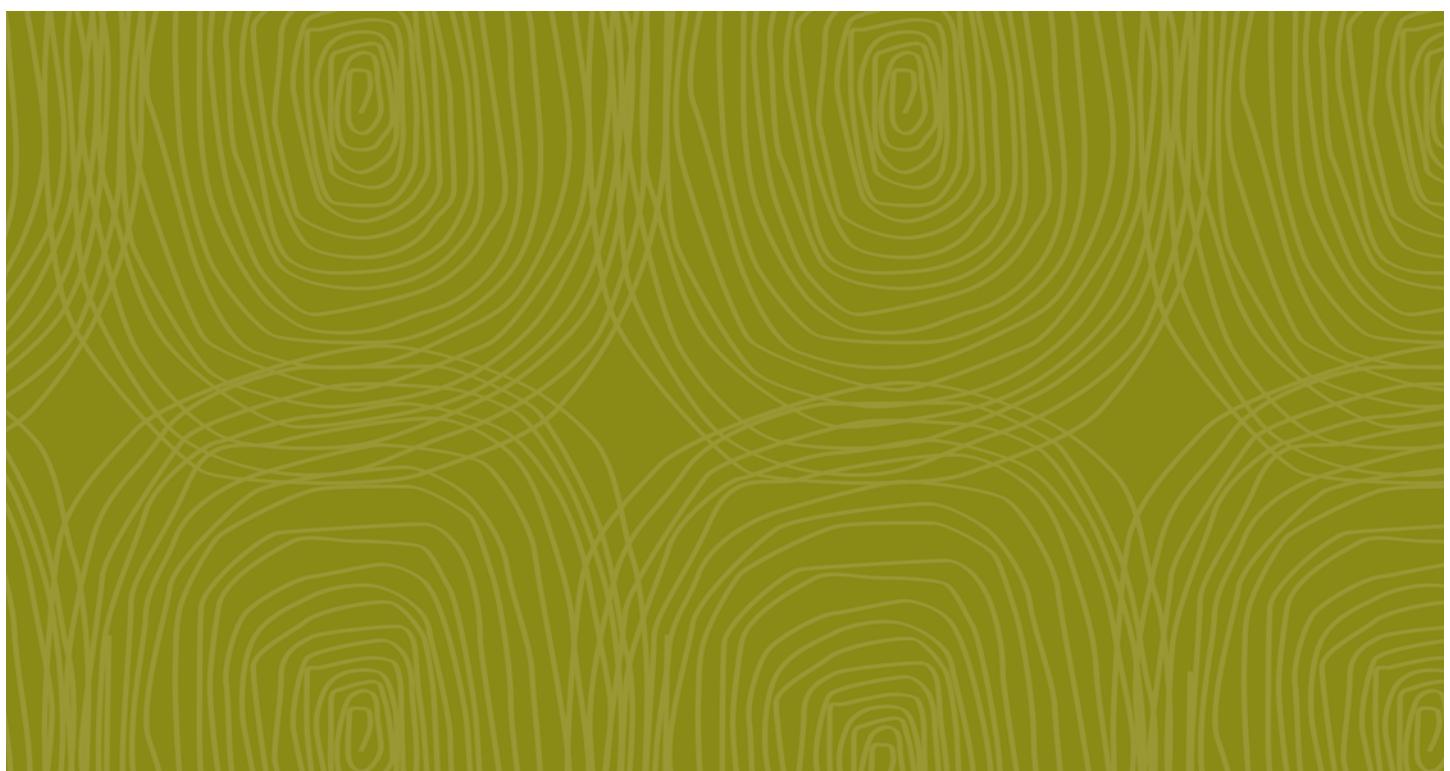


**AE** | Railway Corridor  
– Updated Terrestrial  
Ecology Report





CLIENTS | PEOPLE | PERFORMANCE

## Hancock Projecting Pty Ltd

### Report for Alpha Coal Project (Rail) Supplementary Environmental Impact Statement

Terrestrial Ecology

March 2011



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## Abbreviations

|             |  |
|-------------|--|
| BPA         | Biodiversity Planning Assessment                                     |
| BTF         | Black-throated finch   |
| BVG         | Broad Vegetation Groups  |
| DEEDI       | Department of Employment, Economic Development and Innovation        |
| DERM        | Department of Environment and Resource Management                    |
| DEWHA       | Department of Environment, Water, Heritage and the Arts              |
| DIWA        | Directory of Important Wetlands                                      |
| EIS         | Environmental Impact Statement                                       |
| EPA         | Environmental Protection Agency (now DERM)                           |
| EPBC Act    | <i>Environment Protection and Biodiversity Conservation Act 1999</i> |
| FHMOP       | Fish Habitat Management Operational Policy                           |
| HANZAB      | Handbook of Australian, New Zealand and Antarctic Birds              |
| HERBRECS    | Queensland Herbarium Records   |
| HPPL        | Hancock Prospecting Pty Ltd  |
| MNES        | Matters of National Environmental Significance                       |
| Mtpa        | Million tonnes per annum   |
| NCA         | <i>Nature Conservation Act 1992</i>                                  |
| QPIF        | Queensland Primary Industries and Fisheries                          |
| QR          | Queensland Rail  |
| RE          | Regional Ecosystem   |
| REDD        | Regional Ecosystem Description Database                              |
| SDPWOA      | <i>State Development and Public Works Organisation Act 1971</i>      |
| SEVT        | Semi Evergreen Vine Thicket  |
| TEC         | Threatened Ecological Communities                                    |
| The Project | Alpha rail project   |
| ToR         | Terms of Reference   |
| VMA         | <i>Vegetation Management Act 1999</i>                                |



## Executive Summary

Hancock Prospecting Pty Ltd (HPPL) proposes to construct a 495 km long, standard gauge railway line between the Alpha coal mine and the proposed Port of Abbot Point. This rail infrastructure will enable export of 60 Mtpa of quality thermal coal to overseas markets.

In 2009, GHD was commissioned to undertake an Environmental Impact Statement (EIS) for the proposed rail line. The following document describes the findings of terrestrial flora and fauna assessments undertaken as part of the EIS. The objective of these surveys was to document the existing environment along the length of the alignment, to identify flora, fauna and ecological communities with high environmental value and conservation significance, to identify potential impacts and propose practical mitigation measures.

Terrestrial flora and fauna assessments were undertaken using a combination of database searches, literature reviews and seasonal wet and dry season field surveys. Field methods and site selection were refined through consultation with the Department of Environment and Resource Management (DERM). Flora surveys were undertaken at 19 comprehensive sites and 75 rapid assessment sites and fauna surveys undertaken at 16 comprehensive sites and 43 rapid assessment sites. Dry season surveys were undertaken between November 2 and December 5, 2009 and post wet season surveys between April 12 and 30, 2010. An area of up 1 km either side of the rail alignment was assessed.

The project occurs in the Burdekin Catchment and passes through two bioregions: the Brigalow Belt and Desert Uplands. The Brigalow Belt is a particularly diverse bioregion supporting eight *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act) listed Threatened Ecological Communities (TEC) and 84 *Nature Conservation Act 1992* (NCA) or EPBC Act listed flora and fauna species. Not all of those species occur within the study area. Although the bioregions contain areas of high ecological value, much of the landscape has been modified to some extent by historical land clearing and grazing.

The current certified regional ecosystem (RE) mapping (version 6.0) identified 68 REs within the study area. Field surveys confirmed this number. However amendments were made to the designation of some REs. Based on the amended RE mapping, the project footprint intersects 10 endangered, 19 of concern and 39 least concern REs as classified under the *Vegetation Management Act 1999* (the VMA). The majority of REs are located in the Brigalow Belt Bioregion, with six (least concern REs) in the Desert Uplands. In terms of area, 85% of the remnant vegetation within the project footprint occurs within a least concern RE, 8.5 % occurs within an of concern RE, and 6.5% occurs within an endangered RE. In planning a rail alignment, level terrain is generally favoured, and as a result, REs located on plains and low rises will be the most heavily impacted.

The alignment will pass through 10 endangered REs (111.4 ha) all of which are listed as components of a TEC under provisions of the EPBC Act. The majority of the endangered REs are brigalow communities. The alignment will also pass through a total of 19 REs (104.1 ha) that are classified as of concern under the VMA.

A total of 28 threatened flora and 26 threatened fauna species have been previously recorded or were predicted to occur in the region. Of the 28 threatened flora species predicted to occur in the region assessments of likelihood of occurrence suggest 12 species may occur, one is likely to occur, and two species were confirmed present (the vulnerable tree species black ironbox or *Eucalyptus raveretiana* and the near threatened vine *Bonamia dietrichiana*) within the project footprint. Of the 26 threatened fauna



species predicted to occur, 12 may occur (four reptiles, one mammal and seven birds) five are likely to occur (two reptiles, two birds and one frog) and the following five fauna species were confirmed present: the ornamental snake (*Denisonia orientalis*), little pied bat (*Chalinolobus picatus*) Troughton's sheathtail bat (*Taphozous troughtoni*), squatter pigeon (*Geophaps scripta scripta*) and cotton pygmy-goose (*Nettapus coromandelianus*).

Key impacts on Matters of National Environmental Significance (MNES) include the likely clearing of 110 ha of the Brigalow TEC, 108 ha of Natural Grasslands of the Central Queensland Highlands TEC and 14 ha of Semi Evergreen Vine Thicket TEC. The Weeping Myall Woodlands TEC was not found and is unlikely to occur in the project footprint. Three EPBC listed plant species (black ironbox, king bluegrass *Dicanthium queenslandicum* and bluegrass *Dicanthium setosum*) will potentially experience localised impacts. Although 14 EPBC listed fauna species have the potential to occur in the study area and 26 EPBC listed migratory bird species were confirmed present, no significant impacts are expected on EPBC listed fauna as a result of the Project.

Offset requirements for this project are likely to be extensive. Under the VMA, clearing of endangered and of concern REs and essential habitat, clearing that severs ecological connectivity and clearing in or adjacent to watercourses and wetlands will generally need to be offset. Current offset ratios applied by the government are in the order of three to four times the area being cleared, although the applicable offset policy does not actually specify ratios (it is dependant on the quality of the offset, among other things). Under the EPBC Act, offsetting is likely to play a major role in demonstrating that the impacts on MNES such as the Brigalow and Natural Grassland TECs (among others) will not be significant. Offsetting will also be required to clear or remove species of flora or fauna listed under the NCA as being of conservation significance (such as black ironbox), and for least concern flora and fauna under the NCA where clearing occurs on land not owned by the proponent at the time. Further, offsetting is likely to be necessary in order to meet the requirements of the *Fisheries Act 1994* in relation to removal of marine plants in the Port area.



# 1. Introduction

## 1.1 Project Background

Hancock Prospecting Pty Ltd (HPPL) is proposing to construct a standard gauge, 495 km long railway line for the purposes of transporting processed coal from the Alpha coal mine site to the proposed Port of Abbot Point near Bowen (refer to Figure 1-1). The proposed railway line is a vital piece of infrastructure that will enable export of 60 Mtpa of quality thermal coal to overseas markets.

In September 2009, GHD was commissioned by HPPL to undertake an Environmental Impact Statement (EIS), for the Alpha Coal Project's proposed rail line (herein referred to as the Project). This report summarises the findings of ecological assessments conducted along the proposed rail alignment.

Desktop and field surveys were undertaken to document the existing flora and fauna habitat values along the alignment, to assess the risks to flora and fauna, to identify any significant ecological constraints to development and recommend mitigation measures.

## 1.2 Study Area and Project Footprint

The Project is located between the Alpha coal mine, 38 km northwest of the Alpha township and the Abbot Point coal export terminal, 25 km north of Bowen. The alignment of the Project has been selected on the basis of several factors, primarily environmental, economic and geotechnical grounds. The rail alignment proceeds in a generally north-easterly direction from the Alpha mine, crossing the Belyando River and several of its tributaries in the first 100 km. The railway crosses generally relatively flat lowlands before commencing a gentle climb from near Eaglefield adjacent to the Suttor River, to a point near the existing Newlands mine. This is the highest point on the railway at approximately 300 m above sea level. In the vicinity of the Newlands mine, the railway runs parallel to the Queensland Rail (QR) Northern Missing Link railway for approximately 70 km through a pass in the Leichhardt Range and parallel to the Newlands Railway to a point near the Bowen River. The Railway then travels in a north westerly direction down the Bowen River valley through mostly grazing land toward Mount Herbert. West of Mount Herbert, through a pass in the Clarke Range, the railway travels north-easterly crossing the Bogie River and entering Abbot Point on its western boundary.

The railway passes approximately 70 km to the north east of Clermont, 55 km to the north east of Moranbah, 20 km to the west of Collinsville, and enters the Port of Abbot Point 25 km north of Bowen.

The *project footprint* considered will comprise of:

- ▶ An easement of approximately 495 km long and 60 m wide
- ▶ A series of laydown areas and construction nodes
- ▶ Local construction access tracks (that will be used during construction only)
- ▶ Local maintenance access tracks (that will be used and maintained through the operational phase)



For the purposes of this assessment, the *study area* refers to land 1 km either side of the alignment, for the length of the proposed rail alignment. The alignment is the proposed route of the rail line. Extending the width of the study area was necessary to maximise opportunities for assessment in representative vegetation communities and habitats, given the lack of vehicle access to all parts of the study area, and prudent to consider possible regional impacts on habitats external to the study area.

### 1.3 Assessment Context

On 21 October 2008, the Coordinator-General declared that the Alpha Coal Project a 'significant project for which an EIS is required' under section 26(1) (a) of the *State Development and Public Works Organisation Act 1971* (SDPWOA). On the 13 January 2009, the Project was declared by the Commonwealth Government as a controlled action pursuant to the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). Consultation between the Queensland Department of Infrastructure and Planning (DIP) and Australian Government Department of Environment, Water, Heritage and the Arts (DEWHA), agreed that the environmental impact assessments under the SDPWOA and EPBC Act be conducted under a bilateral agreement based on one ToR and one EIS report.

Section 3.3.2 and Section 3.3.3 of the Project ToR identifies the attributes and values of the terrestrial environment that are to be specifically investigated in the EIS. The following scope of works was conducted to fulfil these requirements. It should be noted that access to all areas of the study area was not available at the time of completing this report due to restricted access to some private properties along the alignment.



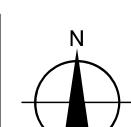
#### LEGEND

- |                     |                       |
|---------------------|-----------------------|
| ● Town              | Proposed Alignment    |
| ▲ Camp              | Local Government Area |
| ■ Marshalling Yards | — State Road          |
| ⊗ Depot             | - - Existing Railway  |

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0 5 10 20 30 40 50 Kilometres



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Alpha Coal Project  
Environmental Impact Statement

Job Number 41-22090  
Revision A  
Date 04-08-2010

#### STUDY AREA

Figure: 1-1



## 1.4 Scope of Works

As part of the EIS conducted for the proposed mine-to-port rail component of the Alpha Coal Project, the terrestrial flora and fauna values of the study area were investigated. This involved:

- ▶ Describing the environmental values of the ecosystems present within the study area;
- ▶ Identifying environmentally sensitive areas that may be directly or indirectly affected by the Project
- ▶ Describing flora and fauna species present or likely to be present
- ▶ Identifying the presence or likely presence of any threatened species or species' habitats in the vicinity of the Project, their regional status and abundance and broad distribution patterns including temporal changes in local abundance due to migration
- ▶ Identifying pest and feral species
- ▶ Identifying potential impacts of the Project on terrestrial flora and fauna and associated ecosystems
- ▶ Describing relevant mitigation and management strategies for protecting and enhancing terrestrial ecology within the affected area.

The approach in undertaking the terrestrial ecological assessment included:

- ▶ A desktop assessment and literature review of available information relating to the flora, fauna and ecology of the region
- ▶ Seasonal field surveys to confirm and provide additional data to the desktop information collected

This report describes the existing terrestrial and aquatic ecological values of the study area, discusses the potential impacts associated with the construction and operation of the Project and recommends measures to mitigate these impacts. The report is structured as follows:

- ▶ Section 2 - Description of the methodology used to assess the existing environmental values
- ▶ Section 3 - Description of existing environmental values of the study area
- ▶ Section 4 - Description of conservation significant areas and species
- ▶ Section 5 - Discussion of potential impacts associated with the Project and the recommended mitigation measures
- ▶ Section 6 - Conclusion

## 1.5 Limitations

Given the restricted ability to sample the expansive project footprint year round (inaccessible during wet seasons, land holder access limitations) achievement of the Project ToR was supported by significant desktop research and targeted field investigations.

**Note:** A terrestrial ecological assessment of two properties south of Collinsville that were inaccessible during EIS studies was undertaken in February 2011. The results of this assessment are presented in Appendix G.



## 2. Methodology

### 2.1 Introduction

To describe the existing environmental values of the study area, a combination of desktop assessments and seasonal field surveys were conducted. The desktop assessment comprised a review of relevant literature, database searches and existing technical reports. Wet and dry season flora and fauna surveys were conducted to obtain ecological information relevant to the Project and to ground-truth results from desktop assessments.

### 2.2 Nomenclature

Scientific and common names for flora and fauna are consistent with those used in the following sources:

- ▶ Census of the Queensland Flora (Bostock and Holland, 2007) and botanical binomials presently accepted by the Queensland Herbarium, Department of Environment and Resource Management (DERM)
- ▶ Handbook of Australian, New Zealand and Antarctic Birds (HANZAB) (Oxford University Press)
- ▶ Field Guide to Mammals of Australia (Menkhorst and Knight, 2001)
- ▶ A Field Guide to Reptiles of Queensland (Wilson, 2005)
- ▶ A Complete Guide to Reptiles of Australia (Wilson and Swan, 2008)
- ▶ A Field Guide to Australian Frogs (Barker and Grigg, 1995)

### 2.3 Desktop Review

Prior to the field surveys, a desktop review was conducted to document the existing environment within the study area and identify any listed flora and fauna species that have been historically recorded or have potential to occur on or adjacent to the alignment. Given the length of the alignment, three separate areas were used in desktop searches:

- ▶ Area 1 (Latitude: -19.9 to -21.73, Longitude: 146.98 to 148.28)
- ▶ Area 2 Latitude: (-21.52 to -22.60; Longitude: 146.50 to 147.77)
- ▶ Area 3 (Latitude: -22.40 to -23.62; Longitude: 146.50 to 147.30)

The desktop assessment included searches of:

- ▶ The DEWHA Protected Matters Search Tool to identify species listed under the EPBC Act that are predicted to occur in the study area
- ▶ The DERM Wildlife Online database to identify flora and fauna species that have been historically recorded in or surrounding the study area, including species listed under the *Nature Conservation Act 1992* (the NCA) and the EPBC Act
- ▶ Queensland Herbarium's (DERM) HERBRECS specimen database to identify any flora species previously collected from within the study area



- ▶ The Queensland DERM RE (Version 6.0, 2009) and Essential Habitat (Version 3.0, 2009) mapping to determine the distribution of protected remnant vegetation as well as areas recognised as essential habitat for NCA listed fauna and flora within the study area
- ▶ The DERM on-line regrowth mapping facility was queried to determine if any areas on or within the study area contained regrowth vegetation protected under the *Vegetation Management and Other Legislation Amendment Act 2009*
- ▶ The DERM Biodiversity Planning and Assessment (BPA) mapping to identify habitats and bioregional wildlife corridors that are significant at state or regional level
- ▶ The DERM Referable Areas mapping to determine if the study area was located in or within 100 m of a referable wetland, a conservation estate, or heritage registered place
- ▶ DEWHA's Directory of Important Wetlands database in Australia
- ▶ Birds Australia Atlas database which lists all bird species previously recorded from the study area during official Birds Australia censuses.

## 2.4 Field Surveys

### 2.4.1 Overview

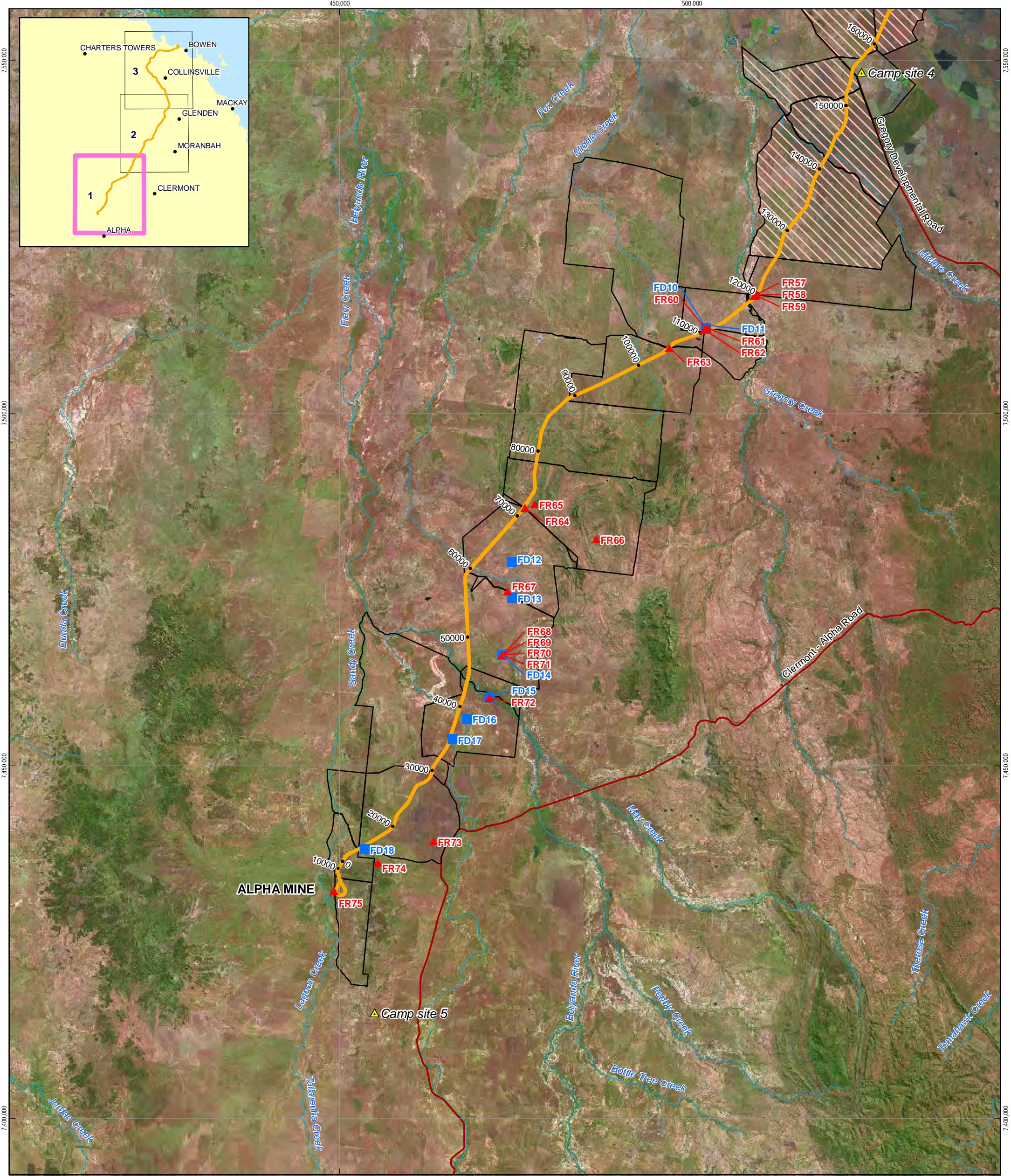
Field surveys were conducted to identify habitats, communities and species in the study area and to verify the likelihood of occurrence of EPBC Act and NCA listed flora and fauna species. Verification was based on direct observations of flora, REs, fauna, fauna traces or suitable habitat. Surveys were conducted in the wet and dry seasons to document seasonal changes in terrestrial flora and fauna assemblages, habitat condition and utilisation. Survey timing and design considered seasonal variation in environmental conditions, the ecology of threatened species and accessibility.

All surveys were undertaken under the GHD Department of Employment, Economic Development and Innovation (DEEDI) Scientific Users Registration Certificate (Registration Number 132), DEEDI General Fisheries Permit (Permit Number 113990), DERM Scientific Purposes Permit (Permit Number WISP06498409) and Queensland Primary Industries and Fisheries (QPIF) Animal Ethics Permits (Permit Number CA2009/11/398 and CA2008/07/280) by appropriately qualified ecologists.

### 2.4.2 Survey Site Selection

Given the extensive length of the rail alignment, careful selection of survey sites was required to optimise survey effort and sample representative habitats, ecosystems and species. The distribution of survey sites is shown in Figure 2-1 and Figure 2-2.

**Note:** the locations of survey sites assessed in February 2011 at two properties not surveyed during the EIS due to access constraints are presented in Appendix G.

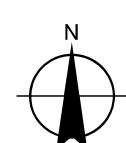
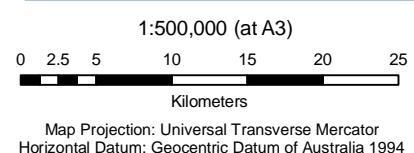


#### LEGEND

|                     |                         |                      |               |
|---------------------|-------------------------|----------------------|---------------|
| ● Town              | ▲ Flora Rapid Survey    | ○ Proposed Alignment | ■ Cadastre    |
| ▲ Camp              | ■ Flora Detailed Survey | — State Road         | ■ Waterbody   |
| ■ Marshalling Yards |                         | — Existing Railway   | — Watercourse |
| ⊗ Depot             |                         |                      |               |

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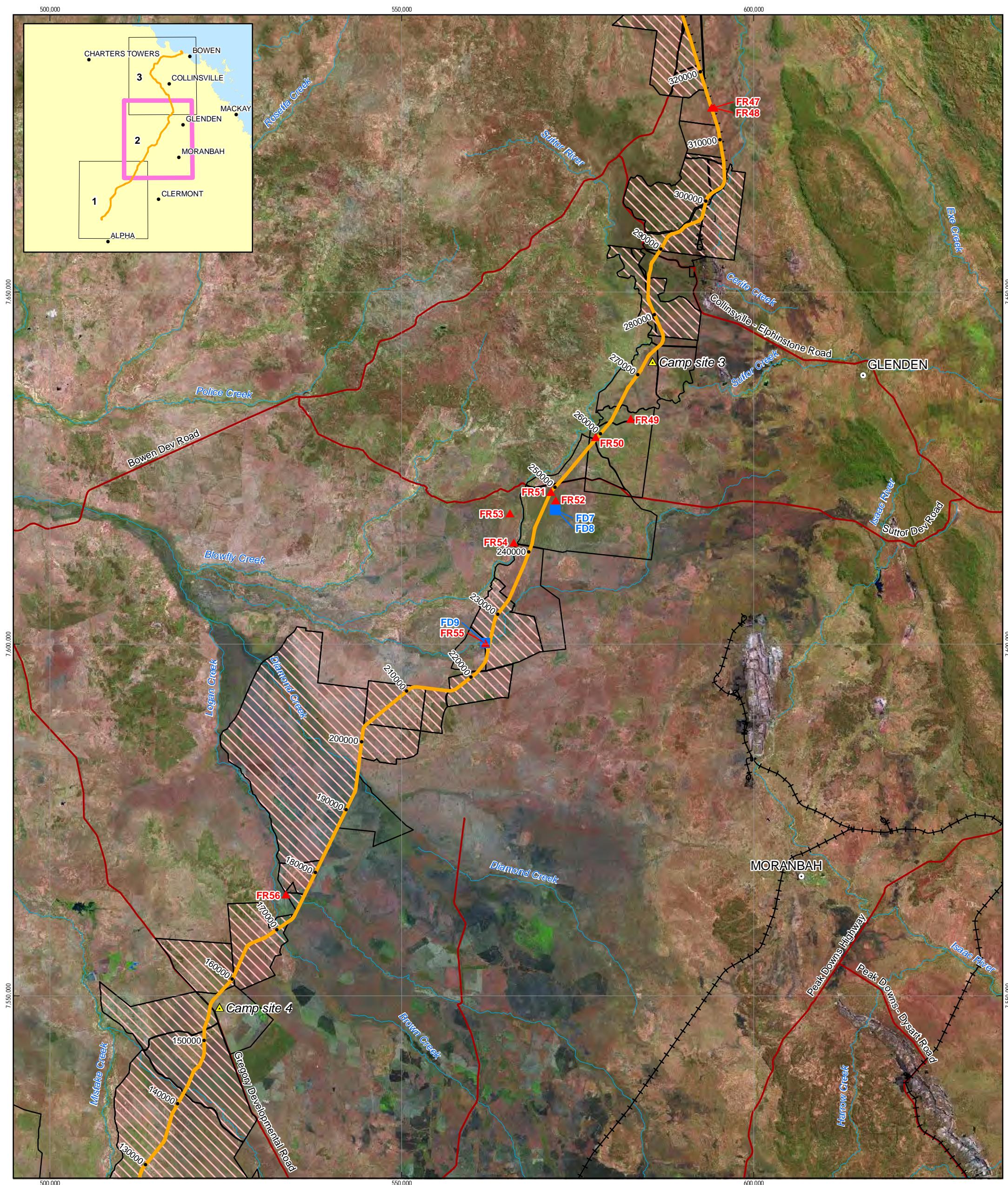
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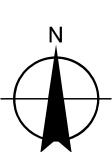
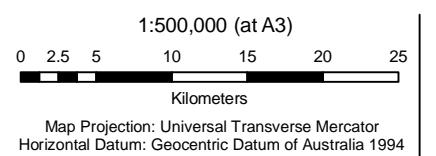


#### LEGEND

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|---------------------|-------------------------|----------------------|-----------------------------|
| ● Town              | ▲ Flora Rapid Survey    | ■ Proposed Alignment | □ Cadastre                  |
| ▲ Camp              | ■ Flora Detailed Survey | — State Road         | ■ No Land Access Permission |
| ■ Marshalling Yards |                         | — Existing Railway   | ■ Waterbody                 |
| ○ Depot             |                         | — Watercourse        |                             |

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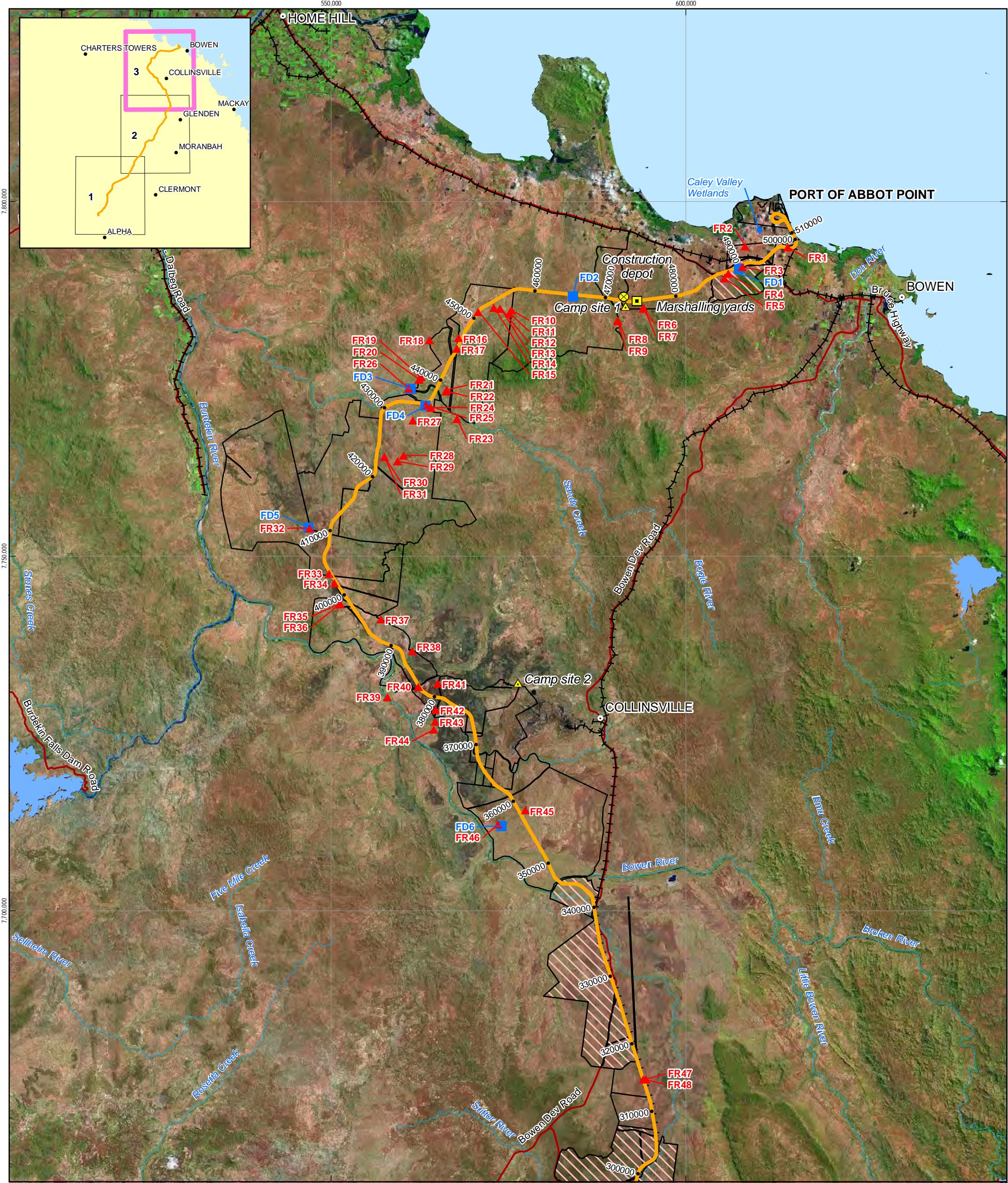
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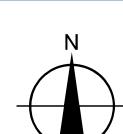
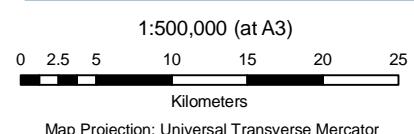

**LEGEND**

- Town
- ▲ Camp
- Marshalling Yards
- Depot
- ◆ Flora Rapid Survey
- Flora Detailed Survey
- Cadastre
- State Road
- Existing Railway
- Watercourse
- Waterbody
- Watercourse

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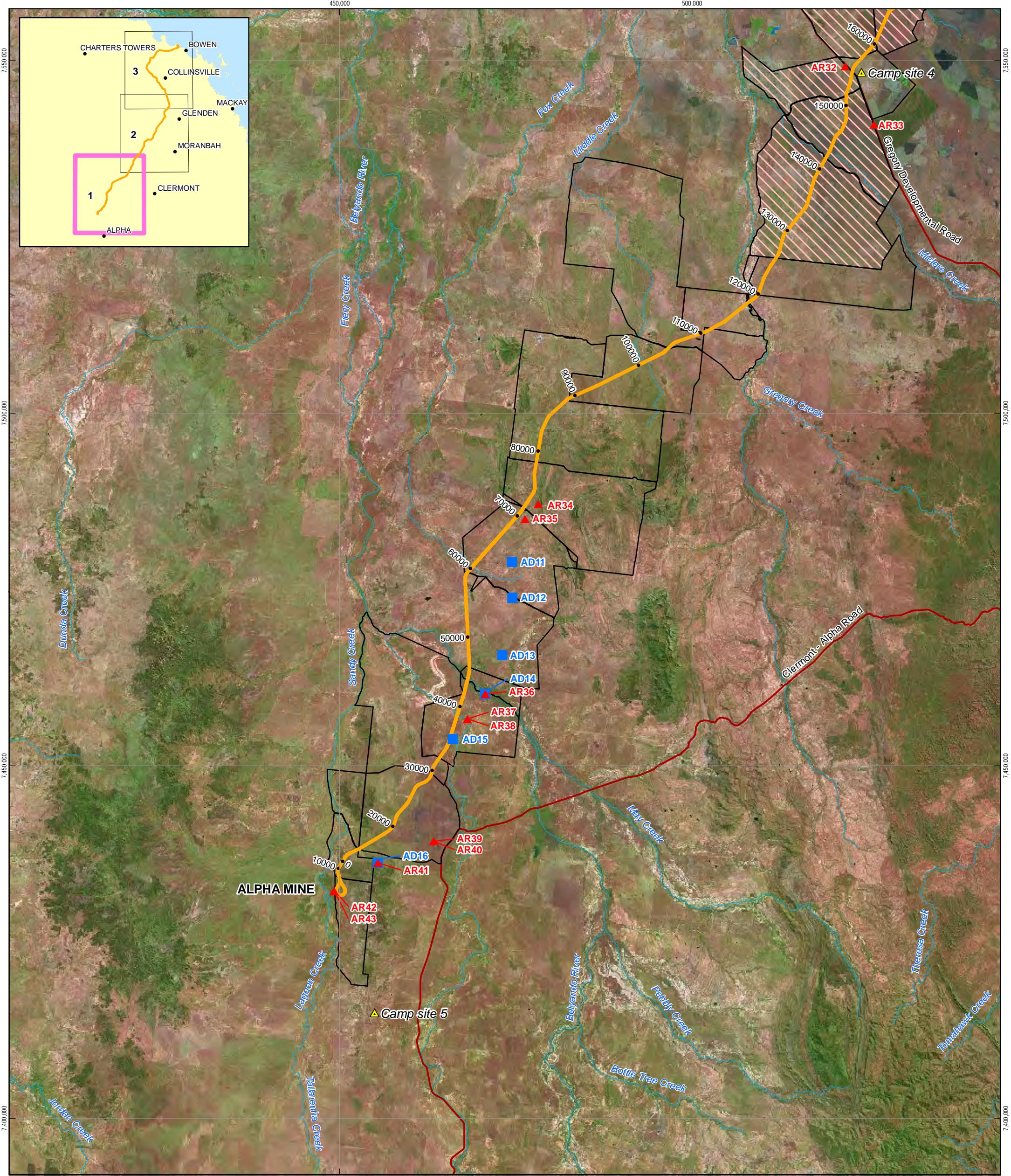
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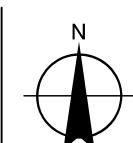
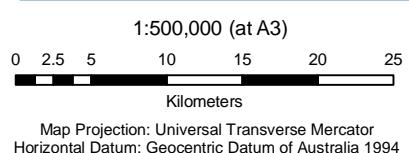


#### LEGEND

|                     |                         |                      |               |
|---------------------|-------------------------|----------------------|---------------|
| ● Town              | ▲ Fauna Rapid Survey    | ■ Proposed Alignment | □ Cadastre    |
| ▲ Camp              | ■ Fauna Detailed Survey | — State Road         | ■ Waterbody   |
| ■ Marshalling Yards |                         | — Existing Railway   | — Watercourse |
| ○ Depot             |                         |                      |               |

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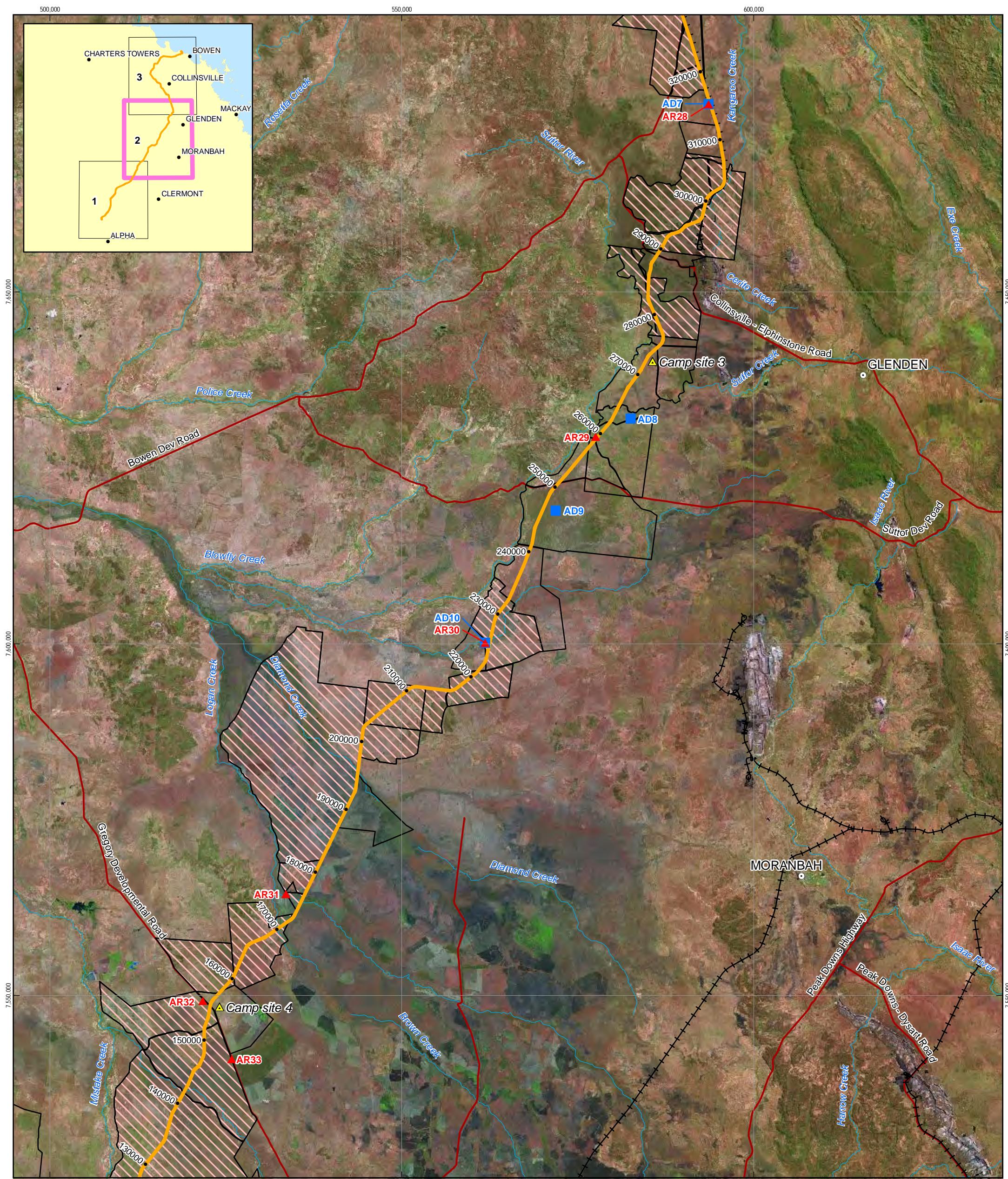
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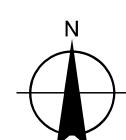
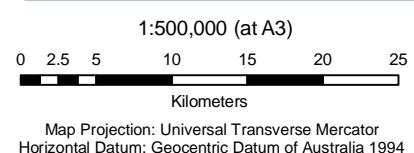
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Sheet 1 of 3


**LEGEND**

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|---------------------|-------------------------|----------------------|---------------|
| ● Town              | ▲ Fauna Rapid Survey    | ■ Proposed Alignment | □ Cadastre    |
| ▲ Camp              | ■ Fauna Detailed Survey | — State Road         | ■ Waterbody   |
| ■ Marshalling Yards |                         | — Existing Railway   | ■ Watercourse |
| ○ Depot             |                         |                      |               |

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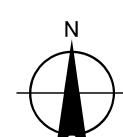
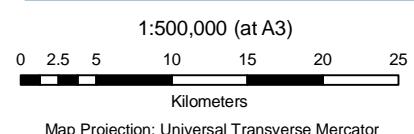
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Sheet 2 of 3


**LEGEND**

- |                     |                             |
|---------------------|-----------------------------|
| ● Town              | ▲ Fauna Rapid Survey        |
| ▲ Camp              | ■ Proposed Alignment        |
| ■ Marshalling Yards | — State Road                |
| ○ Depot             | — Existing Railway          |
|                     | — Watercourse               |
|                     | ■ Cadastre                  |
|                     | ■ Waterbody                 |
|                     | ■ No Land Access Permission |

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## DISTRIBUTION OF FAUNA SURVEY SITES

Figure: 2-2  
Sheet 3 of 3



The final sites were selected based on consideration of the following criteria:

- ▶ Representative REs, vegetation communities and habitats along the study area
- ▶ Spanning the geographical range of the study area (to detect regional variation in species assemblages)
- ▶ Targeting areas expected to have high flora and fauna species diversity (based on the size, connectivity and structural complexity of vegetation remnants)
- ▶ Targeting areas expected to have unique ecological value for listed species (based on knowledge of the habitat requirements of listed species historically recorded or expected to occur in desktops)
- ▶ Correspondence with DERM<sup>1</sup>
- ▶ Corresponding with the project footprint
- ▶ Accessible by vehicle (to maximise survey effort without compromising animal welfare)

#### **2.4.3 Timing of Field Surveys**

The study area experiences distinct dry and wet seasons that strongly influence the ecology, behaviour and detectability of flora and fauna. To document this seasonal change in flora and fauna communities, field surveys were undertaken in the wet and dry season. Dry season terrestrial flora and fauna surveys were conducted in spring from November 2 to December 5, 2009. Field work was undertaken over two, 10 – 12 day survey periods.

