m2 / ha)			
		E	T1	T2	T3	S1	S2	G	E	T1	T2	T3
<i>Eucalyptus crebra</i>	D		19	12						5		
<i>Corymbia clarksoniana</i>	A		16	12						3	2	
<i>Corymbia dallachiana</i>	A		14	10								
<i>Alphitonia excelsa</i>	A					3						
<i>Petalostigma pubescens</i>	A											
<i>Planchonia careya</i>	A											
<i>Pogonolobus reticulatus.</i>	A											
<i>Breynia oblongifolia</i>	A					2						
<i>Acacia leiocalyx</i>	A											
<i>Bursaria spinosa</i>	A											
Ground Cover	5% bare ground			Leaf Litter 60%					Grass 35% (<i>Aristida</i> sp.)			
Status: D = dominant, C = Codominant, S = subdominant, A = associate, EVR = significant species, # = weed, ## = declared plant O = outside plot												

Community Health and Condition	
Overall Health:	Excellent – no evidence of major physical disturbance and dominated by native ground covers
Potential EVR Flora Species Habitat:	Limited
EVR Flora Species Recorded:	Nil
Weed Species:	Nil
Weed Cover (%):	Nil
Disturbance:	Nil
Disturbance Cover (%):	Unknown

Topography and Landform	
Landform Situation:	Sandy rise adjacent to flood plain with narrow incised channel
Altitude:	284m
Relief:	Very low
Slope Class:	Very Gently Inclined (1 – 3 %)
Erosional Landform Pattern:	Coarse grained sandstone exposed by retreating laterite scarp
Soils:	Tenosol
Soil Colour:	Grey-white
Soil Texture:	Coarse sand
Geology:	Sandy colluvium derived from coarse grained sandstone

Survey Details

Recorder / s:	David Stanton/ Stephen Catchepoole
Field Site Number:	Q 103
Date / Time:	8 / 03 / 2012; 14.00

Site Description	
Location:	5.4 km WNW of Newlands Mine
Site Description:	Woodland on alluvial flood plain
Orientation of Transect:	No Transect
Datum:	GDA94
Latitude / Longitude:	-21.1903; 147.8323

Vegetation Community Description												
Woodland with canopy 14-18m												
Dominant Species (50 m x 10 m area)												
Botanical Species	Status*	Average Height (m)							Abundance (m2 / ha)			
		E	T1	T2	T3	S1	S2	G	E	T1	T2	T3
<i>Eucalyptus populnea</i>	D		16						Not Recorded			
<i>Owenia acidula</i>	A					3						
<i>Cassia brewsteri</i>	A					3						
<i>Atalaya hemiglauca</i>						3						
<i>Bothriochloa pertusa</i>								0.25				
<i>Parthenium hysterophorus</i>								0.25				
Ground Cover	Not Recorded			Not Recorded					Not Recorded			

Status: D = dominant, C = Codominant, S = subdominant, A = associate, EVR = significant species, # = weed, ##

Vegetation Community Description	
= declared plant O = outside plot	

Community Health and Condition	
Overall Health:	Moderate – Ground cover is heavily grazed with dominance of exotic species
Potential EVR Flora Species Habitat:	Limited
EVR Flora Species Recorded:	Nil
Weed Species:	<i>Parthenium hysterophorus</i>
Weed Cover (%):	5%
Disturbance:	Heavy grazing of ground cover and minor canopy dieback
Disturbance Cover (%):	Unknown

Topography and Landform	
Landform Situation:	Alluvial outwash plain
Altitude:	287m
Relief:	Very low
Slope Class:	Very Gently Inclined (1 – 3 %)
Soils:	Alluvial – Dermosol
Soil Colour:	Grey
Soil Texture:	Sandy loam
Geology:	Alluvial outwash plain joining flood plain of major drainage channel

Survey Details	
Recorder / s:	David Stanton/ Stephen Catchpoole
Field Site Number:	Q 104
Date / Time:	8/ 03 / 2012; 15.00 am

VEGETATION SURVEY
***Eucalyptus populnea* woodland on alluvial plain (Q 105)**

Regional Ecosystem Profile	
Regional Ecosystem Type:	RE 11.3.2
EPBC Status:	NA
VM Status:	Of Concern
BD Status:	Of concern
DERM Mapped as:	11.8.5
Width of RE:	Not Linear
Survey Level:	Quaternary

Site Description	
Location:	6.1 km NW of Newlands Mine
Site Description:	Woodland on alluvial flood plain
Orientation of Transect:	No Transect
Datum:	GDA94
Latitude / Longitude:	-21.1825; 147.8360

Vegetation Community Description												
Woodland with canopy 14-18m												
Dominant Species (50 m x 10 m area)												
Botanical Species	Status*	Average Height (m)							Abundance (m2 / ha)			
		E	T1	T2	T3	S1	S2	G	E	T1	T2	T3
<i>Eucalyptus populnea</i>	D		16						Not Recorded			
<i>Cassia brewsteri</i>	A					3						
<i>Atalaya hemiglauca</i>						3						
<i>Bothriochloa pertusa</i>								0.25				
<i>Parthenium hysterophorus</i>								0.25				
Ground Cover	Not Recorded	Not Recorded			Not Recorded				Not Recorded			
Status: D = dominant, C = Codominant, S = subdominant, A = associate, EVR = significant species, # = weed, ## = declared plant O = outside plot												

Community Health and Condition	
Overall Health:	Moderate – Ground cover is heavily grazed with dominance of exotic species
Potential EVR Flora Species Habitat:	Limited
EVR Flora Species Recorded:	NI
Weed Species:	<i>Parthenium hysterophorus</i> , <i>Bothriochloa pertusa</i>
Weed Cover (%):	Not Recorded
Disturbance:	Heavy grazing of ground cover and minor canopy dieback
Disturbance Cover (%):	Unknown

Topography and Landform	
Landform Situation:	Alluvial outwash plain
Altitude:	287m
Relief:	Very low
Slope Class:	Very Gently Inclined (1 – 3 %)
Soils:	Alluvial – Dermosol
Soil Colour:	Grey
Soil Texture:	Sandy loam
Geology:	Alluvial outwash plain joining flood plain of major drainage channel

Survey Details	
Recorder / s:	David Stanton/ Stephen Catchpoole
Field Site Number:	Q 105
Date / Time:	8/ 03 / 2012; 15.15 am

VEGETATION SURVEY
Brigalow (*Acacia harpophylla*) woodland on alluvial plain (Q 106)



Regional Ecosystem Profile	
Regional Ecosystem Type:	RE 11.3.1
EPBC Status:	Endangered (Brigalow ecological community)
VM Status:	Endangered dominant
BD Status:	Endangered
DERM Mapped as:	11.8.5
Width of RE:	Not recorded
Survey Level:	Quaternary

Site Description	
Location:	6.5km NW of Newlands Mine
Site Description:	Broad alluvial flat with mosaic of woodland and brigalow
Orientation of Transect:	280
Datum:	GDA94
Latitude / Longitude:	-21.1701; 147.8418

Vegetation Community Description												
Open forest												
Dominant Species (50 m x 10 m area)												
Botanical Species	Status*	Average Height (m)							Abundance (m2 / ha)			
		E	T1	T2	T3	S1	S2	G	E	T1	T2	T3
<i>Acacia harpophylla</i>	D		13			1.5				12		
<i>Alectryon oleifolius</i>	A					3						
<i>Carissa ovata</i>	A					1.5						
<i>Lysiphyllum carronii</i>	A					2						
<i>Poaceae spp.</i>	A					0.25						
Ground Cover	Not Recorded			Not Recorded					Not Recorded			

Status: D = dominant, C = Codominant, S = subdominant, A = associate, EVR = significant species, # = weed, ## = declared plant O = outside plot

Community Health and Condition	
Overall Health:	Moderate– Evidence of prior physical disturbance (>15yrs)
Potential EVR Flora Species Habitat:	Limited
EVR Flora Species Recorded:	No
Weed Species:	<i>Parthenium hysterophorus</i>
Weed Cover (%):	Not Measured
Disturbance:	Minor incursion of exotic species into ground covers. Evidence of prior physical disturbance
Disturbance Cover (%):	Unknown

Topography and Landform	
Landform Situation:	Alluvial outwash plain joining floodplain of major drainage line
Altitude:	284m
Relief:	0
Slope:	Very low
Slope Class:	Very Gentle to Gentle (1-3°)
Erosional Landform Pattern:	Base of basalt hillslope.
Soils:	Alluvial
Soil Colour:	Grey
Soil Texture:	Silty clay loam
Geology:	Alluvial plain

Survey Details	
Recorder / s:	David Stanton / Stephen Catchpoole
Field Site Number:	Q 106
Date / Time:	8 / 03 / 2012; 15.15

VEGETATION SURVEY
***Acacia shirleyi* low open forest and shrubland (Q 107)**



Regional Ecosystem Profile	
Regional Ecosystem Type:	RE 11.7.2
EPBC Status:	NA
VM Status:	Least Concern
BD Status:	No Concern at Present
DERM Mapped as:	11.5.9/11.7.2
Width of RE:	Not Recorded
Survey Level:	Quaternary

Site Description	
Location:	12.5km NW of Newlands Mine
Site Description:	Upper slope of laterite breakaway
	No Transect
Datum:	GDA94
Latitude / Longitude:	-21.1132; 147.8186

Structural Description	Low open forest to tall shrubland							
Canopy Height	8-12m							
Canopy Cover (%)	60%							
Botanical Species	Status*	Structural Representation (average height m)						
		E	T1	T2	T3	S1	S2	G
<i>Acacia shirleyi</i>	D		8					
<i>Carissa ovata</i>	A						0.5	
<i>Cerbera dumicola</i>	D							
<i>Hovea sp.</i>						3		
<i>Ancistrachne uncinulata</i>								0.5
Ground Cover	Not Recorded			Not Recorded		Not Recorded		

Community Health and Condition

Overall Health:	Good – limited disturbance and weed invasion (>15yrs)
Potential EVR Flora Species Habitat:	<i>Cerbera dumicola</i> (NT, NCA) dominant in the shrub layer
EVR Flora Species Recorded:	<i>Cerbera dumicola</i>
Weed Species:	No weeds
Weed Cover (%):	Not recorded
Disturbance:	Minimum although cleared track alignment has facilitated minor edge effect and direct disturbance
Disturbance Cover (%):	0

Topography and Landform	
Landform Situation:	Upperslope on laterite breakaway
Altitude:	319m
Aspect	Top of escarpment – Gentle NW Aspect
Relief:	Very low
Slope:	Gently inclined upper slope
Slope Class:	Gently inclined (1 - 3°)
Erosional Landform Pattern:	Mesa / valley
Soils:	Red brown loam with gravel and rock
Soil Colour:	Red-brown
Soil Texture:	Silty clay loam
Geology:	Rocky / scree derived from eroding laterite scarp

Survey Details	
Recorder / s:	David Stanton/ Stephen Catchpoole
Field Site Number:	Q 107
Date / Time:	08/ 03 / 2012; 15.45

VEGETATION SURVEY
***Acacia shirleyi* low open forest and shrubland (Q 108)**



Regional Ecosystem Profile	
Regional Ecosystem Type:	RE 11.7.2
EPBC Status:	NA
VM Status:	Least Concern
BD Status:	No Concern at Present
DERM Mapped as:	11.5.9/11.7.2
Width of RE:	Not Recorded
Survey Level:	Quaternary

Site Description	
Location:	12.7km NW of Newlands Mine
Site Description:	Upper slope of laterite breakaway
	No Transect
Datum:	GDA94
Latitude / Longitude:	-21.1083; 147.8341

Structural Description	Low open forest to tall shrubland							
Canopy Height	7-10m							
Canopy Cover (%)	60%							
Botanical Species	Status*	Structural Representation (average height m)						
		E	T1	T2	T3	S1	S2	G
<i>Acacia shirleyi</i>	D		8					
<i>Carissa ovata</i>	A						0.5	
<i>Cerbera dumicola</i>	D					5		
<i>Hovea sp.</i>	A					3		
<i>Everistia vacciniifolia</i>	A					3		
<i>Ancistrachne uncinulata</i>	D							0.5
Ground Cover	Not Recorded		Not Recorded		Not Recorded			

Community Health and Condition	
Overall Health:	Good – limited disturbance and weed invasion (>15yrs)
Potential EVR Flora Species Habitat:	<i>Cerbera dumicola</i> (NT, NCA) dominant in the shrub layer
EVR Flora Species Recorded:	<i>Cerbera dumicola</i>
Weed Species:	No weeds
Weed Cover (%):	Not recorded
Disturbance:	Minimum although cleared track alignment has facilitated minor edge effect and direct disturbance
Disturbance Cover (%):	0

Topography and Landform	
Landform Situation:	Upperslope on laterite breakaway
Altitude:	319m
Aspect	Upper slope – Gentle NW Aspect
Relief:	Very low
Slope:	Gently inclined upper slope
Slope Class:	Gently inclined (1 - 3°)
Erosional Landform Pattern:	Mesa / valley
Soils:	Red brown loam with gravel and rock
Soil Colour:	Red-brown
Soil Texture:	Silty clay loam
Geology:	Rocky / scree derived from eroding laterite scarp

Survey Details	
Recorder / s:	David Stanton/ Stephen Catchpoole
Field Site Number:	Q 108
Date / Time:	08/ 03 / 2012; 16.00

VEGETATION SURVEY
***Acacia shirleyi* low open forest and shrubland (Q 109)**



Regional Ecosystem Profile	
Regional Ecosystem Type:	RE 11.7.2
EPBC Status:	NA
VM Status:	Least Concern
BD Status:	No Concern at Present
DERM Mapped as:	11.5.9/11.7.2
Width of RE:	Not Recorded
Survey Level:	Quaternary

Site Description	
Location:	12.5km NW of Newlands Mine
Site Description:	Upper slope of laterite breakaway
	No Transect
Datum:	GDA94
Latitude / Longitude:	-21.1108; 147.8351

Structural Description	Low open forest to tall shrubland							
Canopy Height	7-10m							
Canopy Cover (%)	60%							
Botanical Species	Status*	Structural Representation (average height m)						
		E	T1	T2	T3	S1	S2	G
<i>Acacia shirleyi</i>	D		9					
<i>Eucalyptus exserta</i>	O	14						
<i>Carissa ovata</i>	A						0.5	
<i>Alphitonia excelsa</i>	A					6		
<i>Bursaria tenuifolia</i>	A					7		
<i>Cerbera dumicola</i>	A					5		
<i>Pogonolobus reticulatus</i>	O					2		
<i>Hovea sp.</i>	A					3		

<i>Everistia vacciniifolia</i>	A					3		
<i>Ancistrachne uncinulata</i>	D							0.5
Ground Cover	Not Recorded			Not Recorded		Not Recorded		

Community Health and Condition	
Overall Health:	Good – limited disturbance and weed invasion (>15yrs)
Potential EVR Flora Species Habitat:	<i>Cerbera dumicola</i> (NT, NCA) dominant in the shrub layer
EVR Flora Species Recorded:	<i>Cerbera dumicola</i>
Weed Species:	No weeds
Weed Cover (%):	Not recorded
Disturbance:	Minimum although cleared track alignment has facilitated minor edge effect and direct disturbance
Disturbance Cover (%):	0

Topography and Landform	
Landform Situation:	Upperslope on laterite breakaway
Altitude:	319m
Aspect	South facing slope
Relief:	Very low
Slope:	Gently inclined upper slope
Slope Class:	Gently inclined (1 - 3°)
Erosional Landform Pattern:	Mesa / valley
Soils:	Red brown loam with gravel and rock
Soil Colour:	Red-brown
Soil Texture:	Silty clay loam
Geology:	Rocky / scree derived from eroding laterite scarp

Survey Details	
Recorder / s:	David Stanton/ Stephen Catchpoole
Field Site Number:	Q 109
Date / Time:	08/ 03 / 2012; 16.10

VEGETATION SURVEY
***Acacia shirleyi* low open forest and shrubland (Q 110)**



Regional Ecosystem Profile	
Regional Ecosystem Type:	RE 11.7.2
EPBC Status:	NA
VM Status:	Least Concern
BD Status:	No Concern at Present
DERM Mapped as:	11.5.9/11.7.2
Width of RE:	Not Recorded
Survey Level:	Quaternary

Site Description	
Location:	12.5km NW of Newlands Mine
Site Description:	Upper slope of laterite breakaway
	No Transect
Datum:	GDA94
Latitude / Longitude:	-21.1132; 147.8186

Structural Description	Low open forest to tall shrubland							
Canopy Height	7-10m							
Canopy Cover (%)	60%							
Botanical Species	Status*	Structural Representation (average height m)						
		E	T1	T2	T3	S1	S2	G
<i>Acacia shirleyi</i>	D		8					
<i>Eucalyptus exserta</i>	A		9				0.5	
<i>Corymbia citriodora</i>	O	14						
<i>Hovea sp.</i>	A					3		
Ground Cover	Not Recorded			Not Recorded		Not Recorded		

Community Health and Condition	
Overall Health:	Good – limited disturbance and weed invasion (>15yrs)

Potential EVR Flora Species Habitat:	Potential habitat for <i>Cerbera dumicola</i> (NT, NCA)
EVR Flora Species Recorded:	None recorded
Weed Species:	No weeds
Weed Cover (%):	Not recorded
Disturbance:	Minimum although cleared track alignment has facilitated minor edge effect and direct disturbance
Disturbance Cover (%):	0

Topography and Landform	
Landform Situation:	Upperslope on laterite breakaway
Altitude:	319m
Aspect	Upper slope – Gentle NW Aspect
Relief:	Very low
Slope:	Gently inclined upper slope
Slope Class:	Gently inclined (1 - 3°)
Erosional Landform Pattern:	Mesa / valley
Soils:	Red brown loam with gravel and rock
Soil Colour:	Red-brown
Soil Texture:	Silty clay loam
Geology:	Rocky / scree derived from eroding laterite scarp

Survey Details	
Recorder / s:	David Stanton/ Stephen Catchpoole
Field Site Number:	Q 110
Date / Time:	08/ 03 / 2012; 16.30

VEGETATION SURVEY
***Acacia shirleyi* low open forest and shrubland (Q 111)**



Regional Ecosystem Profile	
Regional Ecosystem Type:	RE 11.5.9
EPBC Status:	NA
VM Status:	Least Concern
BD Status:	No Concern at Present
DERM Mapped as:	11.5.9/11.7.2
Width of RE:	Not Measured
Survey Level:	Quaternary

Site Description	
Location:	9 km WNW of Newlands Mine
Site Description:	Upper slope of laterite breakaway
	No Transect
Datum:	GDA94
Latitude / Longitude:	-21.1630; 147.8139

Structural Description	Woodland to open forest (disturbed / regrowth)							
Canopy Height	10-16m							
Canopy Cover (%)	30%							
Botanical Species	Status*	Structural Representation (average height m)						
		E	T1	T2	T3	S1	S2	G
<i>Eucalyptus crebra</i>	D		12					
<i>Eucalyptus melanophloia</i>	C		10					
<i>Corymbia clarksoniana</i>	A		10					
<i>Acacia shirleyi</i>	C		10	8				
<i>Cerbera dumicola</i>	D					5		
<i>Alphitonia excelsa</i>	A					5		
Ground Cover	Not Recorded		Not Recorded		Not Recorded			

Community Health and Condition	
Overall Health:	Moderate – Partial clearing and canopy disturbance (>15yrs)
Potential EVR Flora Species Habitat:	Habitat for <i>Cerbera dumicola</i> (NT, NCA)
EVR Flora Species Recorded:	<i>Cerbera dumicola</i>
Weed Species:	No weeds
Weed Cover (%):	Not recorded
Disturbance:	Former partial clearing and canopy disturbance is evident in the habitat
Disturbance Cover (%):	Not Recorded

Topography and Landform	
Landform Situation:	Upperslope plateau on indurated sandstone escarpment
Altitude:	319m
Aspect	Upper slope – Flat
Relief:	Very low
Slope:	Gently inclined upper slope
Slope Class:	Gently inclined (1 - 3°)
Erosional Landform Pattern:	Mesa top above breakaway zone
Soils:	Red brown sand and sandy loam (Tenosol)
Soil Colour:	Red-brown
Soil Texture:	Sand and sandy loam
Geology:	Tertiary laterite (with veneer of overtopping sand)

Survey Details	
Recorder / s:	David Stanton/ Stephen Catchpoole
Field Site Number:	Q 111
Date / Time:	09/ 03 / 2012; 9.00 am

VEGETATION SURVEY
***Acacia shirleyi* low open forest and shrubland (Q 112)**

Regional Ecosystem Profile	
Regional Ecosystem Type:	RE 11.7.6
EPBC Status:	NA
VM Status:	Least Concern
BD Status:	No Concern at Present
DERM Mapped as:	11.5.9/11.7.2
Width of RE:	Not Measured
Survey Level:	Quaternary

Site Description	
Location:	12.7km NW of Newlands Mine
Site Description:	Upper slope of laterite breakaway
	No Transect
Datum:	GDA94
Latitude / Longitude:	-21.1108; 147.8154

Structural Description	Woodland to open forest							
Canopy Height	16-23m							
Canopy Cover (%)	30%							
Botanical Species	Status*	Structural Representation (average height m)						
		E	T1	T2	T3	S1	S2	G
<i>Corymbia citriodora</i>	D		19					
<i>Acacia shirleyi</i>	C			8				
<i>Eucalyptus exserta</i>	A			9				
<i>Hovea sp.</i>	A					3		
Ground Cover	Not Recorded		Not Recorded		Not Recorded			

Community Health and Condition	
Overall Health:	Good – limited disturbance and weed invasion (>15yrs)
Potential EVR Flora Species Habitat:	Potential habitat for <i>Cerbera dumicola</i> (NT, NCA)
EVR Flora Species Recorded:	None recorded
Weed Species:	No weeds
Weed Cover (%):	Not recorded
Disturbance:	Minimum although cleared track alignment has facilitated minor edge effect and direct disturbance
Disturbance Cover (%):	0

Topography and Landform	
Landform Situation:	Upperslope plateau on indurated sandstone escarpment
Altitude:	319m
Aspect	Upper slope – Gentle W Aspect
Relief:	Very low
Slope:	Gently inclined upper slope
Slope Class:	Gently inclined (1 - 3°)
Erosional Landform Pattern:	Mesa top above breakaway zone
Soils:	Red brown loam with gravel and rock
Soil Colour:	Red-brown
Soil Texture:	Silty clay loam
Geology:	Rocky / scree derived from eroding laterite scarp

Survey Details	
Recorder / s:	David Stanton/ Stephen Catchpoole
Field Site Number:	Q 112
Date / Time:	08/ 03 / 2012; 16.45

VEGETATION SURVEY
***Acacia shirleyi* low open forest and shrubland (Q 113)**



Regional Ecosystem Profile	
Regional Ecosystem Type:	RE 11.7.2
EPBC Status:	NA
VM Status:	Least Concern
BD Status:	No Concern at Present
DERM Mapped as:	11.5.9/11.7.2
Width of RE:	Not Recorded
Survey Level:	Quaternary