Wet season terrestrial flora and fauna surveys were conducted in the late wet season from April 12 to 30, 2010. Exceptionally wet conditions and a late cyclone caused localised flooding and prevented surveys from being undertaken during the peak wet season. Conditions at the time of survey were representative of a late wet season, with warm temperatures and some rainfall throughout the survey period.

Additional surveys at two properties not assessed during the EIS due to access constraints were performed in February 2011 (refer to Appendix G).

#### **2.4.4 Climatic Conditions**

Weather conditions during the first week of dry season surveys were fine and warm. Overnight minimum temperatures ranged between 12.8°C and 19.2°C and daily maximums ranged between 32°C and 35°C. No rainfall was recorded during the first week of survey. Weather data was obtained from the closest Australian Bureau of Meteorology weather station (Collinsville Post Office: 033013). Weather during the second week of dry season surveys was warm and humid. Overnight minimum temperatures ranged between 15.8°C and 19°C and daily maximums ranged between 25.5°C and 33.7°C. A total of 23.4 mm of rainfall was recorded during the second survey week. This data was recorded at the Clermont Sirius Street weather station (Australian Bureau of Meteorology weather station: 035019).

Weather conditions during the three weeks of wet season survey were warm and humid. During the first week (12 – 18 April), overnight minimum temperatures ranged between 15.6°C and 20.5°C and

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<sup>1</sup> [In October 2009, GHD met with representatives of DERM to review the methodology. On November 12, 2009 DERM provided coordinates for 35 recommended survey sites, specifying 16 for comprehensive surveys and 19 for rapid assessment. These sites formed the foundation of survey effort.]



daily maximums ranged between 27.2°C and 33.4°C for Collinsville. In Clermont during week two of the surveys (19 – 23 April), overnight minimum temperatures ranged between 15.6°C and 18.7°C and daily maximums ranged between 24.4°C and 29.5°C. The third week in Collinsville (24 – 28 April) recorded an overnight minimum temperature range of 17.3°C and 20.4°C and a daily maximum range of 27.6°C and 31.0°C. A total of 109.4 mm of rainfall was recorded for Collinsville in the month prior to survey and 1.2 mm in the week prior to survey. For Clermont, a total of 78.6 mm of rainfall was recorded in the month prior to survey and 53 mm was recorded in the week prior to survey. A total of 4.2 mm of rainfall was recorded at Collinsville during the first week of surveys, 0.2 mm at Collinsville in the third week and no rain was recorded at Clermont during the second week of wet season surveys.

#### 2.4.5 Flora Survey Techniques

Flora surveys were undertaken at 19 comprehensive survey sites and 75 rapid assessment sites. The distribution of these survey sites is shown in Figure 2-1. GPS coordinates for each survey site are provided in Appendix A. A summary of flora survey methods employed at comprehensive survey sites and rapid assessment sites is shown in Table 1. These methods are described in greater detail below.

**Table 1 Summary of terrestrial flora survey methods at different survey sites**

| Comprehensive Survey Site  | Rapid Survey Site   |
|--|---|
| <ul style="list-style-type: none"><li>▶ Quadrat sampling (500 m<sup>2</sup>)</li><li>▶ Site species list</li><li>▶ Rare and threatened plant search via the random meander technique</li><li>▶ RE verification</li><li>▶ General site description with notes recorded on landform, geology, soils, past clearing &amp; weeds</li></ul> | <ul style="list-style-type: none"><li>▶ All trees and shrubs and dominant grasses and herbs recorded over 50 m radius</li><li>▶ Targeted rare and threatened species search</li><li>▶ RE verification</li><li>▶ Brief notes recorded on landform, geology, soils, past clearing &amp; weeds</li></ul> |

Floristic surveys were conducted using CORVEG methodologies defined by the Queensland Herbarium (Neldner *et al.*, 2005). Flora surveys were conducted in areas of remnant vegetation including mapped REs. Flora sampling methods included:

- ▶ Quadrat sampling
- ▶ Site species lists
- ▶ Random meander techniques
- ▶ Verification of REs using quaternary site assessments
- ▶ Site descriptions

#### Quadrat Sampling

Quadrat assessments were conducted primarily at sites identified as requiring comprehensive data collection. At these sites, a 10 x 50 m quadrat was investigated to a secondary CORVEG level, with the only exception to standard Herbarium methodology being that cover was estimated using the Braun-Blanquet scale (to facilitate faster processing of each site). One quadrat was



investigated at each site, positioned in a location considered to be most representative of the site vegetation.

Within each quadrat, the following information was recorded:

- ▶ Site observations such as soils, geology, apparent disturbance including clearing/fire/flood history, landform, slope, aspect, weed cover and presence of grazing
- ▶ Vegetation community details including overall canopy cover, strata present, and stratum height and cover
- ▶ All vascular plant species present (voucher specimens were sent to the Queensland Herbarium for identification where necessary), with abundance data collected by measuring the basal area (with a Bitterlich stick), stem count (for trees and shrubs only) and abundance (recorded by stratum)
- ▶ Vegetation condition was recorded using the VAST (Vegetation Assets, States and Transitions) methodology (Thackway and Lesslie 2005)
- ▶ Six photographs were taken at each transect – three looking along each long axis, with two each end facing diagonally across the quadrat

### **Site Species Lists**

At each of the sampling sites, a species inventory of the main vascular plant species located outside of each transect was prepared together with any ecologically significant characteristics, including the presence of threatened species or vegetation communities (or potential habitats) and threatening processes (such as weed infestations).

Plant species were either identified *in situ* or collected for later identification. For species for which identification or confirmation was required, a vouchered specimen was sent to the Queensland Herbarium. A list of all species collected, including all vouchered identifications, will be included at a later date when the information has been processed by the Queensland Herbarium.

### **Random Meander Technique**

The random meander technique (Cropper, 1993) is a widely accepted method to survey for rare or threatened plant species or other species of interest that may not occur in surveyed quadrats or sample sites. It involves traversing sections of the study area at random searching for flora species that may not have been located using more structured search methods. This technique is particularly suitable for locating species that typically occur at very low densities, or that may be grouped in isolated clumps, as is often the case with many plants listed as rare or threatened.

### **Verification of Mapped Regional Ecosystems**

REs that appear on the certified mapping for the study area were verified at approximately 69 quaternary level sites within the project footprint or adjacent to it (often necessary due to the limited access). Quaternary site assessments are used primarily as a record of field traverses and to verify RE/vegetation mapping. A quaternary level site assessment involves a plotless sampling strategy with data recorded from a 360° arc to approximately 25 m radius. At the quaternary level of assessment, up to seven strata can be assessed (Emergent, Tree 1, Tree 2, Tree 3, Shrub 1, Shrub 2, Ground). Most non-rainforest native plant communities only have between one (i.e. grasslands) and five strata present. The dominant species were recorded for each strata present at a sampling site in order of dominance with their height and cover/abundance measured. Quaternary sites were collected wherever possible where vegetation patterns changed.



#### 2.4.6 Terrestrial Fauna Survey Techniques

Terrestrial fauna surveys were undertaken at 16 comprehensive trapping sites and 43 rapid assessment sites. For the purposes of this assessment, terrestrial fauna are defined as animals that only spend only limited periods of time in aquatic environments. This includes amphibians and semi-aquatic species such as water birds. Fish, freshwater turtles, crocodiles, aquatic macroinvertebrates and platypus are considered in the aquatic assessment report. Terrestrial fauna survey methods employed at comprehensive and rapid survey sites are summarised in Table 2. Each method is described in greater detail below. Targeted searches for threatened species were also performed in suitable habitats and are detailed in this section.

**Table 2 Summary of terrestrial fauna survey methods**

| Comprehensive Trapping Sites  | Rapid Assessment Sites   |
|---|--|
| <ul style="list-style-type: none"><li>▶ Systematic trapping (20 Elliotts, 10 cages, 12 funnels, 19 hair tubes)</li><li>▶ Habitat Assessment</li><li>▶ Opportunistic search for wildlife traces (scats, bones, diggings, tracks)</li><li>▶ Three standardised (20 minute) bird surveys</li><li>▶ One hour of active searches for herpetofauna</li><li>▶ One night of anabat recording</li><li>▶ Standardised spotlighting for nocturnal fauna</li><li>▶ Call-playback for owls and frogs</li></ul> | <ul style="list-style-type: none"><li>▶ Habitat Assessment</li><li>▶ Opportunistic search for wildlife traces (scats, bones, diggings, tracks)</li><li>▶ One standardised (20 minute) bird survey</li><li>▶ Half an hour of active searches for herpetofauna</li></ul> |

#### Terrestrial Habitat Assessment

Terrestrial habitat assessments were undertaken at each fauna survey site and at additional areas throughout the wider study area. The following parameters were recorded during habitat assessments:

- ▶ Landscape context (size, shape, connectivity or relative isolation of habitat remnants)
- ▶ Structural and floristic complexity of vegetation (i.e. tree density, canopy cover, vertical structural complexity of vegetation strata – canopy, shrub and understorey layers, ground cover)
- ▶ Structural complexity and relative heterogeneity of ground-level microhabitats (i.e. substrate type, vegetation cover, leaf litter, woody debris, presence of rocks, logs or boulders)
- ▶ Habitat features (i.e. hollows, fallen logs, rock outcrops, nests, burrows, water bodies, gilgais)
- ▶ Relative abundance of hollows and hollow-bearing (habitat) trees
- ▶ Sources of disturbance (i.e. adjacent land-uses, feral animals, predation, weed infestation)

#### Systematic Trapping Surveys

Systematic trapping was undertaken at each of the 16 comprehensive survey sites. This involved a five day, four night survey of each site using cage, Elliott A traps, hair traps and funnel and drift fences.

At each site, traps were set in a single linear transect of 20 Elliott's, 19 hair tubes and 10 cage traps set within optimal microhabitats. Four drift fence and funnel complexes (each with three funnels) were placed at each site, set in areas with suitable microhabitat adjacent to the linear transects. Traps were set and checked each morning for four consecutive nights. The trap configuration comprised:

- ▶ Funnel traps and drift fence: Twelve funnel traps were established at each site. Each funnel trap complex consisted of a 6 m long (30 cm high) aluminium flywire drift fence with three nylon mesh funnels set along the centre of the fence line (Plate 1). Wet sponges were placed in each funnel. These were covered with vegetation to provide shade and protection.
- ▶ Elliot box traps: each site comprised 20 Elliot A traps baited with universal bait (a mixture of peanut butter, rolled oats and sardines and/or honey) (Plate 2). Traps were located in shady areas or covered with vegetation to minimise heat exposure to animals.
- ▶ Cage traps: 10 cage traps were set at each site. These were interspersed with Elliott traps along linear transects. Cages were baited with universal bait or a single raw chicken neck and covered with hessian sacks to shade from the elements (Plate 2).
- ▶ Hair tubes: 19 hair tubes were placed at each site and baited with universal bait (Plate 1). Hair tubes were positioned approximately 10 m parallel to the Elliot traps. Half the hair tubes were set at ground level and half on tree trunks to target both ground and arboreal mammals.

**Plate 1 Example of funnel trap with drift fence (left) and hair trap (right)**



**Plate 2 Examples of cage trap (left) and Elliot trap (right)**



### **Opportunistic Surveys for Wildlife Traces**

At each site, a minimum of one person hour was spent searching for wildlife traces (i.e. bones, hair traces, tracks, scats, diggings, burrows, nests, skins) that could indicate the presence of additional fauna species. All scats and hairs were sent to a specialist sub-consultant (Scatsabout) for identification.

### **Standardised Bird Surveys**

Standardised bird surveys were undertaken at each survey site using the methods described by Loin (1986) and recommended for surveys by Birds Australia. This involved a timed 20-minute survey of a 2 ha search area, recording the number of birds seen or heard calling. Birds observed flying overhead or outside the search area were recorded as incidental observations to allow their exclusion if precise statistical comparison of sampling units was required later. Bird surveys were undertaken in early morning or afternoon in clear conditions. Standardised bird surveys were undertaken once at each of the rapid assessment sites and a minimum of three times at the comprehensive survey sites.

### **Diurnal Active Searches for Reptiles and Amphibians**

Active searches were undertaken for reptiles and amphibians at each site. This involved searching beneath rocks, logs, bark, corrugated iron and among soil and leaf litter. Vegetation at the edges of local waterbodies was also searched for frogs and aquatic reptiles. Diurnal active searches were standardised by time, each diurnal active search event lasting one person hour. This was



undertaken once at each rapid survey site and repeated four times at each comprehensive survey site.

### Nocturnal Spotlighting and Call Playback

Nocturnal spotlighting surveys were undertaken at each of the detailed survey sites. Two person hours were spent at each site, using a combination of high-powered spotlights and head torches. Visual surveys were undertaken in a 2 ha area, searching trees, shrubs and understorey habitats for arboreal mammals, ground mammals, reptiles, frogs and nocturnal birds.

Call playback was then used at each comprehensive site to detect owls and frogs. Call playback surveys involved broadcasting the call of individual target species for two minutes. This was followed by a listening period of two minutes. Species featured in call-playback included the Australian owlet nightjar, large-tailed nightjar, spotted nightjar, white-throated nightjar, powerful owl, barn owl, grass owl, masked owl, barking owl, rufous owl, southern boobook and tawny frogmouth.

An additional 50 person hours were spent spotlighting on foot and from vehicles on roads within the study area. These surveys targeted nocturnal ground-dwelling reptiles, owls, frogs and mammals.

### Microchiropteran Bats

Anabat II Bat Detectors were used to survey micro-chiropteran (insectivorous) bats by recording and analysing their echolocation calls. Detectors were placed at each of the comprehensive trapping sites for a minimum of one night. Anabat units were placed in potential bat 'flyways' just before dusk and left to record calls overnight. Detectors were positioned on the ground with the microphone orientated upwards at a 45° angle from the ground. All bat calls recorded were sent to a qualified bat-call analyst (Greg Ford) for identification. Bat calls can be identified to species. However there can be overlap between species with similar calls. An indication of the level of certainty was provided for the identification of each species:

- ▶ Definite – one or more calls with absolutely no doubt associated with the species identification
- ▶ Probable – most likely the species named. There is a low probability of confusion with species that have similar calls
- ▶ Possible – the call is comparable with the species named. However, there is a moderate to high possibility of confusion with species that have similar calls

Only bat calls with definite or probable call identification were included in the results.

### Targeted Surveys for Listed Species

Targeted surveys were undertaken for listed species at specific locations where the likelihood of occurrence was considered high based on historical records or the presence of suitable habitat.

#### ***Poephila cincta cincta* (black-throated finch), and *Neochmia ruficauda* (star finch)**

Two listed finches were considered to have the potential to occur at the northern end of the study area. The black-throated finch has been historically recorded near Strathalbyn, several kilometres from Abbot Point (BTF Recovery Team, 2007). The star finch is predicted to occur in the study area according to the Protected Matters database but was considered less likely, based on the lack of historical records and its current known distribution. Targeted surveys were undertaken to detect both finch species. Tall grasses and vegetated creeks at the northern end of the study area were searched for nests and individuals. A number of stock dams and creeks were considered potential



drinking resources for these species. Timed (30-minute) dusk surveys were undertaken at each waterbody, recording all birds that were observed visiting the waterbody.

***Dasyurus hallucatus* (northern quoll)**

The northern quoll has been historically recorded in the vicinity of the study area (Wildlife Online database) and is predicted to occur (Protected Matters). Habitats along the alignment, particularly rocky woodland areas at the northern end of the project footprint (Site AD 5) and rocky creeks (Site AR 21) were considered suitable habitat. At these locations traps were baited with universal bait to target that species. A series of remote infrared cameras were set at three additional locations (outside the trapping network). The cameras were trained on bait positioned on the ground. Cameras were left for a week at each location. Targeted searches for quoll scats and distinctive communal latrines were also undertaken in all suitable habitats.

***Paradelma orientalis* (brigalow scaly-foot), *Denisonia maculata* (ornamental snake), *Furina dunmalli* (Dunmall's snake), and *Egernia rugosa* (yakka skink)**

A number of listed reptile species were considered likely to occur in the study area. The brigalow scaly-foot, ornamental snake, Dunmall's snake and yakka skink occur in vegetation communities that have been heavily impacted by historical land clearing (eg. brigalow, *Acacia harpophylla*) and are listed for this reason. Specific microhabitats were targeted (i.e. brigalow-gilgai formations, grass tussocks, sandstone slabs and cracking black clays). Targeted searches were also undertaken for the distinctive communal scat piles of the yakka skink.



## 3. Existing Environmental Values

### 3.1 Regional Environment

#### 3.1.1 Burdekin Catchment

The Project is located within the Burdekin Catchment, in the North and South Kennedy pastoral regions. The Burdekin Catchment is the second largest catchment on the east coast of Australia, covering an area of 136 000 km<sup>2</sup> (ABARE, 2003). The major regional centres within the catchment include Townsville, Ayr, Bowen, Clermont, Charters Towers and Collinsville (NRM, 2002).

Three bioregions are represented in the Burdekin Catchment however the project footprint passes through only two of these, the Brigalow Belt and the Desert Uplands bioregions (see Section 3.1.2 for bioregion descriptions).

The Burdekin Catchment exhibits distinct seasonal climatic conditions with a pronounced wet summer and dry winter. Mean annual rainfall in the catchment ranges from less than 500 mm to over 2500 mm and is generally highest in the eastern coastal areas and lowest in the western and southern regions (Dight, 2009; BOM, 2010).

#### 3.1.2 Bioregions

The majority of the project footprint occurs within the Brigalow Belt bioregion. A small section at the southern extent of the alignment lies within the Desert Uplands bioregion (Figure 3-1).

#### Brigalow Belt Bioregion (BRB)

The Brigalow Belt bioregion covers 135,500 km<sup>2</sup> and includes coastal areas, rugged ranges and alluvial plains. The bioregion has a sub-humid to semi-arid climate. Dominant vegetation communities include woodlands of narrow-leaved ironbark (*Eucalyptus crebra*) or silver-leaved ironbark (*E. melanophloia*) poplar box (*E. populnea*), Brown's box (*E. brownii*), brigalow (*Acacia harpophylla*), blackwood (*A. argyrodendron*), gidgee (*A. cambagei*), coolabah (*E. coolabah*), river red gum (*E. camaldulensis*), poplar gum (*E. platyphylla*), areas of bluegrass (*Dichanthium sericeum*) downs and patches of semi-evergreen vine thicket (Young *et al.* 1999).

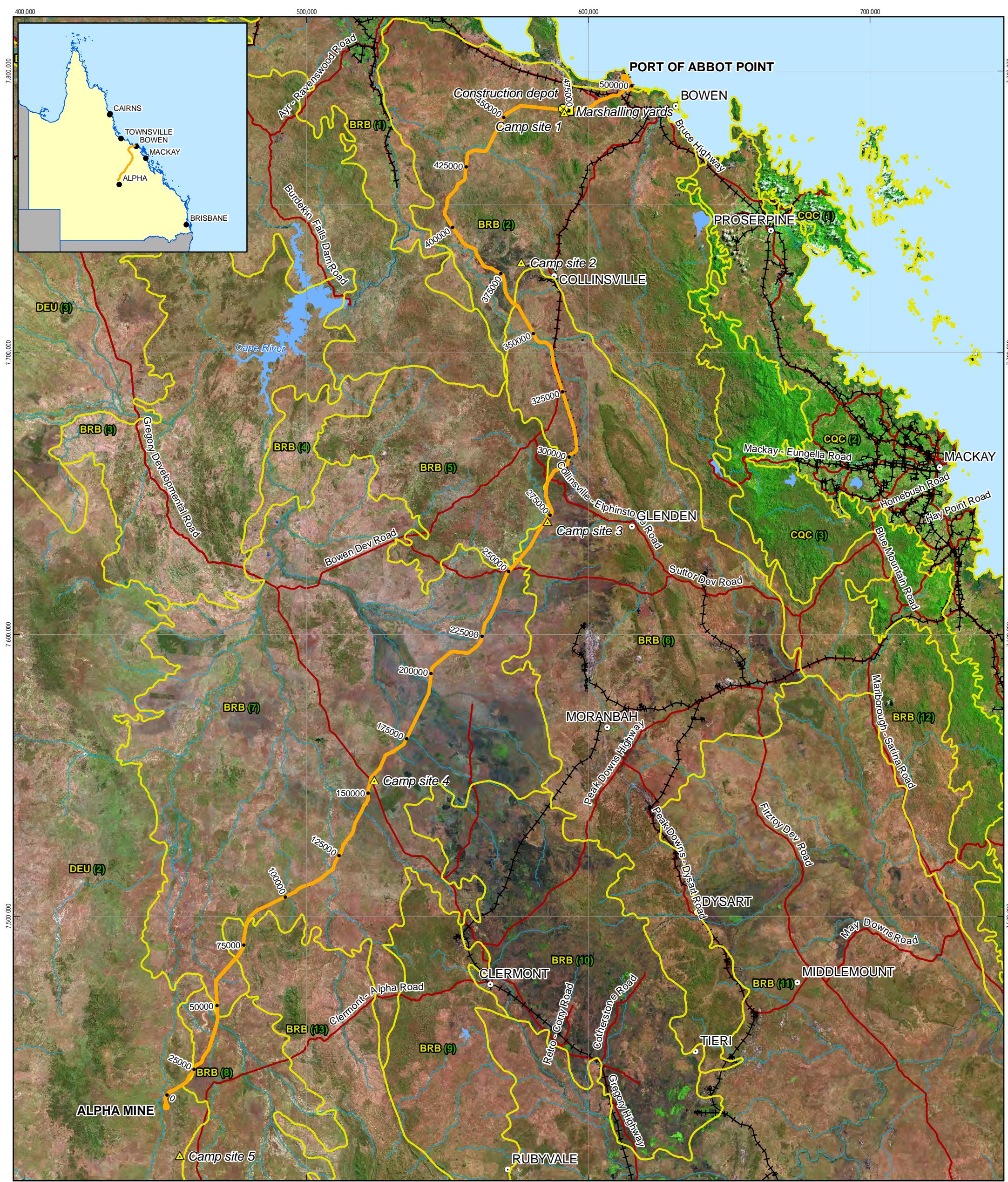
The Brigalow Belt is a particularly diverse bioregion, with 36 subregions supporting eight EPBC Act-listed threatened ecological communities and 84 NCA or EPBC Act-listed flora or fauna species. Biodiversity in the Brigalow Belt bioregion was historically threatened by broadscale land clearing practices, with the greatest losses experienced in the lowland landscapes, particularly those characterised by black and brown clay downs, while the more rugged topography associated with the uplands and ranges has been relatively undisturbed (Young *et al.* 1999). Perhaps the greatest threat to biodiversity in the bioregion (now that broad-scale clearing has been banned and the clearing of high value regrowth is regulated) is the ongoing spread of exotics such as buffel grass (*Pennisetum ciliare*), and intense grazing pressure (Young *et al.* 1999). Ecosystems that have high conservation priority (based on low representation in reserve systems) are semi-evergreen vine thickets, native grasslands, and woodlands dominated by poplar box/brigalow, blackwood and gidgee (DEWHA, 2009a; DEWHA, 2009b).



### Desert Uplands Bioregion (DEU)

The Desert Uplands bioregion covers 70,300 km<sup>2</sup> and includes ranges and plains on Tertiary surfaces or Triassic sandstones. The bioregion has a semi-arid climate and most soils are weathered and nutrient-poor. Dominant vegetation communities include woodlands of *Eucalyptus whitei*, *E. similis* and *Corymbia trachyphloia*. Land-use is predominately characterised by large-scale cattle grazing.

The Desert Uplands has experienced some of the highest rates of broad-scale clearing in the State over the previous decade (this practice ceased in 2006), particularly in the acacia communities dominated by species such as brigalow and gidgee. Today, the greatest threats to biodiversity in the bioregion are high levels of total grazing pressure, and the ongoing introduction of exotic pasture grasses such as buffel grass (Sattler and Williams 1999). Three EPBC Act-listed threatened ecological communities are mapped in the Desert Uplands.



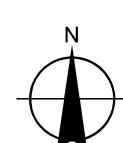
#### LEGEND

- |                     |                    |                                    |
|---------------------|--------------------|------------------------------------|
| ● Town              | Proposed Alignment | Waterbody                          |
| ▲ Camp              | State Road         | Bioregion & Sub-bioregion Boundary |
| ■ Marshalling Yards | Existing Railway   | Watercourse                        |
| ⊗ Depot             |                    |                                    |

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1:1,250,000 (at A3)  
0 5 10 20 30 40 50  
Kilometres



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Alpha Coal Project  
Environmental Impact Statement

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Revision A  
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#### BIOREGION

Figure 3-1



## 3.2 Local Environment

### 3.2.1 Bioregional Subregions

The project footprint intersects seven subregions of the Brigalow Belt and Desert Uplands Bioregions. Starting at the north-east end of the alignment at Abbot Point in the Townsville Plains subregion (BRB 1), the corridor crosses into the Bogie River Hills subregion (BRB 2). Just south of Collinsville the alignment travels south-east through the Northern Bowen Basin subregion (BRB 6), across most of the Belyando Downs subregion (BRB 7), through the northern tip of the South Drummond Basin subregion (BRB 13) west of Clermont and the northern tip of the Upper Belyando Floodout subregion (Brigalow Belt subregion 8) and into the Alice Tableland subregion (DEU 2), north of Alpha (Figure 3-1). These subregions vary in their ecological characteristics and value for threatened species and diversity. For ease of description the study area has been divided into four sections, roughly equivalent to quarters, each of which has consistent patterns of vegetation and landform. These four sections are briefly described below.

### 3.2.2 Abbot Point to Pelican Creek (Townsville Plains and Bogie River Hills)

The northern or coastal quarter of the study area ranges from the Port of Abbot Point, approximately 25 km north west of Bowen, to Pelican Creek west of Collinsville. This section of the study area commences in the Townsville Plains subregion, which is a predominately low-lying region of Cainozoic alluvial plains punctuated by the Burdekin River delta and a number of watercourses with relatively short, coastal catchments such as the Elliot River. Nestled behind Abbot Point is the ephemeral Caley Valley wetland. The plains in this region are dominated by abrupt and disjunct Permian granite hills and mountains that arise almost from sea level.

The adjacent Bogie River Hills subregion is also characterised by Cainozoic plains and Permian granite hills and mountains, becoming more mountainous with increasing distance from the coast. This subregion is drained by a number of large, ephemeral watercourses, three of which cross the proposed corridor - the Elliot River, the Bogie River, and Pelican Creek (in order from north to south). The latter two watercourses are tributaries of the Bowen River, whose catchment dominates this province.

This section of the alignment, although also the most highly populated, also contains the highest proportion of continuous remnant vegetation, mostly woodland dominated by narrow-leaved ironbark (*Eucalyptus crebra*) with red bloodwood (*Corymbia erythrophloia*) and ghost gum (*Corymbia dallachiana*) also common. These are primarily grassy woodlands with a sparse to very sparse shrub layer, the predominant grasses being the exotic pasture grasses creeping bluegrass (*Bothriochloa pertusa*) and buffel grass (*Pennisetum ciliare*). There are some areas of native grassland on black cracking clay plains in the southern third of this section, which are characterised by a relatively high diversity of native grass species. These areas are almost all used for cattle grazing, and provide habitat for a range of native fauna species.

The granite hills in this area contain a relatively high proportion of endemic rare and threatened flora species, mostly in dry rainforest/semi-evergreen vine thickets located primarily in sheltered locations on the slopes. The vulnerable species black ironbox (*Eucalyptus raveretiana*) is also found in this province, on sandy alluvium along the banks of watercourses.



### **3.2.3 Pelican Creek to Suttor Development Road (Northern Bowen Basin)**

The section of the study area between Pelican Creek and the Suttor Development Road runs through the western fringe of the Northern Bowen Basin subregion. This region is located in the Bowen River and Suttor River catchments, and is characterised by clay plains and the mesas of the Leichhardt Range. Major watercourses crossed are the Bowen River just south of Collinville, Suttor Creek and the Suttor River.

This section of the alignment is characterised by a range of vegetation communities. Woodlands of narrow-leaved ironbark or poplar box (*Eucalyptus populnea*) on a range of landforms, and buffel grass pasture growing on plains formerly occupied by brigalow, are most common, with minor patches of native grassland present on black cracking clay plains. Patches of intact brigalow scrub and open forest are located around the Leichhardt Range. Semi-evergreen vine thickets are present but are generally confined to the mesas or low hills.

Rare and threatened species occurring in this region include the vulnerable species *Croton magneticus* and the rare species *Cerbera dumicola*, which occur in semi-evergreen thicket, and the vulnerable species king blue-grass (*Dichanthium queenslandicum*) and Belyando cobbler's pegs (*Trioncinia retroflexa*), and the rare species *Dichanthium setosum*, which occur in native grasslands on black cracking clays. The riparian corridors are also known to contain the vulnerable black ironbox.

### **3.2.4 Suttor Development Road to Gregory Development Road (Belyando Downs)**

The third quarter of the study area is located between the Suttor Development Road and the Gregory Development Road. This section coincides with the Belyando Downs subregion. This is referred to as 'flood out' country that is extensively inundated during periods of heavy sustained rainfall, and is characterised by generally level to gently undulating landforms primarily located on cracking clays and alluvium, often with gilgais. The majority of this land is mapped as non-remnant and appears to be either cultivated or cleared brigalow/acacia shrubland. The Suttor and Belyando Rivers are recognised as important dry season wildlife refuges. Other ecological features of the subregion include RE 11.3.27 which has habitat value for a diverse range of fauna, particularly birds, RE 11.3.3 which has value as nesting habitat for birds and a series of REs which provide habitat for rare plants and animals. *Lasiorhinus kreftii* (northern hairy-nosed wombat) occurs in RE 11.3.7. *Homopholous belsonii* (Belson's panic) occurs in RE 11.3.2, *Dicanthium queenslandicum* occurs in RE 11.4.4, *Cadellia pentastylus* (ooline) occurs in RE 11.7.1 and *Acacia wardellii* (Wardell's wattle) occurs in RE 11.7.2.

### **3.2.5 Gregory Development Road to Windaree (Belyando Downs, South Drummond Basin, Upper Belyando Floodout and Alice Tableland)**

The southern quarter of the study area is located between the Gregory Development Road and Windaree, just north of Alpha. This section is comprised of undulating to level plains and rises in the north and floodout alluvial plains in the south, associated with the Belyando River, with large tracts of remnant vegetation common. Large areas of primarily cleared brigalow on gilgai plains, mapped as non-remnant vegetation, are also located within this section.

Additional detail of the vegetation communities and fauna habitat types within each of the above mentioned four sections is located in Sections 3.5 and 3.6 respectively.



### 3.3 Local Land Use

Much of the study area is extensively grazed by cattle. Impacts attributable to grazing are evident in the form of vegetation clearing, introduction of exotic pasture grasses and consequent displacement of native grasses and herbs, reduced ground cover, soil erosion, soil compaction and erosion of creek banks. These impacts are readily apparent in the dry season, particularly around dams and waterways. In addition to these impacts, grazing has resulted in reduced recruitment of native vegetation, preventing regeneration of woodland habitat previously cleared for pasture.

Additional land uses within the catchment include sugar and horticulture cropping, aquaculture and mining. Mining and mine related infrastructure is evident throughout the surrounding landscape. Water infrastructure is also a significant industry with twelve major dams and weirs occurring throughout the catchment (NRM, 2002; ABARE, 2003).

### 3.4 Regional Ecosystems

#### 3.4.1 The Regional Ecosystem Framework

Regional ecosystems are ordered on three levels, reflected in the three part codes used to identify them. At the highest level is the bioregion – the Queensland Herbarium (the organisation responsible for defining REs and for the initial creation of RE maps) has adopted the Stanton and Morgan (1977) bioregional mapping for Queensland as outlined in Sattler and Williams (1999). Each bioregion is given a number, which is the first number that appears in the RE code (for example, the RE 11.7.2 belongs to bioregion 11 (Brigalow Belt)). Bioregions are in turn divided into subregions, although this information is not incorporated into the RE code (although it can assist in determining the identification of a RE).

The second level is that of the land zone, of which there are 12 (the land zone is the second number – the RE 11.7.2 is found on land zone 7). Land zones are a landscape unit based on a combination of geology, pedology and land form pattern. The final level of organisation is the ecosystem (described in terms of the dominant vegetation in terms of above ground biomass), which is specific to a land zone within a bioregion (unlike bioregional organisation and land zone units, which are consistent across Queensland) (Sattler and Williams, 1999). Therefore, the RE 11.7.2 is the second described ecosystem on land zone seven in the Brigalow Belt bioregion. Ecosystem descriptions within each bioregion have been derived from Queensland Herbarium detailed sampling together with other published sources, which are usually quoted with each RE description.

The conservation status of REs is classed in two ways. Under the VMA, the remnant extent of a RE is measured against the estimated extent within a bioregion prior to European clearing (Sattler and Williams, 1999). This is a quantitative measure of a REs remnant extent within a bioregion and has legislative force under the VMA. The categories under the VMA are as follows:

- ▶ **Endangered** REs are those that have either:
  - less than 10% of the pre-clearing extent remaining
  - 10% to 30% of the pre-clearing extent remaining and the remnant vegetation remaining is less than 10, 000 ha
- ▶ **Of concern** REs are those that have either:
  - 10% to 30% of the pre-clearing extent remaining



- More than 30% of the pre-clearing extent remaining and the remnant vegetation remaining is less than 10,000 ha
- ▶ **Least concern** REs are those that have more than 30% of the pre-clearing extent remaining and the remnant vegetation remaining is more than 10,000 ha

The second method of rating REs is by its biodiversity status. This method takes into account the remnant extent of the RE as well as its condition and perceived threats. Condition is assessed based on soil quality, species diversity and the ability of species diversity to recover. In addition, the presence of threatening processes such as clearing, development pressure, inappropriate fire management, fragmentation and weed incursion are considered. Therefore, this is a rating system that combines quantitative and qualitative data with a threat assessment, assigning ratings of endangered, of concern and no concern at present. DERM assigns a non-legislative Biodiversity Status to individual REs according to the condition of the RE and threats it is facing, in addition to its pre-clearing and remnant extent. Under this process a RE is:

- ▶ Endangered if it has:
  - less than 10% of the pre-clearing extent unaffected by severe degradation and/or biodiversity loss<sup>2</sup>
  - 10-30% of the pre-clearing extent unaffected by severe degradation and/or biodiversity loss and the remnant vegetation is less than 10 000 hectares
  - a rare<sup>3</sup> RE subject to a threatening process<sup>4</sup>
- ▶ Of concern if it has:
  - 10-30% of the pre-clearing extent unaffected by moderate degradation<sup>5</sup> and/or biodiversity loss
- ▶ No concern at Present if it:
  - does not meet the degradation criteria listed for endangered and of concern REs

Unlike the VMA class the biodiversity status has no legislative force. It has been implemented to assist authorities in planning, resource management and development decision-making only. REs with an endangered or of concern biodiversity status are considered to be threatened.

### 3.4.2 Regional Ecosystems within the Study Area

**Note:** all calculations presented in this report relating to the extent and type of mapped vegetation units (i.e. REs, TECs) in the 495 km by 60 m wide corridor through which the alignment traverses are based upon the alignment as of September 2010. The type and extent of vegetation potentially affected by ancillary infrastructure (i.e. laydown areas, access tracks, construction camps) has not been considered in the calculations, due to the uncertainty over the locations of this associated infrastructure. Due to the evolving nature of the project, it is recognised that with changes to the alignment, and with the addition of clearance areas relating to associated infrastructure, the

<sup>2</sup> floristic and/or faunal diversity is greatly reduced but unlikely to recover within the next 50 years even with the removal of threatening processes; or soil surface is severely degraded, for example by loss of A horizon, surface expression of salinity, surface compaction, loss of organic matter or sheet erosion

<sup>3</sup> Pre-clear extent less than 1000 hectares or patch size 100 hectares and of limited extent across its range

<sup>4</sup> for example, clearing, weed invasion, fragmentation, inappropriate fire regime or grazing, or infrastructure development

<sup>5</sup> floristic and/or faunal diversity is greatly reduced but unlikely to recover within the next 20 years even with the removal of threatening processes; or soil surface is moderately degraded



numbers presented in this report will vary until such point that the final alignment and location of associated infrastructure has been confirmed. As such, the calculations presented hereabouts should not be considered final, and are primarily intended to provide an indication of the extent and type of mapped vegetation assemblages within the 495 km by 60 m wide corridor.

The current certified RE mapping (Version 6.0) identifies 68 REs within the study area including 10 classified as endangered, 19 classified as of concern and 39 classified as least concern under the VMA. These REs occur either as homogeneous polygons or as a component of a heterogeneous polygon. A summary of the REs by land zone and VMA class is provided in Table 3, Table 4, Table 5, Table 6, Table 7, Table 8, and Table 9. Descriptions of the mapped REs are derived from the regional ecosystem Description Database (REDD) (Queensland Herbarium, 2009) and detailed in the land zone tables below. The certified RE mapping is provided in Figure 3-2.

Ground-truthing (subject to the limitations outlined in Section 1.5) confirmed the presence of 68 REs within the study area, with the exception of RE 11.5.20 (VMA Class: least concern), which was not present, and the addition of RE 11.5.16 (VMA Class: endangered). Discrepancies with certified mapping were primarily due to inaccuracies in RE attribution - that is, the vegetation on the ground did not match the mapped RE. Revised RE mapping is shown in Figure 3-3. Where discrepancies between the version 6 RE mapping and the revised mapping occur in the project footprint, both figures are shown in Figure 3-2 for comparison. Henceforth, the revised mapping statistics will be used in discussions except where specifically mentioned. It must also be noted that there will be a level of uncertainty regarding the RE calculations as it was not possible to visit every parcel of RE (access restrictions) and there were some minor alterations to the alignment after field surveys had been conducted where RE's were not confirmed.

The data displayed in Table 3 to Table 9 below indicate the spread of REs over the study area by VMA class in each land zone. Where an RE is listed under the EPBC Act as a recognised part of a threatened ecological community (TEC) this has also been indicated. A summary of the REs and TEC's in all land zones is shown in Table 10. Breaking the REs down into land zone and VMA class is instructive as it gives an indication of the community level diversity associated with particular land forms and geologies within the study area, illuminates potential diversity and conservation 'hotspots'. This can be used later to reveal project impact patterns at the landscape level.

In general, the 12 defined land zones can be divided into two groups. Land zones 1 to 6 comprise level to undulating land forms (plains, rises and dunefields) characterised by soils of unconsolidated materials that have been transported from higher elevations in the landscape during the Cainozoic (the last 65 million years, relatively recently by geological time) to their current location. They include alluvial plains, watercourses, clay or sand plains, and littoral dunefields among others. Land zones 7 to 12 comprise undulating to hilly landscapes with soils primarily derived in situ from bedrock materials of pre-Quaternary age. This includes duricrusted mesas and plateaus, plains and hills derived from Cainozoic flood basalts, and lowlands and hilly terrain derived from pre-Cainzoic sedimentary, metamorphic and igneous rocks.

Overall it shows that the project footprint intersects 10 endangered, 19 of concern and 39 least concern REs. The majority of these REs are located in the Brigalow Belt bioregion, with five located in the Desert Uplands (all of which are least concern). In terms of area, 85% of the remnant vegetation within the project footprint occurs within a least concern RE, 8.5 % occurs within an of concern RE, and 6.5% occurs within an endangered RE (to arrive at this figure mixed mapping polygons have been broken down into their constituent parts using the given percentages).



Within the project footprint, 60% of the total area of remnant vegetation and 60% of the total number of REs intersected are located in land zones one to five (the land zones comprising plains and rises). In addition, all four of the TECs protected under the EPBC Act that occur in the Project locale are represented on these land zones (although it was found that the Weeping Myall Woodland TEC was not actually present). The following section briefly describes the REs in each land zone. More detailed descriptions of each RE can be found in Sattler and Williams,(1999).

### **Land Zone 3 REs**

Almost a third of the REs intersected by the Project (22 in total, comprising 443 ha) occur on land zone 3 (described as Quaternary alluvial systems – river flats, flood plains, creek beds and banks etc). This reflects not only the prevalence of alluvial land forms across the entire study area but also the high diversity of vegetation communities that characterise them.

Vegetation communities on alluvial land forms within the study area can be divided into two general types – communities located in and fringing watercourses and wetlands, and communities located on alluvial plains (either above or below the current active flood level). Only three REs, comprising an estimated total of 54 ha of the study area, were located in or fringing watercourses and wetlands – the least concern REs 11.3.25, 11.3.27 and 11.3.37 (see Table 3 for a description). The most common of these is RE 11.3.25, which is found along all of the major watercourses of the alignment, often in association with other REs such as the endangered RE 11.3.1 and the of concern RE 11.3.3 in the central and southern sections, and the of concern RE 11.3.4 in the north. The only species of conservation significance positively identified in the study area (black ironbox – *Eucalyptus raveretiana* – listed as vulnerable under both the NCA and the EPBC Act) was located in RE 11.3.25, at the Elliot River, in the far north of the alignment.

In terms of area (an estimated 405 ha), biodiversity (18 REs) and conservation significance (one endangered and six of concern REs, including three TECs listed under the EPBC Act), the most significant communities occurring on alluvial land forms were located on alluvial plains. Of these, there are four main vegetation alliances (an alliance is a group of vegetation communities dominated by similar types of vegetation, and may encompass one or many REs). The most common alliance comprises alluvial plains dominated by *Eucalyptus* spp. and or *Corymbia* spp., primarily narrow-leaved ironbark (*E. crebra*) and ghost gum (*C. dallachiana*), Brown's box (*E. brownii*) or poplar box (*E. populnea*), Clarkson's bloodwood (*C. clarksoniana*) and carbeen (*C. tessellaris*), and poplar gum (*E. platyphylla*), which spans nine REs. This alliance includes the of concern RE 11.3.2, which forms part of the Weeping Myall Woodland TEC, listed as endangered under the EPBC Act (although this TEC was not identified within the study area) (TSSC, 2008ads).

The least common of the four alluvial plain alliances is characterised by woodland dominated by predominately shrub or small tree species such as black she-oak (*Allocasuarina luehmannii*), false sandalwood (*Eremophila mitchellii*), beefwood (*Grevillea striata*), woodland paperbark (*Melaleuca nervosa*) or broad-leaved paperbark (*M. viridiflora*). These vegetation communities span two of concern and two least concern REs and are generally present as relatively small areas within the project footprint.

In terms of conservation significance, alluvial plains characterised by grasslands and those dominated by acacias are particularly important. There are two grassland REs on alluvial plains present within the project footprint, of which the endangered grassland RE 11.3.21 is the most significant. This RE forms part of the Natural Grasslands of the Queensland Central Highlands and the northern Fitzroy Basin TEC, which is listed as endangered under the EPBC Act (TSSC,



2008adq). However, both RE 11.3.21 and the other alluvial plain grassland RE (least concern RE 11.3.31) comprise a very small part of the overall study area - an estimated 900 m<sup>2</sup> of RE 11.3.21, in the central section of the project footprint, and 7.40 ha of RE 11.3.31, to the south of the Bogie River.

Alluvial plain vegetation communities dominated by acacias are more common. The endangered brigalow (*Acacia harpophylla*) RE 11.3.1 comprises an estimated 24 ha of the project footprint. This RE forms part of the Brigalow TEC, which is listed as endangered under the EPBC Act, and is found south of the Bowen River, primarily in the central section of the project footprint (DEH 2001). The least concern RE 11.3.5 is comprised of gidgee (*A. cambagei*) dominated open forest, often with brigalow and (as commonly observed in the study area) coolabah (*E. coolabah*) co-dominant (Queensland Herbarium, 2009). This RE is present in the vicinity of the larger watercourses in the central and southern sections such as the Belyando River, Native Companion Creek and Eaglefield Creek. A RE dominated by *A. tephrina* is also present on alluvial plains in the far north of the alignment (between the Elliot and Bogie Rivers) (Queensland Herbarium, 2009).

**Table 3 Land Zone 3 Regional Ecosystems mapped within project footprint**

| RE Code | VMA Status    | Description   | Fauna Habitat Type   | Clearing Area <sup>1</sup>        |
|---------|---------------|---|--|-----------------------------------|
| 10.3.27 | Least concern | <i>Eucalyptus populnea</i> open-woodland to woodland.   | Grassy open woodland   | 8.98 ha                           |
| 11.3.1  | Endangered    | <i>Acacia harpophylla</i> and/or <i>Casuarina cristata</i> open forest on alluvial plains     | Brigalow and gidgee scrub – also an <b>EPBC Act TEC - Brigalow</b>                         | 24.13 ha v.6b<br>24.45 ha revised |
| 11.3.2  | Of concern    | <i>Eucalyptus populnea</i> woodland on alluvial plains  | Grassy open woodland – this RE can contain the <b>EPBC Act TEC Weeping myall woodlands</b> | 43.52 ha v.6b<br>25.42 ha revised |
| 11.3.3  | Of concern    | <i>Eucalyptus coolabah</i> woodland on alluvial plains  | Grassy open woodland   | 17.93 ha v.6b<br>15.40 ha revised |
| 11.3.4  | Of concern    | <i>Eucalyptus tereticornis</i> and/or <i>Eucalyptus</i> spp. tall woodland on alluvial plains | Grassy open woodland   | 7.17 ha                           |
| 11.3.5  | Least concern | <i>Acacia cambagei</i> woodland on alluvial plains  | Brigalow and gidgee open forest/scrub  | 14.34 ha v.6b<br>8.39 ha revised  |
| 11.3.7  | Least concern | <i>Corymbia</i> spp. woodland on alluvial plains.   | Grassy open woodland   | 19.37 ha v.6b<br>34.14 ha revised |
| 11.3.9  | Least concern | <i>Eucalyptus platyphylla</i> , <i>Corymbia</i> spp. woodland on alluvial                     | Grassy open woodland   | 15.88 ha                          |



| RE Code | VMA Status    | Description   | Fauna Habitat Type   | Clearing Area <sup>1</sup>        |
|---------|---------------|---|--|-----------------------------------|
|         |               | plains  |  |                                   |
| 11.3.10 | Least concern | <i>Eucalyptus brownii</i> woodland on alluvial plains   | Grassy open woodland   | 46.36 ha v.6b<br>45.68 ha revised |
| 11.3.12 | Least concern | <i>Melaleuca viridiflora M. argentea +/- M. dealbata</i> woodland on alluvial plains                      | Grassy open woodland   | 2.46 ha                           |
| 11.3.13 | Of concern    | <i>Grevillea striata</i> on coastal alluvial plains   | Grassy open woodland   | 0.15 ha                           |
| 11.3.21 | Endangered    | <i>Dichanthium sericeum</i> and/or <i>Astrebla</i> spp. grassland on alluvial plains. Cracking clay soils | Native grasslands – also an EPBC Act TEC – Natural grasslands          | 0.09 ha                           |
| 11.3.25 | Least concern | <i>Eucalyptus tereticornis</i> or <i>E. camaldulensis</i> woodland fringing drainage lines.               | Woodland and open forest fringing ephemeral and permanent watercourses | 37.49 ha v.6b<br>37.98 revised    |
| 11.3.27 | Least concern | Freshwater wetlands   | Woodland and open forest fringing ephemeral and permanent watercourses | 14.88 ha                          |
| 11.3.29 | Least concern | <i>Eucalyptus crebra</i> , <i>E. exserta</i> , <i>Melaleuca</i> spp. woodland on alluvial plains          | Shrubby eucalypt woodland  | 10.96 ha v.6b<br>24.08 ha revised |
| 11.3.30 | Least concern | <i>Eucalyptus crebra</i> , <i>Corymbia dallachiana</i> woodland on alluvial plains                        | Grassy open woodland   | 53.61 ha v.6b<br>55.86 ha revised |
| 11.3.31 | Least concern | <i>Ophiuros exaltatus</i> , <i>Dichanthium</i> spp. grassland on alluvial plains                          | Native grassland   | 7.40 ha                           |
| 11.3.32 | Least concern | <i>Allocasuarina luehmannii</i> open woodland on alluvial plains  | Tall she-oak shrubland   | 67.28 ha v.6b<br>44.98 ha revised |
| 11.3.33 | Of concern    | <i>Eremophila mitchellii</i> open woodland on alluvial plains   | Tall grassy shrubland  | 3.12 ha v.6b<br>7.61 ha revised   |
| 11.3.34 | Of concern    | <i>Acacia tephrina</i> woodland on alluvial   | Grassy open woodland   | 5.88 ha v.6b                      |



| RE Code | VMA Status    | Description   | Fauna Habitat Type   | Clearing Area <sup>1</sup>        |
|---------|---------------|---|--|-----------------------------------|
|         |               | plains  |  | 3.38 ha revised                   |
| 11.3.35 | Least concern | <i>Eucalyptus platyphylla</i> ,<br><i>Corymbia clarksoniana</i><br>woodland on alluvial<br>plains | Shrubby eucalypt<br>woodland   | 34.68 ha v.6b<br>57.69 ha revised |
| 11.3.37 | Least concern | <i>Eucalyptus coolabah</i><br>fringing woodland on<br>alluvial plains                             | Woodland and open<br>forest fringing<br>ephemeral and<br>permanent<br>watercourses | 1.00 ha                           |

<sup>1</sup> 'v.6b' = current official RE map version; 'revised' = the area according to the revised, ground-truthed RE mapping conducted for the Project. Where only one figure is given, the version 6 and revised RE mapping are in agreement.

### Land Zone 5 REs

Land zone 5 (Cainozoic plains with sandy or loamy soils) is also well-represented in the study area, both in terms of area (an estimated 380 ha) and community diversity (nine REs). There are a number of reasons for this, including the Project preference for level ground, the preponderance of this land zone across plains in the region, and the relatively high community diversity in the Brigalow Belt within land zone 5 (21 REs listed for this land zone).

In addition, areas meeting the land zone 5 description commonly contain stony red or red/brown sands and clay loams which frequently develop a hard pan at the surface and are often of low fertility, particularly where poplar box, narrow-leaved ironbark or silver-leaved ironbark (*E. melanophloia*) predominate. Such landscapes are also often highly erodible. For this reason, vegetation communities on land zone 5 have generally been retained (there is no commercial benefit to clear them), and large patches of the RE 11.5.3 (poplar box, narrow-leaved ironbark or silver-leaved ironbark open woodland – Queensland Herbarium, 2009) are traversed by the Project between the Bowen and Belyando Rivers. This least concern RE is the most common vegetation community in the project footprint, with an estimated intercepted area of 226 ha.

However, in some cases vegetation communities on land zone 5 have high conservation significance. Although classified as least concern under the VMA, the RE 11.5.15 is listed under the EPBC Act as forming part of the endangered Semi Evergreen Vine Thicket TEC (TSSC, 2001o). The endangered RE 11.5.16 is also listed under the EPBC Act, as part of the endangered Brigalow TEC (DEH, 2001). The Project will intercept an estimated 1.32 ha and 1.13 ha respectively of these REs. In addition, an estimated 7.8 ha of the of concern RE 11.5.10 will be intercepted by this Project. This RE is comprised of *Melaleuca tamariscina* open shrubland on mesas and ranges (Queensland Herbarium, 2009). The remainder of the REs on land zone 5 within the study area are classed under the VMA as least concern.



**Table 4 Land Zone 5 Regional Ecosystems mapped within project footprint**

| RE Code | VMA Status    | Description  | Fauna Habitat Type  | Clearing Area <sup>1</sup>                                 |
|---------|---------------|--|---|--|
| 10.5.1  | Least concern | <i>Eucalyptus similis</i> and/or <i>Corymbia brachycarpa</i> and/or <i>Corymbia setosa</i> low open woodland to open woodland on sand plains | Shrubby eucalypt woodland                                   | 3.52 ha  |
| 10.5.5  | Least concern | <i>Eucalyptus melanophloia</i> open woodland on sand plains  | Grassy open woodland  | 64.69 ha   |
| 11.5.3  | Least concern | <i>Eucalyptus populnea</i> +/- <i>E. melanophloia</i> +/- <i>Corymbia clarksoniana</i> on Cainozoic sand plains/remnant surfaces             | Shrubby eucalypt woodland                                   | 217.97 ha v.6b<br>225.50 ha revised                        |
| 11.5.5  | Least concern | <i>Eucalyptus melanophloia</i> , <i>Callitris glaucophylla</i> woodland on Cainozoic sand plains/remnant surfaces. Deep red sands            | Grassy open woodland  | 2.62 ha  |
| 11.5.9  | Least concern | <i>E. crebra</i> and other <i>Eucalyptus</i> spp. and <i>Corymbia</i> spp. woodland on Cainozoic sand plains/remnant surfaces                | Grassy open woodland  | 32.93 ha v.6b<br>29.51 ha revised                          |
| 11.5.10 | Of concern    | <i>Melaleuca tamariscina</i> shrubland on Cainozoic sand plains/remnant surfaces   | Shrubby eucalypt woodland.                                  | 7.80 ha  |
| 10.5.12 | Least concern | <i>Eucalyptus populnea</i> open woodland on sand plains  | Grassy open woodland  | 43.76 ha   |
| 11.5.15 | Least concern | Semi-evergreen vine thicket on Cainozoic sand plains/remnant surfaces  | Semi-evergreen vine thicket – also an EPBC Act TEC - SEVT   | 8.98 ha v.6b<br>1.32 ha revised                            |
| 11.5.16 | Endangered    | <i>Acacia harpophylla</i> and/or <i>Casuarina cristata</i> open forest in depressions on Cainozoic sand                                      | Brigalow and gidgee scrub – also an EPBC Act TEC - Brigalow | Not mapped in project footprint by v.6b<br>1.13 ha revised |



| RE Code | VMA Status | Description             | Fauna Habitat Type | Clearing Area <sup>1</sup> |
|---------|------------|-------------------------|--------------------|----------------------------|
|         |            | plains/remnant surfaces |                    |                            |

<sup>1</sup> 'v.6b' = current official RE map version; 'revised' = the area according to the revised, ground-truthed RE mapping conducted for the Project. Where only one figure is given, the version 6 and revised RE mapping are in agreement.

### Land Zone 12 REs

In terms of area, land zone 12 (hills and lowlands derived from granite) is also well represented in the study area, with an estimated 300 ha within the proposed project footprint comprising, one of concern and three least concern REs. Vegetation communities within this land zone are predominately located in the granite-dominated landscapes north of the Bowen River. In particular, the least concern RE 11.12.1, comprised of woodlands dominated by narrow-leaved ironbark on gently undulating to undulating plains and rises (Queensland Herbarium, 2009), characterises large continuous tracts of the project footprint in the northern section (an estimated 226 ha – the second largest intercept of any single RE within the project footprint). This RE dominates the project footprint landscape as it traverses the undulating floor of the eastern side of the Burdekin River valley, from the Elliot River (which is just outside the Burdekin River catchment) to the Bowen River crossing.

Another very common RE on granite landscapes in the study area is the least concern RE 11.12.2, which is estimated to comprise over 66 ha of the project footprint (making it the third largest RE within the project footprint). This RE is described as grassy woodland dominated by silver-leaved ironbark and red bloodwood (*Corymbia erythrophloia*), and is present on undulating rises and low hills formed from Mesozoic to Proterozoic igneous rocks. Within the project footprint this vegetation community is predominately found between Pelican Creek and the Bogie River in mixed communities with narrow-leaved ironbark woodland (RE 11.12.1).

The most conservation significant land zone 12 RE intercepted by the project footprint is the of concern RE 11.12.10. This RE is comprised of *Corymbia clarksoniana* woodland on igneous rocks (Queensland Herbarium, 2009). The project footprint will intercept an estimated 2.12 ha of RE 11.12.10 located in a polygon just south of the Bruce Highway.

**Table 5 Land Zone 12 Regional Ecosystems mapped within project footprint**

| RE Code  | VMA Status    | Description  | Fauna Habitat Type               | Clearing Area <sup>1</sup>          |
|----------|---------------|--|----------------------------------|-------------------------------------|
| 11.12.1  | Least concern | <i>Eucalyptus crebra</i> woodland on igneous rocks       | Eucalypt woodland on rocky rises | 253.56 ha v.6b<br>226.07 ha revised |
| 11.12.2  | Least concern | <i>Eucalyptus melanophloia</i> woodland on igneous rocks | Eucalypt woodland on rocky rises | 66.68 ha                            |
| 11.12.9  | Least concern | <i>Eucalyptus platyphylla</i> woodland on igneous rocks  | Eucalypt woodland on rocky rises | 5.12 ha                             |
| 11.12.10 | Of concern    | <i>Corymbia clarksoniana</i> woodland on igneous         | Eucalypt woodland on rocky rises | 2.12 ha                             |



rocks

<sup>1</sup> 'v.6b' = current official RE map version; 'revised' = the area according to the revised, ground-truthed RE mapping conducted for the Project. Where only one figure is given, the version 6 and revised RE mapping are in agreement.

### Land Zone 9 REs

In terms of total area, the next largest area of RE intercepted by the Project will occur within REs of land zone 9 (gently undulating landscapes formed from fine-grained sedimentary rocks) (see Table 10) In total, 126 ha of land zone 9 comprising three endangered, one of concern and three least concern REs occur within the project footprint. This includes four REs listed under the EPBC Act as constituents of the endangered Brigalow TEC or the Natural Grassland TEC. Land zone 9 REs within the project footprint are generally grouped between the Suttor Creek and Bowen River crossings.

**Table 6 Land Zone 9 Regional Ecosystems mapped within project footprint**

| RE Code | VMA Status    | Description   | Fauna Habitat Type   | Clearing Area <sup>1</sup>        |
|---------|---------------|---|--|-----------------------------------|
| 11.9.1  | Endangered    | <i>Acacia harpophylla</i> -<br><i>Eucalyptus cambageana</i> open forest to woodland on fine-grained sedimentary rocks | Brigalow/gidgee open forest and shrubby eucalypt woodland - <b>also an EPBC Act</b><br><b>TEC – Brigalow</b> | 7.25 ha                           |
| 11.9.2  | Least concern | <i>Eucalyptus melanophloia</i> ± <i>E. orgadophila</i> woodland on fine-grained sedimentary rocks.                    | Grassy open woodland   | 55.34 ha v.6b<br>57.12 ha revised |
| 11.9.3  | Least concern | <i>Dichanthium</i> spp., <i>Astrebla</i> spp. grassland on fine-grained sedimentary rocks                             | Native grassland – <b>also an EPBC Act</b><br><b>TEC – Natural grassland</b>                                 | 41.90 ha                          |
| 11.9.5  | Endangered    | <i>Acacia harpophylla</i> and/or <i>Casuarina cristata</i> open forest on fine-grained sedimentary rocks              | Brigalow and gidgee scrub – <b>also an EPBC Act</b><br><b>TEC - Brigalow</b>                                 | 0.1 ha v.6b<br>0.57 ha revised    |
| 11.9.9  | Least concern | <i>Eucalyptus crebra</i> woodland on fine-grained sedimentary rocks   | Shrubby eucalypt woodland  | 13.70 ha                          |
| 11.9.10 | Of concern    | <i>Eucalyptus populnea</i> , <i>Acacia harpophylla</i> open forest on fine-grained sedimentary rocks                  | Shrubby eucalypt woodland  | 21.46 ha v.6b<br>4.95 ha revised  |
| 11.9.12 | Endangered    | <i>Dichanthium sericeum</i> grassland with clumps   | Native grassland – <b>also an EPBC Act</b>   | 0.45 ha                           |



|  |                                    |
|--|------------------------------------|
| of <i>Acacia harpophylla</i><br>on fine-grained<br>sedimentary rocks | <b>TEC – Natural<br/>grassland</b> |
|--|------------------------------------|

<sup>1</sup> 'v.6b' = current official RE map version; 'revised' = the area according to the revised, ground-truthed RE mapping conducted for the Project. Where only one figure is given, the version 6 and revised RE mapping are in agreement.

### **Land Zone 4 REs**

Although land zone 3 displays the highest diversity in terms of overall number of REs within the project footprint, the highest community diversity occurs on land zone 4 (clay plains) (see Table 7). There are eight REs within only 143 ha of this land zone in the project footprint, of which three are endangered, four are of concern and one is least concern. Of the endangered REs, two are listed as being components of the endangered Brigalow TEC under the EPBC Act, and one is listed as a component of the endangered Semi Evergreen Vine Thicket TEC. The land zone 4 least concern RE forms part of the endangered Natural Grassland TEC. This is a relatively high level of diversity to be present within only 143 ha.

Though of concern REs make up four of the eight REs for land zone 4, these REs make up a very small proportion of REs from this land zone (~10 ha). One of the of concern REs is listed as being a component of the endangered Natural Grassland TEC (11.4.11).

The majority of the study area located on land zone 4 is mapped within three REs. The most common of the land zone 4 REs is the least concern RE 11.4.4, which occupies just over an estimated 54 ha of the project footprint and is described as a tussock grassland dominated by *Dichanthium* sp. (bluegrasses) (Queensland Herbarium, 2009). The most extensive areas of this RE are located on the black cracking clay plains immediately to the north and south of the Pelican Creek crossing, in the Bowen River valley due west of Collinsville. This RE is listed under the EPBC Act as a component of the endangered Natural Grassland TEC.

The other two important land zone 4 REs within the project footprint, both in terms of area and conservation significance, are the endangered REs 11.4.8 and 11.4.9 (these REs have an estimated area within the project footprint of 25 ha and 52 ha respectively). Both of these REs are listed under the EPBC Act as components of the endangered Brigalow TEC, and both are predominately located in the southern section of the project footprint between the Suttor Creek and Belyando River crossings. In addition, the endangered RE 11.4.1 is located within the project footprint. The project footprint only encompasses 0.42 ha, which is listed as a component of the endangered Semi Evergreen Vine Thicket under the EPBC Act.

**Table 7 Land Zone 4 Regional Ecosystems mapped within project footprint**

| RE Code | VMA Status | Description  | Fauna Habitat Type  | Clearing Area <sup>1</sup>      |
|---------|------------|--|---|---------------------------------|
| 11.4.1  | Endangered | Semi-evergreen vine thicket ± <i>Casuarina cristata</i> on Cainozoic clay plains                       | Semi-evergreen vine thicket – also an EPBC Act TEC - SEVT | 0.42 ha                         |
| 11.4.2  | Of concern | <i>Eucalyptus</i> spp. and/or <i>Corymbia</i> spp. grassy or shrubby woodland on Cainozoic clay plains | Shrubby to grassy eucalypt woodland                       | 7.64 ha v.6b<br>0.97 ha revised |



| RE Code | VMA Status    | Description   | Fauna Habitat Type  | Clearing Area <sup>1</sup>        |
|---------|---------------|---|---|-----------------------------------|
| 11.4.4  | Least concern | <i>Dichanthium</i> spp., <i>Astrebla</i> spp. grassland on Cainozoic clay plains  | Native grassland –also an EPBC Act TEC – Native grasslands  | 54.58 ha                          |
| 11.4.5  | Of concern    | <i>Acacia argyrodendron</i> woodland on Cainozoic clay plains   | Brigalow and gidgee open forest/scrub                       | 0.19 ha v.6b<br>0.45 ha revised   |
| 11.4.6  | Of concern    | <i>Acacia cambagei</i> woodland on Cainozoic clay plains  | Brigalow and gidgee scrub                                   | 2.52 ha v.6b<br>0.68 ha revised   |
| 11.4.8  | Endangered    | <i>Eucalyptus cambageana</i> woodland to open forest with <i>Acacia harpophylla</i> or <i>A. argyrodendron</i> on Cainozoic clay plains       | Brigalow and gidgee scrub – also an EPBC Act TEC - Brigalow | 1.41 ha v.6b<br>25.45 ha revised  |
| 11.4.9  | Endangered    | <i>Acacia harpophylla</i> shrubby open forest to woodland with <i>Terminalia oblongata</i> on Cainozoic clay plains                           | Brigalow and gidgee scrub – also an EPBC Act TEC - Brigalow | 15.77 ha v.6b<br>51.55 ha revised |
| 11.4.11 | Of concern    | <i>Dichanthium sericeum</i> , <i>Astrebla</i> spp. and patchy <i>Acacia harpophylla</i> , <i>Eucalyptus coolabah</i> on Cainozoic clay plains | Native grassland – also an EPBC Act TEC – Native grasslands | 8.48 ha                           |

<sup>1</sup> 'v.6b' = current official RE map version; 'revised' = the area according to the revised, ground-truthed RE mapping conducted for the Project. Where only one figure is given, the version 6 and revised RE mapping are in agreement.

### Land Zone 8 REs

Level and gently undulating landforms composed of Tertiary olivine flood basalts (land zone eight) are present in small patches of the study area between the Bowen River and the Suttor Creek crossings. Although of relatively minor extent within the project footprint (five REs with 88 ha in total), REs on land zone eight contain the elements of two EPBC Act listed TECs, Natural Grassland and Semi Evergreen Vine Thicket, and include one of the more common REs in the study area, the least concern RE 11.8.5. The RE listed in the Natural Grassland TEC on land zone eight is the of concern RE 11.8.11. This RE occupies approximately 2.9 ha of the project footprint, and comprises a native grassland community on self-mulching, black cracking clays, often with high species diversity in the ground layer. Patches of this RE are known to contain some of the flora species of conservation significance in the region, including king bluegrass (*Dichanthium queenslandicum*), listed as vulnerable under both the NCA and the EPBC Act.



The REs of concern RE 11.8.3 and the endangered RE 11.8.13 are constituents of the TEC Semi Evergreen Vine Thicket of the Brigalow Belt (North and South) and Nandewar Bioregions, listed as endangered under the EPBC Act. The RE 11.8.3 is semi evergreen vine thicket sometimes with brigalow or eucalypt emergents that is 'generally restricted to steeper, rocky hillsides' (a landform poorly represented within the project footprint), whereas RE 11.8.13 comprises semi evergreen vine thicket occurring on gently undulating plains, rises and low hills (DERM 2009). Both REs have relatively minor occurrences within the project footprint – RE 11.8.3 comprises just 0.001 ha and RE 11.8.13 comprises 0.07 ha.

The most significant land zone eight RE in the study area in terms of area is the least concern RE 11.8.5, which comprises mountain coolibah (*Eucalyptus orgadophila*) grassy open woodland on undulating plains, rises and low hills (DERM 2009). This RE forms a distinctive community of its own within the study area, and is ascribed as its own alliance in Table 11. It is found over approximately 60 ha of the project footprint, making it one of the more common REs encountered, often in association as a mixed polygon with the endangered grassland RE 11.8.11, with which it frequently intergrades.

**Table 8 Land Zone 8 Regional Ecosystems mapped within project footprint**

| RE Code | VMA Status    | Description  | Fauna Habitat Type   | Clearing Area <sup>1</sup>        |
|---------|---------------|--|--|-----------------------------------|
| 11.8.3  | Of concern    | Semi-evergreen vine thicket on Cainozoic igneous rocks.                            | Semi-evergreen vine thicket – also an <b>EPBC Act TEC - SEVT</b>   | 2.46 ha v.6b<br>0.001 ha revised  |
| 11.8.4  | Least concern | <i>Eucalyptus melanophloia</i> woodland on Cainozoic igneous rocks. Hillsides      | Eucalypt woodland on rocky rises                                   | 24.66 ha                          |
| 11.8.5  | Least concern | <i>Eucalyptus orgadophila</i> open woodland on Cainozoic igneous rocks             | Eucalypt woodland on rocky rises                                   | 51.46 ha v.6b<br>59.93 ha revised |
| 11.8.11 | Of concern    | <i>Dichanthium sericeum</i> grassland on Cainozoic igneous rocks                   | Native grassland - <b>also an EPBC Act TEC – Natural grassland</b> | 2.90 ha                           |
| 11.8.13 | Endangered    | Semi-evergreen vine thicket and microphyll vine forest on Cainozoic igneous rocks. | Semi-evergreen vine thicket – also an <b>EPBC Act TEC - SEVT</b>   | 14.31 ha v.6b<br>0.07 ha revised  |

<sup>1</sup> 'v.6b' = current official RE map version; 'revised' = the area according to the revised, ground-truthed RE mapping conducted for the Project. Where only one figure is given, the version 6 and revised RE mapping are in agreement.



### **Regional Ecosystems with Minor Occurrences in the Study Area**

The remaining land zones (land zones 1, 2, 7 and 11) have generally only minor occurrences within the project footprint, both in terms of area and of communities with high conservation significance. Of these minor areas, only land zone 2 contains another RE listed under the EPBC Act – this is the of concern RE 11.2.3, which is listed as a component of the endangered Semi Evergreen Vine Thicket TEC. The alignment crosses only a small section of this RE at the extreme northern limit of the project footprint, near the Abbot Point rail head.

**Table 9 Land Zones 1, 2, 7 and 11 Regional Ecosystems mapped within project footprint**

| RE Code            | VMA Status    | Description   | Fauna Habitat Type   | Clearing Area <sup>1</sup> |
|--------------------|---------------|---|--|----------------------------|
| <b>Land Zone 1</b> |               |   |  |                            |
| 11.1.2             | Least concern | Samphire forbland on marine clay plains   | Native grasslands and samphire forblands                         | 1.96 ha                    |
| 11.1.4             | Least concern | Mangrove forest/woodland on marine clay plains  | Fringing woodland and open forest                                | 0.43 ha                    |
| <b>Land Zone 2</b> |               |   |  |                            |
| 11.2.3             | Of concern    | Microphyll vine forest ("beach scrub") on sandy beach ridges and dune swales  | Semi-evergreen vine thicket – also an <b>EPBC Act TEC - SEVT</b> | 12.16 ha                   |
| 11.2.5             | Least concern | <i>Corymbia-Melaleuca</i> woodland complex of beach ridges and swales   | Shrubby eucalypt woodland  | 5.03 ha                    |
| <b>Land Zone 7</b> |               |   |  |                            |
| 10.7.3             | Least concern | <i>Acacia shirleyi</i> woodland or <i>A. catenulata</i> low woodland at margins of plateaus   | Brigalow/gidgee open forest/woodland                             | 0.25 ha                    |
| 10.7.7             | Least concern | <i>Melaleuca</i> spp. and/or <i>Acacia leptostachya</i> shrubland on ferricrete (eastern)   | Brigalow/gidgee open forest/woodland                             | 0.77 ha                    |
| 11.7.1             | Least concern | <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 | Eucalypt woodland on rocky rises                                 | 9.40 ha                    |
| 11.7.2             | Least concern | <i>Acacia</i> spp. woodland   | Eucalypt woodland on v.6b  | 6.49 ha                    |



| <b>RE Code</b>      | <b>VMA Status</b> | <b>Description</b>  | <b>Fauna Habitat Type</b>        | <b>Clearing Area<sup>1</sup></b> |
|---------------------|-------------------|---|----------------------------------|----------------------------------|
|                     |                   | on Cainozoic lateritic duricrust. Scarp retreat zone.   | rocky rises                      | 2.92 ha revised                  |
| 11.7.4              | Least concern     | <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 | Eucalypt woodland on rocky rises | 8.69 ha v.6b<br>9.08 ha revised  |
| <b>Land Zone 11</b> |                   |   |                                  |                                  |
| 11.11.9             | Least concern     | <i>Eucalyptus populnea</i> or <i>E. brownii</i> woodland on deformed and metamorphosed sediments and interbedded volcanics  | Eucalypt woodland on rocky rises | 12.07 ha                         |
| 11.11.10            | Of concern        | <i>Eucalyptus melanophloia</i> woodland on deformed and metamorphosed sediments and interbedded volcanics   | Eucalypt woodland on rocky rises | 0.13 ha                          |
| 11.11.13            | Of concern        | <i>Acacia harpophylla</i> or <i>A. argyrodendron</i> , <i>Terminalia oblongata</i> low open forest on deformed and metamorphosed sediments and interbedded volcanics    | Brigalow and gidgee scrub        | 4.30 ha                          |
| 11.11.16            | Of concern        | <i>Eucalyptus cambageana</i> , <i>Acacia harpophylla</i> woodland on old sedimentary rocks with varying degrees of metamorphism and folding. Lowlands                   | Eucalypt woodland on rocky rises | 0.09 ha                          |

<sup>1</sup> 'v.6b' = current official RE map version; 'revised' = the area according to the revised, ground-truthed RE mapping conducted for the Project. Where only one figure is given, the version 6 and revised RE mapping are in agreement.



Overall, the majority of REs (41) are estimated to have less than 10 ha located within the project footprint. Of these 29 REs (or 43% of the overall number of REs) are estimated to have less than five hectares within the study area. Only two REs have areas of greater than 100 ha within the project footprint – these are the least concern REs 11.5.3, with 226 ha, and RE 11.12.1, with 226 ha. The next largest RE within the project footprint has a total extent of 67 ha (the least concern RE 11.12.2). Seven REs have between 50 and 100 ha intercepted by the project footprint, six of which are least concern, and one of which is endangered (11.4.9) and which constitutes the endangered Brigalow TEC.



**Table 10 Analysis of REs in the project footprint by land zone and VMA status**

| Land zone <sup>1</sup>   | Endangered REs <sup>2</sup>                         | Of Concern REs <sup>2</sup> | Least Concern REs <sup>2</sup> | TOTAL<br>(area)   |
|--|---|-----------------------------|--------------------------------|---|
| <b>Land zones formed from transported Quaternary deposits</b>  |   |                             |                                |   |
| 1 Quaternary estuarine/marine deposits subject to tidal inundation.  | -   | -                           | 2                              | <b>2</b><br><b>(2 ha)</b>                               |
| 2 Quaternary coastal dunes and beach ridges.   | -   | 1<br>1 TEC-SVT <sup>5</sup> | 1                              | <b>2</b><br><b>(17 ha)</b><br><b>1 TEC/1 TEC RE</b>     |
| 3 Quaternary alluvial systems including floodplains, alluvial plains, terraces, watercourse bed and banks. Excludes colluvium.   | 2<br>1 TEC-B <sup>3</sup><br>1 TEC-NG <sup>4</sup>  | 6<br>1 TEC-WM <sup>6</sup>  | 14                             | <b>22</b><br><b>(443 ha)</b><br><b>3 TECs/3 TEC REs</b> |
| <b>Land zones formed from transported Cainozoic deposits – excludes land forms formed in-situ from bedrock</b>   |   |                             |                                |   |
| 4 Cainozoic clay deposits, usually forming level to gently undulating plains above existing alluvial systems. Excludes clay plains formed in-situ from underlying bedrock. | 3<br>2 TEC-B <sup>3</sup><br>1 TEC-SVT <sup>5</sup> | 4<br>1 TEC-NG <sup>4</sup>  | 1<br>1 TEC-NG <sup>4</sup>     | <b>8</b><br><b>(143 ha)</b><br><b>3 TECs/5 TEC REs</b>  |
| 5 Extensive uniform near level or gently undulating Cainozoic plains with sandy or loamy soils.  | 1<br>1 TEC-B <sup>3</sup>                           | 1                           | 7<br>1 TEC-SVT <sup>5</sup>    | <b>9</b><br><b>(380 ha)</b><br><b>2 TECs/2 TEC REs</b>  |
| 6 Quaternary inland dunefields.  | Not represented in study area                       |                             |                                |   |
| <b>Land zones formed in the Cainozoic from remnant surfaces (duricrust) or flood basalts</b>   |   |                             |                                |   |
| 7 Cainozoic duricrusts formed on a variety of rock types, usually forming mesas or scarps. Includes associated talus and colluvium, and remnants such as                   | -   | -                           | 5                              | <b>5</b><br><b>(22 ha)</b>                              |



| Land zone <sup>1</sup>   | Endangered REs <sup>2</sup>                        | Of Concern REs <sup>2</sup>                          | Least Concern REs <sup>2</sup> | TOTAL<br>(area)                          |
|--|--|--|--------------------------------|--|
| low stony rises.   |  |  |                                |  |
| 8 Cainozoic igneous rocks, predominately flood basalts, forming extensive plains and low scarps. Includes cones and plugs of trachyte/rhyolite, talus, and associated interbedded sediments. | 1<br>1 TEC-SVT <sup>5</sup>                        | 2<br>1 TEC-NG <sup>4</sup><br>1 TEC-SVT <sup>4</sup> | 2                              | 5<br>(88 ha)<br><b>2 TECs/3 TEC REs</b>  |
| <b>Land zones comprising older (pre-Cainozoic) rocks, and soils formed in-situ from underlying bedrock</b>   |  |  |                                |  |
| 9 Gently undulating landscapes formed from fine-grained sedimentary rocks.   | 3<br>2 TEC-B <sup>3</sup><br>1 TEC-NG <sup>4</sup> | 1  | 3<br>1 TEC-NG <sup>4</sup>     | 7<br>(126 ha)<br><b>2 TECs/4 TEC REs</b> |
| 10 Plateaus, scarps, ledges formed from medium-coarse grained sedimentary rocks.   | Not represented in study area                      |  |                                |  |
| 11 Hills and lowlands formed from metamorphosed sedimentary rocks.   | -  | 3  | 1                              | 4<br>(17 ha)                             |
| 12 Hills and lowlands formed from granite and other pre-Cainozoic igneous rocks  | -  | 1  | 3                              | 4<br>(300 ha)                            |
| <b>TOTAL number of REs</b>   | <b>10</b>  | <b>19</b>  | <b>39</b>                      | <b>68 REs</b>                            |
| <b>(total clearing area within project footprint)</b>  | <b>(111 ha)</b>                                    | <b>(104 ha)</b>                                      | <b>(1322 ha)</b>               | <b>(1538 ha)</b>                         |
| <b>(number REs within a TEC)</b>   | <b>(10 TEC REs)</b>                                | <b>(5 TEC REs)</b>                                   | <b>(3 TEC REs)</b>             | <b>3 TECs/<br/>18 TEC REs</b>            |

<sup>1</sup> Land zone descriptions from DERM 2010; <sup>2</sup> Derived from revised RE mapping; <sup>3</sup> TEC-B = EPBC Act Threatened Ecological Community – Brigalow;

<sup>4</sup> TEC-NG = EPBC Act Threatened Ecological Community – Natural Grassland; <sup>5</sup> TEC-SVT = EPBC Act Threatened Ecological Community – Semi-evergreen vine thicket;

<sup>6</sup> TEC-WM = EPBC Act Threatened Ecological Community – Weeping Myall Woodland.



### 3.5 Vegetation Communities

Within the natural environment vegetation occurs in mature-phase communities, which are units displaying a consistent species composition and structure (canopy cover and height). Vegetation communities can be described at a number of levels, with further groupings made based on the landform and substrate that a community usually occurs on (e.g. hills and ranges of Paleozoic granite), or even the geography (e.g. coastal, sub-coastal etc). The basic unit is the association.

An association is a mature-phase community in which the dominant stratum has a relatively uniform species composition and structure (Neldner *et al.* 2005). Associations can be quite broad and may encompass a number of seemingly disparate vegetation units (Sattler and Williams 1999; Nelder *et al.* 2005). Within an association, patches of vegetation at different sites may have sub-dominant strata that have different characteristic species and density. However, in general these patches will look similar from the outside.

For instance, two woodlands dominated by narrow-leaved ironbark, one with no other tree species present, the other having a mix of one or two subdominant tree species, can be classed as the same association. However, these woodlands could be split at the sub-association level, which incorporates more detail and can be mapped at a smaller scale. Sub-associations focus on the species composition of both the dominant and sub-dominant species within a community, and are more sensitive to differences in structure. Most REs are described at either the association or sub-association level (Nelder *et al.* 2005). Differences between sub-associations can generally be detected readily during a quaternary site assessment, but in some cases more detailed secondary or tertiary assessments may be required.

The alliance is the peak floristic grouping. An alliance is a group of floristically related associations whose dominant strata have a similar structure (Neldner *et al.* 2005). For example, the alliance 'dry eucalypt woodlands/open woodlands primarily on sandplains or depositional plains' could include the associations 'ironbark woodlands on Cainozoic sand plains' and 'poplar gum open woodland on broad Quaternary alluvial plains'. At this level, members of an alliance will appear quite different, but can be readily mapped at very coarse scales (although in the case of highly distinctive associations, it may be impossible to group them at a higher level and the association and alliance may be identical). The 'broad vegetation groups' (BVG) developed by the Queensland Herbarium for vegetation mapping at the 1:2 million scale (i.e. statewide) are described at the alliance level, and allow an appreciation of general vegetation patterns at a broad scale (Accad *et al.* 2009).

For the purpose of summarising general vegetation patterns observed across the project footprint, 15 vegetation alliances have been described (see Table 11). Details on general species composition, characteristic landforms, commonly encountered weeds, location in project footprint (including the main sites at which each community was observed), special values (such as conservation significant species or EPBC Act TECs) and the representative REs are provided in Table 11. An estimate of area within the project footprint of each alliance is provided.

In addition, notes on the general condition of the community have been provided. In order to facilitate rapid condition assessments at sites that included non-remnant, regrowth and remnant vegetation, the VAST (Vegetation Assets, States and Transitions) methodology was used (Thackway and Lesslie, 2005). The VAST diagnostic table is reproduced in Appendix F. The strengths of this methodology are that it can be applied quickly and in a universal manner, being applicable to any vegetation type across any landscape including entirely artificial vegetation communities, and at varying scales.



The VAST methodology places vegetation at a site within a scale ordered by degree of anthropogenic modification, with completely natural, vegetated sites (a differentiation is made with naturally unvegetated sites, which are type 0) being a type I 'residual' state. Sites where the natural structure, composition and regenerative capacity of the vegetation have been largely retained, but modifications have occurred (perhaps due to altered fire regimes, selective timber removal, or a sustainable grazing practice) are classed type II 'modified'. Where the natural structure, composition and/or regenerative capacity has been significantly altered, for example through heavy grazing pressure, substantial weed incursions or widespread selective clearing, the vegetation is type III 'transformed' (Thackway and Lesslie, 2005). The majority of remnant vegetation in the project footprint hovered between the modified and transformed states. Sites with a high proportion of weeds or those that were heavily grazed were classed as type III, and those that were largely free of weeds and the effects of grazing were classed as type II.

A major transition in site management occurs after transformed sites in the VAST scale. Sites at which native vegetation has been largely replaced, either as pasture grasses or due to extensive weed incursions are class IV 'adventive'. Those where no vestige of natural structure is retained (such as cropping land) are classed type V 'managed' (Thackway and Lesslie, 2005).

The major vegetation alliance of the study area is ironbark woodland on plains and rises. This is comprised of some 12 REs or parts of REs, occupying an estimated 738 ha of land within the project footprint. The majority of these REs are least concern, reflecting the fact that this land is primarily grazing land that past land managers found was more productive as woodland than as cleared pasture. It occurs on a variety of land forms and soils throughout the length of the project footprint. This alliance provides full or partial habitat for at least seven species of conservation significance within the project footprint, mainly species that are listed as near threatened.