Site Description	
Location:	8.25 km NW of Newlands Mine
Site Description:	Scald area on upper slope of laterite breakaway
	No Transect
Datum:	GDA94
Latitude / Longitude:	-21.1589; 147.8172

Structural Description	Low open forest to shrubland							
Canopy Height	5-10m							
Canopy Cover (%)	60%							
Botanical Species	Status*	Structural Representation (average height m)						
		E	T1	T2	T3	S1	S2	G
<i>Acacia catenulata</i>	D		6			3		
<i>Acacia shirleyi</i>	A	12						
<i>Cerbera dumicola</i>	A					5		
<i>Hovea sp.</i>	A					3		
<i>Aristida caput-medusae</i>	D							0.5
Ground Cover	Not Recorded			Not Recorded		Not Recorded		

Community Health and Condition

Overall Health:	Good – limited disturbance and no exotic species
Potential EVR Flora Species Habitat:	<i>Cerbera dumicola</i> (NT, NCA) scattered in the shrub layer
EVR Flora Species Recorded:	<i>Cerbera dumicola</i>
Weed Species:	No weeds
Weed Cover (%):	Not recorded
Disturbance:	None recorded
Disturbance Cover (%):	0

Topography and Landform	
Landform Situation:	Scald on upperslope of laterite breakaway
Altitude:	320m
Aspect	Upper slope – Gentle NE Aspect
Relief:	Very low
Slope:	Gently inclined upper slope
Slope Class:	Gently inclined (1 - 3°)
Erosional Landform Pattern:	Mesa / valley
Soils:	Rudosol
Soil Colour:	Red-brown
Soil Texture:	Gravel and rock
Geology:	Rocky / scree derived from eroding laterite scarp

Survey Details	
Recorder / s:	David Stanton/ Stephen Catchpoole
Field Site Number:	Q 113
Date / Time:	09/ 03 / 2012; 10.00 am

VEGETATION SURVEY
***Acacia shirleyi* low open forest and shrubland (Q 114)**



Regional Ecosystem Profile	
Regional Ecosystem Type:	RE 11.7.2
EPBC Status:	NA
VM Status:	Least Concern
BD Status:	No Concern at Present
DERM Mapped as:	11.5.9/11.7.2
Width of RE:	Not Recorded
Survey Level:	Quaternary

Site Description	
Location:	8.16 km NW of Newlands Mine
Site Description:	Steep scree slope on laterite breakaway
	No Transect
Datum:	GDA94
Latitude / Longitude:	-21.1588; 147.8184

Structural Description	Low open forest to tall shrubland							
Canopy Height	7-11m							
Canopy Cover (%)	60%							
Botanical Species	Status*	Structural Representation (average height m)						
		E	T1	T2	T3	S1	S2	G
<i>Acacia shirleyi</i>	D		10					
<i>Eucalyptus exserta</i>	O	15						
<i>Cerbera dumicola</i>	A					5		
<i>Hovea sp.</i>	A					3		
<i>Micromyrtus capricornia</i>	A					3		
<i>Croton insularis</i>	A					6		
<i>Aristida caput-medusae</i>	D							0.5
Ground Cover	Not Recorded		Not Recorded		Not Recorded			

Community Health and Condition	
Overall Health:	Good – limited disturbance and no exotic species
Potential EVR Flora Species Habitat:	<i>Cerbera dumicola</i> (NT, NCA) scattered in the shrub layer
EVR Flora Species Recorded:	<i>Cerbera dumicola</i>
Weed Species:	No weeds
Weed Cover (%):	Not recorded
Disturbance:	None recorded
Disturbance Cover (%):	0

Topography and Landform	
Landform Situation:	Scree slope on laterite breakaway
Altitude:	312m
Aspect	Middle slope – NE Aspect
Relief:	Steep
Slope:	Steeply inclined mid slope
Slope Class:	Steeply inclined (15 – 30°)
Erosional Landform Pattern:	Mesa / valley
Soils:	Rudosol
Soil Colour:	Red-brown
Soil Texture:	Gravel and rock
Geology:	Rocky / scree derived from eroding laterite scarp

Survey Details	
Recorder / s:	David Stanton/ Stephen Catchpoole
Field Site Number:	Q 114
Date / Time:	09/ 03 / 2012; 10.15 am

VEGETATION SURVEY
Eucalyptus crebra woodland on sandy residual soils (Q 115)



Regional Ecosystem Profile	
Regional Ecosystem Type:	RE 11.5.9
EPBC Status:	NA
VM Status:	Least concern
BD Status:	No concern at present
DERM Mapped as:	11.7.2/ 11.5.9
Width of RE:	Not Linear
Survey Level:	Quaternary

Site Description	
Location:	8.8km NW of Newlands Mine
Site Description:	Woodland on coarse sandy colluvial wash.
Orientation of Transect:	No Transect
Datum:	GDA94
Latitude / Longitude:	-21.1578; 147.8192

[illegible]

Vegetation Community Description												
<i>Pogonolobus reticulatus.</i>	A											
<i>Breynia oblongifolia</i>	A					2						
<i>Cassia brewsteri</i>	A					5						
<i>Aristida sp.</i>	D							0.5				
Ground Cover	5% bare ground			Leaf Litter 35%					Grass 60% (<i>Aristida sp.</i>)			
Status: D = dominant, C = Codominant, S = subdominant, A = associate, EVNT = significant species, # = weed, ## = declared plant O = outside plot												

Community Health and Condition	
Overall Health:	Excellent – no evidence of major physical disturbance and dominated by native ground covers
Potential EVR Flora Species Habitat:	<i>Cerbera dumicola</i> (NT, NCA) recorded at site
EVR Flora Species Recorded:	<i>Cerbera dumicola</i>
Weed Species:	Nil
Weed Cover (%):	Nil
Disturbance:	Nil
Disturbance Cover (%):	Unknown

Topography and Landform	
Landform Situation:	Sandy colluvial wash at base of ironstone escarpment.
Altitude:	284m
Relief:	Very low
Slope Class:	Gently Inclined (3 – 8 %)
Erosional Landform Pattern:	Coarse grained sand derived from eroding escarpment
Soils:	Tenosol
Soil Colour:	Grey-brown
Soil Texture:	Coarse loamy sand
Geology:	Sandy colluvium derived from scarp retreat

Survey Details	
Recorder / s:	David Stanton/ Stephen Catchpoole
Field Site Number:	Q 115
Date / Time:	9 / 03 / 2012; 10.45am

VEGETATION SURVEY
***Acacia harpophylla* regrowth shrubland (Q 116)**



Regional Ecosystem Profile	
Regional Ecosystem Type:	Non-remnant
EPBC Status:	NA
VM Status:	High Value Regrowth - Endangered
BD Status:	Non-remnant
DERM Mapped as:	Non-remnant
Width of RE:	Not linear
Survey Level:	Quaternary

Site Description	
Location:	6 km S of Newlands Mine on the Glendon Road
Site Description:	Clay plain on the margins of broader basaltic landscape
Orientation of Transect:	No transect
Datum:	GDA94
Latitude / Longitude:	-21.28098; 147.9045

Vegetation Community Description												
Low regrowth shrubland with canopy from 1.5- 2m. PCC of <20%												
Dominant Species (50 m x 10 m area)												
Botanical Species	Status*	Average Height (m) 16m (13 – 18m)							Abundance (m2 / ha)			
		E	T1	T2	T3	S1	S2	G	E	T1	T2	S1
<i>Acacia harpophylla</i>	D					5				Not Measured		
<i>Pennisetum ciliare</i> #	D					3		0.75				
Status: D = dominant, C = Codominant, S = subdominant, A = associate, EVR = significant species, # = weed, ## = declared plant O = outside plot												

Community Health and Condition	
Overall Health:	Poor. Regrowth from total clearing. Ground cover dominated by exotic species. Shrubs are suffering

	from dieback – possibly associated with poisoning
Potential EVR Flora Species Habitat:	Limited
EVR Flora Species Recorded:	No
Weed Species:	<i>Pennisetum ciliare</i> (pasture grass)
Weed Cover (%):	Not recorded
Disturbance:	Regrowth from total clearing
Disturbance Cover (%):	Not recorded

Topography and Landform	
Landform Situation:	Clay plain with minor influence from basal
Altitude:	306m
Relief:	Very low
Slope:	Flat to gently inclined
Slope Class:	Very Gently Inclined (1 – 3 %)
Erosional Landform Pattern:	Clay plain
Soils:	Vertosol
Soil Colour:	Grey-brown
Soil Texture:	Clay Loam
Geology:	Cainozoic Clay plain

Survey Details	
Recorder / s:	David Stanton/ Stephen Catchpoole
Field Site Number:	Q 116
Date / Time:	9 / 03 / 2012; 11.30 am

ATTACHMENT C – FAUNA TRAPPING SITE DESCRIPTIONS

Client/Project:	Trapping Site NW	Unidel Staff:	Mitchell Taylor
Stakeholder:	QCoal	Date:	12/04/2012
Representative:	Lancewood escarpment and plateau	Time:	7am
File Reference: See Trapping GPS Locations			
<u>Notes:</u>			
The North Western Primary Site is found on sandy red soils atop a sandstone ridge. Soils are moderately deep along the top of the ridge (consistent in red sandy texture to a minimum depth of 600mm – based on digging pitfalls with shovel). The escarpment of this plateau largely falls to the south (with a small gentle fall to the north). The escarpment traversing the southern portions of the plateau supports small exposed rocky cliffs with many crevices, however no caves were identified during a transect of this escarpment (four camera traps with bait were set for quolls (<i>Dasyurus hallucatus</i>) in the most suitable habitat available). This escarpment quickly merges into steep washout slopes where vegetation density increases, particularly within gullies which often support semi-evergreen vine thicket (SEVT) species. The canopy layer occurs between 6-10 m and is heavily dominated by lancewood (<i>Acacia shirleyi</i>) and bendee (<i>A.catenulata</i>). Occasional emergent ironbarks (<i>Eucalyptus</i> sp.) and bloodwoods (<i>Corymbia</i> sp.) occur along this ridgeline. Habitats remain similar through the gradient down slope of the escarpment; however shrubs become dense in gully areas. The mid stratum occurs between 1- 4 m and is dominated by juvenile canopy species as well as desert phebalium (<i>Phebalium glandulosum</i> subsp. <i>glandulosum</i>) and <i>Cerbera dumicola</i>. The ground cover is moderate in areas where the canopy has been removed or thinned for access tracks. Evidence of recent fire and disturbances had promoted revegetation in the ground layer. Within areas of denser remnant, the ground cover becomes sparse; however fallen timber and leaf litter is dense, providing good reptile habitat. ○ Evidence of fire <2 years ○ Rocky habitats are low on the plateaus, however increase down slope; ○ Weeds are generally very low; ○ Ground cover varies from 80% in cleared areas to 20% in remnant ○ Fallen timber in remnant is good >50% ○ Regenerating scrub species, particularly along the edge of cleared areas. NOTE: Dry rainforest species occur in gullies downslope of escarpment, forming dense pockets of habitat.			
<u>General Notes:</u>			
Site Photos = 2965 – 2971 (Track), 2972-2983 (Site Trapping area), 2984 – 2991 (Typical Escarpment)			
Trapping Effort in this Primary Site includes			
- 20 Elliot A - 4 Cameras 2 x SM2			
- 5 Elliot B - 5 pits			
- 4 Harp traps - 4 funnels			



Good fallen timber habitat on the plateau



Higher quality rocky habitat along escarpment traverse (camera and funnel traps)



Cleared track for drilling access on plateau (harp traps)



Pit fall line in sandy red soil on top of plateau

Client/Project:	Site NW	Unidel Staff:	Mitchell Taylor
Stakeholder:	QCoal	Date:	12/04/2012
Representative:	Lancewood escarpment and plateau	Time:	7am
File Reference: Thurs AM NW Species List			
<u>Trapping Notes:</u> Trapped: ○ H1 – 2 x Gould's wattled bat (<i>Chalinolobus gouldii</i>) ○ H2/3 – 2 x Western broad-nosed bat (<i>Scotorepens balstoni</i>) ○ H4 – 2 x Gould's wattled bat (<i>C.gouldii</i>); 1 x Lesser long-eared bat (<i>Nyctophilus geoffroyii</i>) Nil capture in terrestrial trapping lines			
<u>Active fauna searches:</u> Brown honeyeater (<i>Lichmera indistincta</i>) Pied currawong (<i>Strepera graculina</i>) Pied butcherbird (<i>Cracticus nigrogularis</i>) Grey shrike-thrush (<i>Colluricincla harmonica</i>) Rainbow lorikeet (<i>Trichoglossus haematodus</i>) Grey-headed honeyeater (<i>Lichenostomus keartlandi</i>) Striated pardalote (<i>Pardalotus striatus</i>) Spangled drongo (<i>Dicrurus bracteatus</i>) Grey fantail (<i>Rhipidura albiscapa</i>) Eastern yellow robin (<i>Eopsaltria australis</i>) Rainbow skink (<i>Carlia vivax</i>) Robust rainbow skink (<i>Carlia schmeltzii</i>) Shaded-litter rainbow-skink (<i>Carlia munda</i>) Inland thornbill (<i>Acanthiza apicalis</i>) Leaden flycatcher (<i>Myiagra rubecula</i>) Barred-sided skink (<i>Eulamprus tenuis</i>) Magpie (<i>Cracticus tibicen</i>) Lewin's honeyeater (<i>Meliphaga lewinii</i>) Dog (<i>Canis familiaris</i>) tracks Bar-shouldered dove (<i>Geopelia humeralis</i>)		Peaceful dove (<i>Geopelia placida</i>) Horsfield's bronze-cuckoo (<i>Chalcites basalıs</i>) Collared sparrowhawk (<i>Accipiter cirrhocephalus</i>)	
<u>Other notes:</u> Current Weather - Mild to moderate sunny morning. Building to warm ~30°. Gusty wind conditions generally throughout morning. Snail shells and scrub/SEVT species indicate a moist environment.			

Client/Project:	Secondary Site 1	Unidel Staff:	Mitchell Taylor
Stakeholder:	QCoal	Date:	12/04/2012
Representative:	SS1 Lateritic scald	Time:	10.30am
File Reference: GPS 604616116F			

Secondary Site Notes:

This secondary site comprises an area of non-remnant lateritic scalds and adjacent vegetation. Generally, this site supports exposed rock with little soil structure. The vegetation fringing this scald is dominated by lancewood (*Acacia shirleyi*) and occasional scrub species. This scald situated at a low point of the ridge where water erosion has exposed rock. This site falls north into small gully where lancewood once again becomes dominant. Dry rain forest shrub species are present in the shrub layer surrounding the scald, particularly to the north where the ridge/scald falls into an incised gully. Generally this area provides poor quality habitat for majority of terrestrial species given its lack of habitat structure. Where the scald falls into an incised gully, vegetation composition and rocky outcrops become more complex and habitat quality increases.

The canopy in adjacent remnant vegetation areas occurs between 4-7m and is heavily dominated by lancewood (*A.shirleyi*).

The shrub layer is extremely sparse however a small number of stunted scrub species occur within the scald area. Dry rainforest species occur in areas fringing the scald.

100% rock cover on scald;
40% ground cover in remnant gully
Fallen timber is generally absent.
Weeds are generally absent.

Active fauna search:

Pied butcherbird (*Cracticus nigrogularis*)
Brown honeyeater (*Lichmera indistincta*)
Spotted pardalote (*Pardalotus punctatus*)
Grey butcherbird (*Cracticus torquatus*)
Grey shrike-thrush (*Colluricincla harmonica*)

General Notes:

Warm, sunny conditions with constant, moderate southerly wind swirling.

Photos: 2996-3001 (sealed); 3002-3005 (drop off and veg); pp3006 (GPS Screen)



Typical view of scald habitat with exposed rock



Typical view of eroded drop off north of the scald

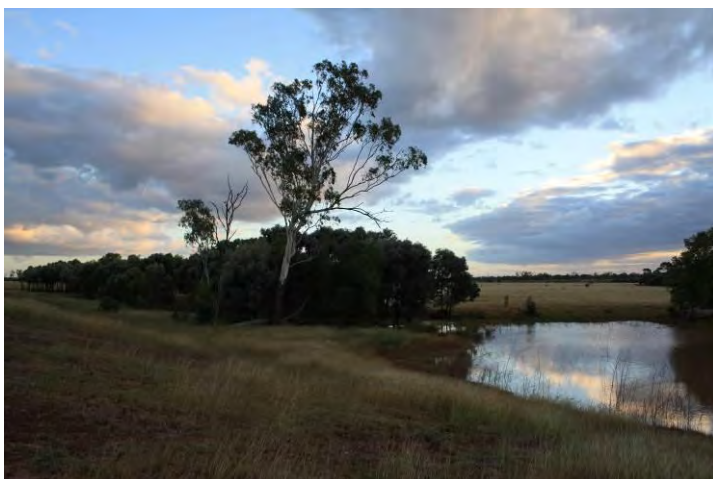
Client/Project:	Secondary Site 2	Unidel Staff:	Mitchell Taylor																																																									
Stakeholder:	QCoal	Date:	12/04/2012																																																									
Representative:	Lacustrine wetland	Time:	5:00pm																																																									
File Reference: GPS No: 7CD8CA5641																																																												
<u>Notes:</u>																																																												
This site supports a large lacustrine wetland in the form of an on-line dam which has been recently constructed. This wetland occurs on gently undulating sandy loam plains dominated by extensive cleared pastoral areas. Large portions of this pastoral land support gilgai habitats with some gilgai supporting regenerating brigalow (<i>Acacia harpophylla</i>) forest. Occasional areas of dead vegetation occur close to dam due to recent drilling activities as well as the dam being created. The canopy occurs between 8-10m and supports mixture of eucalypt species with suppressed bloodwood (<i>Corymbia</i> sp.) and is generally very sparse. The shrub layer is moderate and supports a good variety of native shrub species including melaleuca, acacia, emu apple (<i>Owenia acidula</i>) and dry rainforest species. The ground cover is dense and occurs between 0-1 m. It is dominated by improved pasture grasses such as Indian blue grass (<i>Bothriochloa pertusa</i>) sandy loams soils are dominate and vary between red and black in colour. Very little fallen timber or rocky substrate occur, most likely due to land maintenance. <u>Species:</u>																																																												
<table><tr><td>Restless flycatcher (<i>Myiagra inquieta</i>)</td><td>Magpie lark (<i>Grallina cyanoleuca</i>)</td><td>Australasian grebe (<i>Tachybaptus novaehollandiae</i>)</td></tr><tr><td>Striated pardalote (<i>Pardalotus striatus</i>)</td><td>Apostle bird (<i>Struthidea cinerea</i>)</td><td>Rufous fantail (<i>Rhipidura rufifrons</i>)</td></tr><tr><td>Grey teal (<i>Anas gracilis</i>)</td><td>White-necked heron (<i>Ardea pacifica</i>)</td><td>Spiny-cheeked honeyeater (<i>Acanthagenys rufogularis</i>)</td></tr><tr><td>Pacific black duck (<i>Anas superciliosa</i>)</td><td>Pied cormorant (<i>Phalacrocorax varius</i>)</td><td>Brown quail (<i>Coturnix ypsilophora</i>)</td></tr><tr><td>Brolga (<i>Grus rubicunda</i>)</td><td>Intermediate egret (<i>Ardea intermedia</i>)</td><td>Tawny frogmouth (<i>Podargus strigoides</i>)</td></tr><tr><td>Laughing kookaburra (<i>Dacelo novaeguineae</i>)</td><td>Nankeen kestrel (<i>Falco cenchroides</i>)</td><td>Nankeen night heron (<i>Nycticorax caledonicus</i>)</td></tr><tr><td>Willie wagtail (<i>Rhipidura leucophrys</i>)</td><td>Blue-faced honeyeater (<i>Entomyzon cyanotis</i>)</td><td>Hardhead (<i>Aythya australis</i>)</td></tr><tr><td>Pale-headed rosella (<i>Platycercus adscitus</i>)</td><td>Pied butcherbird (<i>Cracticus nigrogularis</i>)</td><td>Plumed whistling duck (<i>Dendrocygna eytoni</i>)</td></tr><tr><td>Grey fantail (<i>Rhipidura albiscapa</i>)</td><td>Double-barred finch (<i>Taeniopygia bichenovii</i>)</td><td>Blue-winged kookaburra (<i>Dacelo leachii</i>)</td></tr><tr><td>Rainbow bee-eater (<i>Merops ornatus</i>)</td><td>Yellow-throated miner (<i>Manorina flavigula</i>)</td><td>Eastern grey kangaroo (<i>Macropus giganteus</i>)</td></tr><tr><td>Weebill (<i>Smicrornis brevirostris</i>)</td><td>Great bowerbird (<i>Ptilonorhynchus nuchalis</i>)</td><td></td></tr><tr><td>Black-fronted dotterel (<i>Elsayornis melanops</i>)</td><td>Little friarbird (<i>Philemon citreogularis</i>)</td><td></td></tr><tr><td>Masked lapwing plover (<i>Vanellus miles</i>)</td><td></td><td></td></tr><tr><td>Black-faced cuckoo-shrike (<i>Coracina novaehollandiae</i>)</td><td></td><td></td></tr><tr><td>Yellow thornbill (<i>Acanthiza nana</i>)</td><td></td><td></td></tr><tr><td>Whistling kite (<i>Haliastur sphenurus</i>)</td><td></td><td></td></tr><tr><td>Galah (<i>Eolophus roseicapillus</i>)</td><td></td><td></td></tr><tr><td>Torresian crow (<i>Corvus orru</i>)</td><td></td><td></td></tr><tr><td>Grey-crowned babbler (<i>Pomatostomus temporalis</i>)</td><td></td><td></td></tr></table>				Restless flycatcher (<i>Myiagra inquieta</i>)	Magpie lark (<i>Grallina cyanoleuca</i>)	Australasian grebe (<i>Tachybaptus novaehollandiae</i>)	Striated pardalote (<i>Pardalotus striatus</i>)	Apostle bird (<i>Struthidea cinerea</i>)	Rufous fantail (<i>Rhipidura rufifrons</i>)	Grey teal (<i>Anas gracilis</i>)	White-necked heron (<i>Ardea pacifica</i>)	Spiny-cheeked honeyeater (<i>Acanthagenys rufogularis</i>)	Pacific black duck (<i>Anas superciliosa</i>)	Pied cormorant (<i>Phalacrocorax varius</i>)	Brown quail (<i>Coturnix ypsilophora</i>)	Brolga (<i>Grus rubicunda</i>)	Intermediate egret (<i>Ardea intermedia</i>)	Tawny frogmouth (<i>Podargus strigoides</i>)	Laughing kookaburra (<i>Dacelo novaeguineae</i>)	Nankeen kestrel (<i>Falco cenchroides</i>)	Nankeen night heron (<i>Nycticorax caledonicus</i>)	Willie wagtail (<i>Rhipidura leucophrys</i>)	Blue-faced honeyeater (<i>Entomyzon cyanotis</i>)	Hardhead (<i>Aythya australis</i>)	Pale-headed rosella (<i>Platycercus adscitus</i>)	Pied butcherbird (<i>Cracticus nigrogularis</i>)	Plumed whistling duck (<i>Dendrocygna eytoni</i>)	Grey fantail (<i>Rhipidura albiscapa</i>)	Double-barred finch (<i>Taeniopygia bichenovii</i>)	Blue-winged kookaburra (<i>Dacelo leachii</i>)	Rainbow bee-eater (<i>Merops ornatus</i>)	Yellow-throated miner (<i>Manorina flavigula</i>)	Eastern grey kangaroo (<i>Macropus giganteus</i>)	Weebill (<i>Smicrornis brevirostris</i>)	Great bowerbird (<i>Ptilonorhynchus nuchalis</i>)		Black-fronted dotterel (<i>Elsayornis melanops</i>)	Little friarbird (<i>Philemon citreogularis</i>)		Masked lapwing plover (<i>Vanellus miles</i>)			Black-faced cuckoo-shrike (<i>Coracina novaehollandiae</i>)			Yellow thornbill (<i>Acanthiza nana</i>)			Whistling kite (<i>Haliastur sphenurus</i>)			Galah (<i>Eolophus roseicapillus</i>)			Torresian crow (<i>Corvus orru</i>)			Grey-crowned babbler (<i>Pomatostomus temporalis</i>)		
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<u>Actions Arising:</u>																																																												
Photos: 3007-3009 (Photos of farm and site overall); 3010-3013 (small dam next in line)																																																												
Sun setting – easterly consistent light to moderate wind with scattered cloud. Good habitat for wetland bird species																																																												



Recently construct lacustrine wetland (inundated trees still alive) access tracks for drilling on the right.



General view over much of the lacustrine wetland



Secondary overflow dam below main dam

Client/Project:	Spotlighting Drives	Unidel Staff:	Mitchell Taylor
Stakeholder:	QCoal	Date:	12/04/2012
Representative:	Nocturnal transects	Time:	6:30-10:00 pm
File Reference: Secondary Site 22 and NW Trapping Site			

Notes:

Nocturnal spotlight conducted throughout the central portions of the MLA and North Western tracks and Trapping Site.

Species recorded during active searches

Gilgai Centre Species:

Cane toad (*Rhinella marina*) - significant amount of toads throughout this portion of the MLA given suitable habitats for this species.
Green striped frog (*Cyclorana alboguttata*)

Cool and windy, partly cloudy

Transect to the NW Species:

Cane toads (*R.marina*) - observed along the entire length of the access track to the North West Trapping Site.
Dog (*Canis familiaris*) - howling and track.
Bynoe's gecko (*Heteronotia binoei*)
Southern boobook (*Ninox novaeseelandiae*) – calling.
Eastern barn owl (*Tyto javanica*) – calling.
2 x Tawny frogmouth (*Podargus strigoides*) – observed.

Cool and windy, partly cloudy

General Notes:

Temperatures were rapidly cooling from diurnal periods due to windy conditions. Active herpetile searches were conducted within gilgai habitats, Escarpments and driving transects occurred throughout much of the central and north western portions of the MLA.

Client/Project:	NW Trap Site	LAC:	Mitchell Taylor
Stakeholder:	QCoal	Date:	13/04/2012
Representative:	Lancewood escarpment and plateau	Time:	7:00/8:30 am
File Reference: See GPS NW Trapping			

Notes:

2nd morning
Mild to Warm morning with strong easterly/southerly wind gusts

Species recorded during active searches:

Grey shrike-thrush (*Colluricincla harmonica*)
Brown honeyeater (*Lichmera indistincta*)
Pied currawong (*Strepera graculina*)
Magpie (*Cracticus tibicen*)
Rainbow lorikeet (*Trichoglossus haematodus*)
Pied butcherbird (*Cracticus nigrogularis*)
Black-faced cuckoo-shrike (*Coracina novaehollandiae*)
Striated pardalote (*Pardalotus striatus*)
Brush turkey (*Alectura lathamii*)
Red-winged parrot (*Aprosmictus erythropterus*)
Grey-crowned babbler (*Pomatostomus temporalis*)
Grey fantail (*Rhipidura albiscapa*)
Apostle bird (*Struthidea cinerea*)
Striped honeyeater (*Plectorhyncha lanceolata*)
Rufous whistler (*Pachycephala rufiventris*)

Harp 1 – NIL
Harp 2/3 – 2 x *Scotorepens* sp. and 1 x *Vespadelus* sp.
Harp 4 – 3 x Gould's wattled bats (*Chalinolobus gouldii*) and 2 x *Vespadelus* sp. (2F, 1M)

General Notes:

NIL in trap line. Habitats are suitable for small terrestrial mammals, with evidence of bandicoot type diggings throughout remnant areas. The presence of cane toads (*Rhinella marina*) within these higher ridge areas in a negative impact for quolls (*Dasyurus hallucatus*).

One Elliot trap had rolled over and closed

Client/Project:	Secondary Site 3	Unidel Staff:	Mitchell Taylor																												
Stakeholder:	QCoal	Date:	13/04/2012																												
Representative:	Brigalow water course	Time:	9:30 am																												
File Reference: 2C252758A																															
<u>Notes:</u> This Secondary Site is formed by a low, slightly undulating, sandy clay plain with red soils. Soils merge into a flat black soil plain to the east of this site. The main feature within this site is an ephemeral watercourse currently holding pools of water. Distinctive clay elements are evident throughout the soil profile and evidence of erosions was common throughout this site. The canopy is moderate to sparse with small, dense thickets of regenerating brigalow (<i>Acacia harpophylla</i>). It occurs between 5-8 m. The shrub layer is sparse and consists of a mixture of brigalow, yellow wood (<i>Terminalia oblongata</i>) and false sandalwood (<i>Eremophila mitchellii</i>). The ground layer within this site is very good foraging habitat for passerine species. The ground layer occurs between 0-1 m and is dense. It is dominated by Indian blue grass (<i>Bothriochloa pertusa</i>), with other suppressed pastoral grasses sporadically occurring throughout the area. Very little rocky features occur within this site. The watercourse supports small amounts of coarse alluvium which provides good habitat for herptiles. No evidence of fire was identified during survey efforts, however historic clearing was evident. Velvety prickly pear (<i>Opuntia tomentosa</i>) and tiger pear (<i>O. aurantiaca</i>) occur sporadically throughout the immediate area of this site. <u>Species recorded during active searches:</u> <table border="0"> <tr> <td>Pied butcherbird (<i>Cracticus nigrogularis</i>)</td> <td>Rufous whistler (<i>Pachycephala rufiventris</i>)</td> </tr> <tr> <td>Magpie (<i>Cracticus tibicen</i>)</td> <td>Grey shrike-thrush (<i>Colluricincla harmonica</i>)</td> </tr> <tr> <td>Black-faced cuckoo-shrike (<i>Coracina novaehollandiae</i>)</td> <td>Great bowerbird (<i>Ptilonorhynchus nuchalis</i>)</td> </tr> <tr> <td>Red-backed fairy-wren (<i>Malurus melanocephalus</i>)</td> <td>Spotted bowerbird (<i>Ptilonorhynchus maculatus</i>)</td> </tr> <tr> <td>Willie wagtail (<i>Rhipidura leucophrys</i>)</td> <td>Noisy friarbird (<i>Philemon corniculatus</i>)</td> </tr> <tr> <td>Bar-shouldered dove (<i>Geopelia humeralis</i>)</td> <td>Blue-faced honeyeater (<i>Entomyzon cyanotis</i>)</td> </tr> <tr> <td>Pale-headed rosella (<i>Platycercus adscitus</i>)</td> <td>Torresian crow (<i>Corvus orru</i>)</td> </tr> <tr> <td>Yellow-throated miner (<i>Manorina flavigula</i>)</td> <td>Striped honeyeater (<i>Plectorhyncha lanceolata</i>)</td> </tr> <tr> <td>Red-winged parrot (<i>Aprosmictus erythropterus</i>)</td> <td>Rainbow Lorikeet (<i>Trichoglossus haematodus</i>)</td> </tr> <tr> <td>Peaceful dove (<i>Geopelia placida</i>)</td> <td>Brown honeyeater (<i>Lichmera indistincta</i>)</td> </tr> <tr> <td>Apostle bird (<i>Struthidea cinerea</i>)</td> <td>Crested pigeon (<i>Ocyphaps lophotes</i>)</td> </tr> <tr> <td>Grey butcherbird (<i>Cracticus torquatus</i>)</td> <td>Singing honeyeater (<i>ILichenostomus virescens</i>)</td> </tr> <tr> <td>Grey-crowned babbler (<i>Pomatostomus temporalis</i>)</td> <td>Laughing kookaburra (<i>Dacelo novaeguineae</i>)</td> </tr> <tr> <td>Blue-faced honeyeater (<i>Entomyzon cyanotis</i>)</td> <td></td> </tr> </table>				Pied butcherbird (<i>Cracticus nigrogularis</i>)	Rufous whistler (<i>Pachycephala rufiventris</i>)	Magpie (<i>Cracticus tibicen</i>)	Grey shrike-thrush (<i>Colluricincla harmonica</i>)	Black-faced cuckoo-shrike (<i>Coracina novaehollandiae</i>)	Great bowerbird (<i>Ptilonorhynchus nuchalis</i>)	Red-backed fairy-wren (<i>Malurus melanocephalus</i>)	Spotted bowerbird (<i>Ptilonorhynchus maculatus</i>)	Willie wagtail (<i>Rhipidura leucophrys</i>)	Noisy friarbird (<i>Philemon corniculatus</i>)	Bar-shouldered dove (<i>Geopelia humeralis</i>)	Blue-faced honeyeater (<i>Entomyzon cyanotis</i>)	Pale-headed rosella (<i>Platycercus adscitus</i>)	Torresian crow (<i>Corvus orru</i>)	Yellow-throated miner (<i>Manorina flavigula</i>)	Striped honeyeater (<i>Plectorhyncha lanceolata</i>)	Red-winged parrot (<i>Aprosmictus erythropterus</i>)	Rainbow Lorikeet (<i>Trichoglossus haematodus</i>)	Peaceful dove (<i>Geopelia placida</i>)	Brown honeyeater (<i>Lichmera indistincta</i>)	Apostle bird (<i>Struthidea cinerea</i>)	Crested pigeon (<i>Ocyphaps lophotes</i>)	Grey butcherbird (<i>Cracticus torquatus</i>)	Singing honeyeater (<i>ILichenostomus virescens</i>)	Grey-crowned babbler (<i>Pomatostomus temporalis</i>)	Laughing kookaburra (<i>Dacelo novaeguineae</i>)	Blue-faced honeyeater (<i>Entomyzon cyanotis</i>)	
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<u>Actions Arising:</u> Warm, sunny day with moderate south-easterly gusts. Cloud cover rolling in at termination Site Photos: 30104-3020																															



Ephemeral watercourse through brigalow (*Acacia harpophylla*) community



Ephemeral watercourse retaining water after recent rain (note cattle impacts)

Client/Project:	Secondary Site 4	Unidel Staff:	Mitchell Taylor
Stakeholder:	QCoal	Date:	13/04/2012
Representative:	Small rocky knoll	Time:	10:45am
File Reference: 67F768807C			

Notes:

Small rocky knoll adjacent to sandstone ridge. This site provides rocky habitat with small caves (not extensive) and crevices. It is not connective with a larger ridges/escarpment to the south. This isolated knoll consists of a small rocky outcrop at its peak, with wash out slopes being made of course colluvial deposit. Soils are skeletal with wash out slopes being gently graded supporting a mix of course stone and sands with black soils further down slope within the creek and flood plains.

The canopy is sparse (moderate in places) and occurs between 5 – 7 metres. It is dominated by a mix of brigalow (*Acacia harpophylla*) and lancewood (*A.shirleyi*). Typically lower sandy areas are dominated by brigalow with higher stony areas being dominated by lancewood. Shrubs are dense and dominated by false sandalwood (*Eremophila mitchellii*). The shrub layer consists of regenerating canopy species with occasional Acacia species. The ground layer is variable and generally reliant on soil quality. Lower are generally on deeper sands and clays supporting moderate ground cover of improved pastures (including buffel grass (*Pennisetum ciliare*)) and patches of parthenium (*Parthenium hysterophorus*)). Higher areas displaying more skeletal soils support minimal ground cover and rocky surfaces. The higher slopes typically provide moderate herpitile habitat with a mixture of grassy areas, rocky outcrops and crevices.

Species recorded during active searches:

Wedge-tailed eagle (*Aquila audax*)
Pied butcherbird (*Cracticus nigrogularis*)
Striped skink (*Ctenotus robustus*).
Skink (*Cryptoblepharus* sp.)
Laughing kookaburra (*Dacelo novaeguineae*)
Skink (*Carlia* sp.)
Bynoe's gecko (*Heteronotia binoei*)
Grey butcherbird (*Cracticus torquatus*)

General Notes:

Warm morning, humidity rising, cloud cover increasing, strong easterly.
Site Photos: 3021 (view from road) – 3027.



View of rocky knoll proximate to a larger sandstone ridge



Small cave habitat on knoll. Cave does not proceed deeper and little activity noted at the time of survey.

Client/Project:	Secondary Site 5	Unidel Staff:	Mitchell Taylor
Stakeholder:	QCoal	Date:	13/04/2012
Representative:	Black soil brigalow regrowth	Time:	11:30
File Reference: 70F68422BD			

Notes:

This site occurs on black cracking clays which supporting brigalow (*Acacia harpophylla*) regrowth. This is a broad, flat plain of black cracking clay which has been extensively cleared and maintained for grazing apart from of the patch of brigalow regrowth. An ephemeral water course drains westward and supports low brigalow forest. During the survey period this watercourse was holding water from recent rain events. The canopy is moderate, it occurs between 5-8 m and is dominated by brigalow. Scattered emergent ironbarks (*Eucalyptus* sp.) and suppressed belah (*Casuarina cristata*) occasionally occurred within this site and across the broader plain. The shrub layer was sparse and dominated by juvenile canopy species. The ground layer is dense with improved pasture grasses including buffel grass (*Pennisetum ciliare*), Indian blue grass (*Bothriochloa pertusa*) and Cockatoo grass (*Alloteropsis semialata*). This site had a moderate amount of fallen timber, with the lowers areas typically support higher densities of fallen debris. This fallen debris and cracking clays provide good reptile habitat. Crab shells were located around these lower areas indicating that these alluvial systems provide habitat for a wide variety of fauna species.

Parthenium (*Parthenium hysterophorus*) was wide spread throughout this area and should be subject to treatment.

Species recorded during active searches:

Wedge-tailed eagle (*Aquila audax*)
Pied butcherbird (*Cracticus nigrogularis*)
Pale-headed rosella (*Platycercus adscitus*)
Shaded-litter Rainbow-skink (*Carlia munda*)
Striped skink (*Ctenotus robustus*)
Fire-tailed skink (*Morethia taeniopleura*)
Snake-eyed skink (*Cryptoblepharus virgatus*)
Bynoe's gecko (*Heteronotia binoei*)
Crab shells

Notable weeds

Parthenium (*Parthenium hysterophorus*)
Rhodes (*Chloris gayana*)
Velvety tree pear (*Opuntia tomentosa*)
Tiger pear (*O. aurantiaca*)
Buffel grass (*Pennisetum ciliare*)

General Notes:

Photo: 3028-3037

Warm-hot sunny with partly cloudy. Moderate easterly blowing and humid.



Brigalow community on black soils



Fallen timber on black soils

Client/Project:	Secondary Site 6	Unidel Staff:	Mitchell Taylor
Stakeholder:	QCoal	Date:	13/04/2012
Representative:	Vegetated Knoll	Time:	1:15pm
File Reference: in the general vicinity of the gate			
<u>Notes:</u> This site consists of a small, vegetated knoll on lateritic rock. This knoll is surrounded by broad low plains of sandy clay loam and black soils. The knoll is generally steep with rocky outcrops supporting, small crevices and poorly developed caves. The knoll is well vegetated with a moderate canopy of lancewood on the higher rocky outcrops brigalow dominates on the wash out plains. Throughout the canopy layer suppressed Emu apple (<i>Owenia acidula</i>) and Acacia species occur, more notably on the lower slopes. The shrub layer is sparse and consists of regenerating canopy species. The ground layer is moderate to sparse and dominated by improved pastoral grasses with suppressed native grasses occurring on poorer soils. The higher escarpment areas are generally rocky with shallow soils. These escarpments provide small cliffs ~2m with small crevices and caves providing habitat from herpetile species and potentially other terrestrial fauna. <u>Species:</u> Wedge-tailed eagle (<i>Aquila audax</i>) Red-backed fairy-wren (<i>Malurus melanocephalus</i>) Grey butcherbird (<i>Cracticus torquatus</i>) Laughing kookaburra (<i>Dacelo novaeguineae</i>) Pale-headed rosella (<i>Platycercus adscitus</i>) Bynoe's gecko (<i>Heteronotia binoei</i>) Wallaroo (<i>Macropus robustus</i>) Magpie (<i>Cracticus tibicen</i>) Pied butcherbird (<i>Cracticus nigrogularis</i>)			
<u>General Notes:</u> Photo point 3041-3046 Humid and cloudy with constant easterly wind with occasional gusts.			



Exposed rocky soils and fallen timber on isolated rocky knoll surrounded by black soil plains



Good density of fallen timber on rocky knoll

Client/Project:	Secondary Site 7	Unidel Staff:	Mitchell Taylor
Stakeholder:	QCoal	Date:	13/04/2012
Representative:	Regrowth on clay loam	Time:	2:00pm
File Reference: 4131E6FD41			

Notes:

This site occurs on sandy clay loams at the base of an extensive sandstone escarpment and Mesozoic knoll. A number of historical fence lines and access tracks traverse throughout this site, with current light grazing activity occurring.

The canopy layer is generally low regenerating brigalow between 3-5 m with elements of semi-evergreen vine thicket (SEVT) and scrub species. Sporadic bottle trees (*Brachychiton* sp.) occur in the canopy layer between 3-6m. The shrub layer is moderate to dense and for the most part gradually merges into the canopy layer. In places creating as dense thicket that provides good habitat for passerines and terrestrial fauna. This layer is consists of regenerating SEVT and canopy species. The ground layer is moderate to sparse and in places absent where soils become skeletal. It consists of native and improved pastoral grasses with scalded areas supporting nude soils and rock. The site's relief is generally flat and soils range from skeletal rocky outcrops to deep clay plains often supporting cracking black clays. It was noted that historical earthworks through this plain have created numerous artificial drainage lines through this regenerating vegetation. Little fallen timber is low to absent within this site, most likely due to historical management practices. Passerine activity was common within this habitat type given the density of the shrub layer.

Parthenium (*Parthenium hysterophorus*) and velvety tree pear (*Opuntia tomentosa*) were noted within this habitat and should be treated.

Species recorded during active searches:

Nobby dragon (*Amphibolurus nobbi*)
White-bellied cuckoo-shrike (*Coracina papuensis*)
Yellow thornbill (*Acanthiza nana*)
Spangled drongo (*Dicrurus bracteatus*)
Yellow-throated miner (*Manorina flavigula*)
Grey butcherbird (*Cracticus torquatus*)
Red-backed fairy-wren (*Malurus melanocephalus*)
Brown honeyeater (*Lichmera indistincta*)
Magpie (*Cracticus tibicen*)
Double-barred finch (*Taeniopygia bichenovii*)
Striated pardalote (*Pardalotus striatus*)
Pig (*Sus scrofa*)
Fire-tailed skink (*Morethia taeniopleura*)
Rainbow skink (*Carlia vivax*)

General Notes:

Photo: 3047-3056

Mild-warm, cloudy, humid with gusts of wind.



Brigalow regrowth on loamy clay (note: historical access tracks and drains throughout remnant)



Brigalow on loamy clay with semi-evergreen vine thicket

Client/Project:	Secondary Site 8	Unidel Staff:	Mitchell Taylor
Stakeholder:	QCoal	Date:	13/04/2012
Representative:	Sandstone Escarpment	Time:	2:40pm
File Reference: 6B2CF0E02A			

Notes:

The site consists of a sandstone escarpment which runs in an east – west orientation. This habitat type is typical of northern facing sandstone escarpments in central MLA. It is weathered sandstone plateau with small cliffs at the ridge top, steep sloping wash out slopes (colluvial) supporting rocky/sandy soils, large plains the base supporting sandy clay loams or cracking black soils.

The canopy is generally a mixture of lancewood and Eucalypt species with occasional brigalow individuals occurring between 8-12 m. The lower slope canopy blends into Brigalow forest where soils become deeper. The shrub layer is sparse along the escarpment and is comprised of regenerating canopy species; however some small pockets of SEVT occur within gullies. The ground layer is sparse and consists of native grass species; however a small incursion of improved pasture grasses. Large rocky outcrops and rocky soils provide good herpetile habitat with small caves providing good habitat herpetiles and other small terrestrial species.

Notable weed species prickly pear and buffel grass.

Species recorded during active searches:

Striated pardalote (*Pardalotus striatus*)
 Grey butcherbird (*Cracticus torquatus*)
 Yellow-throated miner (*Manorina flavigula*)
 Black-faced cuckoo-shrike (*Coracina novaehollandiae*)
 Grey-shrike thrush (*Colluricincla harmonica*)
 Rufous whistler (*Pachycephala rufiventris*)
 Satin bowerbird (*Ptilonorhynchus violaceus*)
 Apostle bird (*Struthidea cinerea*)
 Grey-crowned babbler (*Pomatostomus temporalis*)
 Lewin's honeyeater (*Meliphaga lewinii*)
 Leaden flycatcher (*Myiagra rubecula*)
 Blue-faced honeyeater (*Entomyzon cyanotis*)
 Spangled drongo (*Dicrurus bracteatus*)
 Pale-headed rosella (*Platycercus adscitus*)
 Singing honeyeater (*Lichenostomus virescens*)
 Little friarbird (*Philemon citreogularis*)
 Fire-tailed skink (*Morethia taeniopleura*)

General Notes:

Photo 3058 - 3064

Warm and humid overcast afternoon gusty easterlies



Small cave habitat located on the top of the sandstone escarpment (note no extensive caves were located during survey).