The next most common alliance in the study area is box woodland on flats and plains, which comprises approximately 370 ha of the project footprint. This alliance is comprised of nine REs, the majority of which are Least Concern, and is located primarily in the central and southern parts of the study area. Included within this alliance is the RE 11.3.2, which forms part of the Weeping Myall Woodland TEC protected under the EPBC Act. However, no evidence that this TEC is actually present was collected during field surveys. In addition, this alliance partly encompasses the RE 11.9.10, which is listed under the EPBC Act as a constituent of the endangered Brigalow TEC.

The native grassland alliance comprises approximately 116 ha of the project footprint, and includes a number of significant communities in the study area. This alliance comprises three least concern, two of concern and two endangered REs, most of which are listed under the EPBC Act as constituents of the endangered Natural Grasslands of the Queensland Central Highlands and northern Fitzroy Basin TEC. However, much of these grasslands have experienced significant incursion by exotic pasture grasses, particularly buffel grass and creeping bluegrass, and it is likely that the actual area of land within the project footprint that will qualify for this TEC will be much less than 116 ha. In addition, a number of species of flora of conservation significance are known to occur in these grasslands in the local area, including king bluegrass (*Dichanthium queenslandicum*). Native grasslands are found throughout the length of the project footprint on level to undulating plains.

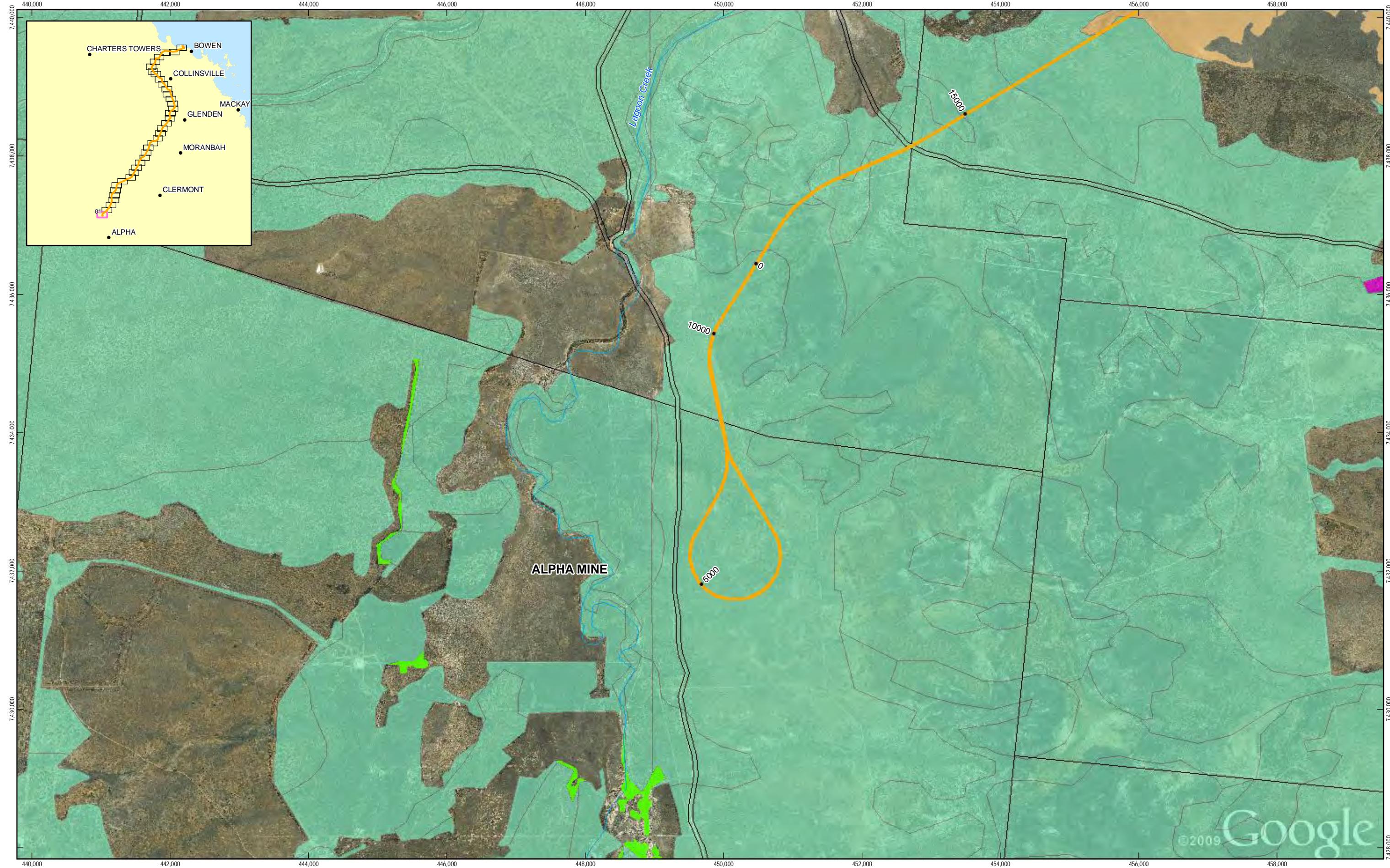
Another significant alliance located within the study area is acacia-dominated woodland and open forest. There are two main manifestations of this alliance present on over 138 ha within the project footprint – brigalow woodland/open forest (associations dominated by *Acacia harpophylla*) and gidgee woodland/open forest (associations dominated by *A. cambagei* other than fringing communities, which are included in another alliance). In total, this alliance comprises 14 REs, the majority of which are of



concern or endangered. Brigalow in particular has been heavily cleared since the early 1950s and converted to pastures for cattle, and this is reflected in the high proportion of this alliance represented by endangered REs. This alliance includes a number of REs listed under the EPBC Act as constituents of the endangered Brigalow TEC, and species of conservation significance such as *Paspalidium scabrifolium*.

The only other alliance of high conservation significance in the study area is semi-evergreen vine thicket, which comprises approximately 14 ha of the project footprint. This alliance is located within only five REs, of which two are endangered and one is of concern. All of these are listed under the EPBC Act as constituents of the endangered Semi Evergreen Vine Thicket TEC. In addition, at least three near threatened species of flora are known to occur in semi-evergreen vine thicket. Only one site located within this alliance was visited during field inspections, however it is suspected (based on extensive prior experience in ground truthing RE mapping in this region) that much of the vegetation mapped within the alliance has been incorrectly attributed.

The remainder of the 15 alliances identified in Table 11 are relatively minor in terms of area, although they may contain individual REs that are of high conservation significance of themselves.



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Kilometres

Map Projection: Universal Transverse Mercator  
Horizontal Datum: Geocentric Datum of Australia 1994  
Grid: Map Grid of Australia, Zone 55



LEGEND

- |               |                      |                       |                             |
|---------------|----------------------|-----------------------|-----------------------------|
| ● Town        | ○ Proposed Alignment | ■ Essential Habitat   | ■ Regional Ecosystems       |
| ▲ Camp        | — State Road         | ■ High Value Regrowth | ■ Not of Concern            |
| ■ Marshalling | — Existing Railway   | ■ Cadastre            | ■ Endangered - Dominant     |
| □ Yards       | — Watercourse        | ■ Yards               | ■ Endangered - Sub-dominant |
| ⊗ Depot       |                      |                       | ■ Of Concern - Dominant     |

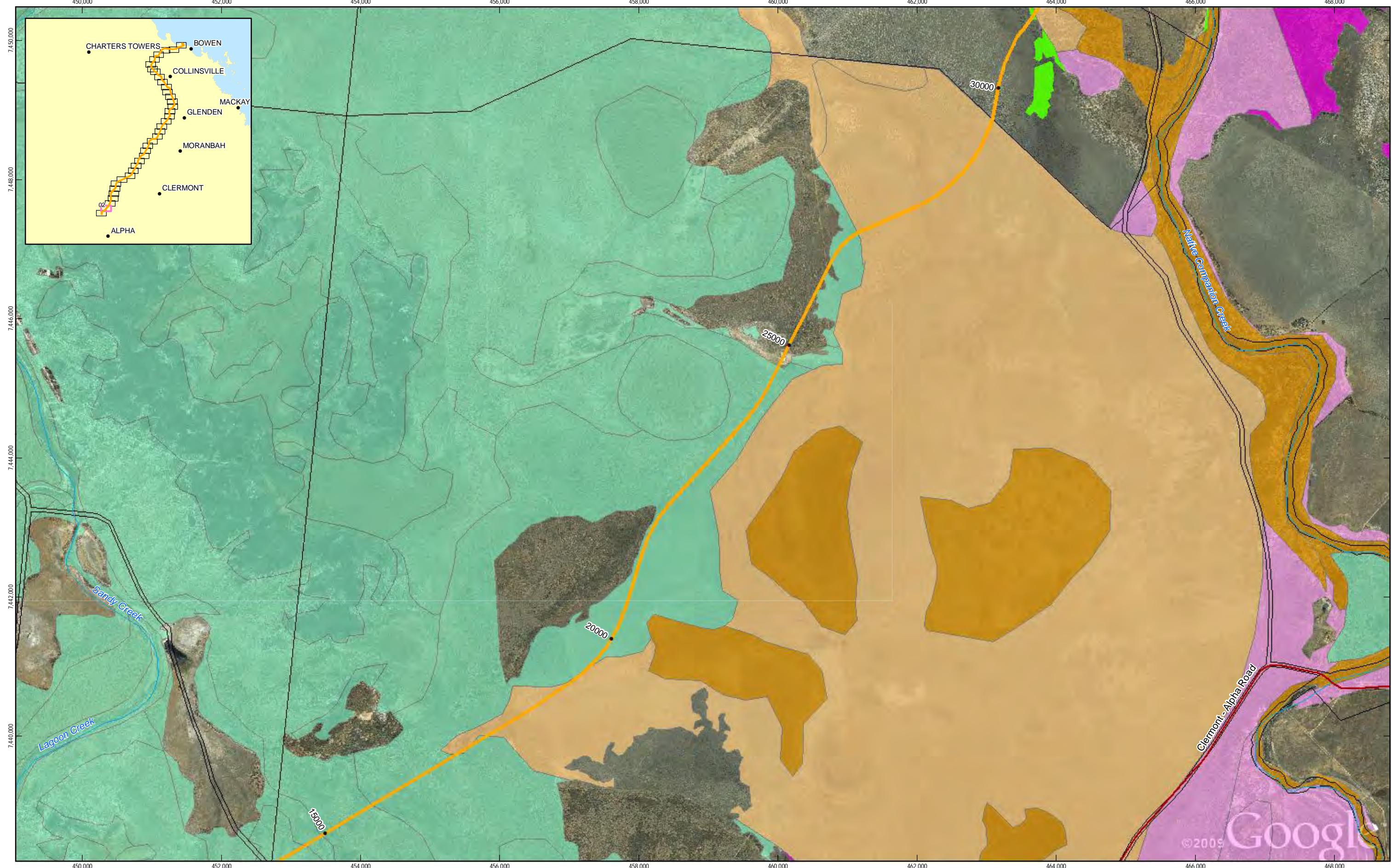
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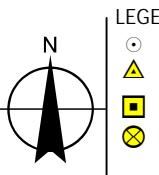
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## CERTIFIED REGIONAL ECOSYSTEMS AND HIGH VALUE REGROWTH

Figure: 3-2  
Sheet 01 of 37



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Map Projection: Universal Transverse Mercator  
Horizontal Datum: Geocentric Datum of Australia 1994  
Grid: Map Grid of Australia, Zone 55



**LEGEND**

|               |                      |                             |                           |
|---------------|----------------------|-----------------------------|---------------------------|
| ○ Town        | — Proposed Alignment | ■ Essential Habitat         | Regional Ecosystems       |
| ▲ Camp        | — State Road         | ■ High Value Regrowth       | Not Of Concern            |
| □ Marshalling | — Existing Railway   | ■ Endangered - Dominant     | Plantation Forest         |
| ⊗ Yards       | — Watercourse        | ■ Endangered - Sub-dominant | Non-Remnant / Regrowth    |
| ⊗ Depot       |                      | ■ Cadastre                  | Of Concern - Dominant     |
|               |                      | ■ Waterbody                 | Of Concern - Sub-dominant |

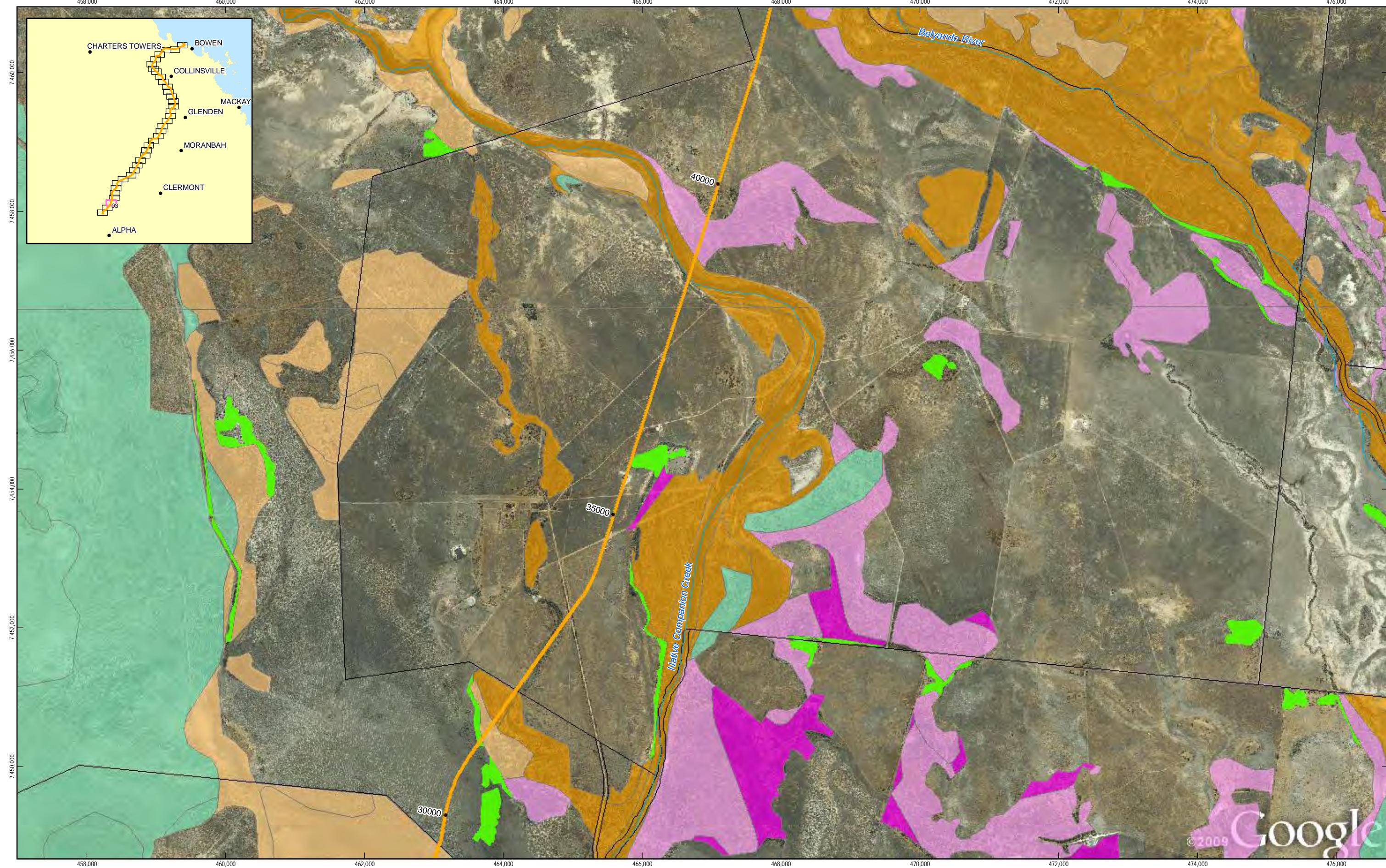
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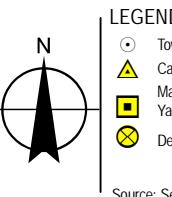
## CERTIFIED REGIONAL ECOSYSTEMS AND HIGH VALUE REGROWTH

Figure: 3-2  
Sheet 02 of 37



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Kilometres

Map Projection: Universal Transverse Mercator  
Horizontal Datum: Geocentric Datum of Australia 1994  
Grid: Map Grid of Australia, Zone 55



**LEGEND**

|               |                      |                             |                        |
|---------------|----------------------|-----------------------------|------------------------|
| ○ Town        | — Proposed Alignment | ■ Essential Habitat         | Regional Ecosystems    |
| ▲ Camp        | — State Road         | ■ High Value Regrowth       | Not Of Concern         |
| □ Marshalling | — Existing Railway   | ■ Endangered - Dominant     | Plantation Forest      |
| ⊗ Yards       | — Watercourse        | ■ Endangered - Sub-dominant | Non-Remnant / Regrowth |
| ◎ Depot       |                      | ■ Of Concern - Dominant     |                        |
|               |                      | ■ Of Concern - Sub-dominant |                        |

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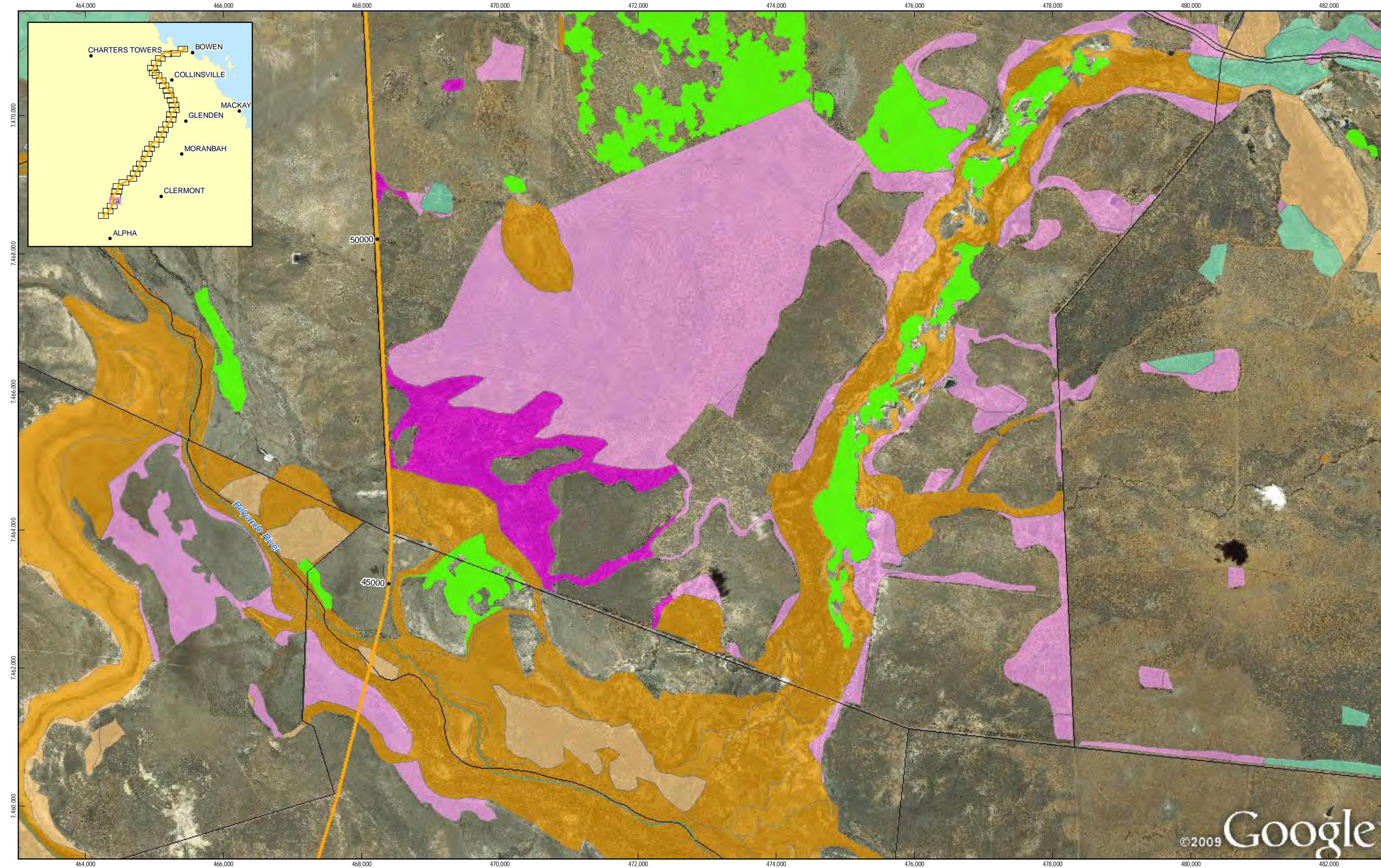
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## CERTIFIED REGIONAL ECOSYSTEMS AND HIGH VALUE REGROWTH

Figure: 3-2  
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 Map Projection: Universal Transverse Mercator  
 Horizontal Datum: Geocentric Datum of Australia 1994

Map Projection: Universal Transverse Mercator  
Horizontal Datum: Geocentric Datum of Australia 1994  
Grid: Map Grid of Australia, Zone 55

LEGEND

- Top
- ▲ Cap
- Man
- ✖ Dew

Source: S

**LEGEND**

|               |                      |                       |                           |
|---------------|----------------------|-----------------------|---------------------------|
| ● Town        | ○ Proposed Alignment | ■ Essential Habitat   | Regional Ecosystems       |
| ▲ Camp        | — State Road         | ■ High Value Regrowth | Endangered - Dominant     |
| ■ Marshalling | -+ Existing Railway  | □ Cadastre            | Endangered - Sub-dominant |
| ■ Yards       | — Watercourse        | ■ Waterbody           | Of Concern - Dominant     |
| ⊗ Depot       |                      |                       | Of Concern - Sub-dominant |
|               |                      |                       | Not Considered            |
|               |                      |                       | Plantation                |
|               |                      |                       | Non-Remnant               |
|               |                      |                       | Regrowth                  |

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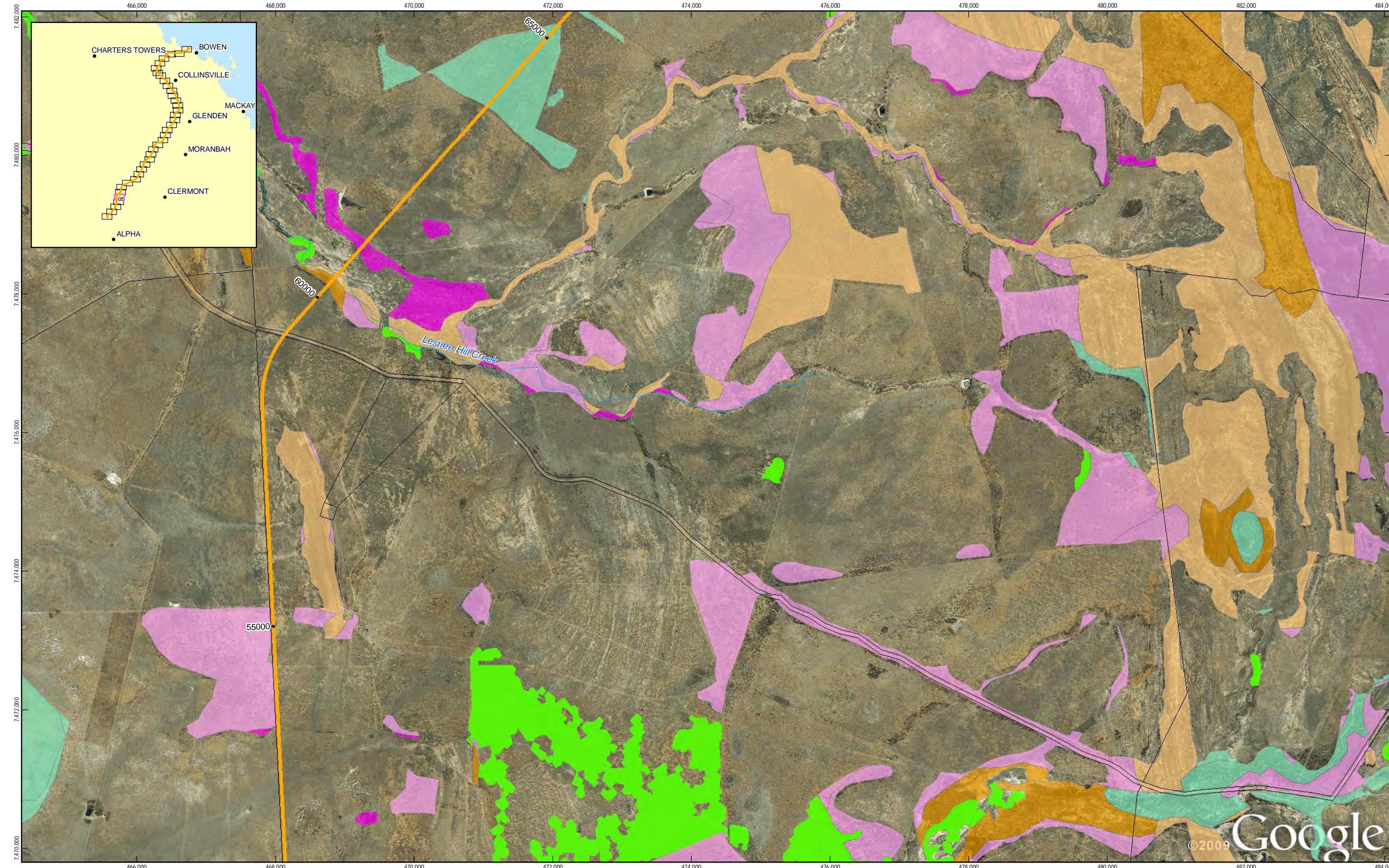
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| Date       | 04-08-2010 |

Figure: 3-2  
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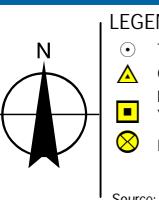
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Kilometres

Map Projection: Universal Transverse Mercator  
Horizontal Datum: Geocentric Datum of Australia 1994  
Grid: Map Grid of Australia, Zone 55



**LEGEND**

- Town
- △ Camp
- Marshalling
- ⊗ Depot
- Proposed Alignment
- State Road
- Existing Railway
- Yards
- Essential Habitat
- High Value Regrowth
- Regional Ecosystems
- Not Of Concern
- Plantation Forest
- Endangered - Dominant
- Endangered - Sub-dominant
- Cadastre
- Watercourse
- Waterbody
- Of Concern - Dominant
- Of Concern - Sub-dominant
- Non-Remnant / Regrowth

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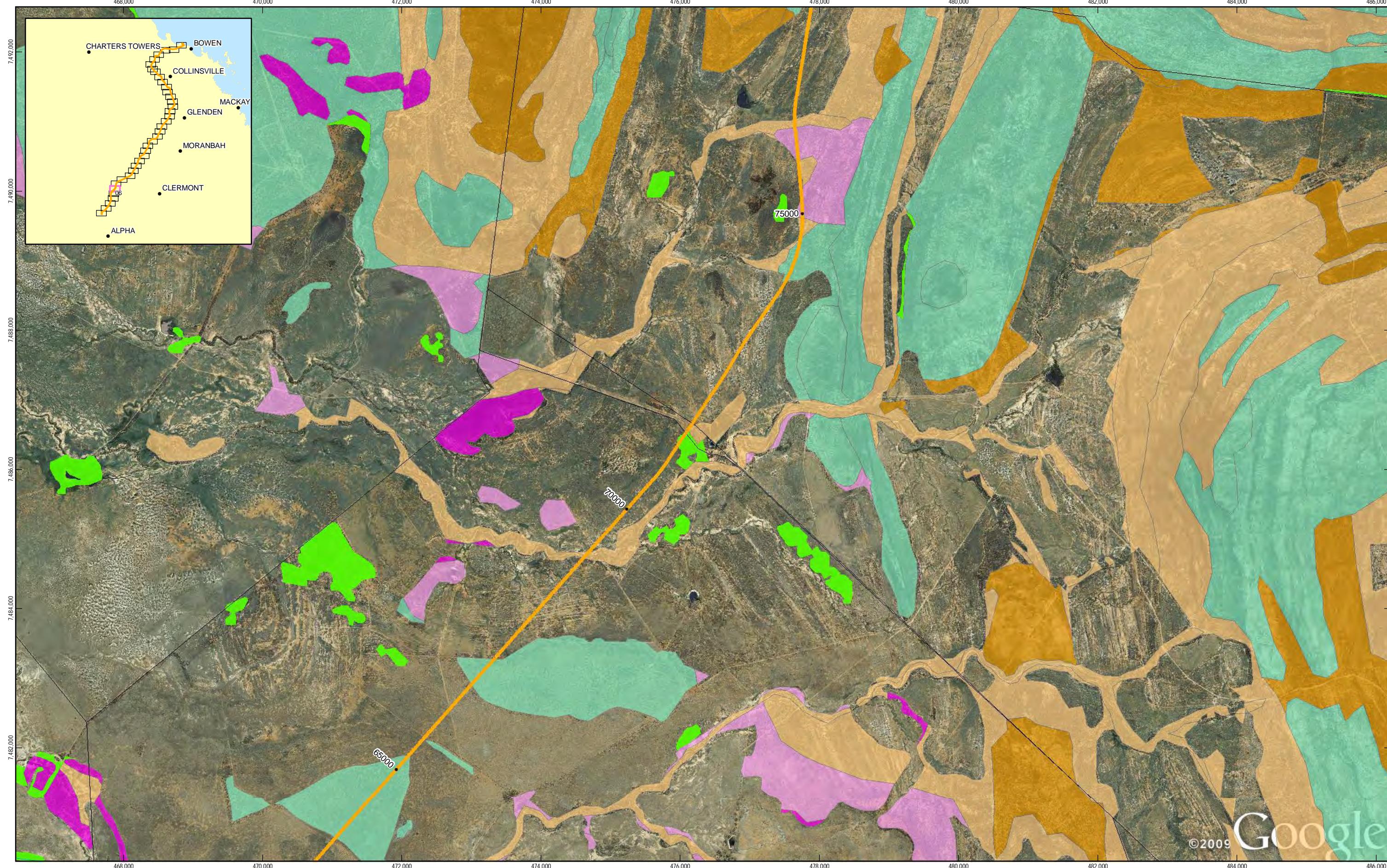
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Date 04-08-2010

## CERTIFIED REGIONAL ECOSYSTEMS AND HIGH VALUE REGROWTH

**Figure: 3-2**  
**Sheet 05 of 37**

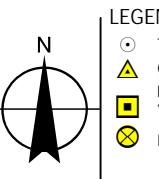
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Horizontal Datum: Geocentric Datum of Australia 1994  
Grid: Map Grid of Australia, Zone 55



LEGEND

|               |                      |                             |                     |
|---------------|----------------------|-----------------------------|---------------------|
| ○ Town        | ■ Proposed Alignment | △ Essential Habitat         | Regional Ecosystems |
| ▲ Camp        | — State Road         | ■ High Value Regrowth       | ■ Not Of Concern    |
| □ Marshalling | - - Existing Railway | ■ Endangered - Dominant     | ■ Plantation Forest |
| ◆ Yards       | — Watercourse        | ■ Endangered - Sub-dominant | ■ Non-Remnant /     |
| ⊗ Depot       |                      | ■ Cadastre                  | ■ Regrowth          |

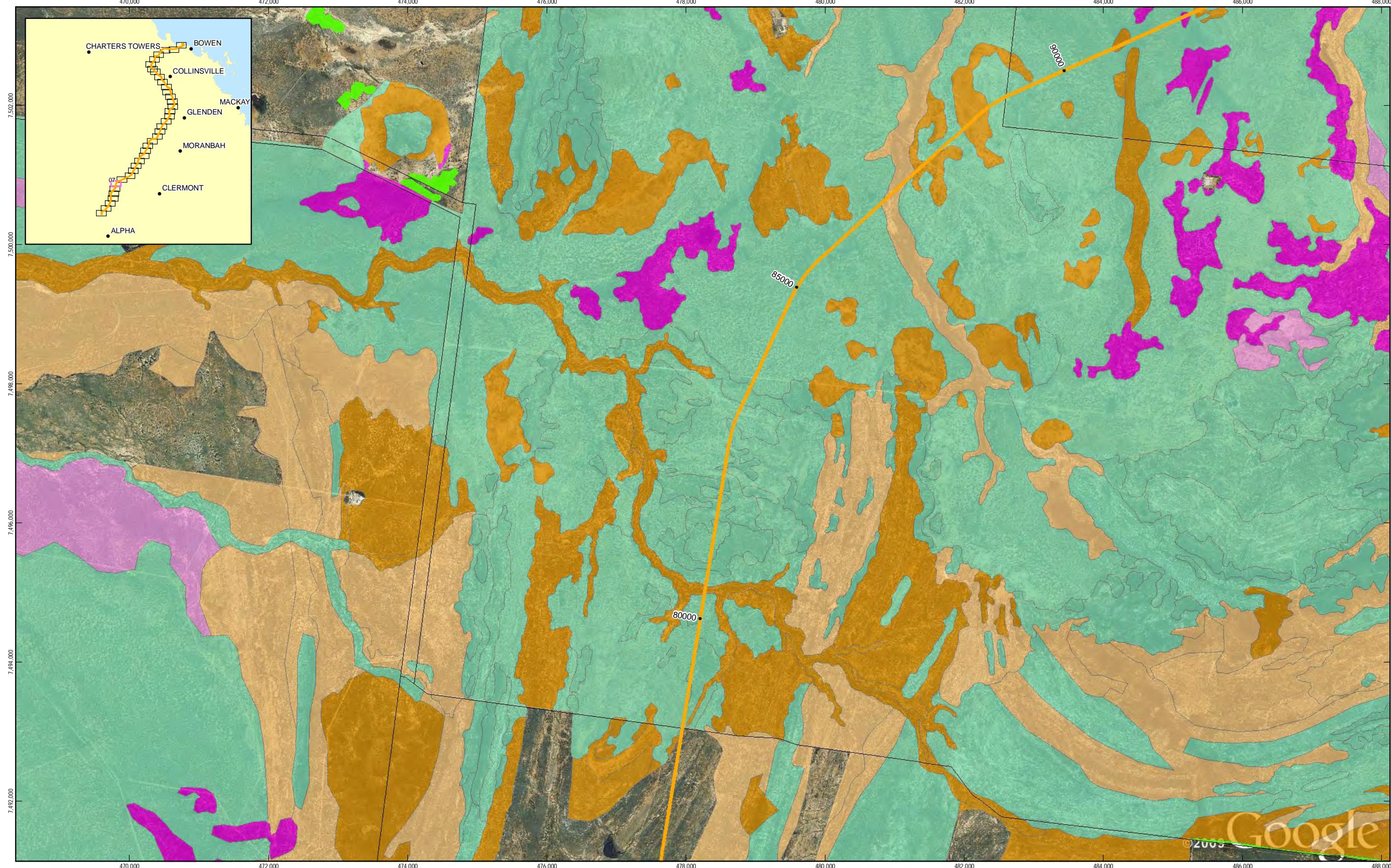
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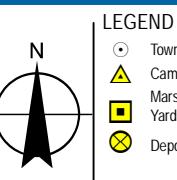
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Figure: 3-2  
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Kilometres

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Horizontal Datum: Geocentric Datum of Australia 1994  
Grid: Map Grid of Australia, Zone 55



**LEGEND**

|               |                    |                           |                        |
|---------------|--------------------|---------------------------|------------------------|
| ○ Town        | Proposed Alignment | Essential Habitat         | Regional Ecosystems    |
| △ Camp        | State Road         | High Value Regrowth       | Not Of Concern         |
| □ Marshalling | Existing Railway   | Cadastre                  | Plantation Forest      |
| ⊗ Yards       | Watercourse        | Endangered - Dominant     | Non-Remnant / Regrowth |
| ⊗ Depot       |                    | Endangered - Sub-dominant |                        |

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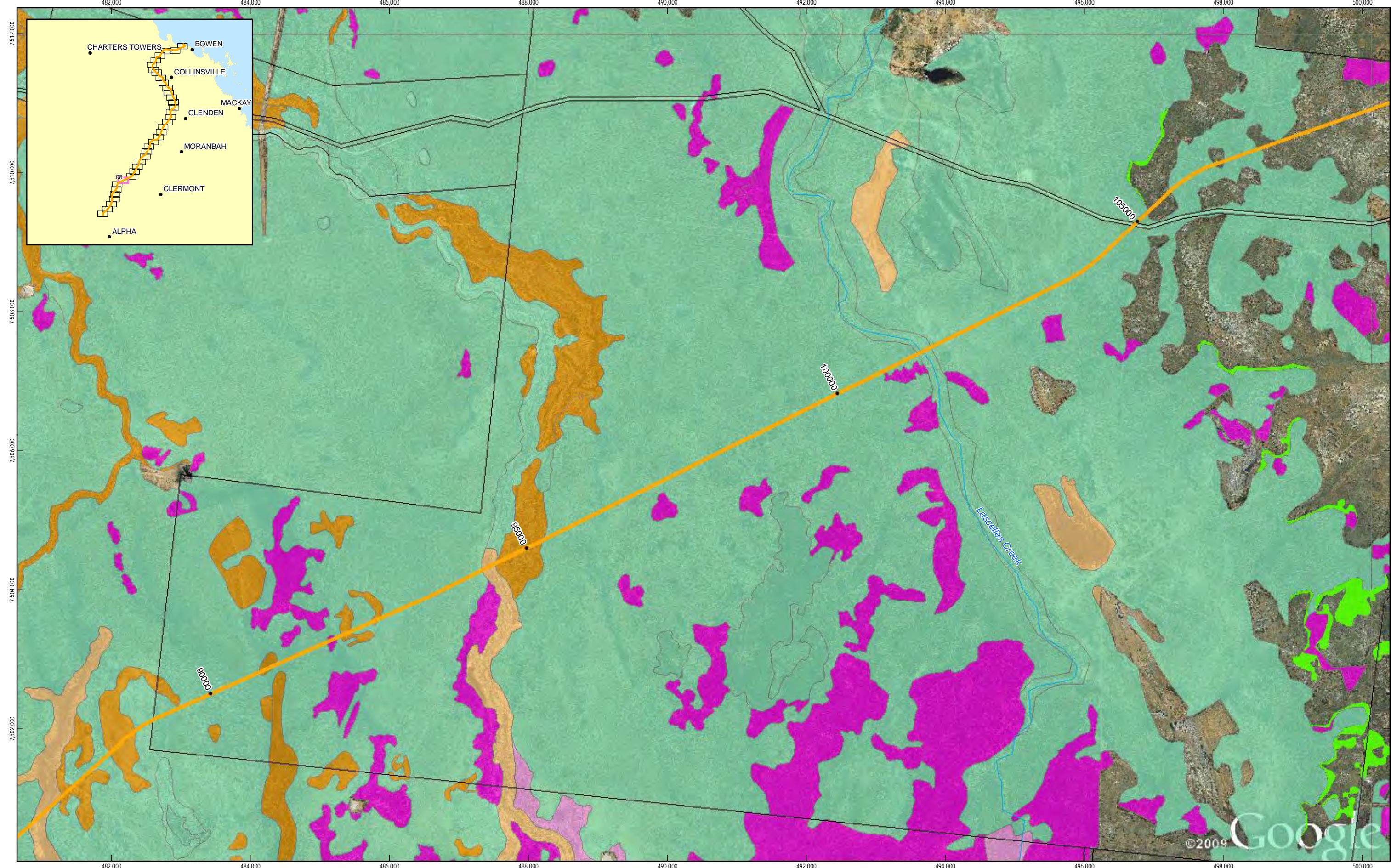
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## CERTIFIED REGIONAL ECOSYSTEMS AND HIGH VALUE REGROWTH

Figure: 3-2  
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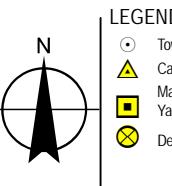
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1:50,000 (at A3)  
0 0.5 1 1.5 2 2.5 Kilometres

Map Projection: Universal Transverse Mercator  
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**LEGEND**

|               |                    |                     |                           |                        |
|---------------|--------------------|---------------------|---------------------------|------------------------|
| ○ Town        | Proposed Alignment | Essential Habitat   | Regional Ecosystems       | Not of Concern         |
| ▲ Camp        | State Road         | High Value Regrowth | Endangered - Dominant     | Plantation Forest      |
| ■ Marshalling | Existing Railway   | Cadastre            | Endangered - Sub-dominant | Non-Remnant / Regrowth |
| □ Yards       | Watercourse        | Waterbody           | Of Concern - Dominant     |                        |
| ⊗ Depot       |                    |                     | Of Concern - Sub-dominant |                        |

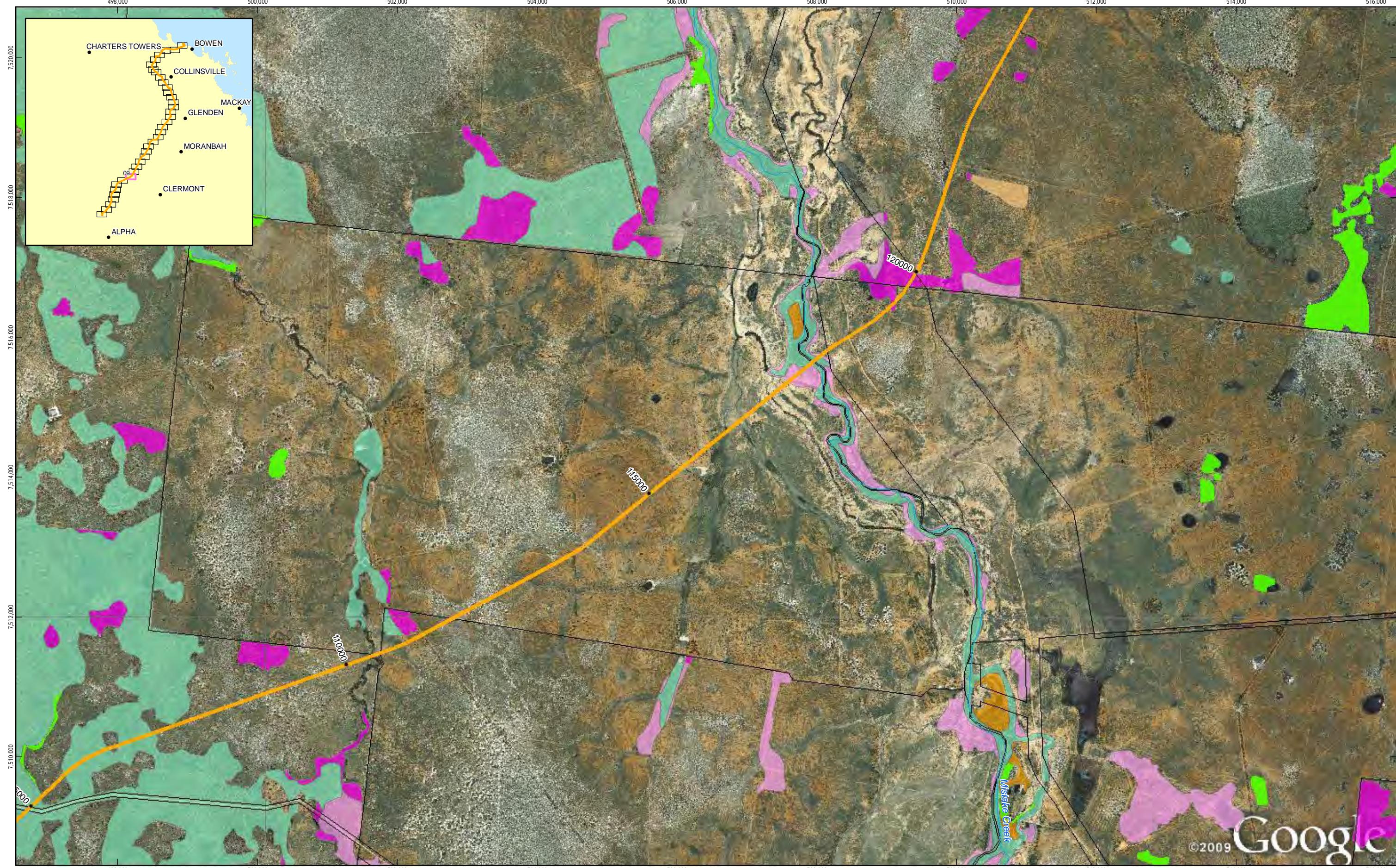
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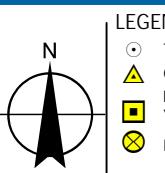
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Figure: 3-2  
Sheet 08 of 37



1:50,000 (at A3)  
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Map Projection: Universal Transverse Mercator  
Horizontal Datum: Geocentric Datum of Australia 1994  
Grid: Map Grid of Australia, Zone 55



**LEGEND**

- Town
- △ Camp
- Marshalling
- ⊗ Depot
- Proposed Alignment
- State Road
- Existing Railway
- Watercourse
- Essential Habitat
- High Value Regrowth
- Cadastre
- Waterbody
- Regional Ecosystems
- Not Of Concern
- Plantation Forest
- Endangered - Dominant
- Endangered - Sub-dominant
- Of Concern - Dominant
- Of Concern - Sub-dominant
- Non-Remnant / Regrowth

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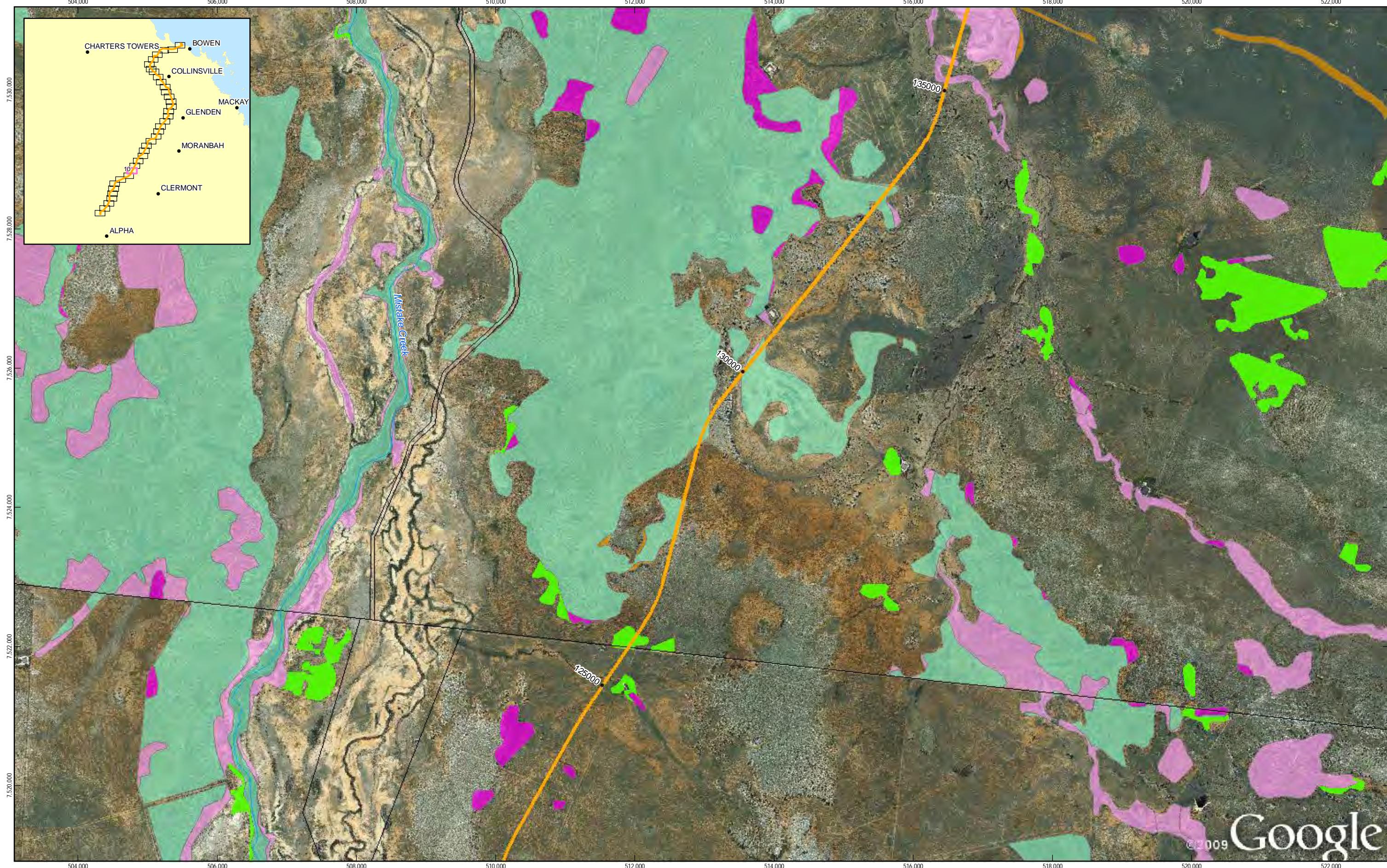
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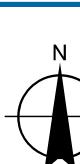
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1:50,000 (at A3)  
0 0.5 1 1.5 2 2.5 Kilometres  
Map Projection: Universal Transverse Mercator  
Horizontal Datum: Geocentric Datum of Australia 1994  
Grid: Map Grid of Australia, Zone 55



LEGEND

- Town
- Camp
- Marshalling
- ⊗ Depot
- Proposed Alignment
- State Road
- Existing Railway
- Watercourse
- Essential Habitat
- High Value Regrowth
- Cadastre
- Waterbody
- Regional Ecosystems
- Not Of Concern
- Plantation Forest
- Endangered - Dominant
- Endangered - Sub-dominant
- Cadastre
- Waterbody
- Of Concern - Dominant
- Of Concern - Sub-dominant
- Non-Remnant / Regrowth

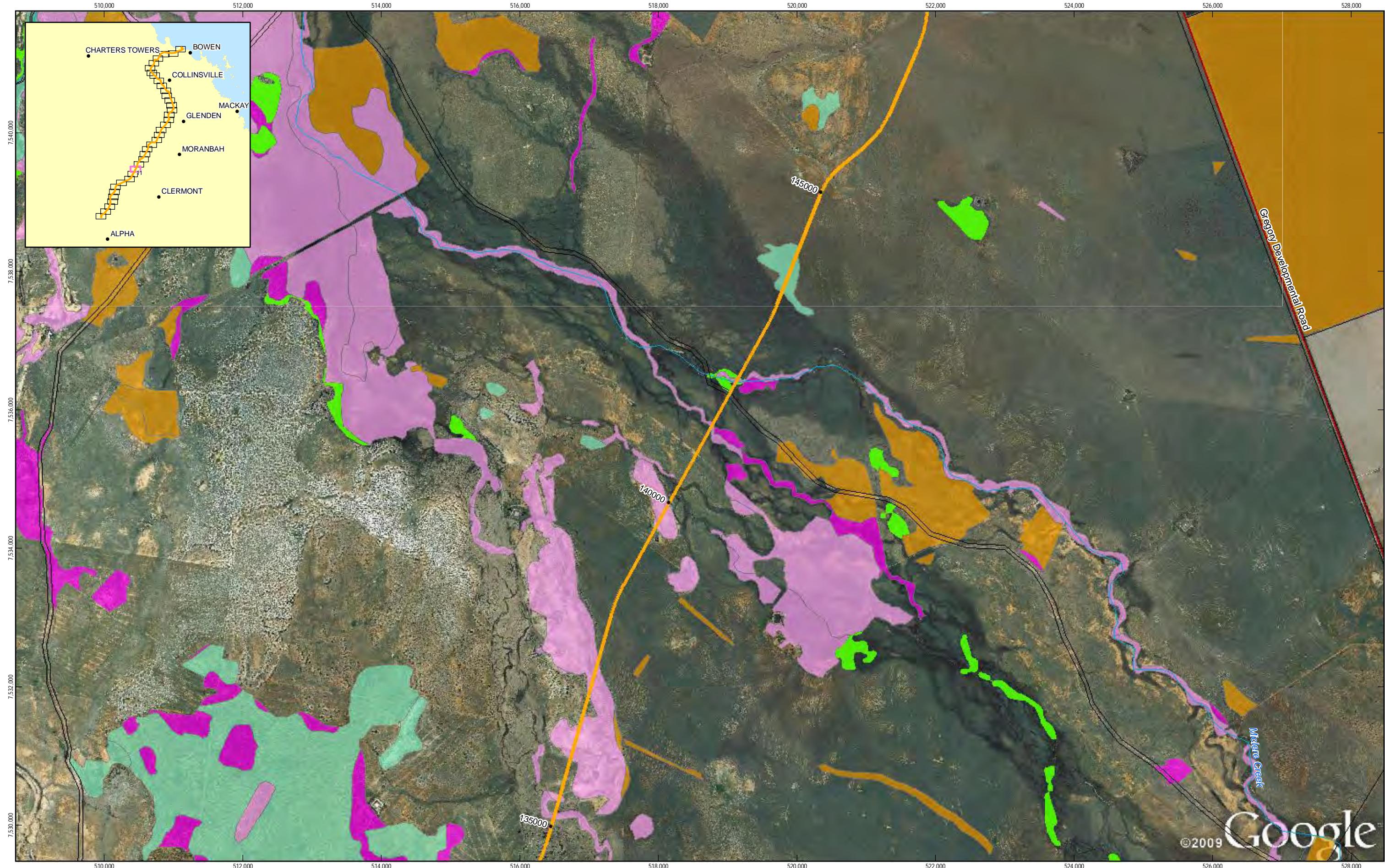
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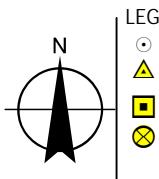
## CERTIFIED REGIONAL ECOSYSTEMS AND HIGH VALUE REGROWTH

Figure: 3-2  
Sheet 10 of 37



1:50,000 (at A3)  
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Kilometres

Map Projection: Universal Transverse Mercator  
Horizontal Datum: Geocentric Datum of Australia 1994  
Grid: Map Grid of Australia, Zone 55



**LEGEND**

|               |                      |                             |                       |
|---------------|----------------------|-----------------------------|-----------------------|
| ○ Town        | ■ Proposed Alignment | △ Essential Habitat         | ■ Regional Ecosystems |
| ▲ Camp        | — State Road         | ■ High Value Regrowth       | ■ Not Of Concern      |
| □ Marshalling | — Existing Railway   | ■ Endangered - Dominant     | ■ Plantation Forest   |
| ⊗ Yards       | — Watercourse        | ■ Endangered - Sub-dominant | ■ Non-Remnant /       |
| ⊗ Depot       |                      | ■ Cadastre                  | ■ Regrowth            |

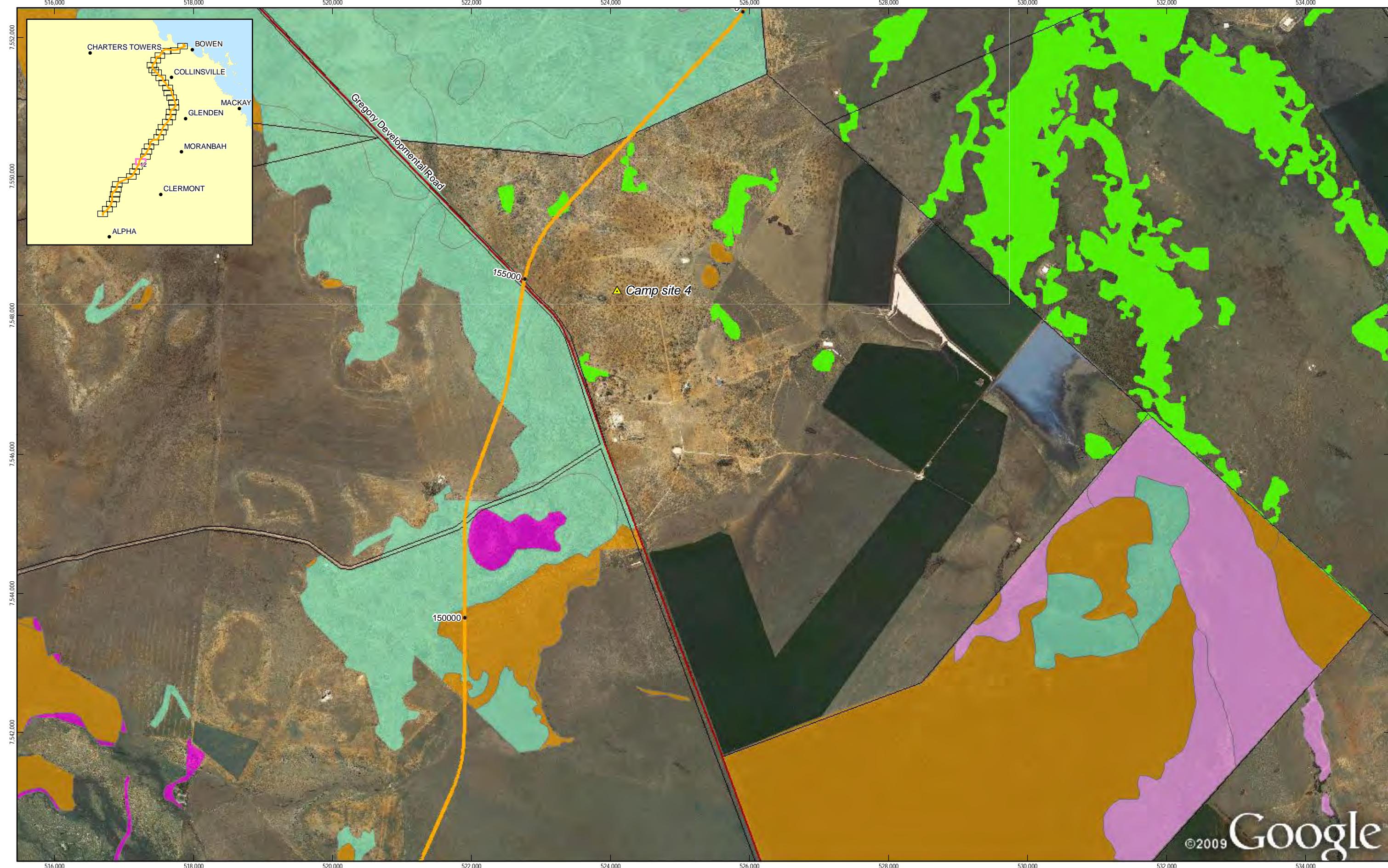
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## CERTIFIED REGIONAL ECOSYSTEMS AND HIGH VALUE REGROWTH

Figure: 3-2  
Sheet 11 of 37



1:50,000 (at A3)  
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Kilometres

Map Projection: Universal Transverse Mercator  
Horizontal Datum: Geocentric Datum of Australia 1994  
Grid: Map Grid of Australia, Zone 55



LEGEND

- Town
- ▲ Camp
- Marshalling
- ⊗ Depot
- Proposed Alignment
- State Road
- Existing Railway
- Watercourse
- Essential Habitat
- High Value Regrowth
- Regional Ecosystems
- Not Of Concern
- Plantation Forest
- Endangered - Dominant
- Endangered - Sub-dominant
- Cadastre
- Yards
- Waterbody
- Of Concern - Dominant
- Of Concern - Sub-dominant

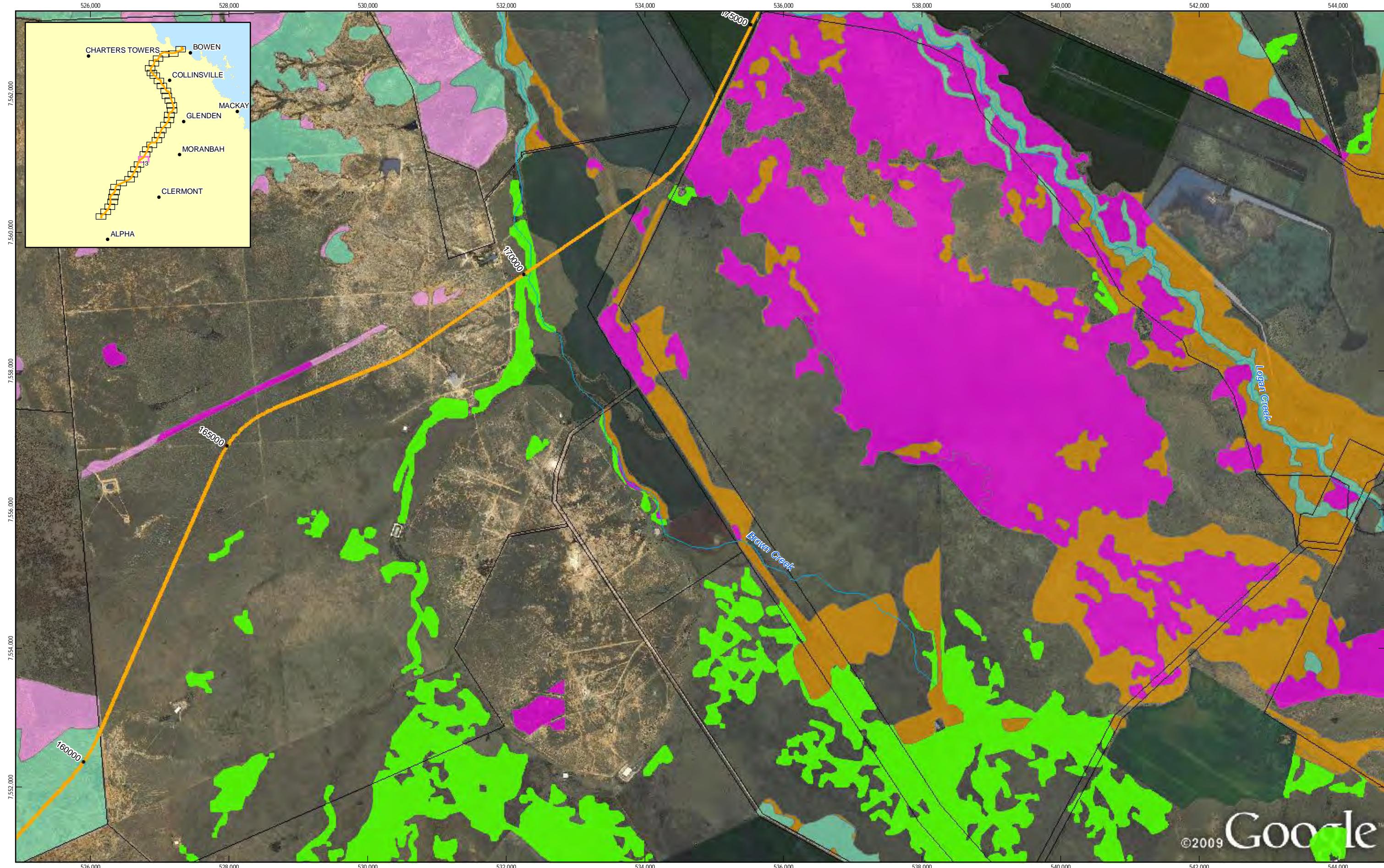
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Environmental Impact Statement

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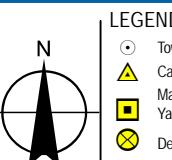
## CERTIFIED REGIONAL ECOSYSTEMS AND HIGH VALUE REGROWTH

**Figure: 3-2**  
**Sheet 12 of 37**



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Kilometres

Map Projection: Universal Transverse Mercator  
Horizontal Datum: Geocentric Datum of Australia 1994  
Grid: Map Grid of Australia, Zone 55



**LEGEND**

|               |                    |                           |                           |
|---------------|--------------------|---------------------------|---------------------------|
| ○ Town        | Proposed Alignment | Essential Habitat         | Regional Ecosystems       |
| ▲ Camp        | State Road         | High Value Regrowth       | Not Of Concern            |
| ■ Marshalling | Existing Railway   | Endangered - Dominant     | Plantation Forest         |
| □ Yards       | Watercourse        | Endangered - Sub-dominant | Non-Remnant / Regrowth    |
| ⊗ Depot       |                    | Cadastre                  | Of Concern - Dominant     |
|               |                    | Waterbody                 | Of Concern - Sub-dominant |

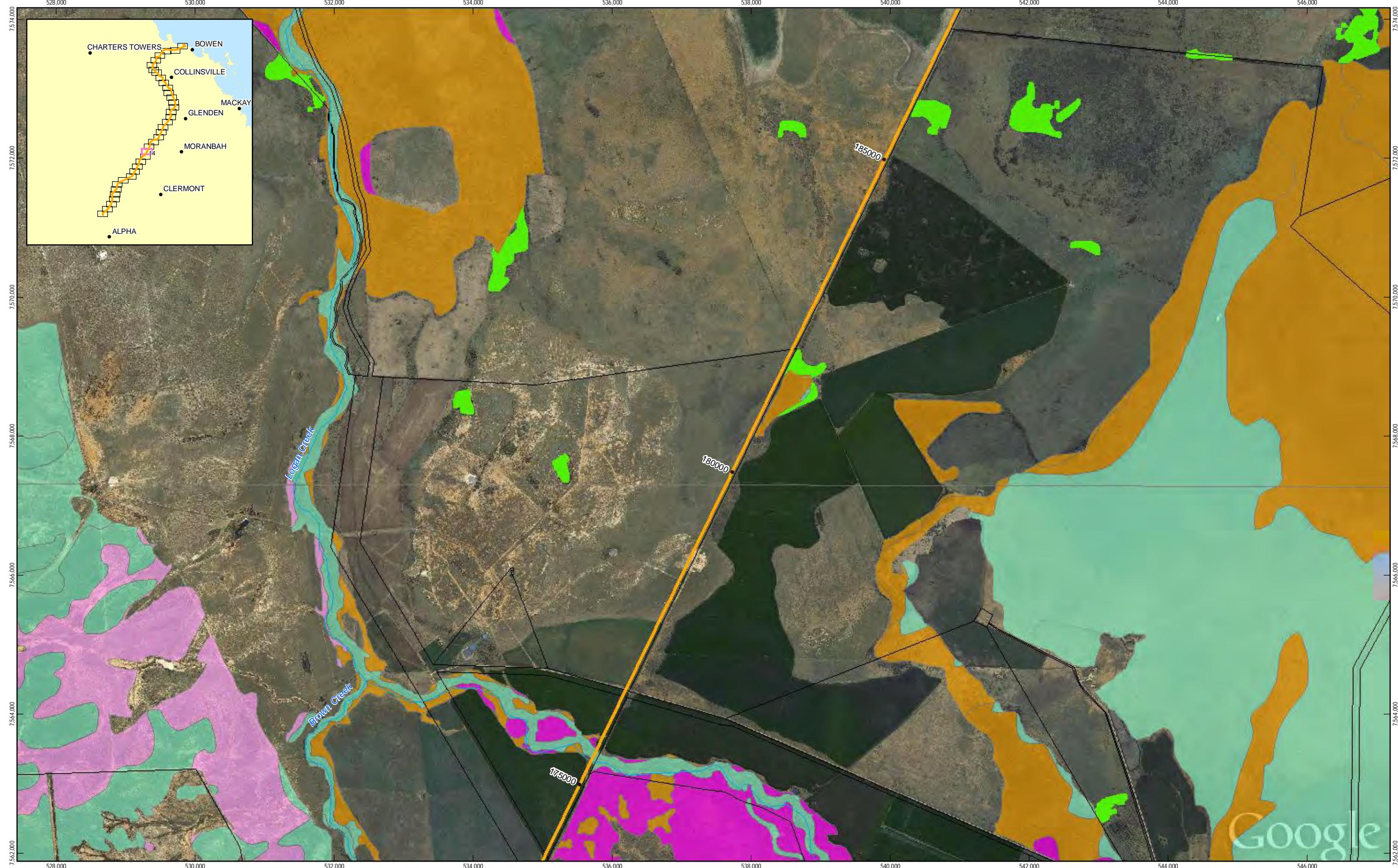
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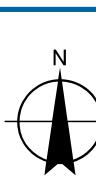
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## CERTIFIED REGIONAL ECOSYSTEMS AND HIGH VALUE REGROWTH

Figure: 3-2  
Sheet 13 of 37



1:50,000 (at A3)  
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Kilometres



Map Projection: Universal Transverse Mercator  
Horizontal Datum: Geocentric Datum of Australia 1994  
Grid: Map Grid of Australia, Zone 55

**LEGEND**

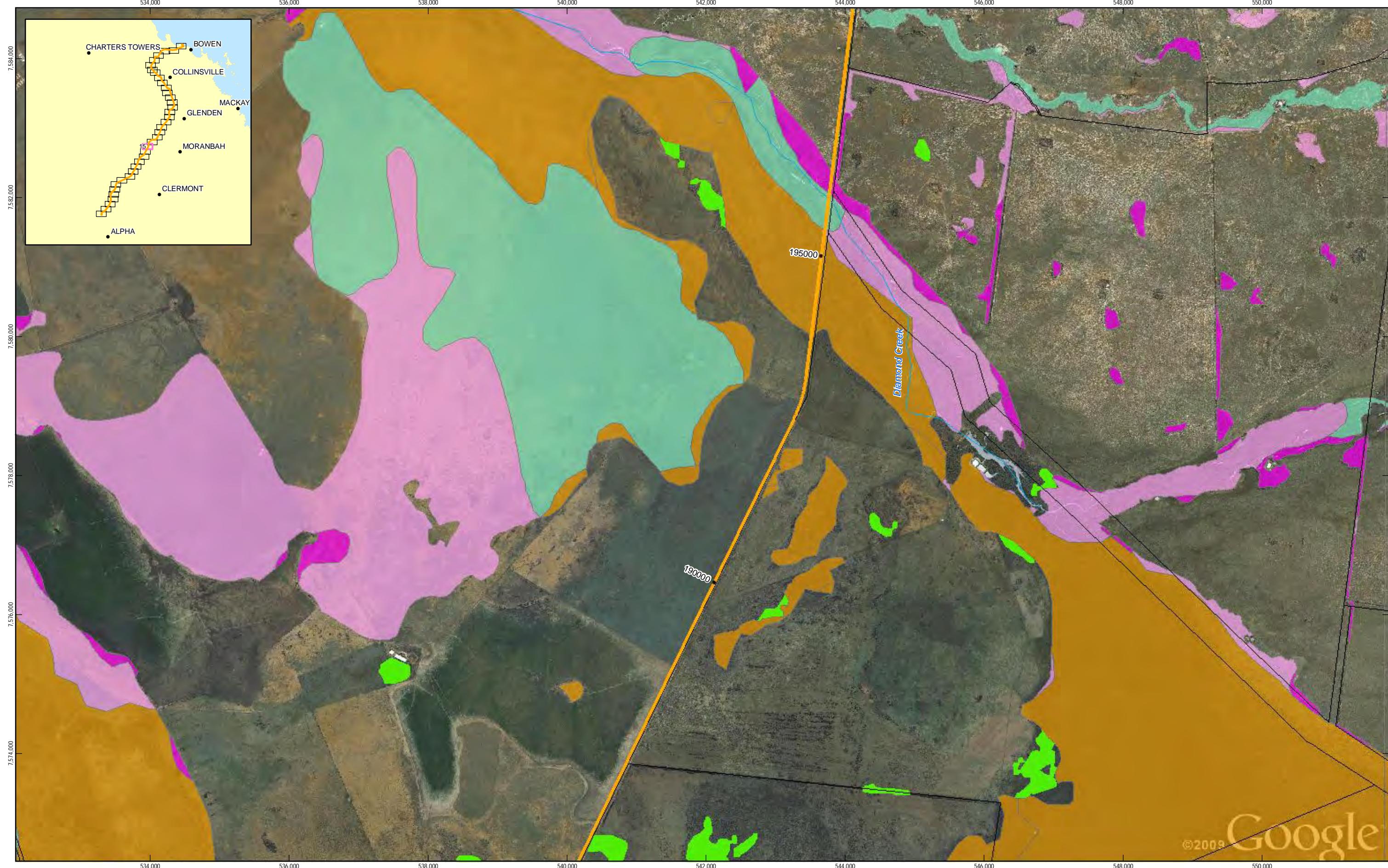
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|---------------|----------------------|-----------------------------|--------------------------|
| ○ Town        | ■ Proposed Alignment | ▨ Essential Habitat         | ■ Regional Ecosystems    |
| ▲ Camp        | — State Road         | ■ High Value Regrowth       | ■ Not Of Concern         |
| □ Marshalling | — Existing Railway   | ■ Endangered - Dominant     | ■ Plantation Forest      |
| ■ Yards       | — Watercourse        | ■ Endangered - Sub-dominant | ■ Non-Remnant / Regrowth |
| ⊗ Depot       |                      | ■ Cadastre                  |                          |
|               |                      | ■ Waterbody                 |                          |
|               |                      | ■ Of Concern - Dominant     |                          |
|               |                      | ■ Of Concern - Sub-dominant |                          |

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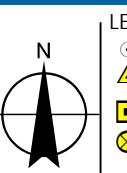
## CERTIFIED REGIONAL ECOSYSTEMS AND HIGH VALUE REGROWTH

Figure: 3-2  
Sheet 14 of 37



1:50,000 (at A3)  
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Kilometres

Map Projection: Universal Transverse Mercator  
Horizontal Datum: Geocentric Datum of Australia 1994  
Grid: Map Grid of Australia, Zone 55



**LEGEND**

- Town
- △ Camp
- Marshalling
- ⊗ Depot
- Proposed Alignment
- State Road
- Existing Railway
- Watercourse
- Essential Habitat
- High Value Regrowth
- Regional Ecosystems
- Not Of Concern
- Plantation Forest
- Endangered - Dominant
- Endangered - Sub-dominant
- Cadastre
- Yards
- Waterbody
- Of Concern - Dominant
- Of Concern - Sub-dominant
- Non-Remnant / Regrowth

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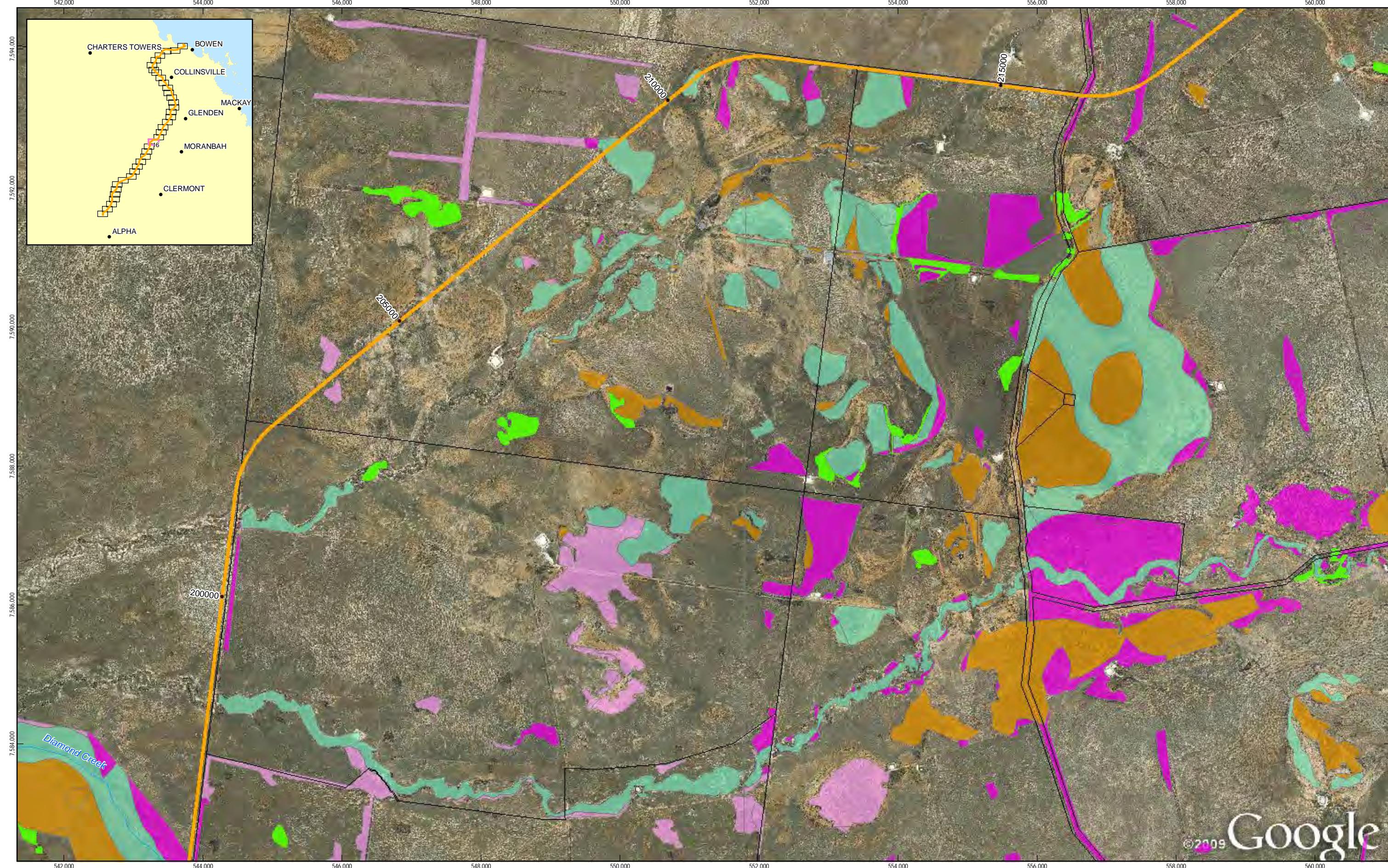
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Date 04-08-2010

## CERTIFIED REGIONAL ECOSYSTEMS AND HIGH VALUE REGROWTH

Figure: 3-2  
Sheet 15 of 37

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1:50,000 (at A3)  
0 0.5 1 1.5 2 2.5  
Kilometres

Map Projection: Universal Transverse Mercator  
Horizontal Datum: Geocentric Datum of Australia 1994  
Grid: Map Grid of Australia, Zone 55



LEGEND  
 • Town  
 ▲ Camp  
 ■ Marshalling  
 ○ Depot  
 — Proposed Alignment  
 — State Road  
 — Existing Railway  
 — Yards  
 — Watercourse  
 — Essential Habitat  
 — High Value Regrowth  
 — Cadastre  
 — Waterbody  
 — Regional Ecosystems  
 — Endangered - Dominant  
 — Endangered - Sub-dominant  
 — Of Concern - Dominant  
 — Of Concern - Sub-dominant  
 — Not Of Concern  
 — Plantation Forest  
 — Non-Remnant / Regrowth

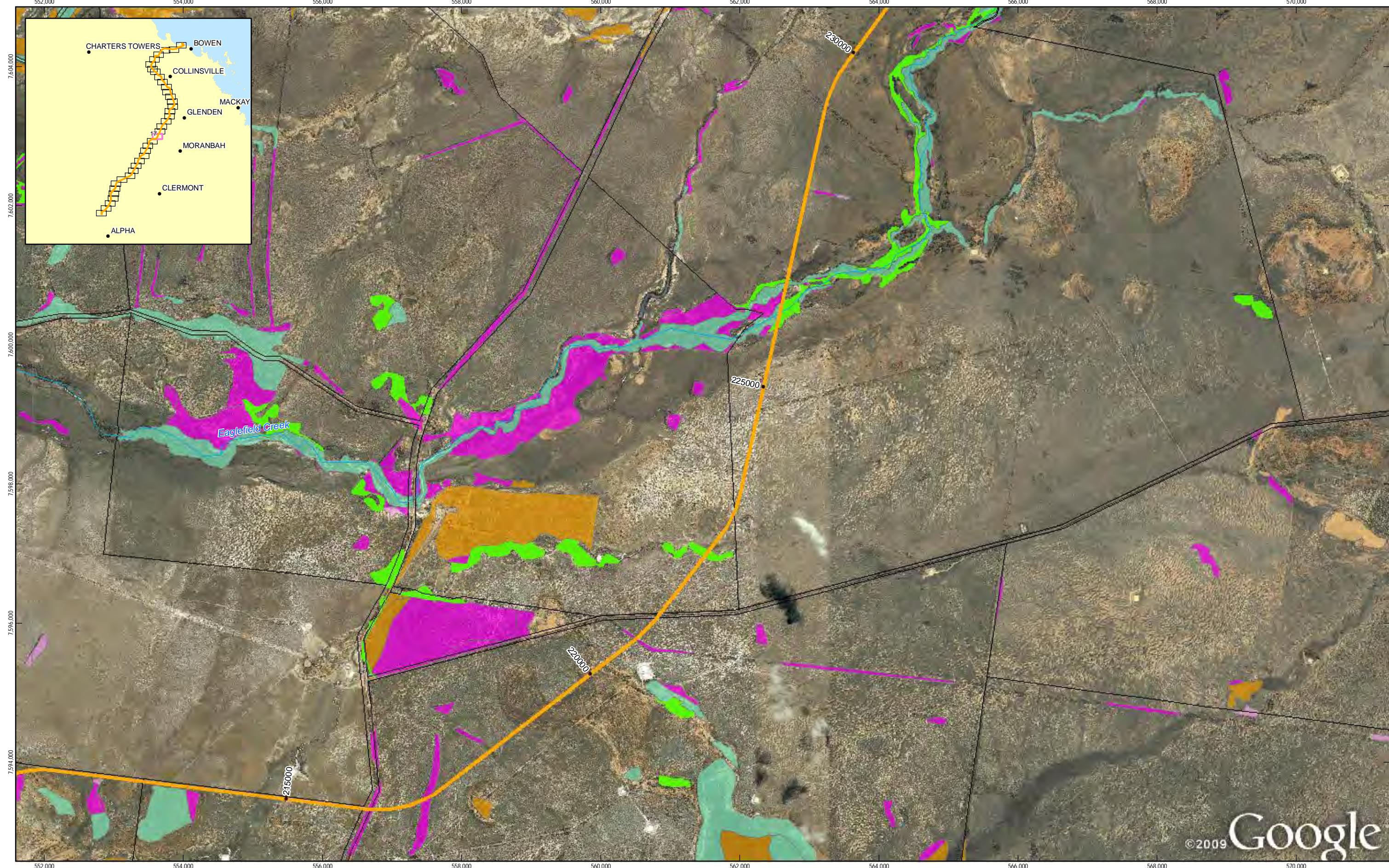
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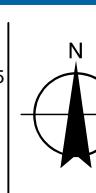
Job Number 41-22090  
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## CERTIFIED REGIONAL ECOSYSTEMS AND HIGH VALUE REGROWTH

Figure: 3-2  
Sheet 16 of 37



1:50,000 (at A3)  
0 0.5 1 1.5 2 2.5  
Kilometres  
Map Projection: Universal Transverse Mercator  
Horizontal Datum: Geocentric Datum of Australia 1994  
Grid: Map Grid of Australia, Zone 55



**LEGEND**

- Town
- △ Camp
- Marshalling
- ⊗ Depot
- Proposed Alignment
- State Road
- Existing Railway
- Watercourse
- Essential Habitat
- High Value Regrowth
- Regional Ecosystems
- Not Of Concern
- Plantation Forest
- Endangered - Dominant
- Endangered - Sub-dominant
- Cadastre
- Yards
- Waterbody
- Of Concern - Dominant
- Of Concern - Sub-dominant
- Non-Remnant / Regrowth

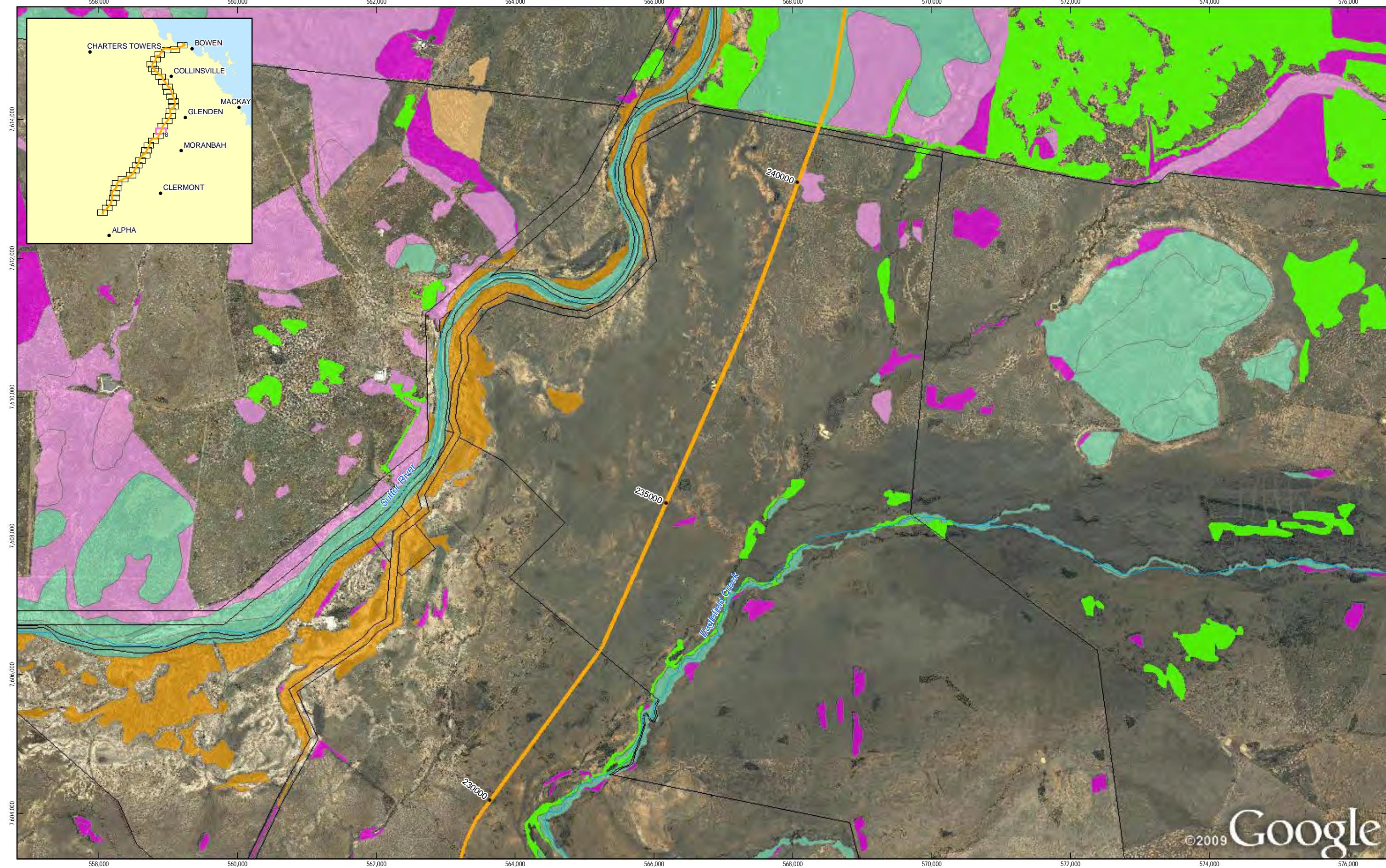
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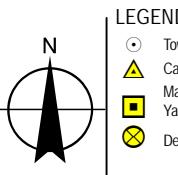
## CERTIFIED REGIONAL ECOSYSTEMS AND HIGH VALUE REGROWTH