View east across escarpment

Client/Project:	Secondary Site 9	LAC:	Mitchell Taylor
Stakeholder:	QCoal	Date:	13/04/2012
Representative:	Sandstone Plateau Remnant	Time:	3:00pm
File Reference: 2491B8DC6A			
<u>Notes:</u> This site occurs on a sandstone plateau in the central eastern portions of the MLA. It is generally a flat plateau which dramatically falls into a broad clay plain to the north. The site supports remnant open woodland typical of the locality. Soils were noted as being sandy with small coarse rocky elements. Generally the canopy layer is sparse and consists of ironbark (<i>Eucalyptus</i> sp.) and spotted gum (<i>Corymbia citriodora</i>) between 7-10 m (no hollows detected within the immediate vicinity of the search). The shrub layer is moderate and consists of regenerating SEVT which includes juvenile bottle trees (<i>Brachychiton</i> sp.). The ground layer is dense and typically supports improved pasture and native grasses. The site supported very little fallen debris and is likely to be a result of historical land management and inappropriate fire regimes. Rocky habitats occurs along the northern edge of this habitat type in the form of a continual sandstone escarpment. Prickly pear (<i>Opuntia stricta</i>) occurs in low densities throughout this site. <u>Species:</u> Rufous whistler (<i>Pachycephala rufiventris</i>) Pied currawong (<i>Strepera graculina</i>) Red-backed fairy-wren (<i>Malurus melanocephalus</i>) Yellow thornbill (<i>Acanthiza nana</i>) Weebill (<i>Smicrornis brevirostris</i>) Magpie (<i>Cracticus tibicen</i>) Grey butcherbird (<i>Cracticus torquatus</i>) Crested pigeon (<i>Ocyphaps lophotes</i>) Pied butcherbird (<i>Cracticus nigrogularis</i>) Black-faced cuckoo-shrike (<i>Coracina novaehollandiae</i>) Laughing kookaburra (<i>Dacelo novaeguineae</i>) Striped honeyeater (<i>Plectorhyncha lanceolata</i>) Singing honeyeater (<i>ILichenostomus virescens</i>) Brown honeyeater (<i>Lichmera indistincta</i>)			
<u>General Notes:</u> Photos: 3065-3073 Warm afternoon, windy and cloudy.			



Eucalypt remnant atop sandstone plateau with semi-evergreen vine thicket species in understorey



Eucalypt remnant atop sandstone plateau with semi-evergreen vine thicket understorey (not red soils with rocky elements)

Client/Project:	Secondary Site 10	Unidel Staff:	Mitchell Taylor
Stakeholder:	QCoal	Date:	14/04/2012
Representative:	Ironbark Open Forest	Time:	4:20pm
File Reference: GPS No: 7B3F36241B			
<u>Notes:</u> This site occurs on a broad undulating plain of sandy road loams and supports remnant open forest or regenerating shrubs. The soils are typically a deep red with stony properties. This site is surrounded by historically cleared land which is currently regenerating (~2 metres tall at the time of survey). The canopy layer is dominated by ironbark (<i>Eucalyptus</i> sp.) with suppressed bloodwood (<i>Corymbia</i> sp.) between 10-15 m and is sparse. No hollow bearing trees were observed within the immediate search area, however numerous dead trees with decorticated bark and crevices occur within this site. The shrub layer is between 2-6 m and consists of canopy species and regenerating SEVT shrubs and suppressed Acacia species. The ground cover is dense and dominated by improved pastures 0-1 m. Fallen timber is low with little senescing trees occurring within the canopy or shrub layer. Fire history 5+ years with little evidence throughout this site. <u>Species recorded during active searches:</u> Collared sparrowhawk (<i>Accipiter cirrhocephalus</i>) Yellow-throated miner (<i>Manorina flavigula</i>) Lack of records due to time of day, heat and foraging collard sparrowhawk.			
<u>General Notes:</u> Photo: 3074-3080; 3081 (<i>Flindersia</i> sp. remnant of Collinsville Scrubs) Sunny afternoon, southerly strong wind			



Remnant ironbark forest on sandy plains with semi-evergreen vine thicket understorey.



Remnant *Flindersia australis*- possibly retained as a shade tree for cattle. Most likely a remnant of the Collinsville scrub.

Client/Project:	Secondary Site 11	Unidel Staff:	Mitchell Taylor
Stakeholder:	QCoal	Date:	14/04/2012
Representative:	Poplar box on alluvial flats	Time:	11:30am
File Reference: 266D9C5413			

Notes:

The site occurs on alluvial flats in the central southern portions of the MLA. This area forms a lower drainage line within broad clay plains which have been subject to broad scale clearing. The site supports a linear strip of poplar box (*Eucalyptus populnea*) open wood land which is connective to larger parcels of vegetation to the south and west. This vegetation has however been subjected to historical thinning and management for the keeping of cattle.

The canopy layer is generally sparse and dominated by poplar box (*E. populnea*) with suppressed spotted gum (*Corymbia citriodora*) present on higher slopes. This layer occurs between 10-15 m with most trees being relatively young and little senescing limbs/hollows. The shrub layer is dominated by regenerating brigalow (*Acacia harpophylla*), most notably on lower slopes where the canopy layer becomes thin. Juvenile canopy species and native shrubs occur sporadically outside of brigalow dominant areas to form a small portion of the shrub layer. The ground layer is dense and consists of improved pastures such as buffel grass (*Pennisetum ciliare*) and Indian blue grass (*Bothriochloa pertusa*). No recent evidence of fire was observed within this site, however surrounding pastures are likely to have been frequently burnt for regrowth maintenance and cattle fodder. Fallen timber is low and possibly a result of grazing activities.

Species:

Double-barred finch (*Taeniopygia bichenovii*)
Golden-headed cisticola (*Cisticola exilis*)
Red-backed fairy-wren (*Malurus melanocephalus*)
Australasian pipit (*Anthus novaeseelandiae*)
Tree martin (*Petrochelidon nigricans*)
Wedge-tailed eagle (*Aquila audax*)
Horsefield's bushlark (*Mirafrja javanica*)
Australian hobby (*Falco longipennis*)
Torresian crow (*Corvus orru*)
Rainbow Lorikeet (*Trichoglossus haematodus*)
Yellow-throated miner (*Manorina flavigula*)

General Notes:

Mild day, overcast, moderate SE wind. Rain possibly on its way.

Photos: 3087-3095



Poplar box on alluvial flats, disturbed understorey from grazing pressures.



Brigalow regenerating within watercourse with poplar box overstorey.

Client/Project:	Secondary Site 12	Unidel Staff:	Mitchell Taylor
Stakeholder:	QCoal	Date:	14/04/2012
Representative:	Poplarbox/scrub on sandy plains	Time:	12:30pm
File Reference: GPS No: 5261800823			

Notes:

This site is comprised of poplar box (*Eucalyptus populnea*) open forest with SEVT scrub on flat sandy plains. This community occurs on red sandy soil. Evidence of historical thinning, fire and grazing was evident throughout this site however regenerating and relict trees provide a moderate habitat value for many fauna species. This parcel of vegetation has been severed from other parcels of vegetation in close proximity, however it provides a good island of habitat.

This sites canopy is sparse and occurs between 8-14 m with sporadic emergent relict canopy trees dominating this layer. The canopy layer also supports suppressed bloodwood (*Corymbia* sp.) and Eucalypt species. The canopy layer supports a low density of hollow bearing features, however hollows are a valuable resource in degraded landscapes and are likely to be heavily utilised in this site. The shrub layer is moderate (dense in patches) and occurs between 2-6 m. This layer is generally dominated by brigalow (*Acacia harpophylla*) with suppressed bottle trees (*Brachychiton* sp.). Numerous pockets of SEVT occur sporadically and are also beginning to regenerating in open areas. Buffel grass (*Pennisetum ciliare*) dominates the ground layer and in parts suppressing the regeneration of native wood vegetation. Generally this site provides moderate habitat for fauna, however the ground layer and lack of fallen timber reduces the quality of the terrestrial habitat.

Species recorded during active searches:

Double-barred finch (<i>Taeniopygia bichenovii</i>)	Spiny-cheeked honeyeater (<i>Acanthagenys rufogularis</i>)
Red-backed fairy-wren (<i>Malurus melanocephalus</i>)	Rufous fantail (<i>Rhipidura rufifrons</i>)
Nankeen kestrel (<i>Falco cenchroides</i>)	Willie wagtail (<i>Rhipidura leucophrys</i>)
Little friarbird (<i>Philemon citreogularis</i>)	Variegated fairy-wren (<i>Malurus lamberti</i>)
Grey fantail (<i>Rhipidura albiscapa</i>)	White-winged fairy-wren (<i>Malurus leucopterus</i>)
Singing honeyeater (<i>ILichenostomus virescens</i>)	Weebill (<i>Smicromis brevirostris</i>)
Rufous whistler (<i>Pachycephala rufiventris</i>)	Red-winged parrot (<i>Aprosmictus erythropterus</i>)
Wedge-tailed eagle (<i>Aquila audax</i>)	Skink (<i>Carlia foliorum</i>)
Spangled drongo (<i>Dicrurus bracteatus</i>)	2 x Eastern grey kangaroo (<i>Macropus giganteus</i>)
Spotted bowerbird (<i>Ptilonorhynchus maculatus</i>)	

General Notes:

Photo: 3096-3106. Mild to warm, overcast and moderate easterly winds



Poplar box on alluvial plains with semi-evergreen vine thicket understorey (note hollow bearing trees common)



Poplar box on alluvial plains with semi-evergreen vine thicket understorey (note hollow bearing trees common)

Client/Project:	Secondary Site 13	Unidel Staff:	Mitchell Taylor																																										
Stakeholder:	QCoal	Date:	14/04/2012																																										
Representative:	Farm dam with blue gum & brigalow	Time:	1:45-2:15																																										
File Reference: 19BFD41D3D																																													
<u>Notes:</u> The site is formed by an on line farm dam within a wide alluvial system. The site has been heavily impacted by cattle grazing and is currently utilized for the watering of cattle. The soils are quite dark and heavy clays. The canopy layer is patchy and moderately dense where it occurs. The canopy layer surrounding the dam is comprised of blue gum (<i>Eucalyptus tereticornis</i>) and has an intact canopy between 12-16m. This layer abruptly ends where the damming of water terminates, and brigalow (<i>Acacia harpophylla</i>) forest becomes the dominant vegetation community, and is restricted to the alluvial areas. This brigalow forest occurs between 6-10 m. The shrub layer is generally absent due to intense cattle grazing pressures. The ground layer consists of two distinct types. Generally all areas outside of the wet areas surrounding the dam consist of improved pasture grasses. The areas which surround the dam, particularly the lower lying areas which become inundated after rain support a wide array of wetland vegetation and provide good habitat for cryptic wetland birds such as rails, crakes, bitterns and snipes. <u>Species recorded during active searches:</u> <table border="0"> <tr> <td>Masked lapwing plover (<i>Vanellus miles</i>)</td><td>Sulphur-crested cockatoo (<i>Cacatua galerita</i>)</td></tr> <tr> <td>Blue-winged kookaburra (<i>Dacelo leachii</i>)</td><td>Short-necked turtle (<i>Emydura</i> sp.)</td></tr> <tr> <td>Magpie lark (<i>Grallina cyanoleuca</i>)</td><td>Whistling kite (<i>Haliastur sphenurus</i>)</td></tr> <tr> <td>Magpie (<i>Cracticus tibicen</i>)</td><td>White-necked heron (<i>Ardea pacifica</i>)</td></tr> <tr> <td>Apostle bird (<i>Struthidea cinerea</i>)</td><td>Brolga (<i>Grus rubicunda</i>)</td></tr> <tr> <td>Australian wood duck (<i>Chenonetta jubata</i>)</td><td>Pig (<i>Sus scrofa</i>)</td></tr> <tr> <td>Pacific black duck (<i>Anas superciliosa</i>)</td><td>Striated pardalote (<i>Pardalotus striatus</i>)</td></tr> <tr> <td>Cattle Egret (<i>Ardea ibis</i>)</td><td></td></tr> <tr> <td>Intermediate egret (<i>Ardea intermedia</i>)</td><td></td></tr> <tr> <td>White-faced heron (<i>Egretta novaehollandiae</i>)</td><td></td></tr> <tr> <td>Torresian crow (<i>Corvus orru</i>)</td><td></td></tr> <tr> <td>Black-fronted dotterel (<i>Elseyornis melanops</i>)</td><td></td></tr> <tr> <td>Nankeen kestrel (<i>Falco cenchroides</i>)</td><td></td></tr> <tr> <td>Black-shouldered kite (<i>Elanus axillaris</i>)</td><td></td></tr> <tr> <td>Wedge-tailed eagle (<i>Aquila audax</i>)</td><td></td></tr> <tr> <td>Grey teal (<i>Anas gracilis</i>)</td><td></td></tr> <tr> <td>Pale-headed rosella (<i>Platycercus adscitus</i>)</td><td></td></tr> <tr> <td>Willie wagtail (<i>Rhipidura leucophrys</i>)</td><td></td></tr> <tr> <td>Yellow-throated miner (<i>Manorina flavigula</i>)</td><td></td></tr> <tr> <td>Straw-necked ibis (<i>Threskiornis spinicollis</i>)</td><td></td></tr> <tr> <td>Galah (<i>Eolophus roseicapillus</i>)</td><td></td></tr> </table>				Masked lapwing plover (<i>Vanellus miles</i>)	Sulphur-crested cockatoo (<i>Cacatua galerita</i>)	Blue-winged kookaburra (<i>Dacelo leachii</i>)	Short-necked turtle (<i>Emydura</i> sp.)	Magpie lark (<i>Grallina cyanoleuca</i>)	Whistling kite (<i>Haliastur sphenurus</i>)	Magpie (<i>Cracticus tibicen</i>)	White-necked heron (<i>Ardea pacifica</i>)	Apostle bird (<i>Struthidea cinerea</i>)	Brolga (<i>Grus rubicunda</i>)	Australian wood duck (<i>Chenonetta jubata</i>)	Pig (<i>Sus scrofa</i>)	Pacific black duck (<i>Anas superciliosa</i>)	Striated pardalote (<i>Pardalotus striatus</i>)	Cattle Egret (<i>Ardea ibis</i>)		Intermediate egret (<i>Ardea intermedia</i>)		White-faced heron (<i>Egretta novaehollandiae</i>)		Torresian crow (<i>Corvus orru</i>)		Black-fronted dotterel (<i>Elseyornis melanops</i>)		Nankeen kestrel (<i>Falco cenchroides</i>)		Black-shouldered kite (<i>Elanus axillaris</i>)		Wedge-tailed eagle (<i>Aquila audax</i>)		Grey teal (<i>Anas gracilis</i>)		Pale-headed rosella (<i>Platycercus adscitus</i>)		Willie wagtail (<i>Rhipidura leucophrys</i>)		Yellow-throated miner (<i>Manorina flavigula</i>)		Straw-necked ibis (<i>Threskiornis spinicollis</i>)		Galah (<i>Eolophus roseicapillus</i>)	
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<u>General notes:</u> Photo: 3107-3118. Cloudy, humid day																																													



On line farm dam with stands of blue gum with wetland understorey



Brigalow woodland along the lower end of on line dam and continuing along watercourse

Client/Project:	Secondary Site 14	Unidel Staff:	Mitchell Taylor
Stakeholder:	QCoal	Date:	14/04/2012
Representative:	Poplar box on sandy plains	Time:	2:40pm
File Reference: 5DIF23E862			

Notes:

This site is a linear corridor (~500-700 m) of remnant poplar box (*Eucalyptus populnea*) open forest that occurs on sandy plains in the south of the MLA. This vegetation is connective with a vegetated corridor which joins the Suttor River riparian corridor. The site has been subject to historical thinning and grazing pressures, however habitats remain in a moderate condition with numerous habitat features present.

The canopy layer is moderately dense with a mixture of relict and regenerating canopy trees. This layer is dominated by poplar box (*E. populnea*) between 8-12 m with a number of relict canopy trees, numerous bearing hollow or sensing limbs. Hollow features and may be a valuable resource in an altered environment and heavily utilised within the locality by fauna such as owls, parrots, gliders, etc. The shrub layer is sparse and low. This layer consists of a mixture of semi-evergreen vine thicket and juvenile canopy species. The ground layer is moderate to dense and occurs between 0-1 m. It is generally composed of improved pasture grasses including Indian blue grass (*Bothriochloa pertusa*) and buffel grass (*Pennisetum ciliare*). This corridor provides a relatively good parcel of habitat, particularly due to its connectivity to other remnant parcels such as the Suttor River (This area is particularly good for koala habitat, however no evidence was observed). No evidence of recent fire and it is likely to have been 5 years between fire events. Fallen timber and debris is low; however what timber or debris is present was of good quality for terrestrial habitat.

Species recorded during active searches:

Spotted python (*Antaresia maculosa*)
Grey-crowned babbler (*Pomatostomus temporalis*)
Yellow-throated miner (*Manorina flavigula*)
Wedge-tailed eagle (*Aquila audax*)
Skink (*Carlia foliorum*)
Eastern mulch slider (*Lerista fragilis*)
Spotted bowerbird (*Ptilonorhynchus maculatus*)
Pheasant coucal (*Centropus phasianinus*)
Magpie (*Cracticus tibicen*)
Bynoe's gecko (*Heteronotia binoei*)
Gecko (large with narrow tail)
Grey butcherbird (*Cracticus torquatus*)
Pied butcherbird (*Cracticus nigrogularis*)
Red-backed fairy-wren (*Malurus melanocephalus*)
Australasian pipit (*Anthus novaeseelandiae*)
Horsefield's bushlark (*Mirafrja javanica*)

General Notes:

Photos: 3119-3125; 3125-3131 (GC Babbler); 3132 Spotted python (*Antaresia maculosa*)

Windy, overcast warm/mild mid-20s.



Hollow bearing limbs are common throughout this habitat



Good canopy habitat throughout this habitat, understorey is been heavily impacted by cattle grazing however still provides habitat for a wide range of larger terrestrial species as well as small mammals and reptiles.



Good fallen timber throughout this habitat, particularly larger fallen logs.

Client/Project:	Trapping Site NE Black soil Remnant	Unidel Staff:	Mitchell Taylor
Stakeholder:	QCoal	Date:	16/04/2012
Representative:	Brigalow/sclerophyll open forest	Time:	7:00am
File Reference: See trapping locations			
<u>Notes:</u>			
The North Eastern Primary Site occurs on a broad undulating black soil plain which has been largely cleared for the keeping of cattle. The soils are dark in colour and consistent with loamy clays which often were deeply cracked providing good habitat for small terrestrial fauna. The undulating clay plain has numerous eroded gully lines traversing it, all of which to the north east into Kangaroo Creek. The site is in close proximity to a major tributary of Kangaroo Creek which at the time of the survey was consistently flowing. Although recent rain had occurred within the locality, water seeping from springs was noted on higher areas to the south. Habitats can be divided into two major types within this Primary Site being; riparian vegetation and brigalow (<i>Acacia harpophylla</i>) forest. The majority of both habitat types have been heavily disturbed by grazing activities. The brigalow (<i>A.harpophylla</i>) canopy layer is moderate, with areas of bare canopy. This layer occurs between 4- 7 m with sporadic eucalypt emergent to 10 m. The shrub layer within this habitat is almost absent. Small clumps of currant bush (<i>Carissa ovata</i>) at the base of some brigalow trees (<i>A.harpophylla</i>) form the majority of this layer and generally occur from 0.5 – 1.5m. The ground layer is dense and dominated by Indian blue grass (<i>Bothriochloa pertusa</i>). The canopy layer within riparian areas consists of a mixture of eucalypt, casuarina, melaleuca and corymbia species and is spares. This layer consists of individual relict trees retained along the banks and flood terraces of the unnamed creek. The shrub layer is almost absent, however small pockets of SEVT occur on the low flow terraces (most likely retained as shade for cattle). The ground layer is dense and is dominated by Indian blue grass (<i>B.pertusa</i>). Woody debris and habitats such as sandy banks are common throughout this habitat and provide good quality denning and roosting sites for species such as bee-eaters, pardalotes and terrestrial fauna such as reptiles and mammals. The majority of the trapping line for this primary site was set within brigalow (<i>A.harpophylla</i>) remnants on the black soil plain. Some trapping locations were utilised within the aforementioned tributary (namely harps, camera and funnel traps). Numerous weed species were encountered during the surveys, however the following weeds of nation significance were note throughout the site: Velvety tree pear (<i>Opuntia tomentosa</i>); parthenium (<i>Parthenium hysterophorus</i>); and tiger pear (<i>O.aurantiaca</i>). ○ Evidence of fire <5 years ○ Rocky habitats occur within creek line, however not significant; ○ Weeds are moderate and include weeds of national significance; ○ Ground cover is generally good >80%, however mainly Indian blue grass (<i>Bothriochloa pertusa</i>); ○ Fallen timber in remnant is low, however woody debris in the creek line is good; and ○ Regenerating scrub species, particularly along the edge of cleared areas.			
<u>General Notes:</u>			
Photos: 3158-3171 (black soil plain with traps, weeds and habitat); 3172 (random patch of eucalvpt)			
Species List Next Page			



Sporadic occurrences of eucalypts on black soils



Typical remnant brigalow (*Acacia harpophylla*) habitat with currant bush (*Carissa ovata*).



Pit fall line in black soil with fallen timber surrounding the trapping site



Clays dug up by crow bar/shovel

Client/Project:	NE Black Soil Site	Unidel Staff:	Mitchell Taylor		
Stakeholder:	QCoal	Date:	16/4/2012		
Representative:	Black Soil	Time:	7:00-8:00 am		
File Reference: See North East Trapping Location					
<u>Species recorded during active serches:</u> <table border="0"> <tr> <td> Striated pardalote (<i>Pardalotus striatus</i>) Grey butcherbird (<i>Cracticus torquatus</i>) Pied butcherbird (<i>Cracticus nigrogularis</i>) Magpie (<i>Cracticus tibicen</i>) Red-winged parrot (<i>Aprosmictus erythropterus</i>) Brown honeyeater (<i>Lichmera indistincta</i>) Willie wagtail (<i>Rhipidura leucophrys</i>) Pale-headed rosella (<i>Platycercus adscitus</i>) Pacific baza (<i>Aviceda subcristata</i>) Torresian crow (<i>Corvus orru</i>) Pied currawong (<i>Strepera graculina</i>) Laughing kookaburra (<i>Dacelo novaeguineae</i>) Yellow-throated miner (<i>Manorina flavigula</i>) Rainbow Lorikeet (<i>Trichoglossus haematodus</i>) </td> <td> Black-faced woodswallow (<i>Artamus cinereus</i>) Grey-crowned babbler (<i>Pomatostomus temporalis</i>) Red-backed fairy-wren (<i>Malurus melanocephalus</i>) <i>Carlia schemltzi</i> Bynoe's gecko (<i>Heteronotia binoei</i>) Oscillated velvet gecko (<i>Oedura monolis</i>) Black-faced cuckoo-shrike (<i>Coracina novaehollandiae</i>) <i>Cryptoblepharus vigatus</i> Wedge-tailed eagle (<i>Aquila audax</i>) Grey shrike-thrush (<i>Colluricincla harmonica</i>) Striped honeyeater (<i>Plectorhyncha lanceolata</i>) Zig zag velvet gecko (<i>Oedura rhombifer</i>) </td> </tr> </table>				Striated pardalote (<i>Pardalotus striatus</i>) Grey butcherbird (<i>Cracticus torquatus</i>) Pied butcherbird (<i>Cracticus nigrogularis</i>) Magpie (<i>Cracticus tibicen</i>) Red-winged parrot (<i>Aprosmictus erythropterus</i>) Brown honeyeater (<i>Lichmera indistincta</i>) Willie wagtail (<i>Rhipidura leucophrys</i>) Pale-headed rosella (<i>Platycercus adscitus</i>) Pacific baza (<i>Aviceda subcristata</i>) Torresian crow (<i>Corvus orru</i>) Pied currawong (<i>Strepera graculina</i>) Laughing kookaburra (<i>Dacelo novaeguineae</i>) Yellow-throated miner (<i>Manorina flavigula</i>) Rainbow Lorikeet (<i>Trichoglossus haematodus</i>)	Black-faced woodswallow (<i>Artamus cinereus</i>) Grey-crowned babbler (<i>Pomatostomus temporalis</i>) Red-backed fairy-wren (<i>Malurus melanocephalus</i>) <i>Carlia schemltzi</i> Bynoe's gecko (<i>Heteronotia binoei</i>) Oscillated velvet gecko (<i>Oedura monolis</i>) Black-faced cuckoo-shrike (<i>Coracina novaehollandiae</i>) <i>Cryptoblepharus vigatus</i> Wedge-tailed eagle (<i>Aquila audax</i>) Grey shrike-thrush (<i>Colluricincla harmonica</i>) Striped honeyeater (<i>Plectorhyncha lanceolata</i>) Zig zag velvet gecko (<i>Oedura rhombifer</i>)
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<u>General Notes:</u>					

Client/Project:	Secondary Site 15	Unidel Staff:	Mitchell Taylor
Stakeholder:	QCoal	Date:	16/04/2012
Representative:	Alluvial System proximate to NE traps	Time:	10:30am
File Reference: 2BA763B33F			

Notes:

Secondary site 15 takes the form of an alluvial system bisecting broad black soil plains.