Figure: 3-2  
Sheet 17 of 37



1:50,000 (at A3)  
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Kilometres

Map Projection: Universal Transverse Mercator  
Horizontal Datum: Geocentric Datum of Australia 1994  
Grid: Map Grid of Australia, Zone 55



**LEGEND**

- Town
- Camp
- Marshalling
- ⊗ Depot
- Proposed Alignment
- State Road
- Existing Railway
- Existing Watercourse
- Essential Habitat
- High Value Regrowth
- Regional Ecosystems
- Not Of Concern
- Plantation Forest
- Endangered - Dominant
- Endangered - Sub-dominant
- Cadastre
- Waterbody
- Of Concern - Dominant
- Of Concern - Sub-dominant

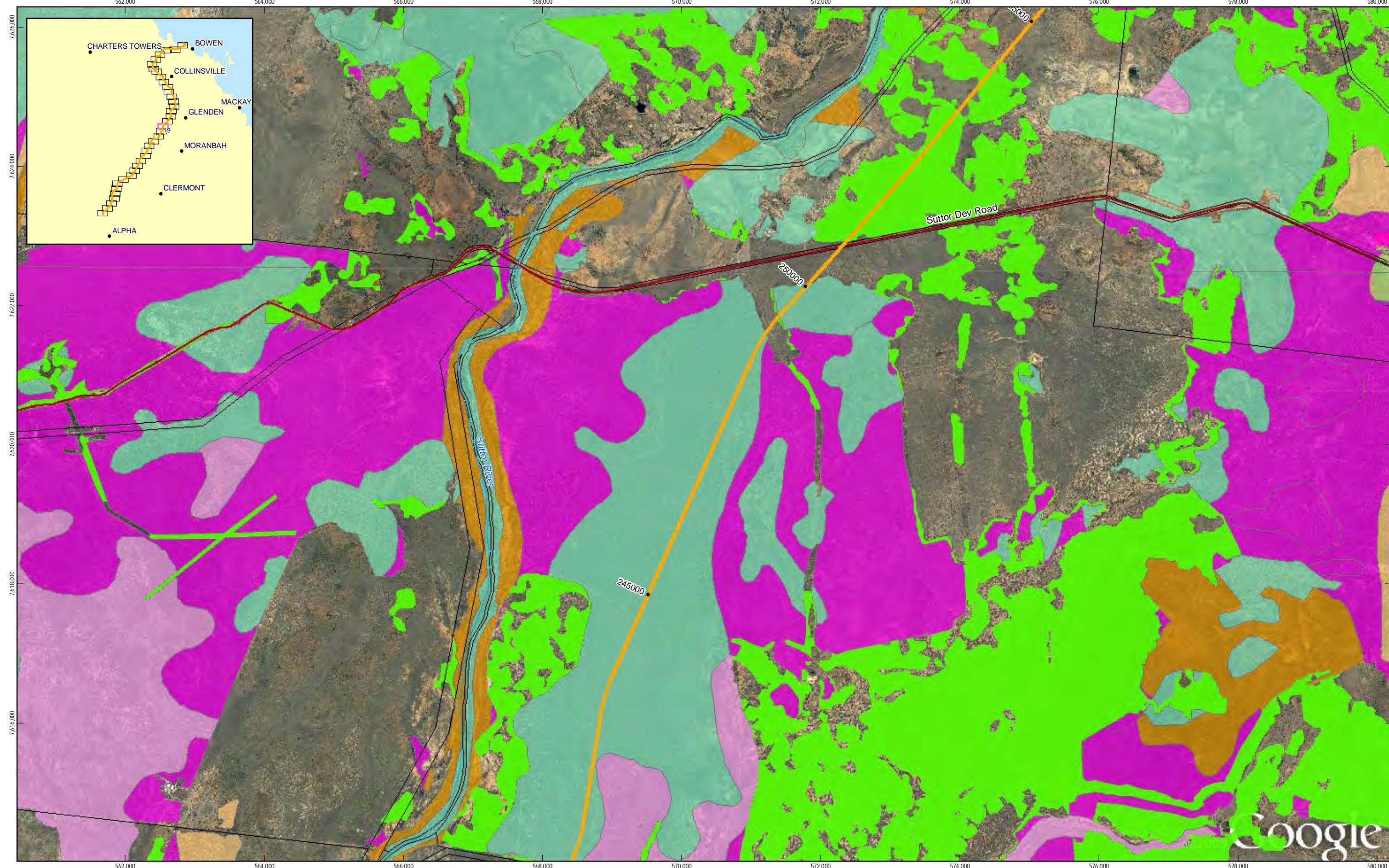
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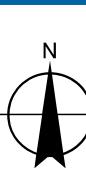
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## CERTIFIED REGIONAL ECOSYSTEMS AND HIGH VALUE REGROWTH

Figure: 3-2  
Sheet 18 of 37



1:50,000 (at A3)  
0 0.5 1 1.5 2 2.5 Kilometres  
Map Projection: Universal Transverse Mercator  
Horizontal Datum: Geocentric Datum of Australia 1994  
Grid: Map Grid of Australia, Zone 55



**LEGEND**

|               |                    |                     |                           |
|---------------|--------------------|---------------------|---------------------------|
| ○ Town        | Proposed Alignment | Essential Habitat   | Regional Ecosystems       |
| △ Camp        | State Road         | High Value Regrowth | Not Of Concern            |
| □ Marshalling | Existing Railway   | Cadastre            | Plantation Forest         |
| ⊗ Yards       | Watercourse        | Yards               | Endangered - Dominant     |
| ⊗ Depot       |                    |                     | Endangered - Sub-dominant |

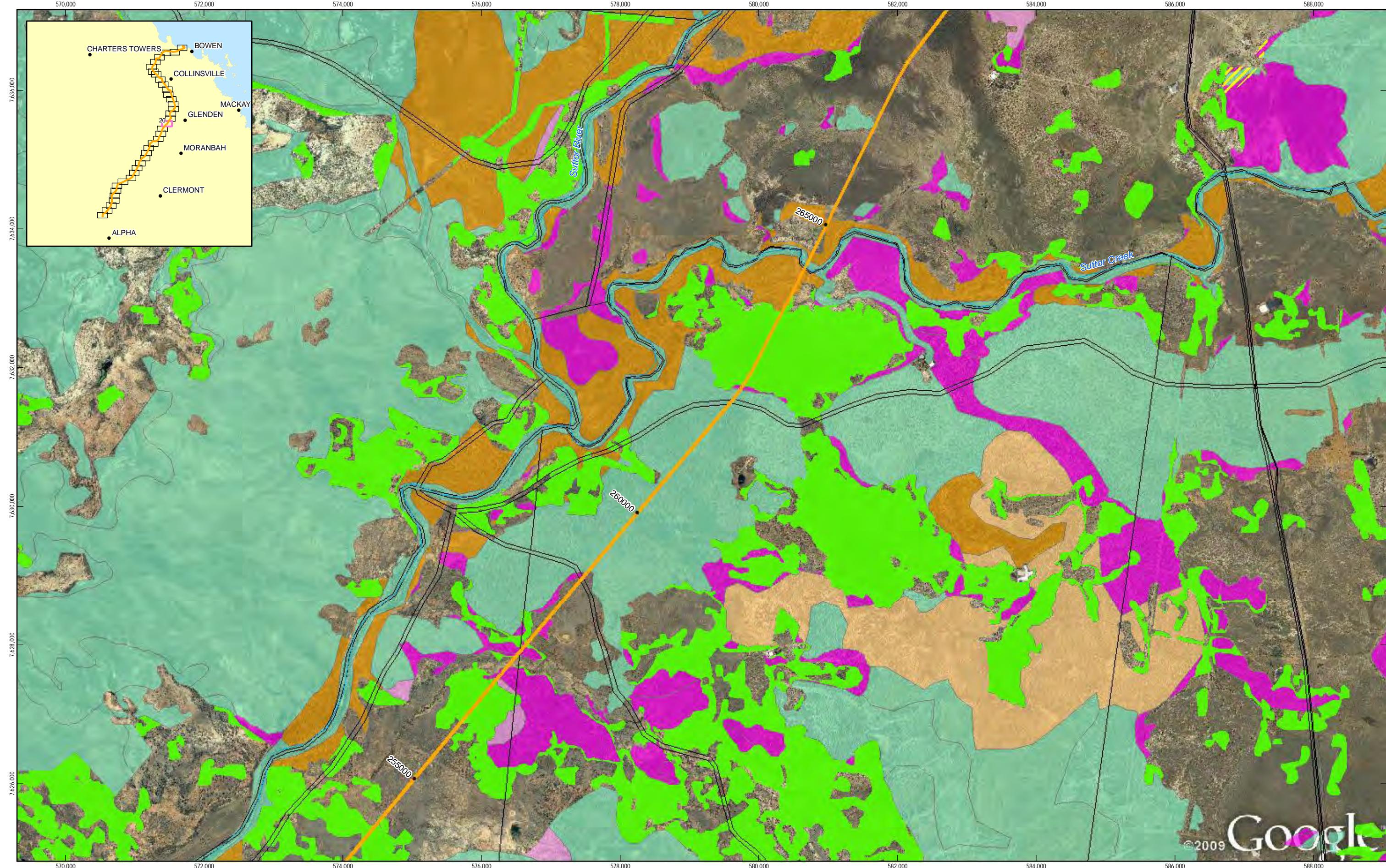
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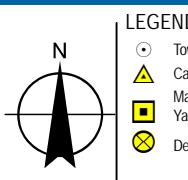
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Figure: 3-2  
Sheet 19 of 37



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Map Projection: Universal Transverse Mercator  
Horizontal Datum: Geocentric Datum of Australia 1994  
Grid: Map Grid of Australia, Zone 55



**LEGEND**

|               |                    |                     |                           |
|---------------|--------------------|---------------------|---------------------------|
| ○ Town        | Proposed Alignment | Essential Habitat   | Regional Ecosystems       |
| ▲ Camp        | State Road         | High Value Regrowth | Not Of Concern            |
| ■ Marshalling | Existing Railway   | Cadastre            | Plantation Forest         |
| □ Yards       | Watercourse        | Waterbody           | Endangered - Dominant     |
| ⊗ Depot       |                    |                     | Endangered - Sub-dominant |

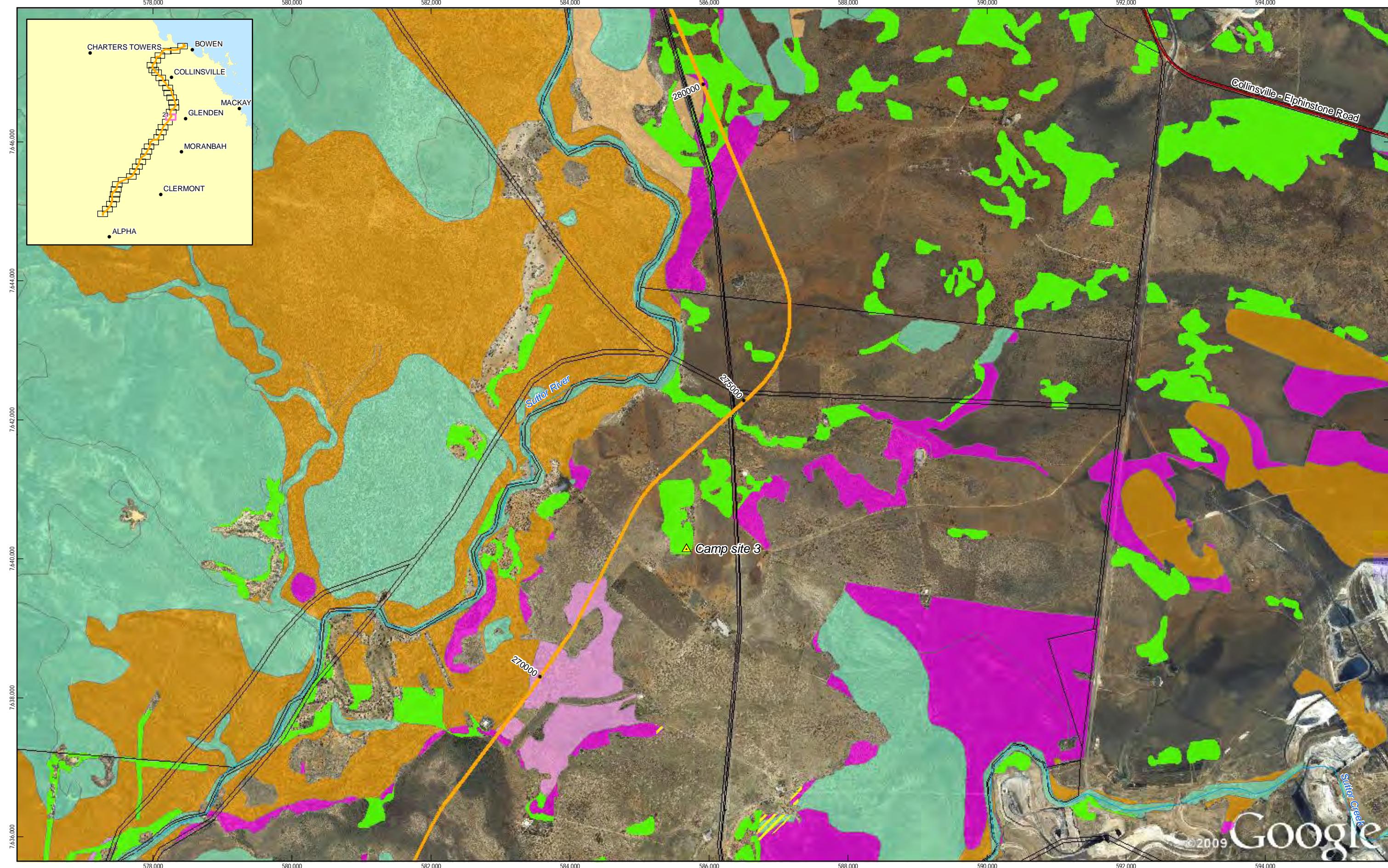
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## CERTIFIED REGIONAL ECOSYSTEMS AND HIGH VALUE REGROWTH

Figure: 3-2  
Sheet 20 of 37



1:50,000 (at A3)  
0 0.5 1 1.5 2 2.5 Kilometres

Map Projection: Universal Transverse Mercator  
Horizontal Datum: Geocentric Datum of Australia 1994  
Grid: Map Grid of Australia, Zone 55



**LEGEND**

|               |                    |                     |                           |
|---------------|--------------------|---------------------|---------------------------|
| ○ Town        | Proposed Alignment | Essential Habitat   | Regional Ecosystems       |
| ▲ Camp        | State Road         | High Value Regrowth | Not Of Concern            |
| ■ Marshalling | Existing Railway   | Cadastre            | Plantation Forest         |
| □ Yards       | Watercourse        | Waterbody           | Non-Remnant / Regrowth    |
| ⊗ Depot       |                    |                     | Endangered - Dominant     |
|               |                    |                     | Endangered - Sub-dominant |
|               |                    |                     | Of Concern - Dominant     |
|               |                    |                     | Of Concern - Sub-dominant |

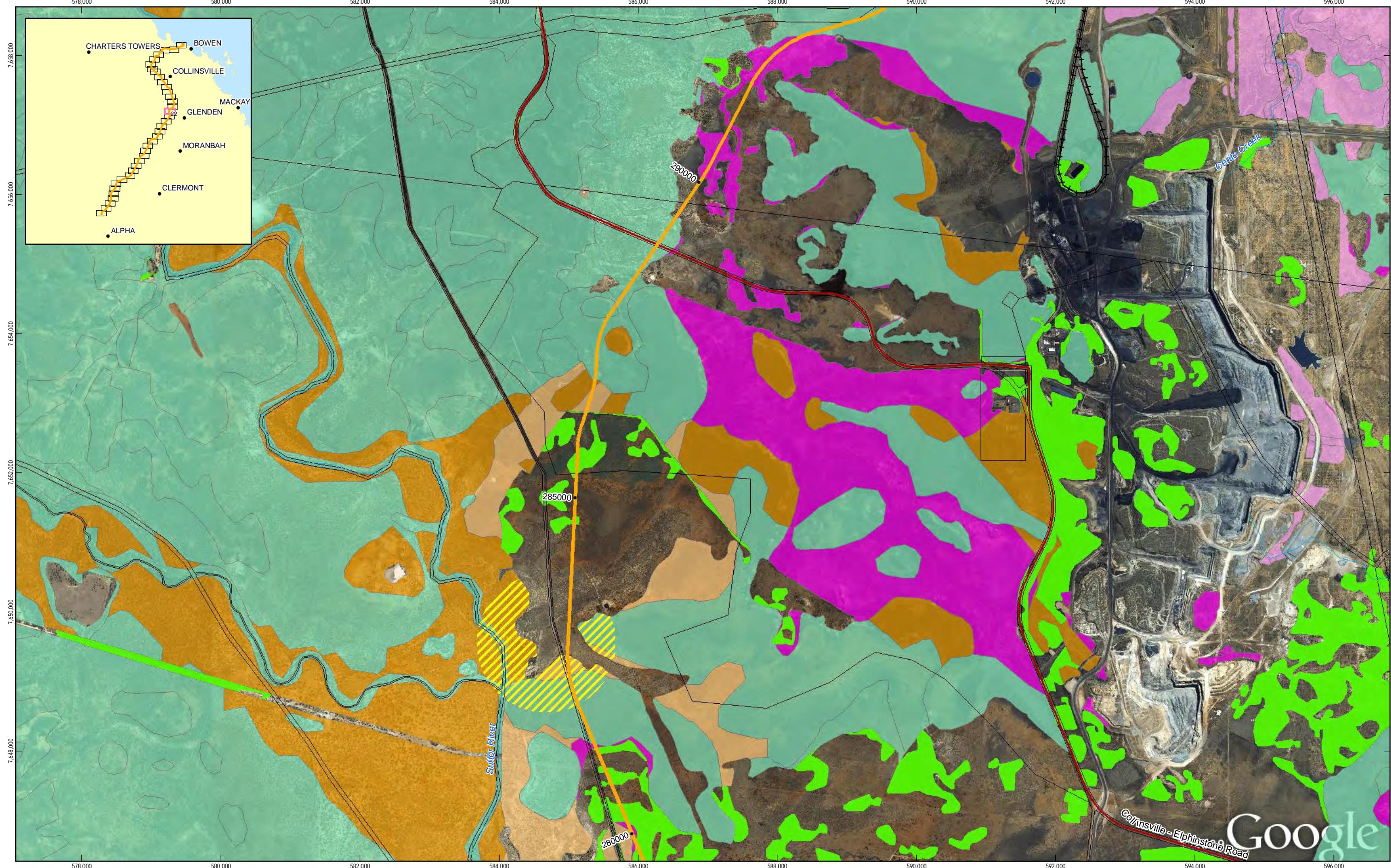
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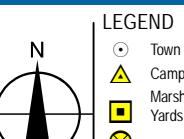
## CERTIFIED REGIONAL ECOSYSTEMS AND HIGH VALUE REGROWTH

Figure: 3-2  
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1:50,000 (at A3)  
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Kilometres

Map Projection: Universal Transverse Mercator  
Horizontal Datum: Geocentric Datum of Australia 1994  
Grid: Map Grid of Australia, Zone 55



**LEGEND**

|               |                      |                       |
|---------------|----------------------|-----------------------|
| ○ Town        | — Proposed Alignment | ▨ Essential Habitat   |
| ▲ Camp        | — State Road         | ■ High Value Regrowth |
| □ Marshalling | — Existing Railway   | ■ Regional Ecosystems |
| ⊗ Yards       | — Watercourse        | ■ Not Of Concern      |
| ⊗ Depot       |                      | ■ Plantation Forest   |

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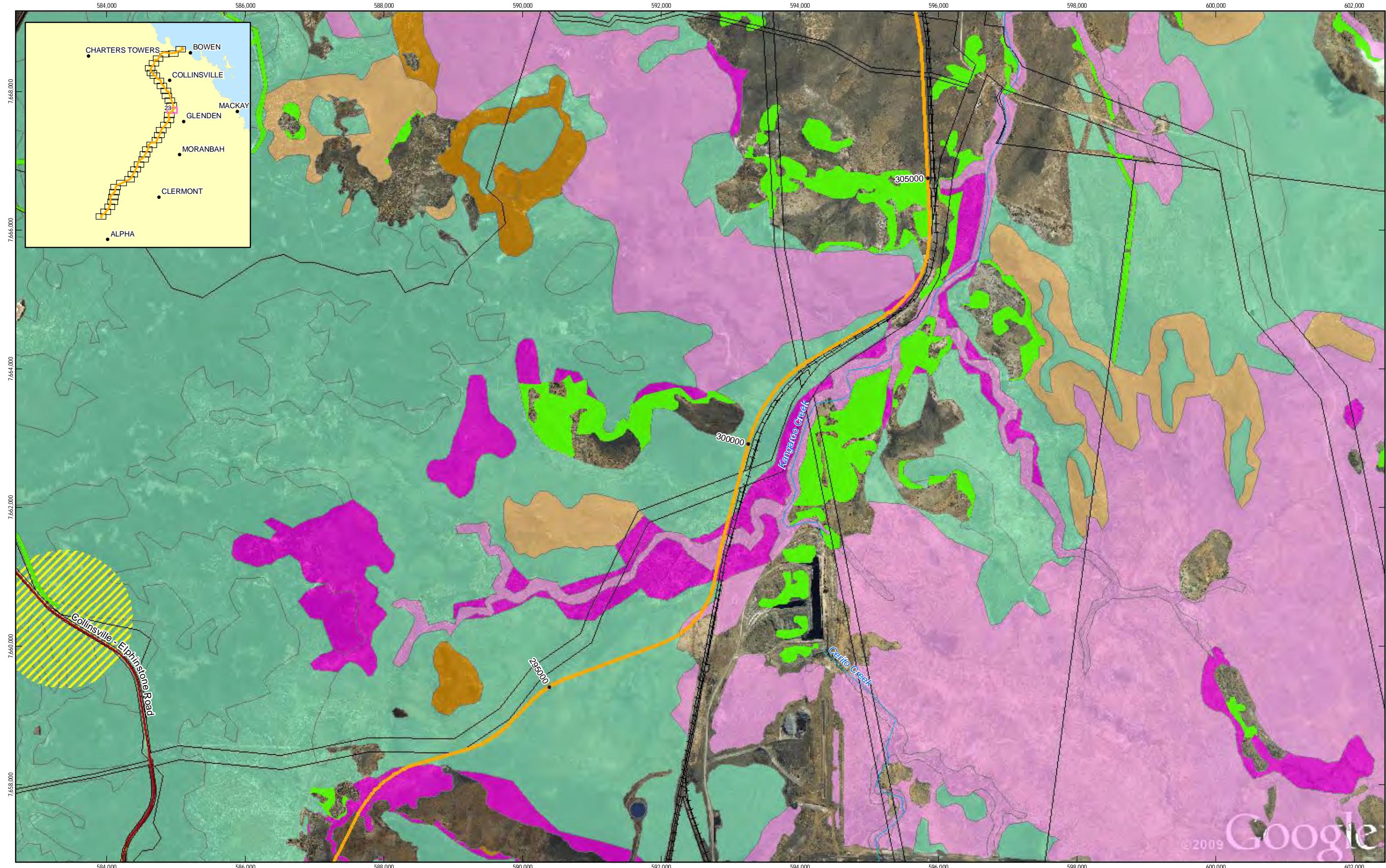
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## CERTIFIED REGIONAL ECOSYSTEMS AND HIGH VALUE REGROWTH

Figure: 3-2  
Sheet 22 of 37

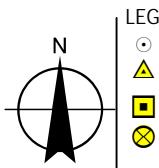
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1:50,000 (at A3)  
0 0.5 1 1.5 2 2.5 Kilometres

Map Projection: Universal Transverse Mercator  
Horizontal Datum: Geocentric Datum of Australia 1994  
Grid: Map Grid of Australia, Zone 55



**LEGEND**

- Town
- △ Camp
- Marshalling
- ⊗ Depot
- Proposed Alignment
- State Road
- Existing Railway
- Watercourse
- Essential Habitat
- High Value Regrowth
- Regional Ecosystems
- Endangered - Dominant
- Endangered - Sub-dominant
- Cadastre
- Yards
- Waterbody
- Not Of Concern
- Plantation Forest
- Non-Remnant / Regrowth
- Of Concern - Dominant
- Of Concern - Sub-dominant

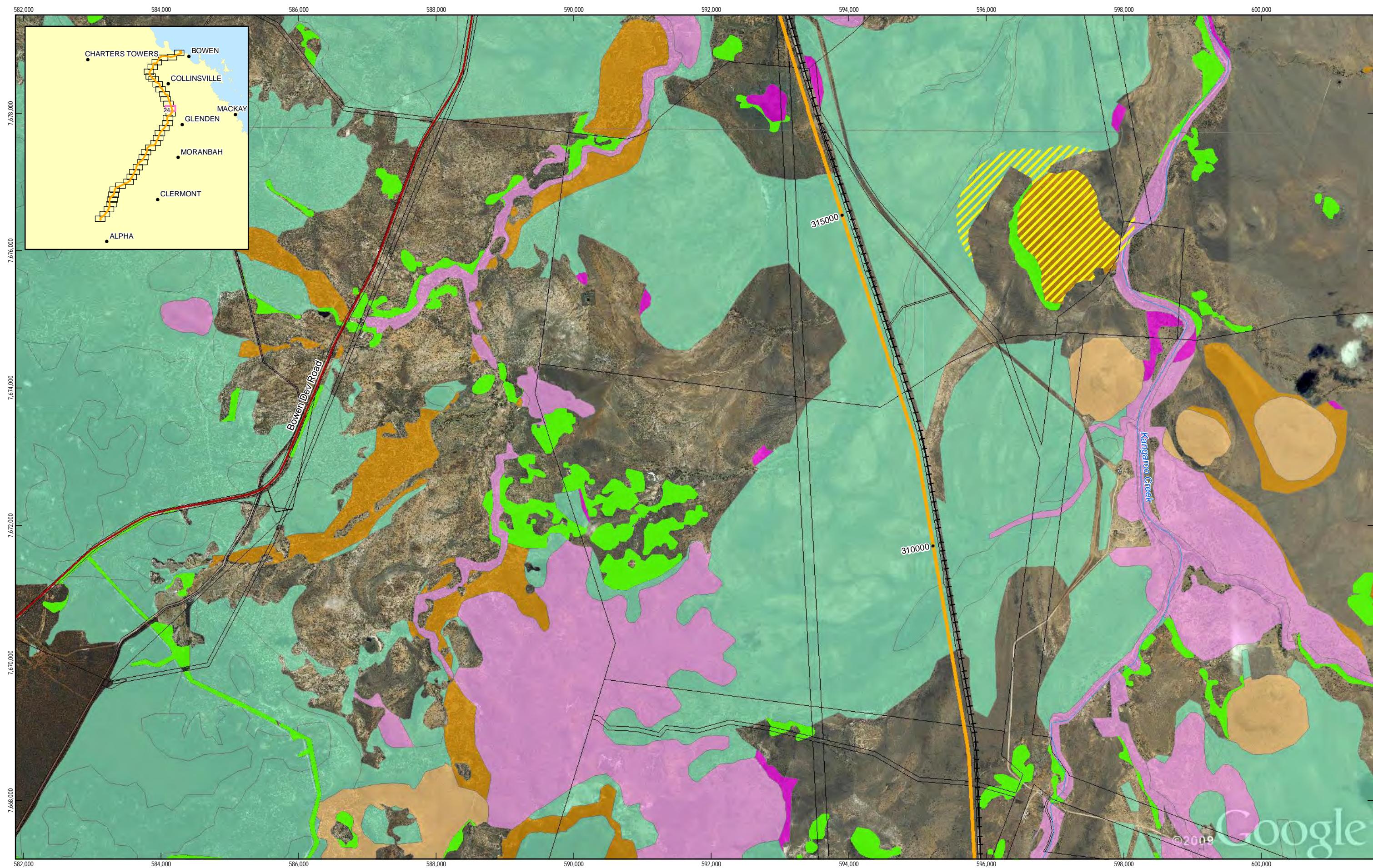
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## CERTIFIED REGIONAL ECOSYSTEMS AND HIGH VALUE REGROWTH

Figure: 3-2  
Sheet 23 of 37



1:50,000 (at A3)  
0 0.5 1 1.5 2 2.5 Kilometres

Map Projection: Universal Transverse Mercator  
Horizontal Datum: Geocentric Datum of Australia 1994  
Grid: Map Grid of Australia, Zone 55



LEGEND

- Town
- ▲ Camp
- Marshalling
- Yards
- ⊗ Depot
- Proposed Alignment
- State Road
- Existing Railway
- Watercourse
- Essential Habitat
- High Value Regrowth
- Cadastre
- Waterbody
- Regional Ecosystems
- Not Of Concern
- Plantation Forest
- Endangered - Dominant
- Endangered - Sub-dominant
- Cadastre
- Non-Remnant / Regrowth
- Of Concern - Dominant
- Of Concern - Sub-dominant

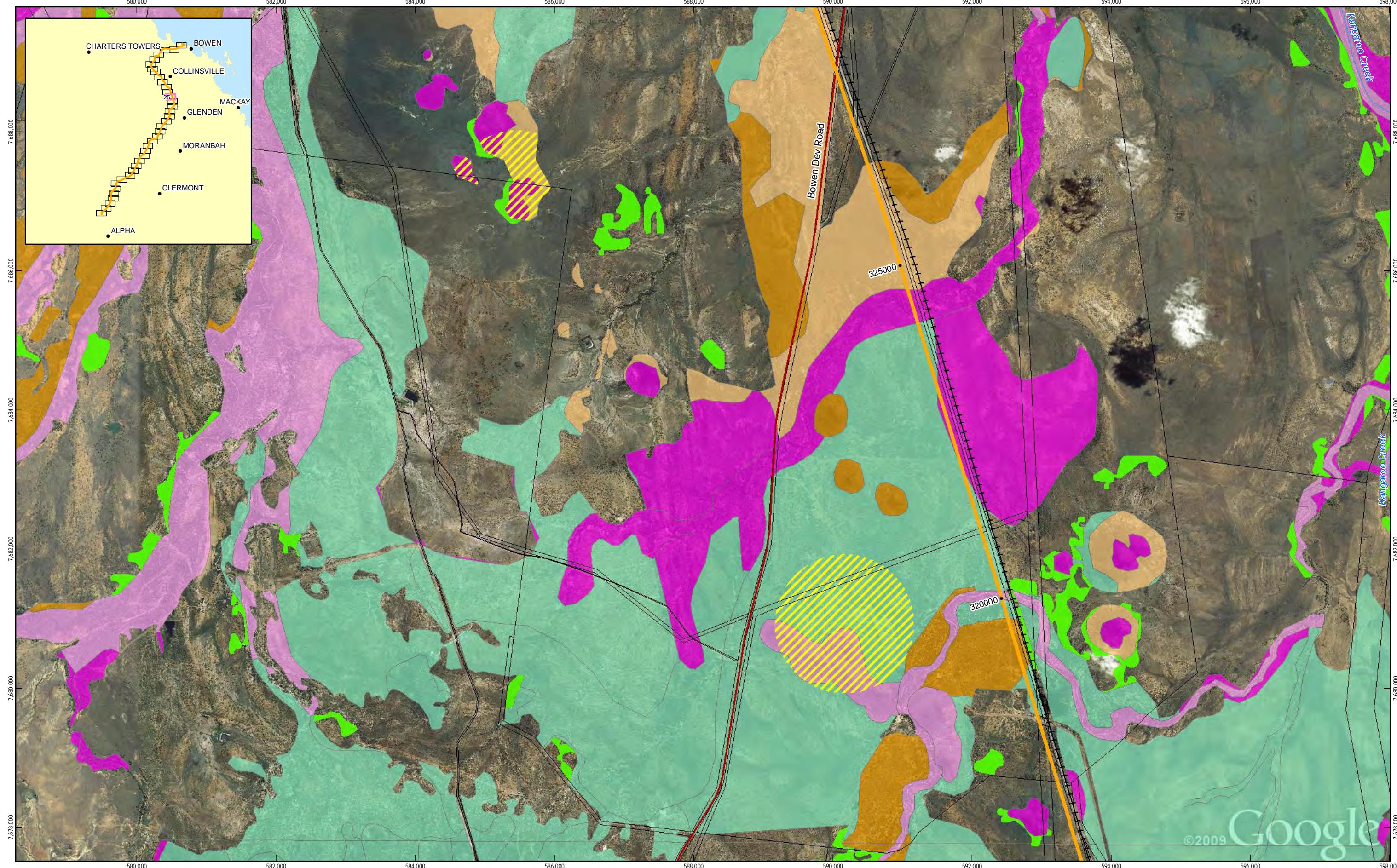
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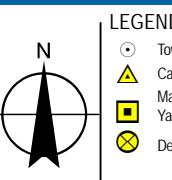
## CERTIFIED REGIONAL ECOSYSTEMS AND HIGH VALUE REGROWTH

Figure: 3-2  
Sheet 24 of 37



1:50,000 (at A3)  
0 0.5 1 1.5 2 2.5  
Kilometres

Map Projection: Universal Transverse Mercator  
Horizontal Datum: Geocentric Datum of Australia 1994  
Grid: Map Grid of Australia, Zone 55



**LEGEND**

|               |                    |                     |                           |
|---------------|--------------------|---------------------|---------------------------|
| ○ Town        | Proposed Alignment | Essential Habitat   | Regional Ecosystems       |
| ▲ Camp        | State Road         | High Value Regrowth | Not Of Concern            |
| ■ Marshalling | Existing Railway   | Cadastre            | Plantation Forest         |
| □ Yards       | Watercourse        | Yards               | Endangered - Sub-dominant |
| ⊗ Depot       |                    | Waterbody           | Of Concern - Dominant     |

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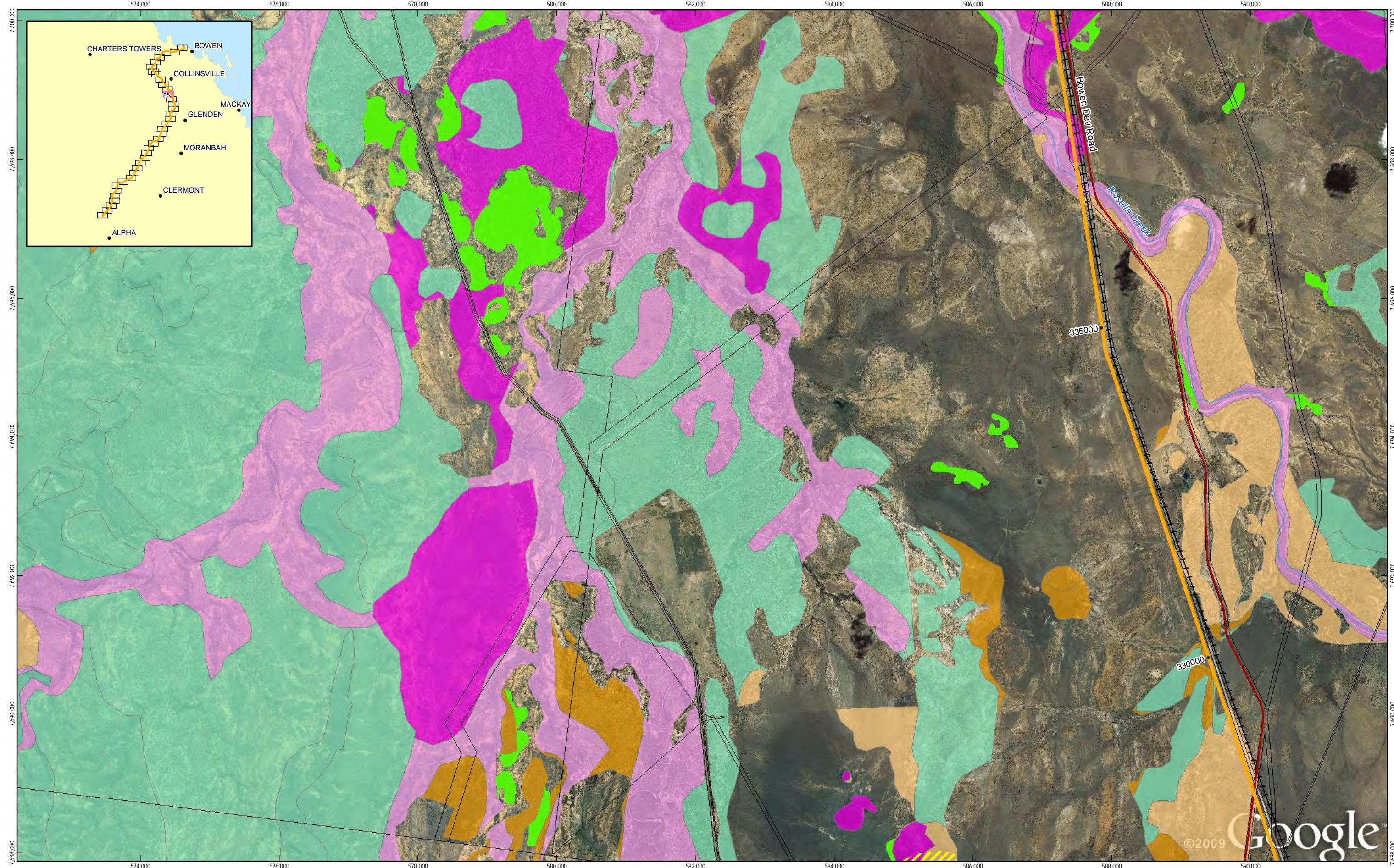
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Job Number 41-22090  
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Date 04-08-2010

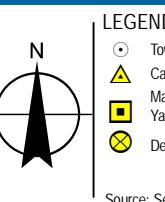
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**Sheet 25 of 37**

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1:50,000 (at A3)  
0 0.5 1 1.5 2 2.5  
Kilometres

Map Projection: Universal Transverse Mercator  
Horizontal Datum: Geocentric Datum of Australia 1994  
Grid: Map Grid of Australia, Zone 55



**LEGEND**

|               |                      |                       |                             |
|---------------|----------------------|-----------------------|-----------------------------|
| ○ Town        | ■ Proposed Alignment | ▨ Essential Habitat   | ■ Regional Ecosystems       |
| ▲ Camp        | — State Road         | ■ High Value Regrowth | ■ Endangered - Dominant     |
| ■ Marshalling | - - Existing Railway | ■ Cadastre            | ■ Endangered - Sub-dominant |
| □ Yards       | — Watercourse        | ■ Waterbody           | ■ Of Concern - Dominant     |
| ⊗ Depot       |                      |                       | ■ Of Concern - Sub-dominant |

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## CERTIFIED REGIONAL ECOSYSTEMS AND HIGH VALUE REGROWTH

Figure: 3-2  
Sheet 26 of 37



1:50,000 (at A3)  
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Map Projection: Universal Transverse Mercator  
Horizontal Datum: Geocentric Datum of Australia 1994  
Grid: Map Grid of Australia, Zone 55



**LEGEND**  
 ● Town  
 ▲ Camp  
 ■ Marshalling  
 ○ Depot  
 ■ Proposed Alignment  
 ■ Essential Habitat  
 ■ State Road  
 ■ Existing Railway  
 ■ Yards  
 ■ Watercourse  
 ■ Waterbody  
 ■ Regional Ecosystems  
 ■ High Value Regrowth  
 ■ Cadastre  
 ■ Waterbody  
 ■ Not Of Concern  
 ■ Plantation Forest  
 ■ Non-Remnant /  
 ■ Regrowth  
 ■ Endangered - Dominant  
 ■ Endangered - Sub-dominant  
 ■ Of Concern - Dominant  
 ■ Of Concern - Sub-dominant