The site is in close proximity to a major tributary of Kangaroo Creek which at the time of the survey was consistently flowing. Although recent rain had occurred within the locality, water seeping from springs was noted on higher areas to the south.

The canopy layer within riparian areas consists of a mixture of Eucalypt, Casuarina, Melaleuca and Corymbia species and is sparse. This layer consists of individual relict trees retained along the banks and flood terraces of the unnamed creek. The shrub layer is almost absent, however small pockets of SEVT occur on the low flow terraces (most likely retained as shade for cattle). The ground layer is dense and is dominated by Indian blue grass (*Bothriochloa pertusa*). Woody debris and habitats such as sandy banks are common throughout this habitat and provide good quality denning and roosting sites for species such as bee-eaters, pardalotes and terrestrial fauna such as reptiles and mammals.

Species recorded during active searches:

Brown honeyeater (*Lichmera indistincta*)
Laughing kookaburra (*Dacelo novaeguineae*)
Black-faced cuckoo-shrike (*Coracina novaehollandiae*)
Striated pardalote (*Pardalotus striatus*)
Spotted bowerbird (*Ptilonorhynchus maculatus*)
Yellow-throated miner (*Manorina flavigula*)
Pacific baza (*Aviceda subcristata*)
Chesnut breasted mannikin
Red-backed fairy-wren (*Malurus melanocephalus*)
Red-winged parrot (*Aprosmictus erythropterus*)
Pale-headed rosella (*Platycercus adscitus*)
Rainbow Lorikeet (*Trichoglossus haematodus*)
Torresian crow (*Corvus orru*)
Magpie (*Cracticus tibicen*)

Pied butcherbird (*Cracticus nigrogularis*)
Grey butcherbird (*Cracticus torquatus*)
Grey-crowned babbler (*Pomatostomus temporalis*)
Little friarbird (*Philemon citreogularis*)
Collared sparrowhawk (*Accipiter cirrhocephalus*)
Fox (*Vulpes vulpes*)
Dog (*Canis familiaris*)
Ctenotus robustus
Cryptoblepharus virgatus
Skink (*Carlia foliorum*)
Yellow honeyeater (*Lichenostomus flavus*)
Olive-backed oriole (*Oriolus sagittatus*)

Weeds

Tiger Pear (*Opuntia aurantiaca*)
Velvety tree pear (*O. tomentosa*)
Parthenium (*Parthenium hysterophorus*)
Buffel grass (*Pennisetum ciliare*)

Actions Arising:

Photos: 3173-3193
Slight breeze, warm-hot, sunny



Pockets of semi-evergreen vine thicket along creek bank with eucalypt canopy.



Exposed outer banks of the creek provide nesting habitat for birds and a good flyway for microbats.



Exposed bedrock along creek line and typical vegetation structure along alluvial system.

Client/Project:	Secondary Site 16	Unidel Staff:	Mitchell Taylor
Stakeholder:	QCoal	Date:	16/04/2012
Representative:	Brigalow and mix Eucalyptus woodland on Suttor River alluvial plain	Time:	2:00pm
File Reference: 629E3A551D			

Notes:

Secondary Site 16 occurs on generally flat sandy plains which adjoin the Suttor River (flood terraces). This site has suffered from historical grazing pressures and canopy thinning for the purposes of keeping cattle. The canopy layer is sparse and dominated by emergent eucalypt species most notably poplar box (*Eucalyptus populnea*) between 10 – 14 m. Hollows were not common within this site despite the size of many emergent trees. Numerous stags do however regularly occur throughout this site and potentially provide good roosting habitat for microbat and reptile species. The shrub layer is moderate to dense and occurs between 4-7m. It is dominated by brigalow (*Acacia harpophylla*) with occasional clumps of SEVT species occurring. The ground layer is dense and dominated by pastoral grasses between 0 – 1.5 m. This layer is heavily dominated by Indian blue grass (*Bothriochloa pertusa*) and buffle grass (*Cenchrus ciliaris*) with native species being suppressed. Fallen timber is common throughout this site, however dense pastoral grass growth has covered many of these logs and it is difficult to determine their density and quality. No recent evidence of fire was discovered within remnant, however grasses would indicate 5-10 years.

Species recorded during active searches:

Magpie lark (*Grallina cyanoleuca*)
 Restless flycatcher (*Myiagra inquieta*)
 Striated pardalote (*Pardalotus striatus*)
 Bar-shouldered dove (*Geopelia humeralis*)
 Peaceful dove (*Geopelia placida*)
 Willie wagtail (*Rhipidura leucophrys*)
 Grey butcherbird (*Cracticus torquatus*)
 Yellow thornbill (*Acanthiza nana*)
 Short-necked worm-skink (*Anomalopus brevicollis*)

General Notes:

Photo: 3194-3200

Moderate wind, partially cloudy, humid.



Brigalow (*Acacia harpophylla*) woodland with emergent eucalyptus species on Suttor River Flood Plain.



Brigalow (*Acacia harpophylla*) forest on Suttor River Flood Plain.

Client/Project:	Secondary Site 17	Unidel Staff:	Mitchell Taylor
Stakeholder:	QCoal	Date:	16/04/2012
Representative:	Suttor River & low flow terrace	Time:	2:30pm
File Reference: 3E28F45B32			
<u>Notes:</u>			
Secondary Site 17 is found on the Suttor River and its associated low flow terrace. The Suttor River provides a large contiguous faunal corridor throughout the broader region which has been subjected to significant broad scale clearing. Vegetated corridors in these largely cleared landscapes are an important ecological feature and allow for the movement of fauna through the landscape. The canopy layer within this corridor is moderate and dominated by Queensland blue gum (<i>Eucalyptus tereticornis</i>) and/or river red gum (<i>E.camaldulensis</i>) with occasional polar box (<i>E.populnea</i>). This layer occurs between 10-15 m. Within the surveyed areas it was noted that there was a low density of trees that supported hollow features. The mid strata is moderate to sparse and occurs between 2-6 m. this layer is generally dominated by melaleuca species, however there is small pockets of SEVT species occurring sporadically. The ground layer is dense, however is dominated improved pastoral grasses, with occasional areas where mattrush (<i>Lomandra</i> sp.) and sedge species occur. A high density of fallen timber and debris occur within these habitats due to regular flood waters moving debris along the river as well as historical tree felling. No evidence of fire was noted during the surveys.			
<u>Species recorded during active searches:</u>			
Striated pardalote (<i>Pardalotus striatus</i>) Australian wood duck (<i>Chenonetta jubata</i>) Grey butcherbird (<i>Cracticus torquatus</i>) Pied butcherbird (<i>Cracticus nigrogularis</i>) Magpie lark (<i>Grallina cyanoleuca</i>) Brown honeyeater (<i>Lichmera indistincta</i>) Pale-headed rosella (<i>Platycercus adscitus</i>) Red-winged parrot (<i>Aprosmictus erythropterus</i>) Sulphur-crested cockatoo (<i>Cacatua galerita</i>) Rainbow bee-eater (<i>Merops ornatus</i>) Laughing kookaburra (<i>Dacelo novaeguineae</i>) Spotted bowerbird (<i>Ptilonorhynchus maculatus</i>) Whistling kite (<i>Haliastur sphenurus</i>) Ornamental Snake (<i>Denisonia maculata</i>)			
<u>General Notes:</u>			
Photo points 3201-3206 Hot humid afternoon with easterly wind.			



Suttor River from the eastern bank with eucalypt canopy and mix acacia and melaleuca shrub layer



Typical view of low flow terrace of the Suttor River. Good debris and habitat that an ornament snake (*Denisonia maculata*) was recorded.



Ornamental snake (*Denisonia maculata*) in nature habitat along Suttor River



Ornamental snake (*Denisonia maculata*)

Client/Project:	Secondary Site 18	Unidel Staff:	Mitchell Taylor
Stakeholder:	QCoal	Date:	16/04/2012
Representative:	Poplar box on floodplain	Time:	Not listed
File Reference: GPS No: 54DAB9693C			
<u>Notes:</u>			
Secondary Site 18 is found on the high flood terraces of the Suttor River. This site is very flat and found on sandy alluvial soils with some clay elements. This site has been subject to historical thinning and significant grazing pressures resulting in an altered remnant habitat. To the east of this site the vegetation rapidly transition into brigalow (<i>Acacia harpophylla</i>) open forest (coinciding with a soil texture change). The canopy layer is sparse to moderate and dominated by poplar box (<i>Eucalyptus populnea</i>) and occurs between 10–15 m. This layer supports a relatively good density of hollow bearing limbs and would provide good habitat for arboreal fauna such as parrots, gliders, owls and reptiles. The shrub layer is absent as a result of historic clearing events and continued grazing pressure. The ground layer is moderate-dense and consists of improved pasture grasses and herbs. A moderate amount of fallen timber and debris occurs within this site and is likely due to historical clearing events and flood events where flood waters have deposited debris.			
<u>Species recorded during active searches:</u>			
Striated pardalote (<i>Pardalotus striatus</i>) Rufous whistler (<i>Pachycephala rufiventris</i>) Spotted bowerbird (<i>Ptilonorhynchus maculatus</i>) Pale-headed rosella (<i>Platycercus adscitus</i>) Willie wagtail (<i>Rhipidura leucophrys</i>) Magpie (<i>Cracticus tibicen</i>) Grey butcherbird (<i>Cracticus torquatus</i>) Pied butcherbird (<i>Cracticus nigrogularis</i>) Red-backed fairy-wren (<i>Malurus melanocephalus</i>) Torresian crow (<i>Corvus orru</i>) Whistling kite (<i>Haliastur sphenurus</i>) Sulphur-crested cockatoo (<i>Cacatua galerita</i>) Rainbow bee-eater (<i>Merops ornatus</i>)			
<u>Actions Arising:</u>			
Photo points 3207-3231			



Poplar box (*Eucalyptus populnea*) on alluvial flood plains of the Suttor River (good amount of hollow bearing limbs)



Poplar box (*Eucalyptus populnea*) on alluvial flood plains of the Suttor River (regeneration of semi evergreen vine thicket species)

Client/Project:	Secondary Site 16/17 Spotlight	Unidel Staff:	Mitchell Taylor
Stakeholder:	QCoal	Date:	16/04/2012
Representative:	Poplar box and Suttor River	Time:	8:00-9:00pm
File Reference: 629E3A551D & 3E28F45B32			
Bynoe's gecko			

Client/Project:	NE Black Soil and Secondary Site 15	Unidel Staff:	Mitchell Taylor																																				
Stakeholder:	QCoal	Date:	17/04/2012																																				
Representative:	Black soil	Time:	7:00am																																				
File Reference: see GPS point		Phone call ☐ Visit ☐ Meeting ☐																																					
<u>Notes:</u> Harp 1 – Little broad-nosed Bat (<i>Scotorepens greyii</i>) Harp 2/3 - NIL Harp 4 – NIL Pitfall 4 – Skink (<i>Carlia foliorum</i>) <u>Species recorded during active searches:</u> <table border="0"> <tr> <td>Rainbow Lorikeet (<i>Trichoglossus haematodus</i>)</td><td>Galah (<i>Eolophus roseicapillus</i>)</td></tr> <tr> <td>Striated pardalote (<i>Pardalotus striatus</i>)</td><td>Sulphur-crested cockatoo (<i>Cacatua galerita</i>)</td></tr> <tr> <td>Yellow honeyeater (<i>Lichenostomus flavus</i>)</td><td>Agile wallaby (<i>Macropus agilis</i>)</td></tr> <tr> <td>Yellow-throated miner (<i>Manorina flavigula</i>)</td><td>Blue-faced honeyeater (<i>Entomyzon cyanotis</i>)</td></tr> <tr> <td>Tawny grassbird (<i>Megalurus timoriensis</i>)</td><td>Tawny frogmouth (<i>Podargus strigoides</i>)</td></tr> <tr> <td>Pied butcherbird (<i>Cracticus nigrogularis</i>)</td><td>Fire-tailed skink (<i>Morethia taeniopleura</i>)</td></tr> <tr> <td>Red-winged parrot (<i>Aprosmictus erythropterus</i>)</td><td>Torresian crow (<i>Corvus orru</i>)</td></tr> <tr> <td>Pictorella mannekin (<i>Heteromunia pectoralis</i>)</td><td>Cockatiel (<i>Nymphicus hollandicus</i>)</td></tr> <tr> <td>Chestnut-breasted mannekin</td><td>Skink (<i>Carlia foliorum</i>)</td></tr> <tr> <td>Noisy friarbird (<i>Philemon corniculatus</i>)</td><td>Black-faced cuckoo-shrike (<i>Coracina novaehollandiae</i>)</td></tr> <tr> <td>Spotted bowerbird (<i>Ptilonorhynchus maculatus</i>)</td><td>Peaceful dove (<i>Geopelia placida</i>)</td></tr> <tr> <td>White-necked heron (<i>Ardea pacifica</i>)</td><td>Rufous whistler (<i>Pachycephala rufiventris</i>)</td></tr> <tr> <td>Pale-headed rosella (<i>Platycercus adscitus</i>)</td><td>Mistletoe bird (<i>Dicaeum hirundinaceum</i>)</td></tr> <tr> <td>Magpie (<i>Cracticus tibicen</i>)</td><td>Grey fantail (<i>Rhipidura albiscapa</i>)</td></tr> <tr> <td>Grey-crowned babbler (<i>Pomatostomus temporalis</i>)</td><td>Yellow thornbill (<i>Acanthiza nana</i>)</td></tr> <tr> <td>Zebra finch (<i>Taeniopygia guttata</i>)</td><td>Pied currawong (<i>Strepera graculina</i>)</td></tr> <tr> <td>Grey butcherbird (<i>Cracticus torquatus</i>)</td><td></td></tr> <tr> <td>Eastern grey kangaroo (<i>Macropus giganteus</i>)</td><td></td></tr> </table>				Rainbow Lorikeet (<i>Trichoglossus haematodus</i>)	Galah (<i>Eolophus roseicapillus</i>)	Striated pardalote (<i>Pardalotus striatus</i>)	Sulphur-crested cockatoo (<i>Cacatua galerita</i>)	Yellow honeyeater (<i>Lichenostomus flavus</i>)	Agile wallaby (<i>Macropus agilis</i>)	Yellow-throated miner (<i>Manorina flavigula</i>)	Blue-faced honeyeater (<i>Entomyzon cyanotis</i>)	Tawny grassbird (<i>Megalurus timoriensis</i>)	Tawny frogmouth (<i>Podargus strigoides</i>)	Pied butcherbird (<i>Cracticus nigrogularis</i>)	Fire-tailed skink (<i>Morethia taeniopleura</i>)	Red-winged parrot (<i>Aprosmictus erythropterus</i>)	Torresian crow (<i>Corvus orru</i>)	Pictorella mannekin (<i>Heteromunia pectoralis</i>)	Cockatiel (<i>Nymphicus hollandicus</i>)	Chestnut-breasted mannekin	Skink (<i>Carlia foliorum</i>)	Noisy friarbird (<i>Philemon corniculatus</i>)	Black-faced cuckoo-shrike (<i>Coracina novaehollandiae</i>)	Spotted bowerbird (<i>Ptilonorhynchus maculatus</i>)	Peaceful dove (<i>Geopelia placida</i>)	White-necked heron (<i>Ardea pacifica</i>)	Rufous whistler (<i>Pachycephala rufiventris</i>)	Pale-headed rosella (<i>Platycercus adscitus</i>)	Mistletoe bird (<i>Dicaeum hirundinaceum</i>)	Magpie (<i>Cracticus tibicen</i>)	Grey fantail (<i>Rhipidura albiscapa</i>)	Grey-crowned babbler (<i>Pomatostomus temporalis</i>)	Yellow thornbill (<i>Acanthiza nana</i>)	Zebra finch (<i>Taeniopygia guttata</i>)	Pied currawong (<i>Strepera graculina</i>)	Grey butcherbird (<i>Cracticus torquatus</i>)		Eastern grey kangaroo (<i>Macropus giganteus</i>)	
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<u>General Notes:</u> Mild, warm morning, partly cloudy with moderate southerly winds																																							

Client/Project:	Secondary Site 19 Dam North East MLA	Unidel Staff:	Mitchell Taylor
Stakeholder:	QCoal	Date:	17/04/2012
Representative:	Farm dam on sandy clay plains (on line)	Time:	11:00am
File Reference: 4C989C4016			

Notes:

Secondary Site 19 is an on line farm dam occurring on sandy clay plains. This habitat is extremely modified for the purposes of keeping cattle. The focal point at this site is a moderate on line dam holding water. Little vegetation persists around the dam outside of two clumps of brigalow (*Acacia harpophylla*). Generally, the locality has been thinned and/or broadly cleared. Ground cover is dense and dominated by Indian blue grass (*Bothriochloa pertusa*) and parthenium (*Parthenium hysterophorus*) is common. The site provides habitat for wetlands birds which were regularly observed in the dam or nearby.

Species recorded during active searches:

Pacific black duck (*Anas superciliosa*)
Australasian grebe (*Tachybaptus novaehollandiae*)
Plumed whistling duck (*Dendrocygna eytoni*)
Eastern great egret (*Ardea modesta*)
Torresian crow (*Corvus orru*)
Magpie (*Cracticus tibicen*)
Black-faced cuckoo-shrike (*Coracina novaehollandiae*)
Cockatiel (*Nymphicus hollandicus*)
Squatter pigeon (*Geophaps scripta scripta*)
Galah (*Eolophus roseicapillus*)
Black-fronted dotterel (*Elseya melanops*)
Masked lapwing plover (*Vanellus miles*)
Sacred kingfisher (*Todiramphus sancta*)
Pale-headed rosella (*Platycercus adscitus*)
Rainbow Lorikeet (*Trichoglossus haematodus*)
Bumpy Rocketfrog (*Litoria inermis*)

General notes:

Photos: 3259-3265

Warm, humid day, partly cloudy and slight easterly winds



Secondary overflow dam with dense grassy fringe. (good for cryptic birds like rails, crakes and snipes)



On line farm dam which is fringed in part by brigalow (*Acacia harpophylla*) or cleared to water cattle.

Client/Project:	Secondary Site 20	Unidel Staff:	Mitchell Taylor
Stakeholder:	QCoal	Date:	17/04/2012
Representative:	Bloodwood/Ironbark open woodland on sandy plains	Time:	1:00pm
File Reference: 31085D6786			
<u>Notes:</u>			
Secondary Site 20 is found on broad, undulating sandy plains with red soils with notable small rocks within its substrate. This habitat has been subjected to historical clearing for land management and the keeping of cattle. These management practices and grazing pressures have suppressed the regeneration of shrub species (however, this may be naturally open habitat). Historical thinning is apparent within the canopy layer given its density. The canopy layer is sparse and dominated by bloodwood (<i>Corymbia</i>) and ironbark (<i>Eucalyptus</i>) species between 6-10m. The shrub layer is sparse and suppressed by dense grass. This layer generally consists of regenerating canopy species and small pockets of brigalow (<i>Acacia harpophylla</i>) regrowth. The ground layer is dense and dominated by a mix of improved pasture grasses, however Indian blue grass (<i>Bothriochloa pertusa</i>) is generally dominate. This site supports a low amount of fallen timber. This site is generally supporting a low quality habitat for terrestrial species. Evidence of a low intensity fire was observed (<5 years).			
<u>Species recorded during active searches:</u>			
Torresian crow (<i>Corvus orru</i>) Pied butcherbird (<i>Cracticus nigrogularis</i>) Striated pardalote (<i>Pardalotus striatus</i>) Willie wagtail (<i>Rhipidura leucophrys</i>) Restless flycatcher (<i>Myiagra inquieta</i>) Magpie (<i>Cracticus tibicen</i>) Pale-headed rosella (<i>Platycercus adscitus</i>) Pheasant coucal (<i>Centropus phasianinus</i>) Peaceful dove (<i>Geopelia placida</i>)			
<u>General Notes:</u>			
Photos: 3267-3272			
Hot, still, humid, scattered cloud			



Open forest of bloodwood (*Corymbia* sp.) and ironbark (*Eucalyptus* sp.) with a grassy understorey



Open forest of bloodwood (*Corymbia* sp.) and ironbark (*Eucalyptus* sp.) with a grassy understorey

Client/Project:	Secondary Site 21	Unidel Staff:	Mitchell Taylor
Stakeholder:	QCoal	Date:	17/04/2012
Representative:	Sandstone escarpment	Time:	1:30-2:30 pm
File Reference:			

Notes:

This site is found on the escarpment of a sandstone plateau in the northern portions of the MLA. The site supports large cliff faces of exposed sandstone with small cave and crevice habitats. The washout slopes are densely vegetated and support rocky soils and fallen debris. The escarpment is surrounded by undulating, sandy plains which have been cleared for the most part to support the keeping of cattle. This escarpment does not support extensive or large enough caves to support species such as the northern quoll (*Dasyurus hallucatus*) or rock wallaby (*Petrogale inornata*).

The canopy layer along the escarpment is moderate and dominated by Lancewood with suppressed fig species between 5 – 8 m. The shrub layer is relatively absent from this layer given the ruggedness and rocky terrain. The ground layer is sparse and dominated by native grasses to 1 metre.

The wash out slopes are very steep and occur on rocky scree. The canopy layer is dense and dominated by lancewood (*Acacia shirleyi*) with suppressed brigalow (*Acacia harpophylla*) between 4-7m. The shrub layer is moderate-dense and consists of canopy species and acacia species between 1-4m. The ground layer is moderate and consists mainly of native grasses. The escarpment and wash out slopes provide a rocky substrates and outcrops which supporting very small caves and crevices. The slopes support dense amounts of thin fallen timber which provided foraging habitat for reptiles. Towards the lower slopes it was noted that large slabs of bloodwood (*Corymbia* sp.) bark and limbs were common providing good denning and forage habitat for reptile and terrestrial species.

Species encountered during active search:

Bynoe's gecko (*Heteronotia binoei*)
Rainbow skink (*Carlia vivax*)
Skink (*Carlia foliorum*)

General Notes:

Warm, slight southerly, partly cloudy

Photo point 3273 – 3293 (includes panoramic view from top of escarpment)



Foot slopes of the sandstone escarpment



Lancewood (*Acacia shirleyi*) on sandstone foot slopes (very steep and rocky)



Rocky habitat on escarpment with crevice and small cave habitat. Caves are not extensive or deep.



Rock shelter along the escarpment



View to the south east from the top of escarpment



View to the north east from the top of the escarpment

Client/Project:	NE trapline and Creek	Unidel Staff:	Mitchell Taylor																														
Stakeholder:	QCoal	Date:	18/04/2012																														
Representative:	Not listed	Time:	7:00am																														
File Reference: See trapping line																																	
<u>Notes:</u> Pit fall 2: Skink (<i>Cryptoblepharus carnabyi</i> or <i>C. plagiocephalus</i>) <u>Species:</u> <table border="0"> <tr> <td>Spotted bowerbird (<i>Ptilonorhynchus maculatus</i>)</td> <td>Restless flycatcher (<i>Myiagra inquieta</i>)</td> </tr> <tr> <td>Striated pardalote (<i>Pardalotus striatus</i>)</td> <td>Brown honeyeater (<i>Lichmera indistincta</i>)</td> </tr> <tr> <td>Yellow honeyeater (<i>Lichenostomus flavus</i>)</td> <td>Rufous whistler (<i>Pachycephala rufiventris</i>)</td> </tr> <tr> <td>Yellow-throated miner (<i>Manorina flavigula</i>)</td> <td>Fig bird (<i>Sphecotheres vieilloti</i>)</td> </tr> <tr> <td>Black-faced cuckoo-shrike (<i>Coracina novaehollandiae</i>)</td> <td>Olive-backed oriole (<i>Oriolus sagittatus</i>)</td> </tr> <tr> <td>Bar-shouldered dove (<i>Geopelia humeralis</i>)</td> <td>Grey-crowned babbler (<i>Pomatostomus temporalis</i>)</td> </tr> <tr> <td>Magpie lark (<i>Grallina cyanoleuca</i>)</td> <td>Yellow thornbill (<i>Acanthiza nana</i>)</td> </tr> <tr> <td>Grey fantail (<i>Rhipidura albiscapa</i>)</td> <td>Rainbow Lorikeet (<i>Trichoglossus haematodus</i>)</td> </tr> <tr> <td>Magpie (<i>Cracticus tibicen</i>)</td> <td>Red-backed fairy-wren (<i>Malurus melanocephalus</i>)</td> </tr> <tr> <td>Peaceful dove (<i>Geopelia placida</i>)</td> <td>Blue-faced honeyeater (<i>Entomyzon cyanotis</i>)</td> </tr> <tr> <td>Pied butcherbird (<i>Cracticus nigrogularis</i>)</td> <td>Singing honeyeater (<i>Lichenostomus virescens</i>)</td> </tr> <tr> <td>Torresian crow (<i>Corvus orru</i>)</td> <td>Rainbow bee-eater (<i>Merops ornatus</i>)</td> </tr> <tr> <td>Pale-headed rosella (<i>Platycercus adscitus</i>)</td> <td>Mistletoe bird (<i>Dicaeum hirundinaceum</i>)</td> </tr> <tr> <td></td> <td>Varied Sittela (White headed)</td> </tr> <tr> <td></td> <td>Copper-tailed Skink (<i>Ctenotus taeniolatus</i>)</td> </tr> </table>				Spotted bowerbird (<i>Ptilonorhynchus maculatus</i>)	Restless flycatcher (<i>Myiagra inquieta</i>)	Striated pardalote (<i>Pardalotus striatus</i>)	Brown honeyeater (<i>Lichmera indistincta</i>)	Yellow honeyeater (<i>Lichenostomus flavus</i>)	Rufous whistler (<i>Pachycephala rufiventris</i>)	Yellow-throated miner (<i>Manorina flavigula</i>)	Fig bird (<i>Sphecotheres vieilloti</i>)	Black-faced cuckoo-shrike (<i>Coracina novaehollandiae</i>)	Olive-backed oriole (<i>Oriolus sagittatus</i>)	Bar-shouldered dove (<i>Geopelia humeralis</i>)	Grey-crowned babbler (<i>Pomatostomus temporalis</i>)	Magpie lark (<i>Grallina cyanoleuca</i>)	Yellow thornbill (<i>Acanthiza nana</i>)	Grey fantail (<i>Rhipidura albiscapa</i>)	Rainbow Lorikeet (<i>Trichoglossus haematodus</i>)	Magpie (<i>Cracticus tibicen</i>)	Red-backed fairy-wren (<i>Malurus melanocephalus</i>)	Peaceful dove (<i>Geopelia placida</i>)	Blue-faced honeyeater (<i>Entomyzon cyanotis</i>)	Pied butcherbird (<i>Cracticus nigrogularis</i>)	Singing honeyeater (<i>Lichenostomus virescens</i>)	Torresian crow (<i>Corvus orru</i>)	Rainbow bee-eater (<i>Merops ornatus</i>)	Pale-headed rosella (<i>Platycercus adscitus</i>)	Mistletoe bird (<i>Dicaeum hirundinaceum</i>)		Varied Sittela (White headed)		Copper-tailed Skink (<i>Ctenotus taeniolatus</i>)
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<u>General Notes:</u> See previous notes																																	

Client/Project:	Secondary Site 12 Spotlight Traverse	Unidel Staff:	Mitchell Taylor
Stakeholder:	QCoal	Date:	16/04/212
Representative:	Poplar box on sandy plains	Time:	6:30-7:45 pm
File Reference: 5261800823			

Notes:

Mild night with dusk shower which cleared on night fall. Slight easterly making it cool.

Species recorded during active searches:

Rabbit (*Oryctolagus cuniculus*)
Painted button quail (*Turnix varia*)
Rainbow skink (*Carlia vivax*)
Brushtail possum (*Trichosurus vulpecular*)
Eastern grey kangaroo (*Macropus giganteus*)
Tawny frogmouth (*Podargus strigoides*)
Green tree frog (*Litoria caerulea*) - car traverse
Australia bustard (*Ardeotis australis*) - car traverse

Client/Project:	Drive into NE Trapping site from car	Unidel Staff:	Mitchell Taylor
Stakeholder:	QCoal	Date:	18/04/2012
Representative:	Not listed	Time:	06:00
File Reference: Pictorella mannekin (<i>Heteromunia pectoralis</i>) GPS Spot			

Notes:

Lots of shrubs and leucaena (*Leucaena leucocephala*) plants.

Species recorded during active searches:

Fairy martin (*Petrochelidon ariel*)
 Tree martin (*Petrochelidon nigricans*)
 Pictorella mannekin (*Heteromunia pectoralis*)
 Zebra finch (*Taeniopygia guttata*)
 Double-barred finch (*Taeniopygia bichenovii*)
 Chestnut-Breasted mannekin (*Lonchura castaneothorax*)
 Richard's pipit (*Anthus novaeseelandiae*)
 Red-winged parrot (*Aprosmictus erythropterus*)
 Pale-headed rosella (*Platycercus adscitus*)
 Magpie (*Cracticus tibicen*)
 Galah (*Eolophus roseicapillus*)
 Agile wallaby (*Macropus agilis*)
 Black kite (*Milvus migrans*)
 Red-backed fairy-wren (*Malurus melanocephalus*)
 Red-backed kingfisher (*Todiramphus pyrrhopygius*)
 Magpie lark (*Grallina cyanoleuca*)

Site Name	TR 1
Survey Period	2009
Survey Type	Trapping
Latitude/Longitude	
Regional Ecosystem	11.4.9
Total basal area	5.5 m ² / ha
Stems>10 cm dbh	191.6 stems/ha
Density hollow trees	5.1 numbers./ha
Avg. height of tallest trees	23 m
Canopy cover	35 %
Canopy species	<i>Acacia harpophylla</i> , <i>Eucalyptus cambageana</i>
Samplings	573 stems/ha
Shrubs	261.7 stems/ha
Acacia density>3cm	157.9
Live trees, decortivating bark (m2/ha)	0
Dead trees, exfoliating bark (m2/ha)	0.5
Logs-solid (nos/ha)	12.7
Logs-hollow (no./ha)	0
Grass cover %	50
Average grass height (cm)	50
Low shrub cover %	10
Fine litter cover %	22.5
Coarse litter cover %	10
Rocks present	y
Soil cracks	n
Free water present	N
Caves present	N
Soil Colour	Brown
Soil texture	Sandy loam



Site Name	TR2
Survey Period	2009
Survey Type	Trapping
Latitude/Longitude	
Regional Ecosystem	Non-remnant
Total basal area (m2/ha)	0
Stems>10 cm dbh (stems/ha)	7.6
Density hollow trees (no./ha)	0
Avg. height of tallest trees (m)	5
Canopy cover %	0
Canopy species	None
Samplings (stems/ha)	0
Shrubs (stems/ha)	12.7
Acacia density>3cm	0
Live trees, decorticating bark (m2/ha)	0
Dead trees, exfoliating bark (m2/ha)	0
Logs-solid (nos/ha)	0
Logs-hollow (no./ha)	0
Grass cover %	82.5
Average grass height (cm)	100
Low shrub cover %	2.5
Fine litter cover %	10
Coarse litter cover %	0
Rocks present	n
Soil cracks	y
Free water present	n
Caves present	n
Soil Colour	Brown
Soil texture	Cracking clays



Site Name	TR 3
Survey Period	2009
Survey Type	Trapping
Latitude/Longitude	
Regional Ecosystem	11.9.9
Total basal area (m2/ha)	3.5
Stems>10 cm dbh (stems/ha)	63.7
Density hollow trees (no./ha)	10.2
Avg. height of tallest trees (m)	18
Canopy cover %	15
Canopy species	<i>Corymbia clarksoniana</i> , <i>Eucalyptus crebra</i>
Samplings (stems/ha)	30.6
Shrubs (stems/ha)	700.3
Acacia density>3cm	7.1
Live trees, decorticated bark (m2/ha)	0
Dead trees, exfoliating bark (m2/ha)	1
Logs-solid (nos/ha)	49.5
Logs-hollow (no./ha)	14.1
Grass cover %	55
Average grass height (cm)	50
Low shrub cover %	0
Fine litter cover %	40
Coarse litter cover %	10
Rocks present	y
Soil cracks	n
Free water present	n
Caves present	n
Soil Colour	Brown
Soil texture	sandy loam with pebbles



Site Name	TR 4
Survey Period	2009
Survey Type	Trapping
Latitude/Longitude	
Regional Ecosystem	11.8.5
Total basal area (m2/ha)	1
Stems>10 cm dbh (stems/ha)	12.7
Density hollow trees (no./ha)	5.1
Avg. height of tallest trees (m)	17
Canopy cover %	2.5
Canopy species	<i>Eucalyptus orgadophila</i>
Samplings (stems/ha)	15.3
Shrubs (stems/ha)	2.5
Acacia density>3cm	0
Live trees, decortivating bark (m2/ha)	1
Dead trees, exfoliating bark (m2/ha)	0
Logs-solid (nos/ha)	2.5
Logs-hollow (no./ha)	0
Grass cover %	95
Average grass height (cm)	75
Low shrub cover %	0
Fine litter cover %	5
Coarse litter cover %	0
Rocks present	n
Soil cracks	y
Free water present	n
Caves present	n
Soil Colour	Light brown
Soil texture	cracking clays



Site Name	TR 5
Survey Period	2009
Survey Type	Trapping
Latitude/Longitude	
Regional Ecosystem	11.5.3
Total basal area (m2/ha)	5
Stems>10 cm dbh (stems/ha)	122.2
Density hollow trees (no./ha)	15.3
Avg. height of tallest trees (m)	22.5
Canopy cover %	30
Canopy species	<i>Eucalyptus populnea</i> , <i>Eremophila mitchellii</i> , <i>Atalaya hemiglauca</i>
Samplings (stems/ha)	155.6
Shrubs (stems/ha)	2.5.1
Acacia density>3cm	0
Live trees, decorticated bark (m2/ha)	0
Dead trees, exfoliating bark (m2/ha)	0
Logs-solid (nos/ha)	21.2
Logs-hollow (no./ha)	56.6
Grass cover %	50
Average grass height (cm)	100
Low shrub cover %	10
Fine litter cover %	25
Coarse litter cover %	10
Rocks present	n
Soil cracks	n
Free water present	n
Caves present	n
Soil Colour	Brown
Soil texture	clay loam



Site Name	TR 6
Survey Period	2009
Survey Type	Trapping
Latitude/Longitude	
Regional Ecosystem	11.3.25
Total basal area (m2/ha)	12.5
Stems>10 cm dbh (stems/ha)	135
Density hollow trees (no./ha)	25.5
Avg. height of tallest trees (m)	35
Canopy cover %	50
Canopy species	<i>Eucalyptus tereticornis</i>
Samplings (stems/ha)	84.9
Shrubs (stems/ha)	275.9
Acacia density>3cm	0
Live trees, decorticating bark (m2/ha)	5
Dead trees, exfoliating bark (m2/ha)	0
Logs-solid (nos/ha)	12.7
Logs-hollow (no./ha)	12.7
Grass cover %	60
Average grass height (cm)	65
Low shrub cover %	7.5
Fine litter cover %	10
Coarse litter cover %	5
Rocks present	n
Soil cracks	n
Free water present	y
Caves present	n
Soil Colour	Light Brown
Soil texture	alluvial loam



Site Name	TR 7
Survey Period	2010
Survey Type	Trapping
Latitude / Longitude	-21.2144 / 147.8519
Regional Ecosystem	
Landform	Flat / Plain
Vegetation Description	Woodland
Understorey	Shrubs/Grasses
Dominant species	Mix of <i>Acacia harpophylla</i> and semi-evergreen vine thicket species
Distance Water	11 - 50 m
Distance Riparian	11 - 50 m
Weather Conditions	Wet / Warm
Ground Logs / 50 m plot	1
Rocky Substrate	Surface Rocks
Fire Evidence	>3 Years Ago
Tree Hollows per 50 m plot	1
Canopy % Cover	20
Shrub % Cover	50
Sub-canopy % Cover	0
Leaf Litter % Cover	10
Weed Cover	Widespread And Abundant
Soil Type	Cracking Clay
Habitat Condition (1-10)	5



Site Name	TR8
Survey Period	2010
Survey Type	Trapping
Latitude / Longitude	-21.1948 / 147.8197
Regional Ecosystem	11.5.9/11.7.2
Landform	Hill Mid Slope
Vegetation Description	Woodland
Understorey	Grasses
Dominant species	Eucalypt acacia woodland with grassy understorey
Distance Water	11 - 50 m
Distance Riparian	11 - 50 m
Weather Conditions	Wet / Warm
Ground Logs / 50 m plot	3
Rocky Substrate	No Rocks
Fire Evidence	>3 Years Ago
Tree Hollows per 50 m plot	2
Canopy % Cover	40
Shrub % Cover	10
Sub-canopy % Cover	0
Leaf Litter % Cover	10
Weed Cover	Rare
Soil Type	Sandy Loam
Habitat Condition (1-10)	6



Site Name	TR 9
Survey Period	2010
Survey Type	Trapping
Latitude / Longitude	-21.1721 / 147.8315
Regional Ecosystem	11.5.3
Landform	Hill Lower Slope
Vegetation Description	Woodland
Understorey	Grasses
Dominant species	Poplar box dominated with grassy understorey
Distance Water	501 m - 2 km
Distance Riparian	11 - 50 m
Weather Conditions	Wet / Warm
Ground Logs / 50 m plot	7
Rocky Substrate	Surface Rocks & Outcrops
Fire Evidence	>3 Years Ago
Tree Hollows per 50 m plot	3
Canopy % Cover	20
Shrub % Cover	50
Sub-canopy % Cover	0
Leaf Litter % Cover	20
Weed Cover	Rare
Soil Type	Sandy Loam
Habitat Condition (1-10)	7



Site Name	TR 10
Survey Period	2010
Survey Type	Trapping
Latitude / Longitude	-21.0872 / 147.791
Regional Ecosystem	
Landform	Hill Upper Slope
Vegetation Description	Open Forest
Understorey	Shrubs / Grasses
Dominant species	Eucalypt (corymbia citriodora) and acacia open forest on upper slope with shrubs and grassy understorey
Distance Water	501 m - 2 km
Distance Riparian	501 m - 2 km
Weather Conditions	Wet / Warm
Ground Logs / 50 m plot	5
Rocky Substrate	No Rocks
Fire Evidence	>3 Years Ago
Tree Hollows per 50 m plot	1
Canopy % Cover	20
Shrub % Cover	30
Sub-canopy % Cover	50
Leaf Litter % Cover	40
Weed Cover	Rare
Soil Type	Sandy Loam
Habitat Condition (1-10)	7



Client/Project:	Secondary Site 19 Dam	Unidel Staff:	Mitchell Taylor
Stakeholder:	QCoal	Date:	18/04/2012
Representative:	Waterbody	Time:	6:45
File Reference: 4C989C4016			
<u>Notes:</u> <u>Species recorded during active searches:</u> Australian wood duck (<i>Chenonetta jubata</i>) Pacific black duck (<i>Anas superciliosa</i>) Grey teal (<i>Anas gracilis</i>) Australasian grebe (<i>Tachybaptus novaehollandiae</i>) Black-fronted dotterel (<i>Elseyaornis melanops</i>) Masked lapwing plover (<i>Vanellus miles</i>) Galah (<i>Eolophus roseicapillus</i>) Plumed whistling duck (<i>Dendrocygna eytoni</i>) Rainbow Lorikeet (<i>Trichoglossus haematodus</i>) Striated pardalote (<i>Pardalotus striatus</i>) Torresian crow (<i>Corvus orru</i>) Restless flycatcher (<i>Myiagra inquieta</i>) Magpie lark (<i>Grallina cyanoleuca</i>) Magpie (<i>Cracticus tibicen</i>) Common bronzewing Pale-headed rosella (<i>Platycercus adscitus</i>)			

Client/Project:	Secondary Site 2	Unidel Staff:	Mitchell Taylor
Stakeholder:	QCoal	Date:	18/04/2012
Representative:	Large dam/ wetland	Time:	3:00-5:00pm
File Reference: see SS2			

Notes:

Species recorded during active searches:

Restless flycatcher (<i>Myiagra inquieta</i>)	Australian wood duck (<i>Chenonetta jubata</i>)
Grey-crowned babbler (<i>Pomatostomus temporalis</i>)	Pacific black duck (<i>Anas superciliosa</i>)
Rainbow bee-eater (<i>Merops ornatus</i>)	Grey teal (<i>Anas gracilis</i>)
Fairy martin (<i>Petrochelidon ariel</i>)	Australasian grebe (<i>Tachybaptus novaehollandiae</i>)
Tree martin (<i>Petrochelidon nigricans</i>)	Eastern great egret (<i>Ardea modesta</i>)
White-breasted wood swallow (<i>Artamus leucorhynchus</i>)	Intermediate egret (<i>Ardea intermedia</i>)
Grey butcherbird (<i>Cracticus torquatus</i>)	Cattle Egret (<i>Ardea ibis</i>)
Magpie (<i>Cracticus tibicen</i>)	Little friarbird (<i>Philemon citreogularis</i>)
Pied butcherbird (<i>Cracticus nigrogularis</i>)	Pied cormorant (<i>Phalacrocorax varius</i>)
Pale-headed rosella (<i>Platycercus adscitus</i>)	Little black cormorant (<i>Phalacrocorax sulcirostris</i>)
Rainbow Lorikeet (<i>Trichoglossus haematodus</i>)	Darter (<i>Anhinga novaehollandiae</i>)
Masked lapwing plover (<i>Vanellus miles</i>)	Plumed whistling duck (<i>Dendrocygna eytoni</i>)
Black-fronted dotterel (<i>Elsayornis melanops</i>)	Wandering whistling duck (<i>Dendrocygna arcuata</i>)
Singing honeyeater (<i>Lichenostomus virescens</i>)	Little Pied cormorant (<i>Microcarbo melanoleucos</i>)
Yellow-throated miner (<i>Manorina flavigula</i>)	Great cormorant (<i>Phalacrocorax carbo</i>)
Latham's snipe (<i>Gallinago hardwickii</i>)	Masked woodswallow (<i>Artamus personatus</i>)
Comb-crested jacana (<i>Irediparra gallinacean</i>)	Striated pardalote (<i>Pardalotus striatus</i>)
Straw-necked ibis (<i>Threskiornis spinicollis</i>)	Black-winged stilt (<i>Himantopus himantopus</i>)
Ibis (<i>Threskiornis molucca</i>)	Brown goshawk (<i>Accipiter fasciatus</i>)
Willie wagtail (<i>Rhipidura leucophrys</i>)	
Magpie lark (<i>Grallina cyanoleuca</i>)	

Client/Project:	Secondary Site 22	Unidel Staff:	Mitchell Taylor
Stakeholder:	QCoal	Date:	18/04/2012
Representative:	Gilgai on sandy clay	Time:	5:00pm
File Reference: See C. Albugalta			
<u>Notes:</u>			
Secondary Site 22 occurs on a broad sandy clay plain which has suffered historical broad scale clearing, denuding the landscape to allow for cattle grazing. The site is on the lower portions of the broader plain where an extensive network of gilgai's occur. Vegetation and land management has been minimal for the past couple of years with large areas of gilgai now supporting regenerating brigalow (<i>Acacia harpophylla</i>) regrowth. This may be due to the extensive drilling activity that has been ongoing within this area. The canopy layer is absent with extremely rare paddock trees being retained sporadically throughout this plain. Within the Secondary Site, dense areas of regenerating brigalow (<i>A.harpophylla</i>) occur between 2-3 m forming thick clusters habitat surrounding ephemeral gilgai habitats, which at the time of the survey were holding water. The ground layer was moderate to dense and dominated by improved pastoral grasses. The regeneration of forbs and sedge species around the gilgai habitat was suppressed, however noted. Due to the cleared nature of the plain, very little fallen debris or timber was noted within the site. No evidence of recent fire was noted, however given the current densities of grass and regrowth it would suggest this was > 5 years ago			
<u>General Notes:</u>			
Good habitat for the ornamental snake (<i>Denisonia maculata</i>). There is a lack of fallen timber for shelter, however the dense grass layer may provide denning habitat for this species.			