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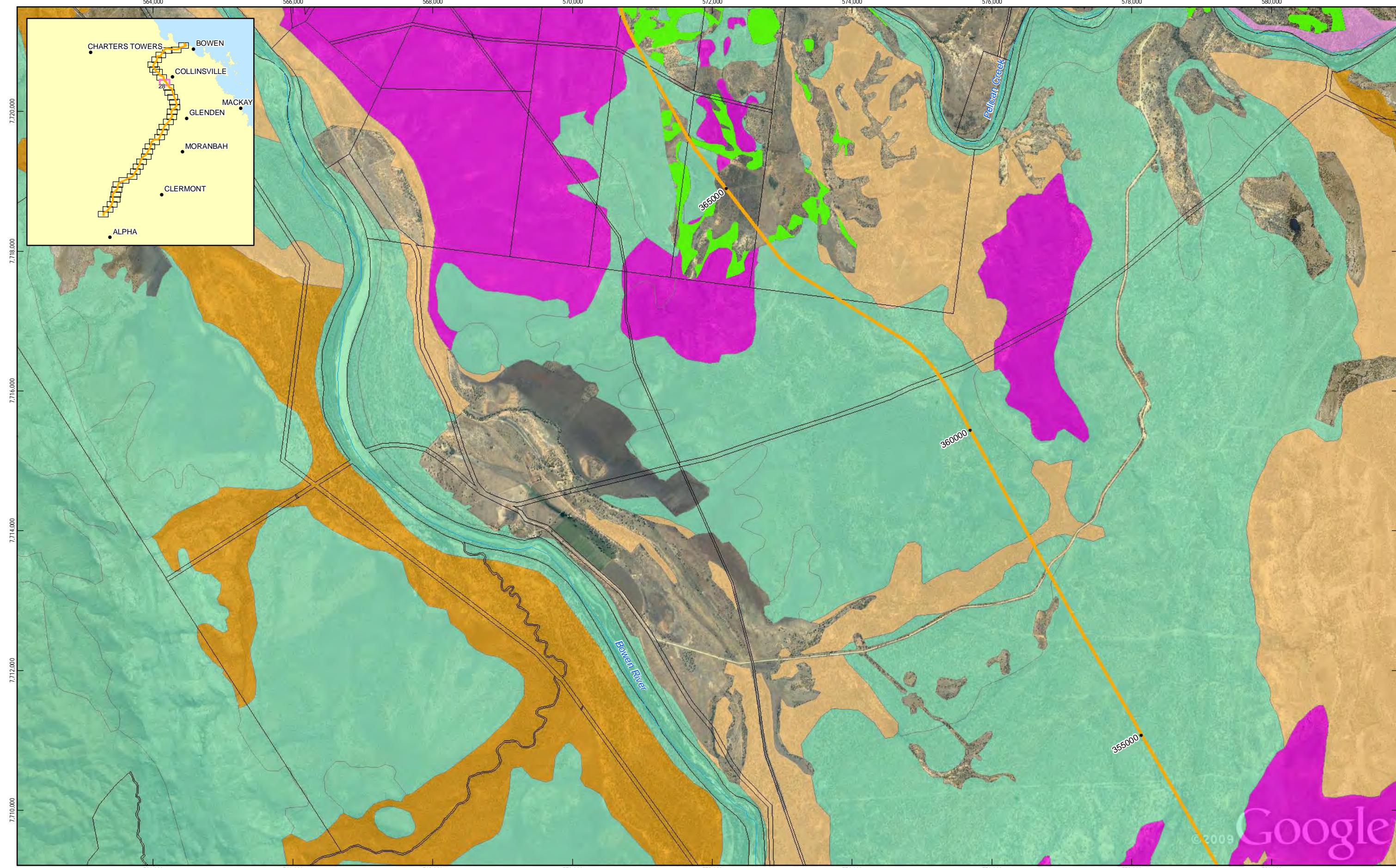
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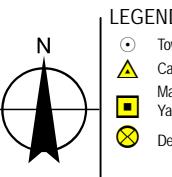
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1:50,000 (at A3)  
0 0.5 1 1.5 2 2.5  
Kilometres

Map Projection: Universal Transverse Mercator  
Horizontal Datum: Geocentric Datum of Australia 1994  
Grid: Map Grid of Australia, Zone 55



**LEGEND**

|               |                    |                           |                        |
|---------------|--------------------|---------------------------|------------------------|
| ○ Town        | Proposed Alignment | Essential Habitat         | Regional Ecosystems    |
| ▲ Camp        | State Road         | High Value Regrowth       | Not Of Concern         |
| ■ Marshalling | Existing Railway   | Cadastre                  | Plantation Forest      |
| □ Yards       | Watercourse        | Endangered - Dominant     | Non-Remnant / Regrowth |
| ⊗ Depot       |                    | Endangered - Sub-dominant |                        |
|               |                    | Of Concern - Dominant     |                        |
|               |                    | Of Concern - Sub-dominant |                        |

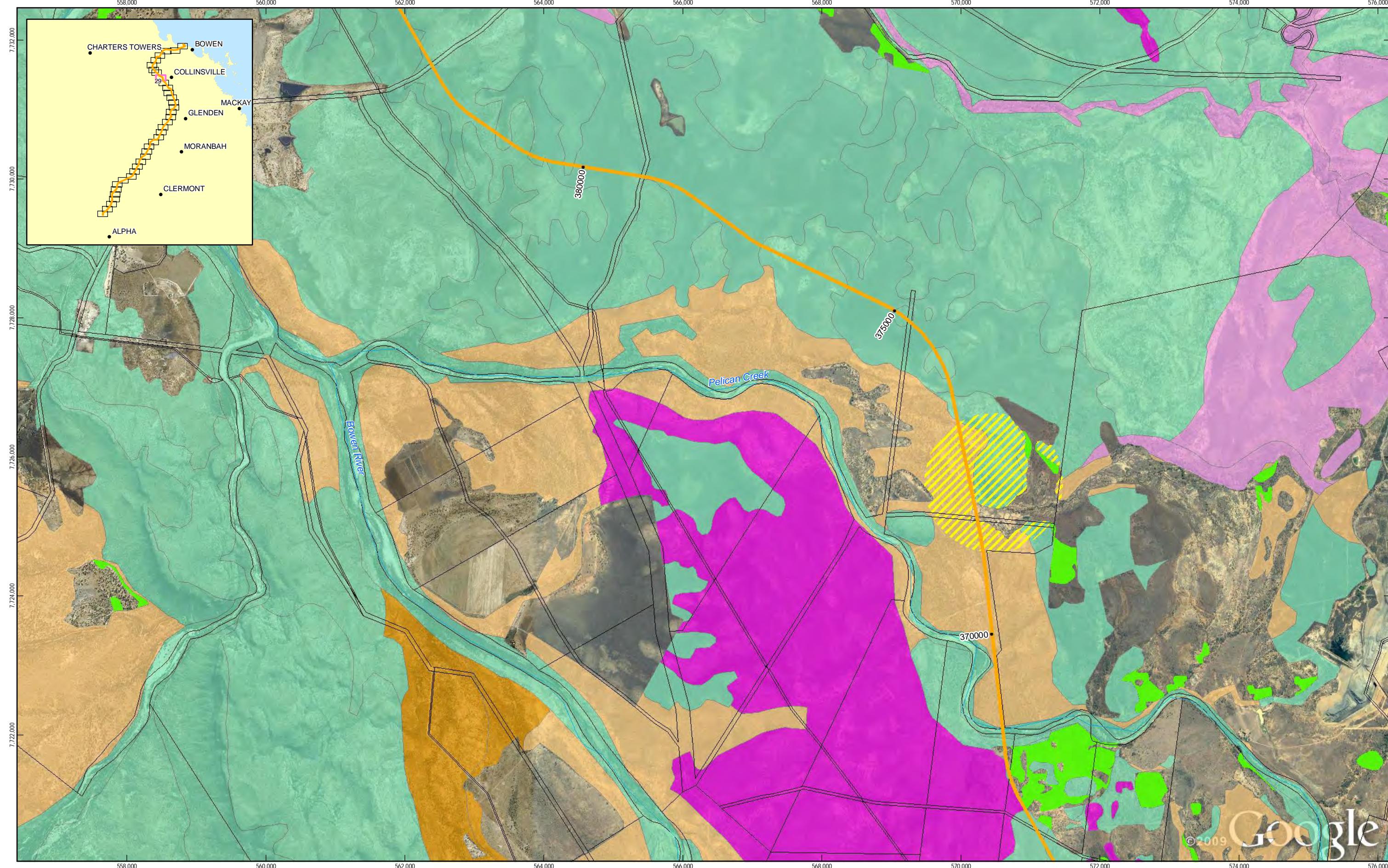
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1:50,000 (at A3)  
0 0.5 1 1.5 2 2.5 Kilometres  
Map Projection: Universal Transverse Mercator  
Horizontal Datum: Geocentric Datum of Australia 1994  
Grid: Map Grid of Australia, Zone 55



**LEGEND**

- Town
- △ Camp
- Marshalling
- ⊗ Depot
- Proposed Alignment
- State Road
- Existing Railway
- Watercourse
- Essential Habitat
- High Value Regrowth
- Regional Ecosystems
- Not Of Concern
- Plantation Forest
- Endangered - Dominant
- Endangered - Sub-dominant
- Of Concern - Dominant
- Of Concern - Sub-dominant
- Cadastre
- Yards
- Waterbody

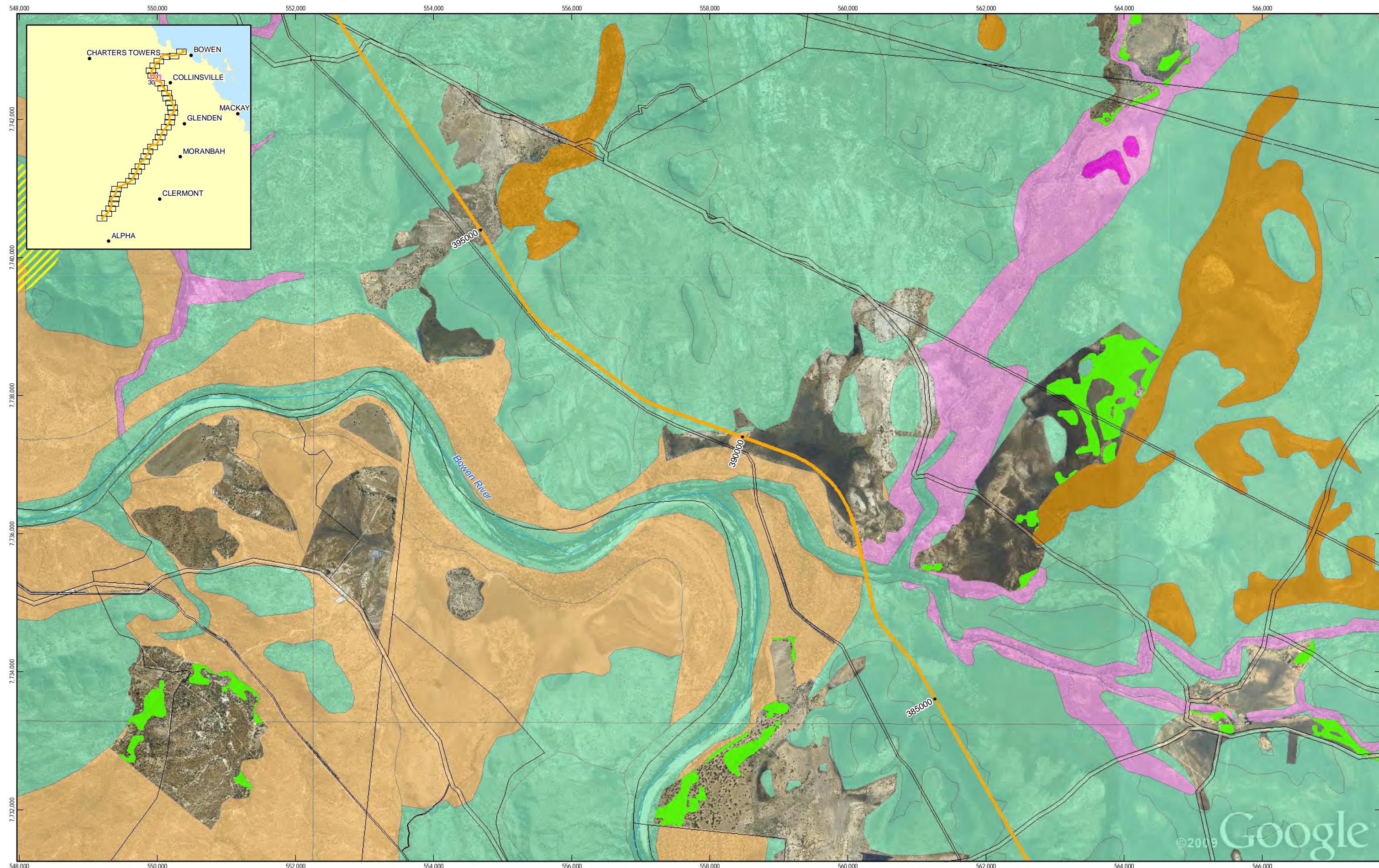
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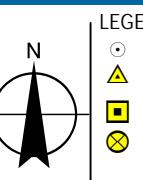
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Figure: 3-2  
Sheet 29 of 37



1:50,000 (at A3)  
0 0.5 1 1.5 2 2.5 Kilometres

Map Projection: Universal Transverse Mercator  
Horizontal Datum: Geocentric Datum of Australia 1994  
Grid: Map Grid of Australia, Zone 55



**LEGEND**

|               |                    |                     |                           |
|---------------|--------------------|---------------------|---------------------------|
| ○ Town        | Proposed Alignment | Essential Habitat   | Regional Ecosystems       |
| ▲ Camp        | State Road         | High Value Regrowth | Not Of Concern            |
| ■ Marshalling | Existing Railway   | Cadastre            | Plantation Forest         |
| □ Yards       | Watercourse        | Waterbody           | Non-Remnant / Regrowth    |
| ⊗ Depot       |                    |                     | Of Concern - Dominant     |
|               |                    |                     | Of Concern - Sub-dominant |

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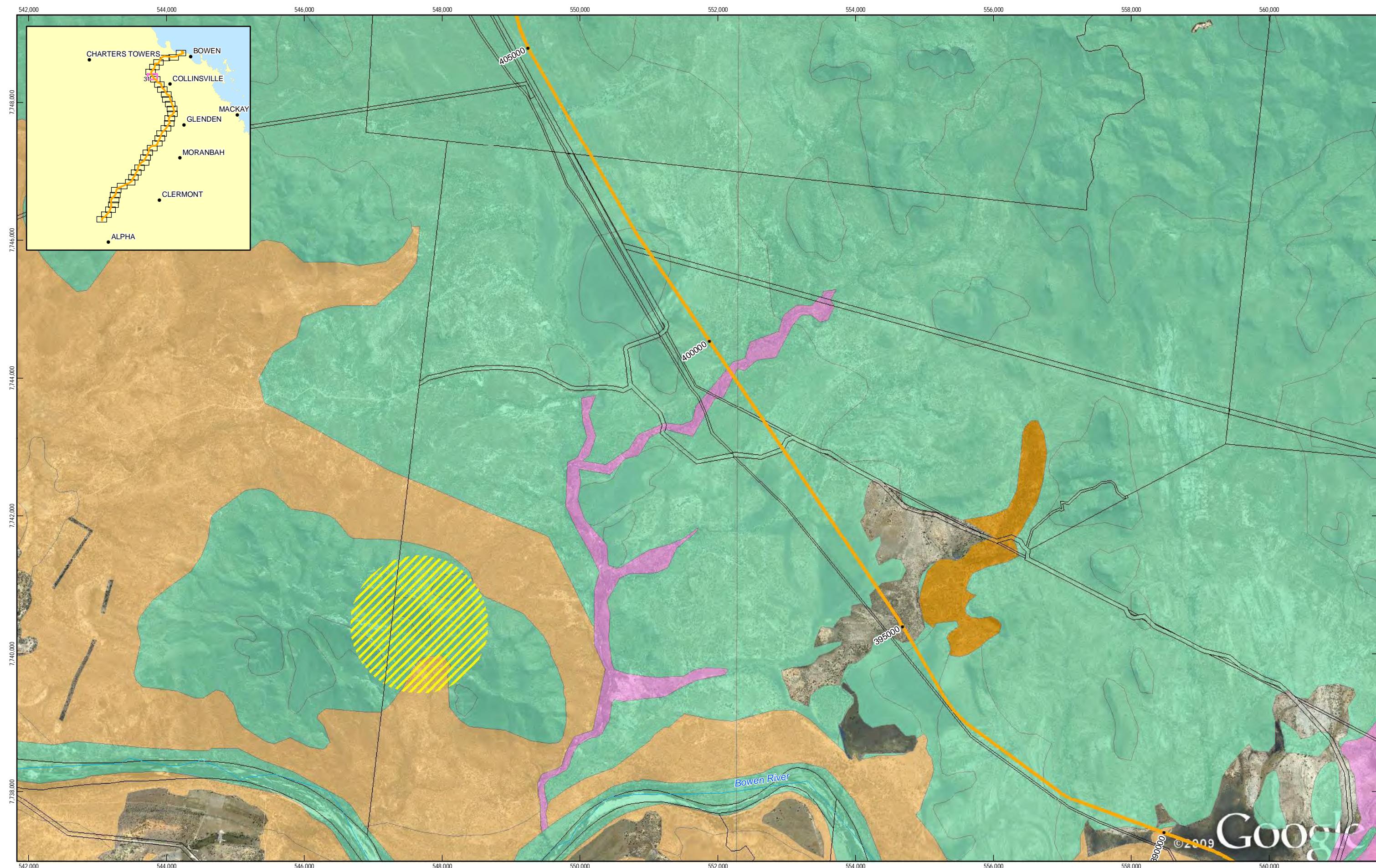
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1:50,000 (at A3)  
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Kilometres

Map Projection: Universal Transverse Mercator  
Horizontal Datum: Geocentric Datum of Australia 1994  
Grid: Map Grid of Australia, Zone 55



N

|               |                    |                     |                           |                           |
|---------------|--------------------|---------------------|---------------------------|---------------------------|
| ○ Town        | Proposed Alignment | Essential Habitat   | Regional Ecosystems       | Not Of Concern            |
| ▲ Camp        | State Road         | High Value Regrowth | Endangered - Dominant     | Plantation Forest         |
| ■ Marshalling | Existing Railway   | Yards               | Endangered - Sub-dominant | Non-Remnant / Regrowth    |
| □ Yards       | Watercourse        | Waterbody           | Of Concern - Dominant     | Of Concern - Sub-dominant |
| ⊗ Depot       |                    |                     |                           |                           |

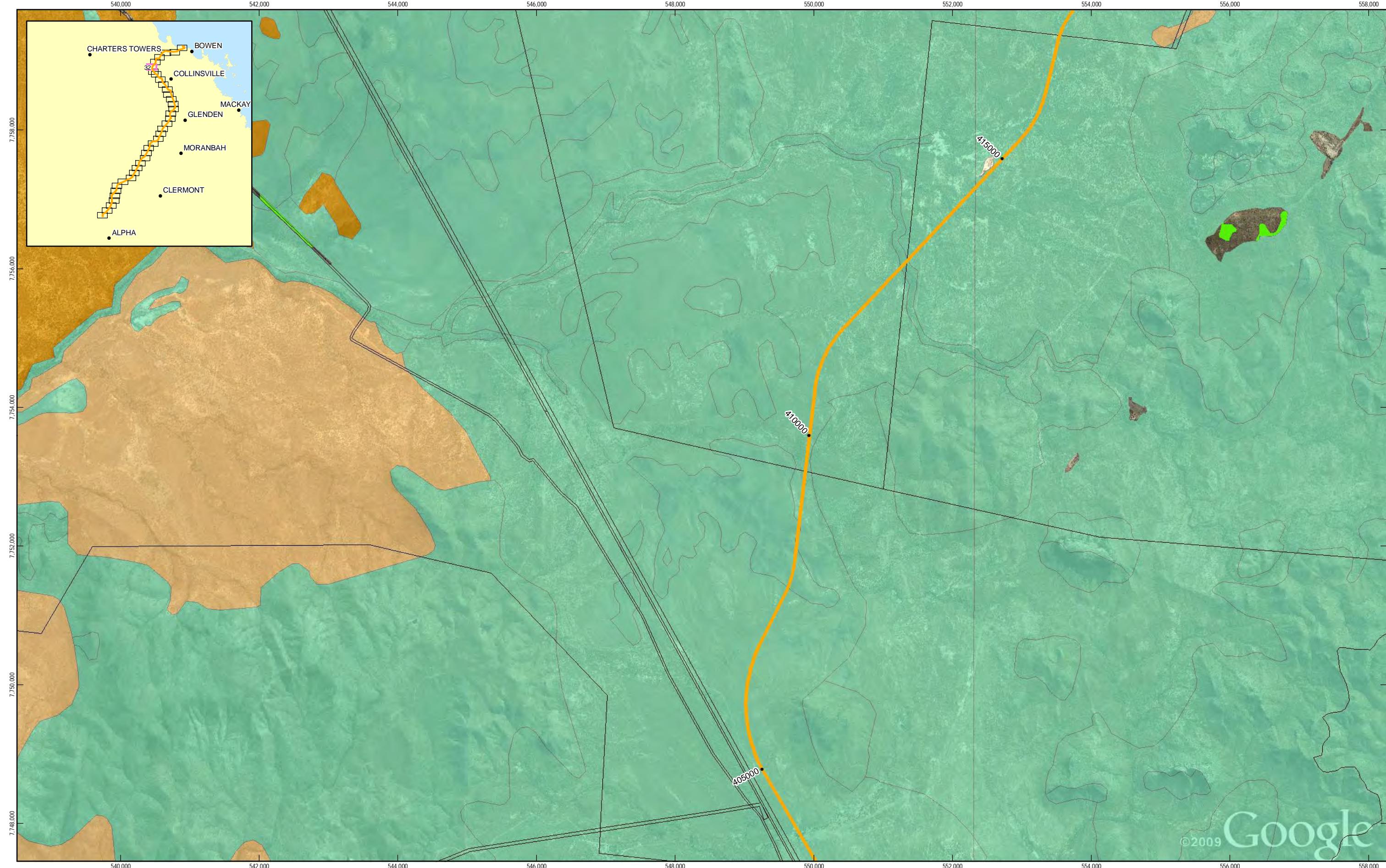
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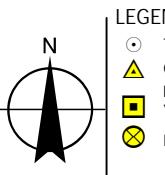
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Kilometres

Map Projection: Universal Transverse Mercator  
Horizontal Datum: Geocentric Datum of Australia 1994  
Grid: Map Grid of Australia, Zone 55



**LEGEND**

|               |                    |                           |                        |
|---------------|--------------------|---------------------------|------------------------|
| ○ Town        | Proposed Alignment | Essential Habitat         | Regional Ecosystems    |
| ▲ Camp        | State Road         | High Value Regrowth       | Not Of Concern         |
| ■ Marshalling | Existing Railway   | Endangered - Dominant     | Plantation Forest      |
| □ Yards       | Watercourse        | Endangered - Sub-dominant | Non-Remnant / Regrowth |
| ⊗ Depot       |                    | Of Concern - Dominant     |                        |
|               |                    | Of Concern - Sub-dominant |                        |

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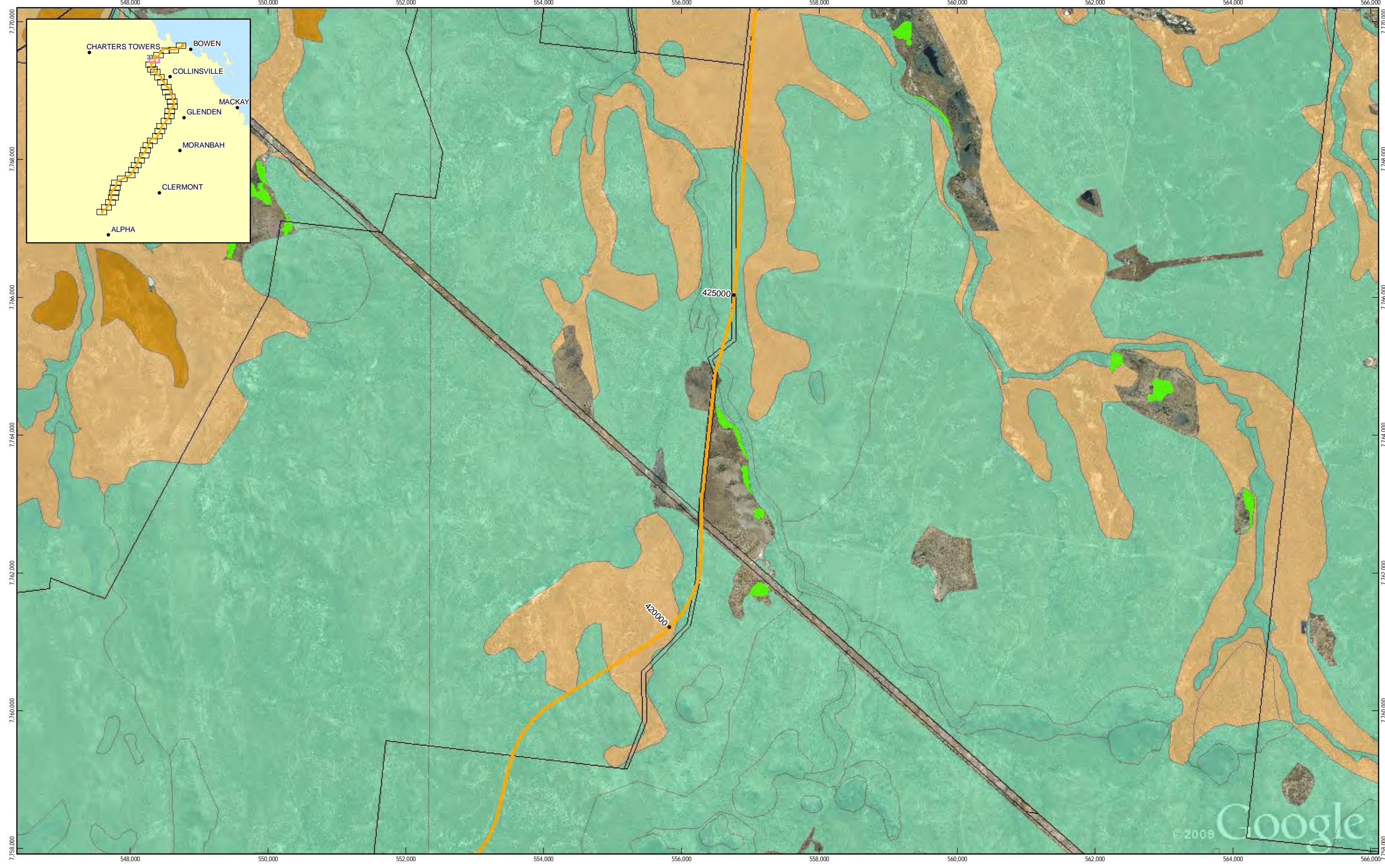
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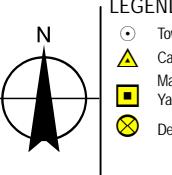
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1:50,000 (at A3)  
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Kilometres

Map Projection: Universal Transverse Mercator  
Horizontal Datum: Geocentric Datum of Australia 1994  
Grid: Map Grid of Australia, Zone 55



**LEGEND**

|               |                    |                           |                        |
|---------------|--------------------|---------------------------|------------------------|
| ○ Town        | Proposed Alignment | Essential Habitat         | Regional Ecosystems    |
| △ Camp        | State Road         | High Value Regrowth       | Not Of Concern         |
| □ Marshalling | Existing Railway   | Endangered - Dominant     | Plantation Forest      |
| ⊗ Yards       | Watercourse        | Endangered - Sub-dominant | Non-Remnant / Regrowth |
| ⊗ Depot       |                    | Of Concern - Dominant     |                        |
|               |                    | Of Concern - Sub-dominant |                        |

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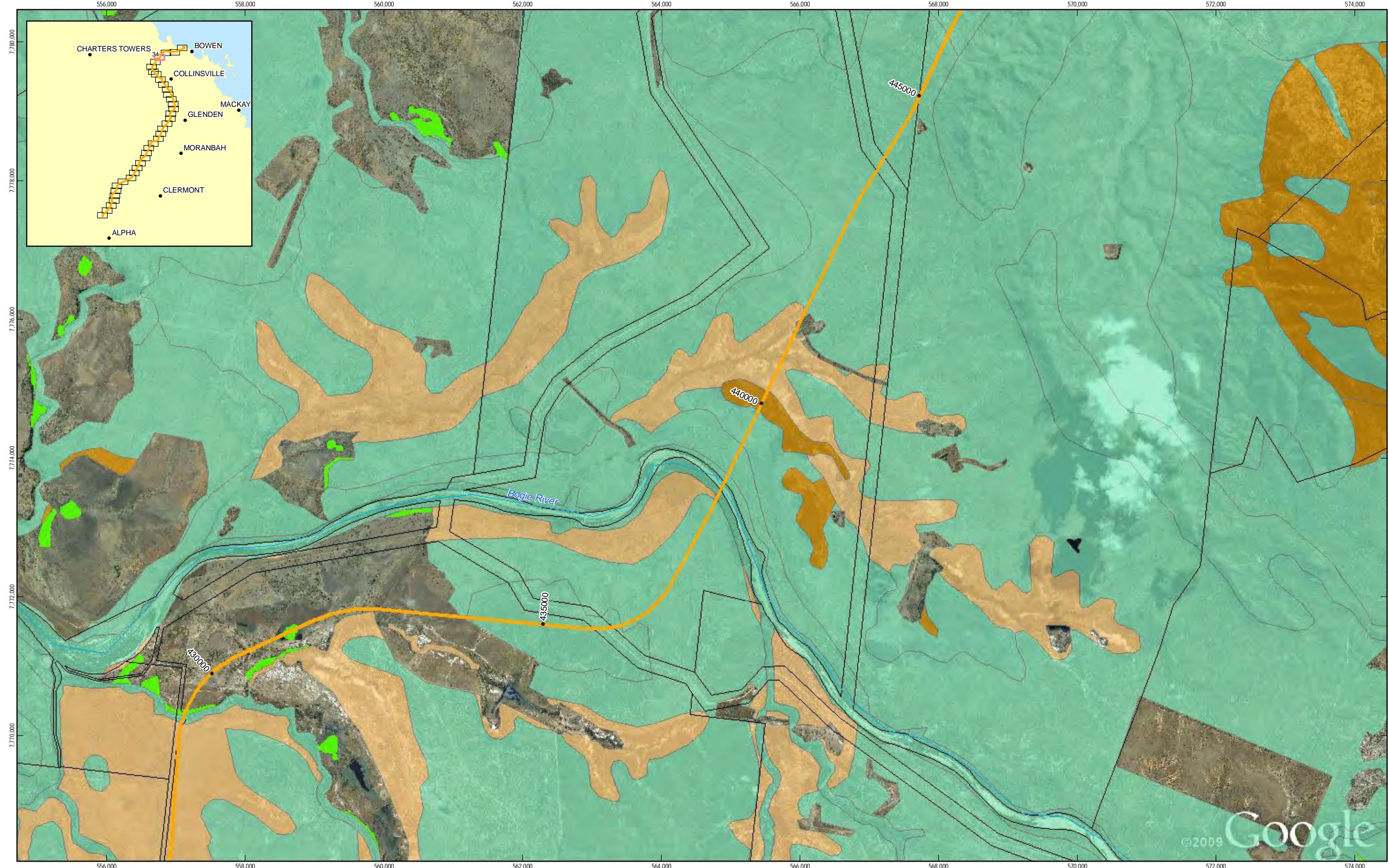
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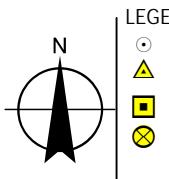
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0 0.5 1 1.5 2 2.5 Kilometres

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Grid: Map Grid of Australia, Zone 55



**LEGEND**

|               |                    |                       |                           |
|---------------|--------------------|-----------------------|---------------------------|
| ○ Town        | Proposed Alignment | Essential Habitat     | Regional Ecosystems       |
| △ Camp        | State Road         | High Value Regrowth   | Not Of Concern            |
| □ Marshalling | Existing Railway   | Endangered - Dominant | Plantation Forest         |
| ⊗ Yards       | Watercourse        | Cadastre              | Endangered - Sub-dominant |
| ⊗ Depot       |                    | Waterbody             | Non-Remnant / Regrowth    |

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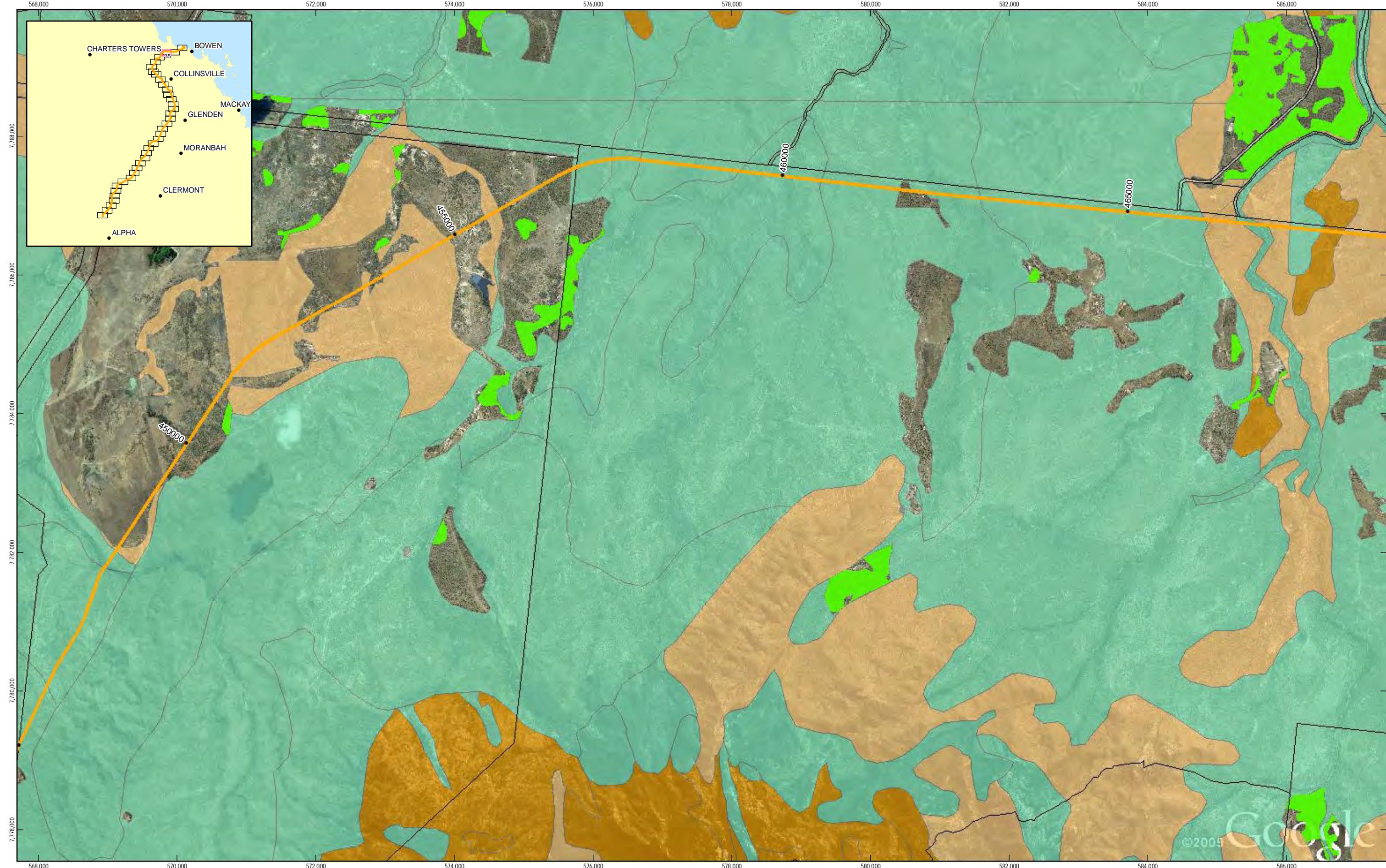
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1:50,000 (at A3)  
0 0.5 1 1.5 2 2.5  
Kilometres

Map Projection: Universal Transverse Mercator  
Horizontal Datum: Geocentric Datum of Australia 1994  
Grid: Map Grid of Australia, Zone 55



LEGEND

- Town
- ▲ Camp
- Marshalling
- ◆ Depot
- Proposed Alignment
- State Road
- Existing Railway
- Watercourse
- Essential Habitat
- High Value Regrowth
- Cadastre
- Yards
- Waterbody
- Regional Ecosystems
- Endangered - Dominant
- Endangered - Sub-dominant
- Not Of Concern
- Plantation Forest
- Non-Remnant / Regrowth
- Of Concern - Dominant
- Of Concern - Sub-dominant

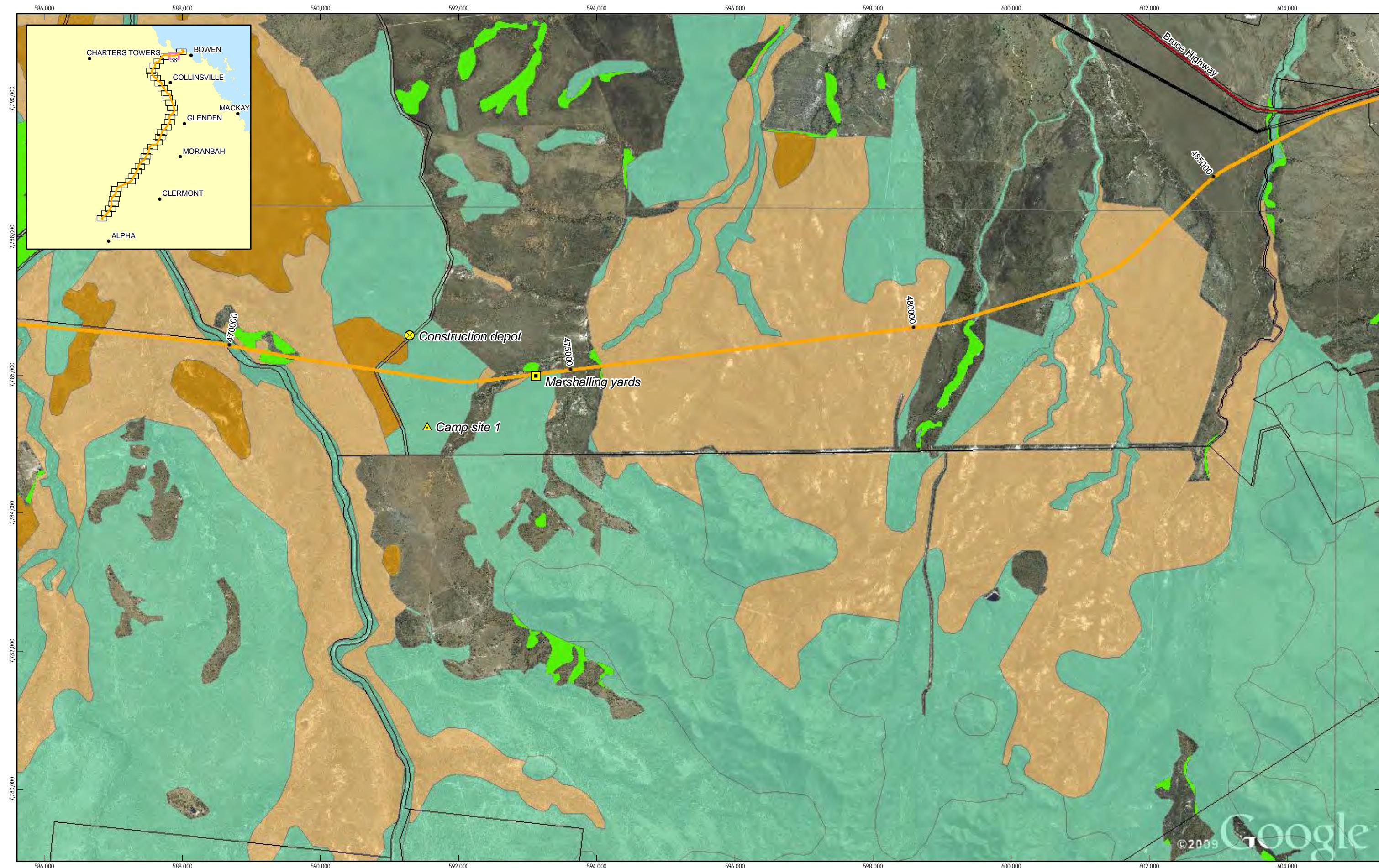
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Figure: 3-2  
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1:50,000 (at A3)  
0 0.5 1 1.5 2 2.5  
Kilometres

Map Projection: Universal Transverse Mercator  
Horizontal Datum: Geocentric Datum of Australia 1994  
Grid: Map Grid of Australia, Zone 55



LEGEND

- Town
- Proposed Alignment
- △ Camp
- Marshalling
- ⊗ Depot
- State Road
- - Existing Railway
- Yards
- Construction depot
- Essential Habitat
- High Value Regrowth
- Cadastre
- Watercourse
- Waterbody
- Regional Ecosystems
- Not Of Concern
- Plantation Forest
- Endangered - Dominant
- Endangered - Sub-dominant
- Cadastre
- Non-Remnant / Regrowth
- Of Concern - Dominant
- Of Concern - Sub-dominant

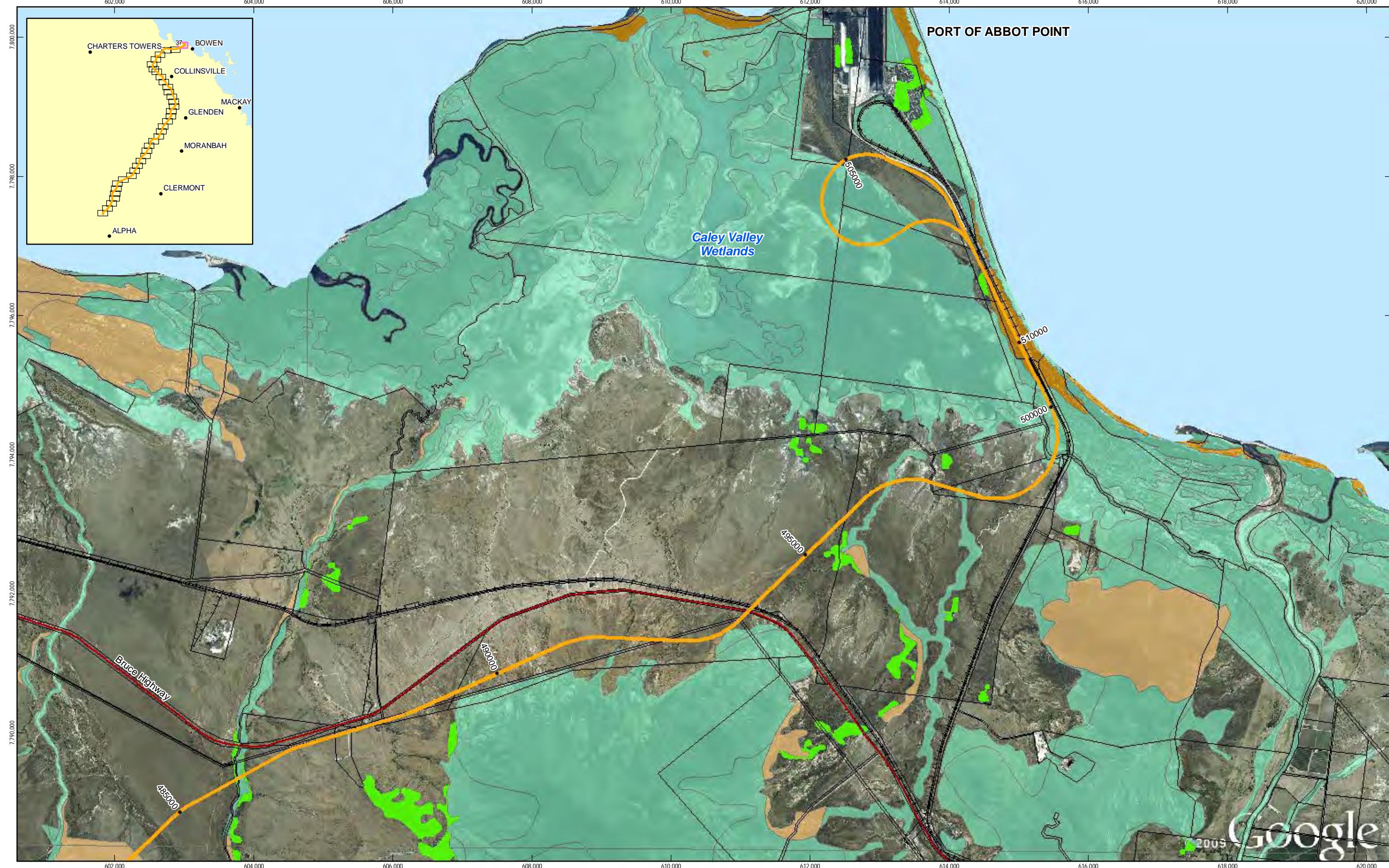
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Figure: 3-2  
Sheet 36 of 37