Regrowth brigalow (*Acacia harpophylla*) surrounding gilgai habitats.



Regrowth brigalow (*Acacia harpophylla*) surrounding gilgai habitats holding water.

ATTACHMENT D – FLORA SPECIES LIST

Species	Common name
<i>Abelmoschus ficulneus</i>	native rosella
<i>Abutilon guineense</i>	
<i>Abutilon oxycarpum</i> var. <i>oxycarpum</i>	lantern bush
<i>Acacia catenulata</i>	bendee
<i>Acacia excelsa</i>	ironwood
<i>Acacia farnesiana</i>	mimosa bush
<i>Acacia harpophylla</i>	brigalow
<i>Acacia holosericea</i>	candelabra wattle
<i>Acacia julifera</i> subsp. <i>julifera</i>	
<i>Acacia leiocalyx</i>	black wattle
<i>Acacia leiophylla</i>	smooth-leaved wattle
<i>Acacia leptostachya</i>	Townsville wattle
<i>Acacia salicina</i>	sally wattle
<i>Acacia shirleyi</i>	lancewood
<i>Acacia</i> sp.	
<i>Acalypha eremorum</i>	turkey bush
<i>Achyranthes aspera</i>	chaff flower
<i>Acronychia oblongifolia</i>	yellow wood/white aspen
<i>Adriana urticoides</i> var. <i>urticoides</i>	
<i>Aeschynomene indica</i>	budda pea
<i>Alectryon connatus</i>	alectryon
<i>Alectryon diversifolius</i>	scrub boonaree
<i>Alectryon oleifolius</i> subsp. <i>elongatus</i>	western rosewood/boonaree
<i>Allocasuarina luehmannii</i>	bulloak
<i>Alloteropsis cimicina</i> (L.) Stapf	summer grass
<i>Alloteropsis semialata</i>	cockatoo grass
<i>Alloteropsis</i> sp.	
<i>Alphitonia excelsa</i>	soap tree
<i>Alstonia constricta</i>	bitter bark
<i>Alternanthera denticulata</i> var. <i>micrantha</i>	lesser joyweed
<i>Alternanthera nana</i>	hairy joyweed
<i>Alyxia ruscifolia</i>	chain fruit
<i>Amyema congener</i> subsp. <i>rotundifolia</i> Barlow	mistletoe
<i>Amyema quandang</i>	grey mistletoe
<i>Ancistrachne uncinulata</i>	hooky grass
<i>Archidendropsis basaltica</i>	dead finish
<i>Aristida calycina</i> var. <i>praealta</i>	
<i>Aristida caput-medusae</i>	
<i>Aristida exserta</i>	
<i>Aristida jerichoensis</i> var. <i>subspinulifera</i>	
<i>Aristida latifolia</i>	
<i>Aristida leptopoda</i>	
<i>Aristida lignosa</i>	
<i>Aristida</i> sp.	
<i>Aristida vagans</i>	
<i>Arundinella nepalensis</i>	
<i>Atalaya calcicola</i>	
<i>Atalaya hemiglauca</i>	whitewood
<i>Atriplex muelleri</i>	
<i>Basilicum polystachyon</i>	
<i>Bertya pedicellata</i>	
<i>Bidens bipinnata</i>	

<i>Boerhavia dominii</i>	
<i>Boerhavia</i> sp.	
<i>Bothriochloa bladhii</i> subsp. <i>glabra</i>	
<i>Bothriochloa decipiens</i> var. <i>decipiens</i>	
<i>Bothriochloa erianthoides</i>	
<i>Bothriochloa ewartiana</i>	
<i>Bothriochloa pertusa</i>	
<i>Bothriochloa</i> sp.	
<i>Brachychiton australis</i>	
<i>Brachychiton populneus</i>	
<i>Brachychiton rupestris</i>	
<i>Breynia oblongifolia</i>	
<i>Bridelia leichhardtii</i>	
<i>Brunoniella australis</i>	
<i>Bursaria incana</i>	
<i>Bursaria spinosa</i> subsp. <i>spinosa</i>	
<i>Bursaria tenuifolia</i>	
<i>Calotis cuneifolia</i>	
<i>Capparis arborea</i>	
<i>Capparis canescens</i>	
<i>Capparis lasiantha</i>	
<i>Capparis mitchellii</i>	
<i>Carissa ovata</i>	
<i>Cassia brewsteri</i>	
<i>Cassia rotundifolia</i>	
<i>Casuarina cristata</i>	
<i>Casuarina cunninghamiana</i>	
<i>Centella asiatica</i>	
<i>Centipeda minima</i>	
<i>Centrosema molle</i>	
<i>Cerbera dumicola</i>	
<i>Chamaesyce dallachyana</i>	
<i>Chamaesyce hirta</i>	
<i>Chenopodium carinatum</i>	
<i>Chloris inflata</i>	
<i>Chloris ventricosa</i>	
<i>Chrysopogon fallax</i>	
<i>Cissus reniformis</i>	
<i>Cissus</i> sp.	
<i>Citrus glauca</i>	
<i>Cleistanthus</i> sp.	
<i>Cleistanthus xerophyllus</i>	
<i>Clematicissus opaca</i>	
<i>Cleome viscosa</i>	
<i>Clitoria ternatea</i>	butterfly pea
<i>Commelina benghalensis</i>	
<i>Commelina diffusa</i>	
<i>Convolvulus</i> sp.	
<i>Conyza bonariensis</i>	
<i>Conyza bonariensis</i>	
<i>Corchorus olitorius</i>	
<i>Corchorus</i> sp.	
<i>Corchorus tomentellus</i>	
<i>Corchorus trilocularis</i>	
<i>Corymbia citriodora</i>	
<i>Corymbia clarksoniana</i>	
<i>Corymbia dallachiana</i>	
<i>Corymbia erythrophloia</i>	
<i>Corymbia tessellaris</i>	

<i>Corymbia trachyphloia</i>	
<i>Crotalaria dissitiflora</i> subsp. <i>dissitiflora</i>	
<i>Crotalaria juncea</i>	sunn hemp
<i>Crotalaria montana</i>	
<i>Crotalaria</i> sp.	
<i>Croton insularis</i>	
<i>Croton phebaloides</i>	
<i>Croton</i> sp.	
<i>Cryptostegia grandiflora</i>	
<i>Cucumis melo</i>	
<i>Cyanthillium cinereum</i>	
<i>Cymbidium canaliculatum</i>	
<i>Cymbopogon bombycinus</i>	
<i>Cymbopogon oblectus</i>	
<i>Cymbopogon refractus</i>	
<i>Cymbopogon</i> sp.	
<i>Cynodon dactylon</i> var. <i>dactylon</i>	
<i>Cyperus alopecuroides</i>	
<i>Cyperus bifax</i>	
<i>Cyperus concinnus</i>	
<i>Cyperus fulvus</i>	
<i>Cyperus gilesii</i>	
<i>Cyperus gracilis</i>	
<i>Cyperus isabellinus</i>	
<i>Cyperus</i> sp.	
<i>Dactyloctenium radulans</i>	
<i>Denhamia oleaster</i>	
<i>Desmodium campylocaulon</i>	
<i>Desmodium muelleri</i>	
<i>Desmodium</i> sp.	
<i>Dianella</i> sp.	
<i>Dichanthium annulatum</i>	sheda grass
<i>Dichanthium aristatum</i>	
<i>Dichanthium sericeum</i>	
<i>Digitaria</i> sp.	
<i>Dioscorea transversa</i>	
<i>Diospyros geminata</i>	
<i>Diospyros humilis</i>	
<i>Diplocyclos palmatus</i>	
<i>Dodonaea</i> sp.	
<i>Dodonaea stenophylla</i>	
<i>Dodonaea triangularis</i>	triangle-leaved hop bush
<i>Dodonaea viscosa</i>	sticky hop bush
<i>Drypetes deplanchei</i>	
<i>Dysphania carinata</i>	
<i>Echinochloa colona</i>	
<i>Ehretia grahamii</i>	
<i>Ehretia membranifolia</i>	
<i>Elaeodendron australe</i>	
<i>Emilia sonchifolia</i>	
<i>Enchylaena tomentosa</i>	
<i>Enneapogon lindleyanus</i>	
<i>Enteropogon acicularis</i>	
<i>Enteropogon ramosus</i>	
<i>Enteropogon unispiceus</i>	
<i>Epaltes australis</i>	
<i>Eragrostis alveiformis</i>	
<i>Eragrostis elongata</i>	
<i>Eragrostis lacunaria</i>	

<i>Eragrostis microcarpa</i>	
<i>Eragrostis parviflora</i>	
<i>Eragrostis sororia</i>	
<i>Eragrostis</i> sp.	
<i>Eragrostis speciosa</i>	
<i>Eremophila mitchellii</i>	
<i>Eriachne benthami</i>	
<i>Eriachne obtusa</i>	
<i>Eriachne</i> sp.	
<i>Eriochloa crebra</i>	
<i>Eriochloa procera</i>	
<i>Erythrina vespertilio</i>	
<i>Erythroxylum australe</i>	
<i>Eucalyptus cambageana</i>	
<i>Eucalyptus coolabah</i>	coolibah
<i>Eucalyptus crebra</i>	narrow-leaved ironbark
<i>Eucalyptus exserta</i>	
<i>Eucalyptus melanophloia</i>	
<i>Eucalyptus orgadophila</i>	
<i>Eucalyptus persistens</i>	
<i>Eucalyptus platyphylla</i>	
<i>Eucalyptus populnea</i>	
<i>Eucalyptus</i> sp.	
<i>Eucalyptus tereticornis</i>	
<i>Euchiton sphaericus</i>	
<i>Eulalia aurea</i>	
<i>Euphorbiaceae</i> sp.	
<i>Eustrephus latifolius</i>	
<i>Everistia vacciniifolia</i> forma <i>vacciniifolia</i>	
<i>Everistia vacciniifolia</i> var. <i>nervosa</i>	
<i>Evolvulus alsinoides</i>	
<i>Evolvulus</i> sp.	
<i>Exocarpos latifolius</i>	
<i>Ficus coronata</i>	
<i>Ficus opposita</i>	
<i>Ficus platypoda</i>	
<i>Ficus rubiginosa</i>	
<i>Ficus</i> sp.	
<i>Fimbristylis dichotoma</i>	
<i>Fimbristylis</i> sp.	
<i>Flindersia australis</i>	
<i>Flindersia collina</i>	
<i>Flindersia maculata</i>	
<i>Galactia tenuiflora</i> forma <i>sericea</i>	
<i>Geijera parviflora</i>	
<i>Geijera salicifolia</i>	
<i>Glossocarya hemiderma</i>	
<i>Glycine latifolia</i>	
<i>Glycine tabacina</i>	
<i>Glycine tomentella</i>	
<i>Gossia bidwillii</i>	
<i>Gossypium australe</i>	
<i>Gossypium</i> sp.	
<i>Grevillea helmsiae</i>	
<i>Grevillea parallela</i>	
<i>Grewia latifolia</i>	
<i>Grewia retusifolia</i>	
<i>Grewia scabrella</i>	
<i>Hakea laurina</i>	

<i>Haloragis aspera</i>	
<i>Harrisia martinii</i>	Harrisia cactus
<i>Heliotropium geocharis</i>	
<i>Heliotropium indicum</i>	
<i>Heliotropium tenuifolium</i>	
<i>Heteropogon contortus</i>	
<i>Heteropogon triticeus</i>	
<i>Hibiscus</i> sp.	
<i>Hibiscus sturtii</i>	
<i>Hibiscus trionum</i>	
<i>Hovea longipes</i>	
<i>Hovea</i> sp.	
<i>Hybanthus stellarioides</i>	
<i>Indigofera brevidens</i>	
<i>Indigofera colutea</i>	
<i>Indigofera glandulosa</i>	
<i>Indigofera hirsuta</i>	
<i>Indigofera linifolia</i>	
<i>Indigofera linnaei</i>	Birdsville indigo
<i>Indigofera pratensis</i>	
<i>Indigofera</i> sp.	
<i>Ipomoea lonchophylla</i>	
<i>Ipomoea plebeia</i>	
<i>Ipomoea</i> sp.	
<i>Iseilema macratherum</i>	
<i>Iseilema membranaceum</i>	
<i>Iseilema vaginiflorum</i>	
<i>Jacquemontia paniculata</i> var. <i>tomentosa</i>	
<i>Jasminum didymum</i> subsp. <i>racemosum</i>	
<i>Juncus continuus</i>	
<i>Kelita uncinella</i>	
<i>Larsenaikia ochreatea</i>	
<i>Leptochloa decipiens</i> subsp. <i>decipiens</i>	
<i>Leptochloa decipiens</i> subsp. <i>peacockii</i>	
<i>Leucas lavandulifolia</i>	
<i>Lomandra longifolia</i>	
<i>Ludwigia octovalvis</i>	
<i>Lysiphyllum carronii</i>	
<i>Lysiphyllum hookerii</i>	
<i>Maclura cochichinensis</i>	
<i>Macroptilium atropurpureum</i>	siratro
<i>Maireana microphylla</i>	
<i>Malva parviflora</i>	
<i>Malvastrum americanum</i>	spiked malvastrum
<i>Malvastrum americanum</i> var. <i>stellatum</i>	
<i>Malvastrum coromandelianum</i>	
<i>Marsdenia viridiflora</i> R.Br. subsp. <i>viridiflora</i>	
<i>Maytenus cunninghamii</i>	
<i>Megathyrsus maximus</i> var. <i>pubiglumis</i>	
<i>Megathyrsus maximus</i> var. <i>trichoglume</i>	
<i>Melaleuca fluviatilis</i>	
<i>Melaleuca</i> sp.	
<i>Melaleuca viminalis</i>	
<i>Melhania oblongifolia</i>	
<i>Melinis minutiflora</i>	
<i>Melinis repens</i>	red natal grass
<i>Melodorum leichhardtii</i>	
<i>Micromyrtus capricornia</i>	
<i>Mimosa pudica</i>	

<i>Mnesithea rottboellioides</i>	
<i>Monochoria cyanea</i>	
<i>Moorochloa eruciformis</i>	
<i>Murraya ovatifoliolata</i>	
<i>Myoporum montanum</i>	
<i>Nelsonia campestris</i>	
<i>Neptunia gracilis forma gracilis</i>	
<i>Neptunia</i> sp.	
<i>Notelaea microcarpa</i>	
<i>Nymphaea</i> sp.	
<i>Nyssanthus erecta</i>	
<i>Opuntia aurantiaca</i>	tiger pear
<i>Opuntia stricta</i>	prickly pear
<i>Opuntia tomentosa</i>	velvety tree pear
<i>Owenia acidula</i>	
<i>Oxalis radicata</i>	
<i>Oxalis</i> sp.	
<i>Oxalis thompsoniae</i>	
<i>Panicum decompositum</i>	
<i>Panicum effusum</i>	
<i>Panicum queenslandicum</i>	
<i>Panicum</i> sp.	
<i>Parsonsia eucalyptophylla</i>	
<i>Parsonsia lanceolata</i>	
<i>Parsonsia plaesiophylla</i>	
<i>Parsonsia</i> sp.	
<i>Parthenium hysterophorus</i>	
<i>Paspalidium caespitosum</i>	
<i>Paspalidium distans</i>	
<i>Paspalum scrobiculatum</i>	
<i>Pennisetum ciliare</i>	buffel grass
<i>Peripleura</i> sp.	
<i>Perotis rara</i>	
<i>Petalostigma pubescens</i>	
<i>Petalostigma</i> sp.	
<i>Phebalium glandulosum</i> subsp. <i>glandulosum</i>	
<i>Phyla nodiflora</i>	
<i>Phyllanthus fuernrohrii</i>	
<i>Phyllanthus gunnii</i>	
<i>Phyllanthus</i> sp.	
<i>Phyllanthus virgatus</i>	
<i>Physalis angulata</i>	
<i>Pimelea haematostachya</i>	
<i>Pittosporum angustifolium</i>	
<i>Pittosporum spinescens</i>	
<i>Planchonella cotinifolia</i>	
<i>Planchonella myrsinifolia</i>	
<i>Planchonia careya</i>	
<i>Platysace</i> sp.	
<i>Platysace valida</i>	
<i>Plectranthus parviflorus</i>	
<i>Plectranthus</i> sp.	
<i>Pleiogynium timorense</i>	
<i>Pluchea</i> sp.	
<i>Plumbago zeylanica</i>	
<i>Pogonolobus reticulatus</i>	
<i>Polycarpaea corymbosa</i> var. <i>minor</i>	
<i>Polymeria ambigua</i>	
<i>Portulaca bicolor</i>	

<i>Pouteria queenslandica</i>	
<i>Pseuderanthemum variabile</i>	
<i>Psydrax attenuata</i>	
<i>Psydrax johnsonii</i>	
<i>Psydrax odorata</i>	
<i>Psydrax oleifolia</i>	
<i>Psydrax</i> sp.	
<i>Pterocaulon serrulatum</i>	
<i>Pterocaulon</i> sp.	
<i>Pterocaulon sphacelatus</i>	
<i>Rhynchosia acuminatissima</i>	
<i>Rhynchosia minima</i>	
<i>Rhynchosia</i> sp.	
<i>Ricinocarpos ledifolius</i>	
<i>Rivina humilis</i>	
<i>Rostellularia adscendens</i> subsp. <i>adscendens</i>	
<i>Salsola kali</i>	roly poly bush
<i>Salsola tragus</i> L.	
<i>Santalum lanceolatum</i>	
<i>Sarga</i> sp.	
<i>Schoenoplectus litoralis</i>	
<i>Scleria sphacelata</i>	
<i>Sclerolaena tetracuspis</i>	
<i>Scoparia dulcis</i>	
<i>Senecio brigalowensis</i>	
<i>Senecio madagascarensis</i>	
<i>Senna allata</i>	
<i>Senna barclayana</i>	
<i>Senna coronilloides</i>	
<i>Senna gaudichaudii</i>	
<i>Senna sophera</i>	
<i>Sesbania cannabina</i> var. <i>cannabina</i>	
<i>Setaria surgens</i>	
<i>Sida brachypoda</i>	
<i>Sida cordifolia</i>	flannel weed
<i>Sida filiformis</i>	
<i>Sida hackettiana</i>	
<i>Sida pleiantha</i>	
<i>Sida rhombifolia</i>	
<i>Sida</i> sp.	
<i>Sida spinosa</i>	spiny sida
<i>Sida trichopoda</i>	
<i>Solanum ellipticum</i>	
<i>Solanum parvifolium</i> subsp. <i>parvifolium</i>	
<i>Solanum</i> sp.	
<i>Sonchus oleraceus</i>	
<i>Sorghum nitidum</i>	
<i>Sorghum</i> sp.	
<i>Spermacose brachystemma</i>	
<i>Sporobolus caroli</i>	
<i>Sporobolus elongatus</i>	
<i>Sporobolus</i> sp.	
<i>Stachytarpheta jamaicensis</i>	
<i>Stylosanthes humilis</i>	
<i>Stylosanthes scabra</i>	shrubby stylo
<i>Tabernaemontana pandacaqui</i>	
<i>Tephrosia filipes</i> var. (Mt Blackjack A.R.Bean+ 7332)	
<i>Tephrosia fillipes</i>	
<i>Tephrosia leptoclada</i>	

<i>Tephrosia rosea</i>	
<i>Tephrosia</i> sp.	
<i>Terminalia oblongata</i> subsp. <i>oblongata</i>	
<i>Terminalia</i> sp.	
<i>Themeda arguens</i>	
<i>Themeda australis</i>	
<i>Themeda avenaceus</i>	
<i>Themeda triandra</i>	
<i>Tinospora smilacina</i>	
<i>Tragus australianus</i>	
<i>Trema tomentosa</i> var. <i>aspera</i>	
<i>Trianthema portulacastrum</i>	
<i>Trianthema triquetra</i>	
<i>Trichodesma zeylanicum</i>	
<i>Triflorensia ixoroides</i>	
<i>Triraphis mollis</i>	
<i>Triumfetta</i> sp.	
<i>Urochloa mosambicensis</i>	sabi grass
<i>Urochloa texana</i>	
<i>Ventilago viminalis</i>	
<i>Verbena macrostachya</i>	
<i>Wahlenbergia gracilis</i>	
<i>Waltheria indica</i>	
<i>Wedelia spilanthis</i>	
<i>Xanthium pungens</i>	Noogoora burr
<i>Xanthium spinosum</i>	Bathurst burr
<i>Zaleya galericulata</i>	
<i>Zornia dyctiocarpa</i>	
<i>Zornia muelleriana</i> subsp. <i>muelleriana</i>	
<i>Zornia muriculata</i>	

ATTACHMENT E – FAUNA SPECIES LIST

Scientific Name	Common Name
Amphibians	
<i>Cyclorana alboguttata</i>	greenstripe frog
<i>Limnodynastes salmini</i>	salmon-striped frog
<i>Limnodynastes tasmaniensis</i>	spotted grass frog
<i>Litoria bicolor</i>	Northern dwarf treefrog
<i>Litoria caerulea</i>	Australian green treefrog
<i>Litoria fallax</i>	Eastern dwarf treefrog
<i>Litoria gracilentia</i>	graceful treefrog
<i>Litoria inermis</i>	bumpy rocketfrog
<i>Litoria latopalmata</i>	broad palmed rocketfrog
<i>Litoria nasuta</i>	rocketfrog
<i>Litoria rothii</i>	Northern laughing frog
<i>Litoria rubella</i>	ruddy treefrog
<i>Notaden bennettii</i>	crucifix toad
<i>Opisthodon ornatus</i>	ornate burrowing frog
<i>Rhinella marina</i>	cane toad
Birds	
<i>Acanthagenys rufogularis</i>	spiny-cheeked honeyeater
<i>Acanthiza apicalis</i>	inland thornbill
<i>Acanthiza nana</i>	yellow thornbill
<i>Acanthiza reguloides</i>	buff-rumped thornbill
<i>Accipiter cirrhocephalus</i>	collared sparrowhawk
<i>Accipiter fasciatus</i>	brown goshawk
<i>Aegotheles cristatus</i>	Australian owl-nightjar
<i>Alectura lathamii</i>	Australian brush-turkey
<i>Anas gracilis</i>	grey teal
<i>Anas superciliosa</i>	Pacific black duck
<i>Anhinga novaehollandiae</i>	Australasian darter
<i>Anthus novaeseelandiae</i>	Australasian pipit
<i>Aprosmictus erythropterus</i>	red-winged parrot
<i>Aquila audax</i>	wedge-tailed eagle
<i>Ardea ibis</i>	cattle egret
<i>Ardea intermedia</i>	intermediate egret
<i>Ardea modesta</i>	Eastern great egret
<i>Ardea pacifica</i>	white-necked heron
<i>Ardeotis australis</i>	Australian bustard
<i>Artamus cinereus</i>	black-faced woodswallow
<i>Artamus leucorhynchus</i>	white-breasted woodswallow
<i>Artamus personatus</i>	masked woodswallow
<i>Aviceda subcristata</i>	Pacific baza
<i>Aythya australis</i>	hardhead
<i>Cacatua galerita</i>	sulphur-crested cockatoo
<i>Cacatua sanguinea</i>	little corella
<i>Cacomantis flabelliformis</i>	fan-tailed cuckoo
<i>Centropus phasianinus</i>	pheasant coucal
<i>Chalcites basalis</i>	Horsfield's bronze-cuckoo
<i>Chenonetta jubata</i>	Australian wood duck
<i>Chrysococcyx lucidus</i>	shining bronze-cockoo
<i>Chrysococcyx minutillus</i>	little bronze-cuckoo
<i>Circus assimilis</i>	spotter harrier
<i>Cincloramphus mathewsi</i>	rufous songlark
<i>Cisticola exilis</i>	golden-headed cisticola
<i>Colluricincla harmonica</i>	grey shrike-thrush
<i>Coracina maxima</i>	ground cockoo-shrike
<i>Coracina novaehollandiae</i>	black-faced cuckoo-shrike
<i>Coracina papuensis</i>	white-bellied cuckoo-shrike
<i>Corcorax melanorhamphos</i>	white-winged chough
<i>Corvus coronoides</i>	Australian raven
<i>Corvus orru</i>	Torresian crow
<i>Coturnix ypsilophora</i>	brown quail
<i>Cracticus nigrogularis</i>	pied butcherbird
<i>Cracticus tibicen</i>	Australian magpie
<i>Cracticus torquatus</i>	grey butcherbird
<i>Cygnus atrata</i>	black swan
<i>Dacelo leachii</i>	blue-winged kookaburra
<i>Dacelo novaeguineae</i>	laughing kookaburra
<i>Daphoenositta chrysoptera</i>	varied sittella

<i>Dendrocygna arcuata</i>	wandering whistling-duck
<i>Dendrocygna eytoni</i>	plumed whistling-duck
<i>Dicaeum hirundinaceum</i>	mistletoe bird
<i>Dicrurus bracteatus</i>	spangled drongo
<i>Dromaius novaehollandiae</i>	emu
<i>Egretta novaehollandiae</i>	white-faced heron
<i>Elanus axillaris</i>	black-shouldered kite
<i>Elseyornis melanops</i>	black-fronted dotterel
<i>Entomyzon cyanotis</i>	blue-faced honeyeater
<i>Eolophus roseicapillus</i>	galah
<i>Eopsaltria australis</i>	Eastern yellow robin
<i>Ephippiorhynchus asiaticus</i>	black-necked stork
<i>Eurostopodus argus</i>	spotted nightjar
<i>Eurystomus orientalis</i>	collarbird
<i>Falco berigora</i>	brown falcon
<i>Falco cenchroides</i>	nankeen kestrel
<i>Falco longipennis</i>	Australian hobby
<i>Falco subniger</i>	black falcon
<i>Fulica atra</i>	Eurasian coot
<i>Gallinago hardwickii</i>	Latham's snipe
<i>Gallirallus philippensis</i>	buff banded rail
<i>Geopelia humeralis</i>	bar-shouldered dove
<i>Geopelia placida</i>	peaceful dove
<i>Geophaps scripta scripta</i>	squatter pigeon
<i>Gerygone albogularis</i>	white-throated gerygone
<i>Grallina cyanoleuca</i>	maggie lark
<i>Grus rubicunda</i>	brolga
<i>Haliaeetus leucogaster</i>	white-bellied sea eagle
<i>Haliastur sphenurus</i>	whistling kite
<i>Heteromunia pectoralis</i>	pictorella mannikin
<i>Himantopus himantopus</i>	black-winged stilt
<i>Irediparra gallinacea</i>	comb-crested jacana
<i>Lichenostomus flavus</i>	yellow honeyeater
<i>Lichenostomus fuscus</i>	fuscous honeyeater
<i>Lichenostomus keartlandi</i>	grey-headed honeyeater
<i>Lichenostomus virescens</i>	singing honeyeater
<i>Lichmera indistincta</i>	brown honeyeater
<i>Lonchura castaneothorax</i>	chestnut-breasted mannikin
<i>Lophoictinia isura</i>	square-tailed kite
<i>Malurus lamberti</i>	variegated fairy-wren
<i>Malurus leucopterus</i>	white-winged fairy-wren
<i>Malurus melanocephalus</i>	red-backed fairy-wren
<i>Manorina flavigula</i>	yellow-throated miner
<i>Megalurus timoriensis</i>	tawny grassbird
<i>Meliphaga lewinii</i>	Lewin's honeyeater
<i>Melithrptus albogularis</i>	white-throated honeyeater
<i>Merops ornatus</i>	rainbow bee-eater
<i>Microcarbo melanoleucos</i>	little pied cormorant
<i>Milvus migrans</i>	black kite
<i>Mirafrja javanica</i>	Horsfield's bushlark
<i>Myiagra cyanoleuca</i>	satin flycatcher
<i>Myiagra inquieta</i>	restless flycatcher
<i>Myiagra rubecula</i>	leaden flycatcher
<i>Myzomela sanguinolenta</i>	scarlet honeyeater
<i>Neochmia modesta</i>	plum-headed finch
<i>Nettapus coromandelianus</i>	cotton pygmy goose
<i>Ninox novaeseelandiae</i>	Southern boobook
<i>Nycticorax caledonicus</i>	nankeen night heron
<i>Nymphicus hollandicus</i>	cockatiel
<i>Ocyphaps lophotes</i>	crested pigeon
<i>Oriolus sagittatus</i>	olive-backed oriole
<i>Pachycephala rufiventris</i>	rufous whistler
<i>Pardalotus punctatus</i>	spotted pardalote
<i>Pardalotus striatus</i>	striated pardalote
<i>Pelecanus conspicillatus</i>	Austalian pelican
<i>Petrochelidon ariel</i>	fairy martin
<i>Petrochelidon nigricans</i>	tree martin
<i>Phalacrocorax carbo</i>	great cormorant

<i>Phalacrocorax sulcirostris</i>	little black cormorant
<i>Phalacrocorax varius</i>	pied cormorant
<i>Phaps chalcoptera</i>	common bronzewing
<i>Philemon citreogularis</i>	little friarbird
<i>Philemon corniculatus</i>	noisy friarbird
<i>Platalea regia</i>	royal spoonbill
<i>Platycercus adscitus</i>	pale-headed rosella
<i>Plectorhyncha lanceolata</i>	striped honeyeater
<i>Podargus strigoides</i>	tawny frogmouth
<i>Pomatostomus temporalis</i>	grey-crowned babbler
<i>Ptilonorhynchus maculatus</i>	spotted bowerbird
<i>Ptilonorhynchus nuchalis</i>	great bowerbird
<i>Ptilonorhynchus violaceus</i>	satin bowerbird
<i>Rhipidura albiscapa</i>	grey fantail
<i>Rhipidura leucophrys</i>	willie wagtail
<i>Rhipidura rufifrons</i>	rufous fantail
<i>Scythrops novaehollandiae</i>	channel-billed cuckoo
<i>Sericornis frontalis</i>	white-browed scrubwren
<i>Smicornis brevirostris</i>	weebill
<i>Sphecotheres vieilloti</i>	fig bird
<i>Strepera graculina</i>	pied currawong
<i>Struthidea cinerea</i>	apostle bird
<i>Tachybaptus novaehollandiae</i>	Australasian grebe
<i>Taeniopygia bichenovii</i>	double-barred finch
<i>Taeniopygia guttata</i>	zebra finch
<i>Threskiornis molucca</i>	Australian white ibis
<i>Threskiornis spinicollis</i>	straw-necked ibis
<i>Todiramphus macleayii</i>	forest kingfisher
<i>Todiramphus pyrrhopygus</i>	red-backed kingfisher
<i>Todiramphus sancta</i>	sacred kingfisher
<i>Trichoglossus haematodus</i>	rainbow lorikeet
<i>Turnix varia</i>	painted button quail
<i>Tyto javanica</i>	Eastern barn owl
<i>Vanellus miles</i>	masked lapwing plover
Mammals	
<i>Aepyprymnus rufescens</i>	rufous bettong
<i>Bos sp.</i>	Brahman cross domestic cattle
<i>Canis familiaris</i>	wild dog
<i>Chaerephon jobensis</i>	Northern freetail bat
<i>Chalinolobus gouldii</i>	
<i>Chalinolobus nigrogriseus</i>	hoary wattled bat
<i>Chalinolobus picatus</i>	little pied bat
<i>Felis catus</i>	feral cat
<i>Isodon macrourus</i>	Northern brown bandicoot
<i>Macropus agilis</i>	agile wallaby
<i>Macropus dorsalis</i>	black-striped wallaby
<i>Macropus giganteus</i>	Eastern grey kangaroo
<i>Macropus parryi</i>	whiptail wallaby
<i>Macropus robustus</i>	common wallaroo
<i>Macropus rufogriseus</i>	red-necked wallaby
<i>Macropus rufus</i>	red kangaroo
<i>Miniopterus australis</i>	little bent-wing bat
<i>Miniopterus orianae oceanensis</i>	Eastern bent-wing bat
<i>Mormopterus beccarii</i>	Beccari's freetail bat
<i>Mormopterus ridei</i>	Eastern freetail bat
<i>Mormopterus sp.2</i>	
<i>Mormopterus sp.3</i>	
<i>Mus musculus</i>	house mouse
<i>Nyctophilus geoffroyi</i>	lesser long-eared bat
<i>Nyctophilus sp.</i>	long-eared bat
<i>Oryctolagus cuniculus</i>	rabbit
<i>Petaurus australis</i>	yellow-bellied glider
<i>Petrogale inornata</i>	unadorned rock wallaby
<i>Planigale maculata</i>	common planigale
<i>Planigale tenuirostris</i>	narrow-nosed planigale
<i>Pseudomys gracilicaudatus</i>	Eastern chesnut mouse
<i>Rattus fuscipes</i>	bush rat
<i>Saccolaimus flaviventris</i>	yellow-bellied sheath-tail bat

<i>Scotorepens balstoni</i>	inland broad-nose bat
<i>Scotorepens greyii</i>	little broad-nosed bat
<i>Sus scrofa</i>	feral pig
<i>Tachyglossus aculeatus</i>	short-beaked echidna
<i>Trichosurus vulpecula</i>	common brushtail possum
<i>Vespadelus baverstocki</i>	inland forest bat
<i>Vespadelus troughtoni</i>	Eastern cave bat
<i>Vulpes vulpes</i>	fox
<i>Wallabia bicolor</i>	swamp wallaby
Reptiles	
<i>Amphibolurus nobbi</i>	nobby dragon
<i>Anomalopus sp.</i>	
<i>Antaresia maculosa</i>	spotted python
<i>Boiga irregularis</i>	brown tree snake
<i>Carlia foliorum</i>	
<i>Carlia munda</i>	shaded-litter rainbow-skink
<i>Carlia pectoralis</i>	open-litter rainbow skink
<i>Carlia schmeltzii</i>	robust rainbow-skink
<i>Carlia vivax</i>	rainbow skink
<i>Cryptoblepharus virgatus</i>	snake-eyed skink
<i>Ctenotus robustus</i>	striped skink
<i>Ctenotus taeniolatus</i>	copper-tailed skink
<i>Dendrelaphis punctulata</i>	common tree snake
<i>Denisonia maculata</i>	ornamental snake
<i>Denmansia papuensis</i>	greater black whipsnake
<i>Denmansia psammophilis</i>	yellow-faced whipsnake
<i>Diplodactylus vittatus</i>	wood gecko
<i>Diporiphora australis</i>	Tommy roundhead dragon
<i>Emydura sp.</i>	Short-necked turtle
<i>Eulamprus tenuis</i>	barred-sided skink
<i>Furina ornata</i>	orange-naped snake
<i>Gehyra dubia</i>	dubious gecko
<i>Heteronotia binoei</i>	Bynoe's gecko
<i>Lerista fragilis</i>	eastern mulch slider
<i>Lucasium steindachneri</i>	Steindachner's gecko
<i>Menetia greyii</i>	
<i>Morethia boulengeri</i>	
<i>Morethia taeniopleura</i>	
<i>Oedura monolis</i>	ocellated velvet gecko
<i>Oedura rhombifer</i>	zigzag velvet gecko
<i>Pogona barbata</i>	Eastern bearded dragon
<i>Pseudechis australis</i>	king brown snake
<i>Pseudonaja textilis</i>	Eastern brown snake
<i>Suta Suta</i>	Myall snake
<i>Varanus storri</i>	Storr's monitor

ATTACHMENT F – CLEARING AREAS BY STAGE

Clearing Areas by Stage

RE Type	RE Biodiversity Status	Percentage (%)	BVG	Total Area (ha)
Year 1				
11.3.1	Endangered	100	25a	1.3
11.4.2	Of Concern	100	17a	0.3
11.4.8	Endangered	100	25a	0.2
11.4.9	Endangered	100	25a	0.4
11.5.1	No Concern at present	100	18b	0.2
11.7.3	No Concern at present	100	19d	0.2
11.7.4	No Concern at present	100	12a	17.8
11.7.6	No Concern at present	100	10a	1.5
HVR 11.9.5	Endangered	100	25a	1.8
Non-remnant	Non-remnant	100	NA	352.8
YEAR 1 TOTAL				376.5
Year 3				
11.3.1	Endangered	100	25a	5.5
11.4.2	Of Concern	100	17a	26.7
11.4.8	Endangered	100	25a	7.3
11.4.9	Endangered	100	25a	6.9
11.5.16	Endangered	100	25a	0.1
11.7.3	No Concern at present	100	19d	0.4
11.7.4	No Concern at present	100	12a	41.7
11.7.6	No Concern at present	100	10a	6.9
HVR 11.3.1	Endangered	100	25a	5.1
HVR 11.8.13	Endangered	100	7a	0.4
Non-remnant	Non-remnant	100	NA	524.7
YEAR 3 TOTAL				625.7
Year 5				
11.3.1	Endangered	100	25a	0.7
11.4.2	Of Concern	100	17a	1.3
11.5.3	No Concern at present	100	17a	5.4
11.7.3	No Concern at present	100	19d	0.1
11.7.4	No Concern at present	100	12a	77.2
11.7.6	No Concern at present	100	10a	26.1
HVR 11.3.1	Endangered	100	25a	1.4
Non-remnant	Non-remnant	100	NA	448.3
YEAR 5 TOTAL				560.5

RE Type	RE Biodiversity Status	Percentage (%)	BVG	Total Area (ha)
Year 10				
11.3.1	Endangered	100	25a	0.4
11.4.2	Of Concern	100	17a	58.7
11.4.8	Endangered	100	25a	1.9
11.4.9	Endangered	100	25a	6.3
11.5.1	No Concern at present	100	18b	18.1
11.5.3	No Concern at present	100	17a	22.7
11.5.16	Endangered	100	25a	3.5
11.7.4	No Concern at present	100	12a	2.1
11.7.6	No Concern at present	100	10a	51.7
HVR 11.3.1	Endangered	100	25a	4.6
HVR 11.4.9	Endangered	100	25a	0.2
HVR 11.8.5	No Concern at present	100	11a	0.6
Non-remnant	Non-remnant	100	NA	736.2
YEAR 10 TOTAL				906.9
Year 16				
11.3.1	Endangered	100	25a	0.8
11.3.4/11.3.25	Of Concern	60/40	16c/16a	2.6
11.3.25	Of Concern	100	16a	7.7
11.5.16	Endangered	100	25a	7.3
11.7.1 x 1	Of Concern	100	25a	10.9
11.7.2	No Concern at present	100	24a	89.7
11.7.3	No Concern at present	100	19d	2.2
11.7.4	No Concern at present	100	12a	11.5
11.7.6	No Concern at present	100	10a	180.4
11.8.4	No Concern at present	100	11a	43.8
11.8.5	No Concern at present	100	11a	67.2
11.8.13	Endangered	100	7a	8.1
Non-remnant	Non-remnant	100	NA	115.1
YEAR 16 TOTAL				547.2
Year 25				
11.3.1	Endangered	100	25a	0.1
11.4.2	Of Concern	100	17a	48.0
11.4.8	Endangered	100	25a	25.1
11.4.9	Endangered	100	25a	17.7
11.5.1	No Concern at present	100	18b	1.9
11.5.3	No Concern at present	100	17a	0.8

RE Type	RE Biodiversity Status	Percentage (%)	BVG	Total Area (ha)
11.5.16	Endangered	100	25a	70.1
11.7.1 x 1	Of Concern	100	25a	21.5
11.7.2	No Concern at present	100	24a	98.4
11.7.3	No Concern at present	100	19d	6.2
11.7.4	No Concern at present	100	12a	24.7
11.7.6	No Concern at present	100	10a	335.2
11.8.4	No Concern at present	100	11a	24.6
11.8.5	No Concern at present	100	11a	30.1
11.8.13	Endangered	100	7a	5.0
HVR 11.4.9	Endangered	100	25a	0.9
Non-remnant	Non-remnant	100	NA	1298.2
YEAR 25 TOTAL				2008.5
Year 46				
11.4.2	Of Concern	100	17a	21.3
11.4.9	Endangered	100	25a	31.0
11.5.3	No Concern at present	100	17a	2.1
11.5.16	Endangered	100	25a	109.4
11.7.1	Of Concern	100	25a	20.1
11.7.1 x 1	Of Concern	100	25a	161.6
11.7.2	No Concern at present	100	24a	52.7
11.7.3	No Concern at present	100	19d	31.3
11.7.6	No Concern at present	100	10a	240.0
11.8.4	No Concern at present	100	11a	6.4
11.8.5	No Concern at present	100	11a	90.8
11.8.11	Of Concern	100	30b	84.3
11.8.13	Endangered	100	7a	4.9
HVR 11.4.9	Endangered	100	25a	6.5
Non-remnant	Non-remnant	100	NA	1595.0
YEAR 46 TOTAL				2457.5

Clearing in Remnant Watercourse Vegetation by Stage

Stream Order	Clearing Area by Years (ha)							Total Clearing (ha)
	0–1	2–3	4–5	6–10	11–16	17–25	26–46	
1	–	–	–	–	34.3	37.8	37.6	109.7
2	1.1	2.2	–	3.8	10.5	12.8	6.5	36.8
3	–	2.1	0.6	2.3	40.8	43.3	9.2	98.3
4	–	–	–	–	2.3	–	–	2.3
5	–	0.3	–	–	–	–	–	0.3
TOTAL	1.1	4.6	0.6	6.1	87.9	93.9	53.3	247.3

ATTACHMENT G – PROJECT OVERLAP AND BUFFERS FOR CUMULATIVE IMPACT ASSESSMENT

Project	Buffer Applied	Total Area (ha)	Overlap Area Covered in other Project		Remaining after Overlap Removed (ha)
			Area (ha)	Project	
Byerwen Coal project					
Abbot Point Coal Terminal	4 km	4800.03			4800.03
Arrow Bowen Pipeline Project	15 m	1841.78	93.75	Bow Energy Gas Pipeline	1654.24
			0.27	Burton Project	
			17.18	Eaglefield Expansion	
			1.49	Ellensfield Coal Mine	
			10.47	Goonyella Riverside Mine ML	
			15.07	Moorvale Coal	
			44.68	Moranbah SCG Operations	
			4.62	Newlands Coal Extension	
Bow Energy Gas Pipeline	15 m	1182.75	93.87	Arrow Bowen Pipeline Project	1088.9
Bowen basin Coal Growth Caval Ridge		21 641.38	133.18	Moranbah SCG Operations	21 508.20
Bowen Basin Coal Growth Daunia Mine		3351.05			3351.05
Burton Project		5058.38	3.64	New Lenton	5054.74
Central Queensland Gas Pipeline	15	1350.10	0.12	Arrow Bowen Pipeline Project	1156.28
			33.60	Eagle Downs Coal Project	
			81.36	Moranbah SCG Operations	
			5.45	PL224 (and Grosvenor Coal)	
			73.28	Saraji East	
Central Queensland Integrated Rail	15 m	1871.95	12.83	Abbot Point Coal Terminal	1637.88
			0.09	Arrow Bowen Pipeline Project	
			213.94	Northern Missing Link	
			0.09	NQ Gas Pipeline	
			6.50	Twin Hills	
			0.62	Water For Bowen Project	
Clermont Coal Mine		2055.52			2055.52

Project	Buffer Applied	Total Area (ha)	Overlap Area Covered in other Project		Remaining after Overlap Removed (ha)
			Area (ha)	Project	
Cows Coal	Selected from ML data	211.30	4.05	Drake Coal Project	207.25
Dalrympie Bay Coal Terminal	Sourced from NRA data	264.19			264.19
Drake Coal Project		9226.34			9226.34
Dudgeon Point Coal Terminal	7 km	4799.98			4799.98
Eagle Downs Coal Terminal		4551.37	0.12	Moranbah SCG Operations	4551.25
Eaglefield Expansion		3580.20	97.48	Goonyella Riverside Mine ML	3479.84
			2.88	Wards Well Underground	
Ellenfield Coal Mine		3386.87			3386.87
Goonyella Riverside Mine ML		14 604.13			14 604.13
Grosvenor Coal		9500.50	8084.86	Moranbah SCG Operations	219.61
			1196.02	PL224	
Integrated Issac Plains ML		2249.76	936.71	Moranbah SCG Operations	1313.05
Jax Project		1950.37			1950.37
Jilalan Rail Yard	1 km	300.00			300.00
Millenium Expansion Project		2969.83	97.42	Moranbah SCG Operations	2872.41
Moorvale Coal		3848.52			3848.52
Moranbah CSG Operation		53 190.03			53 190.03
Nebo Moranbah Power Stations	500 m	150.00	6.09	Moranbah SCG Operations	75.00
			68.91	PL224	
New Lenton		6098.53			6098.53
Newlands Coal		6707.14			6707.14
Newlands Coal Extension		11 695.70			11 695.70

Project	Buffer Applied	Total Area (ha)	Overlap Area Covered in other Project		Remaining after Overlap Removed (ha)
			Area (ha)	Project	
Northern Missing Link	15 m	214.03	0.09	Arrow Bowen Pipeline Project	213.94
NQ Gas Pipeline	15 m	1178.96	0.09	Central Queensland Integrated Rail	1155.89
			1.63	Moranbah SCG Operations	
			21.36	PL224	
Olive Downs		1635.77			1635.77
PL224		7006.00			7006.00
Saraji East		9334.47	30.16	Bowen Basin Coal Growth Caval ridge	9304.31
Sarsfield Project		1208.21			1208.21
Twin Hills		733.03			733.03
Vermont Coal		4908.43			4908.43
Wards Well Underground		5638.34			5638.34
Water For Bowen Project	15 m	726.24	3.93	Abbot Point Coal terminal	721.70
			0.62	Central Queensland Integrated Rail	
TOTAL IMPACTED AREA (ha)					203 622.65