**Table 11 Vegetation alliances within the study area**

| Vegetation Alliance   | Description   | Photograph   |
|---|---|--|
| <b>Ironbark woodland on plains and rises</b><br><br>Representative sites: FD1, FD2, FD 10, FD 13, FR7, FD17, FR15, FR17, FR18, FR24, FR28, FR60, FR61, FR63 (in part), FR74, FR75<br><br>Includes least concern REs: 10.5.5, 11.3.29, 11.3.30, 11.5.3 (in part), 11.5.9, 11.7.4, 11.8.4, 11.9.2, 11.9.9, 11.12.1, 11.12.2.<br><br>Includes the of concern RE 11.11.10.<br><br>Total area ~ 738 ha | <p>Dominates the undulating and rolling country along the entire alignment. Occurs predominately on older floodplains of Cainozoic alluvium and undulating and rolling rises formed from Palaeozoic granite (north of the Bogie River), Tertiary sand plains (south of Suttor Creek) or cracking clays. Minor occurrences on laterite and metamorphic rock.</p> <p>These communities are <i>typically</i> shrubby woodland on the alluvial landforms and grassy woodland to open woodland on the cracking clay and sand plains, and the granite rises.</p> <p>Tree layer: dominated by narrow-leaved ironbark (<i>Eucalyptus crebra</i>) or silver-leaved ironbark (<i>E. melanophloia</i>), +/- poplar box (<i>E. populnea</i>), ghost gum (<i>Corymbia dallachiana</i>), Clarkson's bloodwood (<i>C. clarksoniana</i>), red bloodwood (<i>C. erythrophloia</i>), poplar gum (<i>E. platyphylla</i>).</p> <p>Shrub layer: generally sparse to mid-dense, with quinine bush (<i>Petalostigma pubescens</i>), beefwood (<i>Grevillea striata</i>), bull oak (<i>Allocasurina luehmannii</i>), paperbarked tea-tree (<i>Melaleuca nervosa</i>), currant bush (<i>Carrisa ovata</i>), prickly pine (<i>Bursaria incana</i>), false sandalwood (<i>Eremophila mitchellii</i>) etc.</p> <p>Ground layer: generally comprised of combinations of black spear grass (<i>Heteropogon contortus</i>), kangaroo grass (<i>Themeda triandra</i>), red Natal grass (*<i>Melinis repens</i>), the exotic pasture grasses buffel grass (*<i>Pennisetum ciliare</i>) and creeping bluegrass (*<i>Bothriochloa pertusa</i>), lovegrasses (<i>Eragrostis</i> spp.) and wiregrasses (<i>Aristida</i> spp.) etc.</p> <p>Condition: these woodlands are subject to cattle grazing and are generally <i>modified</i> to <i>transformed</i> from original condition under the VAST scale (type II or III – see Appendix F) (Thackway and Lesslie, 2005).</p> <p>Characteristic weeds: class 2 weeds harrisia cactus (*<i>Harrisia</i> sp.) and prickly pear (*<i>Opuntia stricta</i> and *<i>O. tomentosa</i>), class 3 weed lantana (*<i>Lantana camara</i>), and minor pasture weeds including creeping bluegrass, buffel grass, rattlepods (*<i>Crotalaria</i> spp.), stylo (*<i>Stylosanthes</i> spp.).</p> <p>Special values: may provide habitat for up to seven flora species of conservation significance, including the vulnerable <i>Marsdenia pumila</i> and <i>Polianthion multiflorum</i>.</p> |    |



| Vegetation Alliance   | Description   | Photograph |
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| <b>Box woodland on flats and plains</b><br><br>Representative sites: FD6, FD12, FD14, FD18, FR21, FR53, FR54, FR63 (in part)<br><br>Includes the least concern REs: 10.3.27, 10.5.12, 11.3.10, 11.5.3, 11.5.5 and 11.11.9.<br><br>Includes the of concern REs 11.3.2, 11.4.2 and 11.9.10 (in part).<br><br>Total area ~370 ha | <p>Woodland dominated by poplar box, Brown's box (<i>E. brownii</i>) or less commonly, mallee box (<i>Eucalyptus peristens</i>). Occurs on Quaternary alluvial plains and flats, and Tertiary clay plains with a red, hard pan surface (often texture contrast).</p> <p>Tree layer: dominated by poplar box, Brown's box or mallee box, either in pure stands or with silver-leaved ironbark or narrow-leaved ironbark, ghost gum, poplar gum.</p> <p>Shrub layer: mid-dense to very sparse, characterised by species such as wilga (<i>Geijera parviflora</i>), false sandalwood, dead finish (<i>Archidendropsis basaltica</i>), cocaine bush (<i>Erythroxylum australe</i>), leopardwood (<i>Flindersia dissosperma</i>), <i>Acacia coriacea</i> subsp. <i>stenophylla</i>, ironwood (<i>A. excelsa</i>), kurrajong (<i>Brachychiton populneus</i>), currantbush.</p> <p>Ground layer: characterised by species such as kangaroo grass, desert bluegrass (<i>Bothriochloa ewartiana</i>), creeping bluegrass, buffel grass, dark wiregrass (<i>Aristida calycina</i>) and other wiregrasses, emu berry (<i>Grewia retusifolia</i>), conetop nineawn (<i>Enneapogon lindleyanus</i>), soft spinifex (<i>Triodia pungens</i>) (in the south) etc.</p> <p>Condition: these woodlands are generally grazed by cattle and were usually <i>modified</i> from natural status under the VAST scale (type II – see Appendix F) (Thackway and Lesslie, 2005).</p> <p>Characteristic weeds: class 2 weeds harrisia cactus and prickly pear; also the pasture grasses creeping bluegrass and buffel grass.</p> <p>Special values: includes the EPBC Act endangered TEC Weeping Myall Woodlands (however, this TEC was not actually present within the alignment). This alliance partly covers the RE 11.9.10, which is part of the Brigalow TEC.</p> |            |

| Vegetation Alliance  | Description  | Photograph |
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| <b>Native grassland</b><br><br>Representative sites: FD5, FR38, FR40, FR41, FR42, FR43, FR48, FR73.<br><br>Includes the least concern REs 11.3.31, 11.4.4, 11.9.3.<br><br>Includes the of concern REs 11.4.11, 11.8.11.<br><br>Includes the endangered REs 11.3.21, 11.9.12.<br><br>Total area ~116 ha | <p>Grassland of predominately native species, generally located on plains and rises, frequently of black and brown cracking clay soils. Found south of the Bogie River.</p> <p>Tree layer: a very sparse tree layer sometimes present, generally comprised of one or more of red bloodwood, ghost gum, mountain coolibah (<i>Eucalyptus orgadophila</i>) or silver-leaved ironbark. angleton grass</p> <p>Shrub layer: a very sparse shrub layer was sometimes present, generally comprised of Leichhardt bean (<i>Cassia brewsteri</i>), whitewood (<i>Atalaya hemiglauca</i>), currant bush, red bauhinia (<i>Lysiphyllum carronii</i>), desert lime (<i>Citrus glauca</i>), emu apple (<i>Owenia acidula</i>), corkwood wattle (<i>Acacia bidwillii</i>) etc.</p> <p>Ground layer: the ground layer was dense and comprised of (among others) Queensland bluegrass (<i>Dicanthium sericeum</i> subsp.. <i>sericeum</i>), black speargrass, canegrass (<i>Mnesitheia rotboelloides</i>), creeping bluegrass, buffel grass, angleton grass (<i>Dichanthium aristatum</i>), native sensitive weed (<i>Neptunia gracilis</i>), emu bush, brown silkytop (<i>Eulalia aurea</i>), chain pea (<i>Alysicarpus rugosus</i>), white speargrass (<i>Aristida leptopoda</i>), feathertop (<i>Aristida latifolia</i>), cockatoo grass (<i>Alloteropsis cimicina</i>), native couch (<i>Brachyachne convergens</i>), red Flinders grass (<i>Iseilema vaginiflorum</i>), shot grass (<i>Paspalidium globoideum</i>), native millet (<i>Panicum decompositum</i>), Coolibah grass (<i>Thellungiya advena</i>) etc.</p> <p>Characteristic weeds: the class 2 weed parthenium (*<i>Parthenium hysterophorus</i>) was often present, especially along the edges of roads, and buffel grass and creeping bluegrass were often present.</p> <p>Condition: native grasslands typically ranged from <i>transformed</i> from natural conditions to <i>replaced</i>, with a high degree of incursion from parthenium*, buffel grass* and creeping bluegrass* (VAST type III to IV – see Appendix F) (Thackway and Lesslie, 2005).</p> <p>Special values: the REs 11.3.21, 11.4.4, 11.4.11, 11.8.11, 11.9.3 and 11.9.12 of this community meet the requirements of the EPBC Act endangered TEC Natural Grasslands of the Queensland Central Highlands and the northern Fitzroy Basin. A number of flora species of conservation significance occur in this community including the vulnerable king blue grass (<i>Dichanthium queenslandicum</i>), near threatened bluegrass (<i>Dichanthium setosum</i>), and the endangered Belyando cobbler's pegs (<i>Trioncinia retroflexa</i>).</p> | <br><br>   |

| Vegetation Alliance   | Description  | Photograph |
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| <b>Acacia-dominated woodland/open forest</b>                                | <p>Woodland and open forest dominated by an <i>Acacia</i> spp. – mostly brigalow (<i>Acacia harpophylla</i>), also gidgee (<i>A. cambagei</i>), lancewood (<i>A. shirleyi</i>), Townsville wattle (<i>A. leptostachya</i>), black gidgee (<i>A. argyrodendron</i>), boree (<i>A. tephrina</i>). Located on a range of landforms, primarily level to undulating plains on alluvial or clay soils, or laterite. Found throughout the study area.</p> |            |
| Representative site: FD7, FD8, FR22, FR52, FR55, FR58, FR64, FR70, FR74     | The most common association is brigalow open forest/woodland.  |            |
| Includes the least concern RE 10.7.3, 10.7.7, 11.3.5, 11.7.1.               | Tree layer: ranges from dense to sparse; most common species is brigalow, often with Dawson's gum ( <i>E. cambageana</i> ); other species often associated are yellow wood ( <i>Terminalia oblongata</i> ), red bauhinia, poplar box, false sandalwood, leopardwood, sandalwood ( <i>Santalum lanceolatum</i> ), damson ( <i>Terminalia sericocarpa</i> ).   |            |
| Includes the of concern REs 11.3.34, 11.4.5, 11.11.13, 11.11.16.            | Shrub layer: sparse to mid-dense, with species listed in the tree layer above, in addition to currant bush, whitewood, shiny-leaved canthium ( <i>Psydrax odorata</i> ), wait-a-while ( <i>Capparis lasiantha</i> ), warrior bush ( <i>Apophyllum anomalum</i> ), narrow-leaf bumble ( <i>Capparis loranthifolia</i> ), scrub boonaree ( <i>Alectryon diversifolius</i> ), peach bush ( <i>Ehretia membranifolia</i> ), wilga, desert lime etc.    |            |
| Includes the endangered REs 11.3.1, 11.4.6, 11.4.8, 11.4.9, 11.9.1, 11.9.5. | Ground layer: often dominated by buffel grass or creeping bluegrass, with black spear grass, wiregrasses, lovegrasses, twirly windmill grass ( <i>Enteropogon ramosus</i> ), native couch, spreading panic grass ( <i>Paspalidium distans</i> ) and other <i>Paspalidium</i> spp., among others. Chenopods are also common.  |            |
| Total area ~138 ha.   | Characteristic weeds: the class 2 weeds prickly pear, parthenium, harrisia cactus are commonly encountered.  |            |
|   | Condition: these associations within the study area have typically been modified or transformed (VAST type II or III – see Appendix F) (Thackway and Lesslie, 2005).   |            |
|   | Special values: many of the REs of this community meet the requirements of the EPBC Act endangered TEC Brigalow ( <i>Acacia harpophylla</i> dominant and codominant). In addition, <i>Paspalidium scabrifolium</i> is known to occur in the area in brigalow.  |            |

| Vegetation Alliance   | Description   | Photograph   |
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| <b>Bloodwood woodland</b><br>Representative sites: FR6, FR65<br>Includes the least concern REs 10.5.1 and 11.3.7.<br>Includes the of concern RE 11.12.10.<br>Total area ~40 ha. | <p>Woodland dominated by <i>Corymbia</i> spp., primarily in the southern half of the study area. Located on rises of granite, sand and alluvial plains, and levees.</p> <p>Tree layer: comprised of <i>Corymbia</i> spp. including Clarkson's bloodwood, red bloodwood, ghost gum, yellow bloodwood (<i>C. leichhardtii</i>), western bloodwood (<i>C. terminalis</i>), desert bloodwood (<i>C. brachycarpa</i>) or rough-leaved bloodwood (<i>C. setosa</i>).</p> <p>Shrub layer: often dense, comprised of species such as sally wattle (<i>Acacia salicina</i>), quinine bush, beefwood, white bauhinia (<i>Lysiphyllum hookeri</i>), prickly pine, <i>Acacia coriacea</i> ssp. <i>stenophylla</i>, red ash (<i>Alphitonia excelsa</i>), bushman's clothes pegs (<i>Grevillea glauca</i>), budgeroo (<i>Lysicarpus angustifolius</i>), cocaine bush, wilga, currant bush.</p> <p>Ground layer: very sparse to dense, sometimes with a relatively high species diversity, including small burr grass (<i>Tragus australianus</i>), silkyheads (<i>Cymbopogon obtectus</i>), kangaroo grass, black spear grass, buffel grass, dark wiregrass, other wiregrasses, cockatoo grass, waltheria (<i>Waltheria indica</i>), emu bush, <i>Abutilon</i> sp., pigeon grass (<i>Setaria surgens</i>) etc.</p> <p>Characteristic weeds: the class 2 weeds prickly pear and harrisia cactus are common; also buffel grass.</p> <p>Condition: most of this alliance was not visited, however given the generally marginal, infertile soils these communities occur on, condition is estimated to be <i>modified</i> (VAST type II), possibly extending to <i>transformed</i> (VAST type III – see Appendix F) (Thackway and Lesslie, 2005).</p> | <br> |



| Vegetation Alliance  | Description   | Photograph   |
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| <b>Mixed species shrubland/low woodland</b><br><br>Representative sites: FD4, FR15, FR19, FR25,<br><br>Includes the least concern RE 11.3.32.<br><br>Includes the of concern RE 11.3.13 and 11.3.33.<br><br>Total area ~53 ha. | <p>Shrubland and low woodland dominated by bull oak, beefwood or false sandalwood, often present as localised patches within a matrix of sclerophyll woodland. Occurs on plains formed from older alluvial deposits, often on pale, sandy soils. A minor alliance located primarily in the far northern sections.</p> <p>Tree layer: generally mid-dense to sparse and comprised of bull oak, beefwood or false sandalwood with poplar gum, Clarkson's bloodwood, carbeen (<i>Corymbia tessellaris</i>), ghost gum and/or narrow-leaved ironbark.</p> <p>Shrub layer: generally sparse to very sparse and comprised almost entirely of bull oak, with scattered quinine bush, whitewood, paperbarked tea-tree, broad-leaved tea tree (<i>Melaleuca viridiiflora</i>) etc.</p> <p>Ground layer: sparse, including creeping bluegrass, wire grasses (<i>Aristida</i> spp. particularly <i>A. calycina</i>), Wanderrie grasses (<i>Eriachne</i> spp.), button grass (<i>Dactyloctenium radulans</i>), <i>Pleurostylis barbata</i>, waltheria, flannel weed (*<i>Sida cordifolia</i>) etc.</p> <p>Characteristic weeds: primarily the class 2 weed rubber vine (*<i>Cryptostegia grandiflora</i>) and the class 3 weed lantana; also snake weed (*<i>Stachytarpheta jamaicensis</i>).</p> <p>Condition: generally <i>modified</i> (VAST type II – see Appendix F) (Thackway and Lesslie, 2005).</p> | <br> |



| Vegetation Alliance  | Description   | Photograph |
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| <b>Mixed eucalypt and paperbark open forest fringing watercourses</b><br><br>Representative sites: FD3, FR4, FR8, FR9, FR26, FR49<br><br>Includes the least concern REs 11.3.25 and 11.3.27.<br><br>Includes the of concern REs 11.3.4 (in part) and 11.3.7 (in part).<br><br>Total area ~94 ha. | <p>Mixed eucalypt and paperbark open forest bordering watercourses traversed north of and including Suttor Creek. Extends over the swale and bank system (part of a meander plain) present beside many of the larger watercourses (e.g. the Bogie and Bowen Rivers, and Pelican and Suttor Creeks).</p> <p>Tree layer: a mix of some/most of river red gum (<i>Eucalyptus camaldulensis</i>), forest red gum (<i>E. tereticornis</i>), narrow-leaved ironbark, black ironbox (<i>E. raveretiana</i>), poplar gum, ghost gum, weeping paperbark (<i>Melaleuca leucadendra</i>), grey paperbark (<i>M. dealbata</i>), <i>M. fluviatilis</i>, carbeen, Clarkson's bloodwood, Burdekin plum (<i>Pleiogynium timorense</i>), swamp box (<i>Lophostemon grandiflorus</i>), river oak (<i>Casuarina cunninghamiana</i>).</p> <p>Shrub layer: cocky apple (<i>Planchonia careya</i>), white currant (<i>Flueggea virosa</i>), Leichhardt bean, rubber vine, lantana, white bauhinia, sally wattle, lolly bush (<i>Clerodendron inerme</i>), flaxleaf paperbark (<i>Melaleuca trichostachya</i>).</p> <p>Ground layer: characteristic species include black spear grass, creeping bluegrass, *<i>Urochloa mosambicensis</i>, <i>Crotalaria montana</i>.</p> <p>Condition: this community was generally intact but typically exhibited a high level of weed infestation – most sites were <i>modified</i> or <i>transformed</i> from natural condition (VAST type II-III – see Appendix F) (Thackway and Lesslie, 2005).</p> <p>Characteristic weeds: weeds are often prevalent in this community and can dominate the shrub and ground layers. In particular, the class 2 weed rubber vine and class 3 weed lantana. Environmental weeds include red Natal grass, mintweed (*<i>Hyptis suaveolens</i>), pink burr (*<i>Urena lobata</i>), siratro (*<i>Macroptilium atropurpureum</i>) and Mexican poppy (*<i>Argemone ochroleuca</i>).</p> <p>Special values: black ironbox is listed as vulnerable under both the NCA and the EPBC Act</p> |            |



| Vegetation Alliance  | Description   | Photograph   |   |   |
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| <b>Mountain coolibah open woodland on rocky plains and rolling rises</b><br><br>Representative site: FR47<br>Includes the least concern RE 11.8.5.<br>Total area ~60 ha. | <p>Open woodland dominated by mountain coolibah, located on extensive plains formed of Cainozoic flood basalts, which typically form black, friable, self-mulching cracking clay soils. This community is located primarily between the Bowen River and Suttor Creek.</p> <p>Tree layer: very sparse and dominated by mountain coolibah, with occasional ghost gum and red bloodwood.</p> <p>Shrub layer: very sparse, comprised of prickly pine, whitewood, wilga, native olive (<i>Notolaea macrocarpa</i>), wallaby apple (<i>Pittosporum angustifolium</i>), sally wattle.</p> <p>Ground layer: can exhibit a high degree of species diversity including grasses, sedges and herbs; species include native couch, parthenium, red Flinders grass, creeping bluegrass, buffel grass, barnyard grass (*<i>Echinochloa crus-galli</i>), wandering jew (<i>Commelina diffusa</i>), native sensitive weed, at least three <i>Cyperus</i> sp., spade flower (<i>Rostellularia adscendens</i>), rhynchosia (<i>Rhynchosia minima</i>), shot grass, chain pea, <i>Spermacoce brachystema</i>, early spring grass (<i>Eriochloa pseudoacrotricha</i>), twirly windmill grass and velvet hibiscus (<i>Melhania oblongifolia</i>) among others.</p> <p>Characteristic weeds: class 2 weed parthenium is common, prickly pear is generally present but very sparse.</p> <p>Condition: generally modified from natural condition (VAST type II), but where buffel grass or creeping bluegrass have replaced native grass and herb cover, this community is <i>transformed to replaced</i> (VAST type III to IV – see Appendix F) (Thackway and Lesslie, 2005).</p> | A photograph showing a sparse landscape dominated by tall, thin mountain coolibah trees. The ground is covered in dry, brown grass and some low-lying shrubs under a clear blue sky. | A photograph of a more lush and dense mountain coolibah woodland. The ground is covered in vibrant green grass, and the trees are more numerous and closely spaced than in the first photo. | A photograph of a mature mountain coolibah woodland. The trees are taller and more densely packed, creating a more continuous canopy. The ground is covered in green grass. |



| Vegetation Alliance   | Description   | Photograph   |
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| <p><b>Poplar gum open woodland on alluvial plains</b></p> <p>Representative sites:<br/>FR20, FR23</p> <p>Includes the least concern REs 11.3.9 and 11.3.35, and some non-remnant areas.</p> <p>Total area ~74 ha.</p> | <p>Open woodland dominated by poplar gum on broad level alluvial plains. Present only in the north of the study area associated with the Bogie River, and in the port area. This vegetation community occupies large areas of plain along the Bogie River corridor, however it is only of minor occurrence within the corridor.</p> <p>Tree layer: very sparse, dominated by poplar gum, sometimes with narrow-leaved ironbark, carbeen, ghost gum, Clarkson's bloodwood.</p> <p>Shrub layer: usually very sparse to absent, and comprised of bull oak, quinine bush, paperbarked tea tree, broad-leaved tea tree, beefwood, scrub breadfruit (<i>Pandanus</i> spp.) etc.</p> <p>Ground layer: primarily buffel grass and creeping bluegrass; also <i>*Urochloa mosambicensis</i>, giant spear grass (<i>Heteropogon triticeus</i>), pitted bluegrass (<i>Bothriochloa decipiens</i>), <i>*angleton</i> grass, salt couch (<i>Sporobolus virginicus</i>) (Port area), Katoora grass (<i>Sporobolus actinocladus</i>), button grass, stylo, red Flinders grass, Rhodes grass (<i>*Chloris virgata</i>), <i>Pterocaulon serrulatum</i>.</p> <p>Characteristic weeds: class 2 weeds chinee apple (<i>*Ziziphus mauritiana</i>) and rubber vine, class 3 weed lantana; also the environmental weeds noogoora burr (<i>*Xanthium occidentale</i>), snake weed, mimosa bush (<i>*Acacia farnesiana</i>), leucaena (<i>*Leucaena leucocephala</i>) and mintweed.</p> <p>Condition: generally <i>modified</i> (VAST type II – see Appendix F) (Thackway and Lesslie, 2005).</p> | <br> |

| Vegetation Alliance  | Description  | Photograph   |
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| <b>Semi-evergreen vine thicket</b><br>Representative sites: FD1<br>Includes the least concern REs 11.5.15.<br>Includes the of concern REs 11.2.3, 11.8.3.<br>Includes the endangered REs 11.4.1 and 11.8.13.<br>Total area ~14 ha. | <p>Semi-evergreen vine thicket, located on a variety of substrates including coastal dunes and granite pediments (at the foot of Mount Roundback), but chiefly on level to undulating plains. Present across the study area, generally at highly localised sites (limited in extent).</p> <p>Tree layer: emergents such as narrow-leaved ironbark, red bloodwood, mountain coolibah, crows ash (<i>Flindersia australis</i>) or bottle tree (<i>Brachychiton</i> spp.) may be present, over a low tree layer (usually less than 10 m) with a composition and structure that is highly dependant on the substrate and location. Common species can include brigalow, gidgee, scrub ironbark (<i>Acacia fasciculifera</i>), helicopter tree (<i>Gyrocarpus americanus</i>), Burdekin plum, red coondoo (<i>Mimusops elengi</i>), bush tuckeroo (<i>Cupaniopsis anacardioides</i>), wild prune (<i>Pouteria sericea</i>), greybark (<i>Drypetes deplanchei</i>), native cherry (<i>Exocarpus latifolius</i>), native jasmine (<i>Jasminum didymum</i> or <i>J. simplicifolium</i> among others), wilga etc.</p> <p>Shrub layer: can be highly species diverse, with composition dependant on substrate and locality, e.g., small-leaved ebony (<i>Diospyros humilis</i>), acalypha (<i>Acalypha ermorum</i>), scrub boonaree, shiny-leaved canthium, peach bush, leopardwood, currant bush, cocaine bush, <i>Parsonsia</i> spp., brush hovea (<i>Hovea longipes</i>), soft milkwood (<i>Alstonia constricta</i>), caustis vine (<i>Sarcostemma viminale</i>), gidgee gidgee (<i>Abrus precatorius</i>), water vines (<i>Cissus</i> spp.) etc.</p> <p>Ground layer: tends to be very sparse, but can contain buffel grass, creeping bluegrass, black spear grass, <i>Cyperus</i> spp., <i>Scleria</i> spp., native lemongrasses (<i>Cymbopogon</i> spp.), small burr grass, <i>Oplismenus</i> spp., lovegrasses, wire grasses etc.</p> <p>Characteristic weeds: the class 2 weed rubber vine and the class 3 weed lantana; also buffel grass, creeping bluegrass, mintweed, pink burr.</p> <p>Condition: generally poor condition, classified as <i>transformed</i> (type III VAST – see Appendix F) (Thackway and Lesslie, 2005).</p> <p>Special values: the REs 11.2.3, 11.4.1, 11.5.15 and 11.8.13 are constituents of the TEC ‘Semi Evergreen Vine Thickets of the Brigalow Belt (North and South) and Nandewarr Bioregions’, which is listed as endangered under the EPBC Act. It also contains a high number of the conservation significant species for the area, including Dietrich’s morning glory (<i>Bonamia dietrichiana</i>), airy shaw (<i>Croton magneticus</i>) and <i>Cerbera dumicola</i> (all near threatened under the NCA).</p> | <br> |

| Vegetation Alliance  | Description   | Photograph  |
|--|---|---|
| <b>Melaleuca-dominated shrublands/ woodlands</b><br>Representative site: FR15<br>Includes the least concern REs 11.2.5 and 11.3.12<br>Includes the of concern RE 11.5.10<br>Total area ~15 ha. | <p>Shrubland and woodland (often low woodland) dominated by <i>Melaleuca</i> spp. on littoral dunes and swale systems, alluvial plains with deep sandy soils, and sand plains. A minor community situated in a small number of discrete locations in the far north and in the south.</p> <p>Trees: mid-dense (littoral association) to absent (plain associations); species dominating this alliance are grey paperbark, broad-leaved paperbark, <i>Melaleuca tamariscina</i>, carbeen, paperbarked tea-tree and weeping paperbark. The littoral associations will include scrub breadfruit, Burdekin plum, cabbage palms (<i>Livistona</i> sp.), red coondoo and vines, <i>inter alia</i>.</p> <p>Shrub layer: sparse to very sparse; the littoral association will have the highest shrub diversity, including cocky apple, red ash, coastal wattle (<i>Acacia oraria</i>), golden parrot tree (<i>Grevillea pteridifolia</i>) among others. The other associations will have very sparse shrub layers limited to the dominant species.</p> <p>Ground layer: mid-dense to very sparse, including marine couch, blady grass (<i>Imperata cylindrica</i>), <i>Fimbristylis</i> spp., dark wiregrass, other wiregrasses, black speargrass, giant speargrass, <i>Cyperus</i> spp., hare's-foot grass (<i>Ectrosia leporina</i>), <i>Ischaemum fragile</i>, <i>Crinum</i> sp., Brown's lovegrass (<i>Eragrostis brownii</i>), kangaroo grass etc.</p> <p>Characteristic weeds: for the Port area, the class 2 weeds rubber vine, parkinsonia (<i>Parkinsonia aculeata</i>), and prickly acacia, the class 3 weed lantana, and numerous environmental weeds. The other associations are likely to have class 2 weeds prickly pear, harrisia cactus and rubber vine.</p> <p>Condition: only one of the sites within this alliance was visited, however it is known that the littoral woodland in the Abbot Point hinterland is generally in good condition, but with a very high degree of weed incursion – those sites are likely to be <i>transformed</i> from their natural state (type III VAST – see Appendix F). The remaining sites are likely to be <i>modified</i> (type II VAST) (Thackway and Lesslie, 2005).</p> |  |

| Vegetation Alliance   | Description   | Photograph |
|---|---|------------|
| <b>Coolabah and gidgee open forest/woodland fringing waterways</b>  | Woodland (occasionally open-forest) comprised of mixed coolabah ( <i>Eucalyptus coolabah</i> ) and/or gidgee, fringing waterways. Primarily located south of Eaglefield Creek, and particularly the Belyando River.   |            |
| Representative sites: FD9, FD15, FR35, FR41, FR56, FR57, FR59, FR72 | Tree layer: dominated or codominated by coolabah and/or gidgee. Other species sometimes present include brigalow, vine tree ( <i>Ventilago viminalis</i> ), silver-leaved ironbark and river red gum.   |            |
| Includes the least concern RE 11.3.37.                              | Shrub layer: frequently composed of yellowwood ( <i>Terminalia oblongata</i> ), <i>A. excelsa</i> , white bauhinia, red bauhinia, sandalwood, boobialla ( <i>Myoporum montanum</i> ), sally wattle, warrior bush, <i>Capparis shanesiana</i> , flaxleaf paperbark.  |            |
| Includes the of concern RE 11.3.3.                                  | Ground layer: frequently dominated by buffel grass; also Queensland blue grass, narrow-leaved plains-bush ( <i>Pluchea baccharoides</i> ), white leadwort ( <i>Plumbago zeylanica</i> ), handsome lovegrass ( <i>Eragrostis speciosa</i> ), lignum ( <i>Muehlenbeckia florulenta</i> ), umbrella canegrass ( <i>Leptochloa digitata</i> ), flat sedge ( <i>Cyperus victoriensis</i> ) etc.                              |            |
| Total area ~16 ha   | <p>Condition: this community generally exhibited a relatively high degree of internal integrity and was typically <i>modified</i> from natural condition (VAST type II – see Appendix F ) (Thackway and Lesslie, 2005).</p> <p>Characteristic weeds: class 2 weeds rubber vine, harrisia cactus, prickly pear, parthenium, parkinsonia; environmental weeds noogoora burr and para grass (*<i>Urochloa mutica</i>).</p> |            |



| Vegetation Alliance  | Description   | Photograph   |
|--|---|--|
| <b>Mangroves and tidal saltmarsh</b><br><br>Representative sites:<br>none.<br><br>Includes the least concern REs 11.1.2 and 11.1.4.<br><br>Total area ~2 ha. | <p>Mangrove tall shrubland and saltmarsh dominated by forblands, located along the northern loop. The mangrove association comprises shrubland fringing a small tidal creek draining the Caley Valley wetland, which comprises the forbland when dry. Neither association was visited during the field survey. However, the field workers have worked in this area previously.</p> <p>Trees: the forbland association typically lacks trees, and the mangrove association at this location is not developed to the point of containing trees.</p> <p>Shrubs: the forbland lacks shrubs, with the exception of occasional grey mangroves (<i>Avicennia marina</i>) present as isolated single plants along the margins. The mangrove association contains grey mangrove, yellow mangrove (<i>Ceriops tagal</i>), river mangrove (<i>Aegiceras corniculatum</i>), white-flowered mangrove (<i>Lumnitzera racemosa</i>) among others.</p> <p>Ground layer: the forbland is dominated by a small range of forbs from the Chenopodiaceae family, including glasswort (<i>Halosarcia indica</i>), beadweed (<i>Sarcocornia quinqueflora</i>), seablite (<i>Suaeda</i> sp.), ruby saltbush (<i>Enchytraea tomentosa</i>), pigweed (<i>Portulaca</i> sp.), sea purslane (<i>Sesuvium portulacastrum</i>) and the grass salt couch.</p> <p>Characteristic weeds: the class 2 weeds rubber vine, parkinsonia and chinee apple are present along the margins of this alliance.</p> <p>Condition: this alliance is generally in original <i>residual</i> condition (VAST type I).</p> | <br> |
| <b>Regrowth vegetation</b><br><br>Representative sites:<br>none<br><br>Total area ~ 62 ha  | <p>Includes regenerating areas of non-remnant vegetation with minimal ecological function. Covers a broad range of alliances – detailed mapping was not possible for this Project.</p> <p>Characteristic weeds: as for the alliances listed above.</p> <p>Condition: by definition this vegetation is generally <i>transformed</i> (VAST type III)</p>  |    |



| Vegetation Alliance  | Description   | Photograph   |
|--|---|--|
| <b>Non-remnant vegetation</b><br><br>Representative site(s): none<br><br>Contains only non-remnant vegetation<br><br>Total area ~1497 ha | <p>The majority of land within the study area is non-remnant grazing land, dominated by the exotic buffel grass or creeping bluegrass, or the native black spear grass and kangaroo grass, with scattered eucalypt trees often present. Some areas are cleared brigalow, and are characterised by brigalow in various stages of regrowth. Small sections of the study area south of Eaglefield Creek are crop land. Includes areas such as roads.</p> <p>Characteristic weeds: the class 2 weeds parthenium, prickly pear and harrisia cactus are commonly encountered; in the northern sections, the environmental weeds mintweed, stylo (*<i>Stylosanthes</i> spp.) and snake weed (*<i>Stachytarpheta jamaicensis</i>) are frequently present.</p> <p>Condition: obviously, natural vegetation communities have been replaced in these areas by exotic pasture grasses and are <i>adventive</i> (VAST type IV). In some cases, this community type is entirely <i>managed</i> (VAST type V), for instance where cropping occurs.</p> | <br> |



## 3.6 Fauna Habitats

### 3.6.1 Habitat Types

A total of twelve terrestrial habitat types were identified within the study area. These generally correspond with the vegetation communities identified in Section 3.5. The study area contains a diverse range of habitats from grasslands to open woodland, acacia-dominated shrublands and mature woodland with varying shrub and understorey layers. These habitats vary in their value for terrestrial fauna. Much of the study area intersects open grasslands and grazing land that supports relatively low fauna diversity. However areas of structurally complex vegetation occur along the rail alignment and provide a variety of food, shelter and nesting resources for a range of local wildlife. The ecological values of some habitat types vary dramatically depending on the intensity of grazing pressure. This influences the structural and floristic complexity of the shrub and understorey vegetation layers. The alignment intersects a series of streams and rivers. These are important habitat features within the landscape, providing a valuable source of water, food and habitat for a variety of animals.

Conservation significant species within the study area are predominantly restricted to vegetation communities that have been heavily impacted by historical land clearing (i.e. brigalow and belah woodland). Consequently many of the REs that are mapped as endangered or of concern support fauna that are protected under the NCA and EPBC Act. Table 12 provides a description and ecological value for each habitat type, while Figure 3-3 illustrates the distribution of habitats across the study area. It is important to note that the habitat boundaries have been based on the amended RE mapping layer. There is likely to be substantial variation in the ecological value within each habitat type. The habitat boundaries are also only as accurate as the RE mapping upon which they have been based.

### 3.6.2 Habitat Dynamics

A number of habitats within the study area are highly dynamic. Most habitats experience significant seasonal changes due to differences in rainfall and resulting water flows.

#### Seasonal Changes in Terrestrial Habitats

All terrestrial habitats in the study area display a seasonal change in vegetation structure. Most experience an increase in the height and density of the grassy understorey following the wet season and grasses typically seed during the wetter months. Resource availability for terrestrial fauna fluctuates accordingly. The seasonal increase in grasses and grass seeds provides refuge and foraging habitat for ground fauna and grassland-dwelling birds. Tree species in the study area also flower and fruit at different times of the year. These provide food resources for birds, arboreal mammals and flying foxes.

Within the study area, sources of freshwater are limited during the dry season (restricted to artificial dams and isolated ponds along rivers and ephemeral creeks). Freshwater bodies represent important wildlife refuges during the drier months. By retaining water, these areas not only provide drinking sites, but also retain shelter, microhabitats and food associated with persisting vegetation and fauna communities. Patterns of rainfall influence the distribution of fauna. Many animals tend



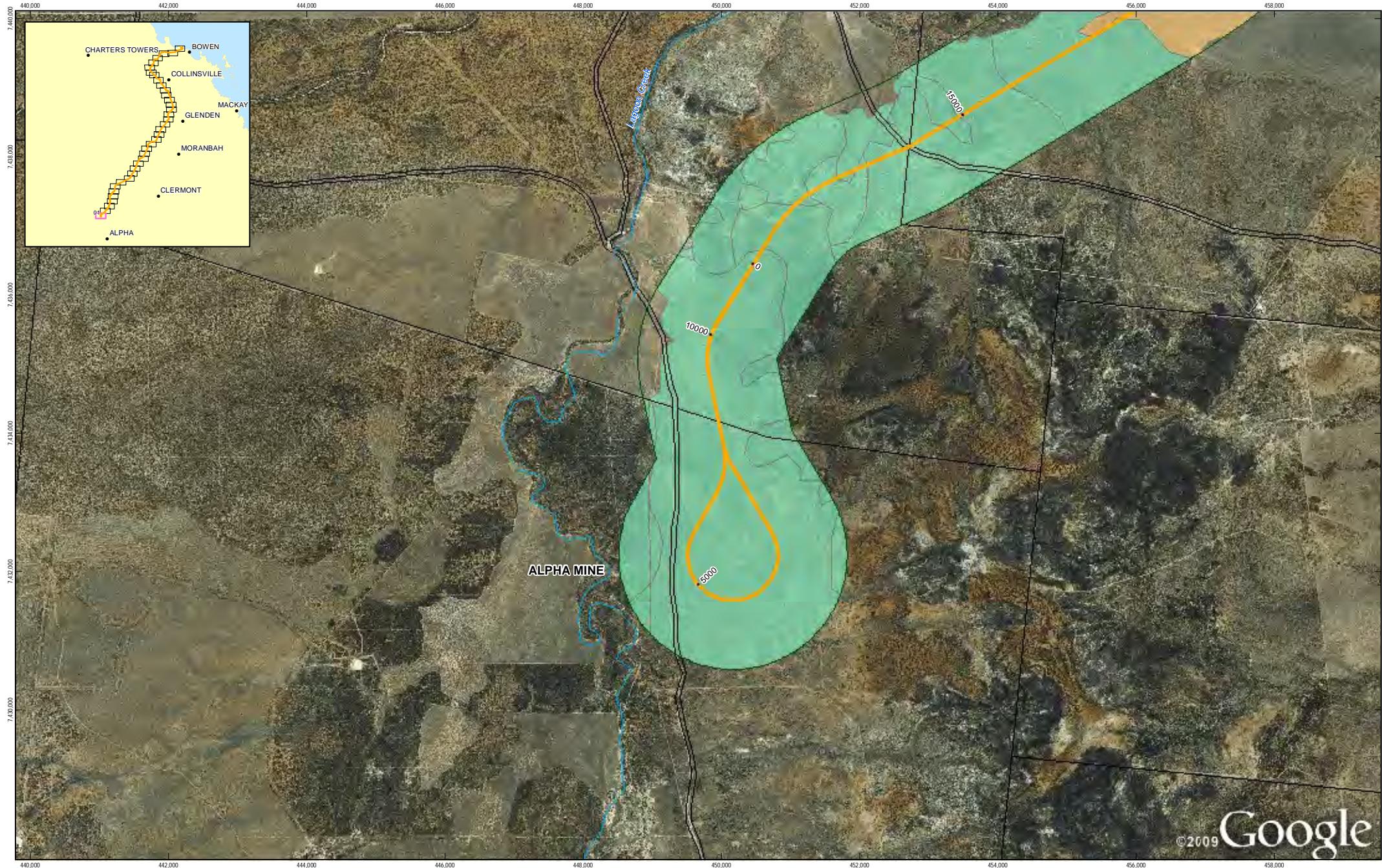
to contract to habitats adjacent to local water sources (i.e. rivers, streams, dams) during the dry season and then disperse in the wetter months.

### **Seasonal Changes in Wetland and Aquatic Habitats**

The seasonal changes in resource availability are most pronounced in wetland and aquatic habitats. Most streams and rivers within the study area are ephemeral in nature and only accommodate active fauna during the wet season. Many aquatic wildlife species have adapted to this seasonal trend in habitat availability. Most have developed strategies to cope with long periods of desiccation and short periods where habitat conditions are favourable for breeding, feeding, growth and development.

Gilgais are another strongly seasonal microhabitat type that occurs within the study area. Gilgais (or melonholes) are small rounded depressions formed in cracking clay soils. During the dry season, these small depressions have limited value, other than providing a refuge for reptiles and burrowing frogs. Following rainfalls, these depressions fill with water and aquatic macrophytes, becoming a rich source of flora and fauna diversity. Gilgais provide habitat for a wide range of terrestrial flora, birds, snakes, lizard and frogs.

Gilgais also have the potential to support a wide range of aquatic flora, turtles, fish, crustaceans and macro-invertebrates. As discussed in the aquatic report, gilgais have limited value for aquatic fauna during the dry season when they completely dry out to cracking clay soils.



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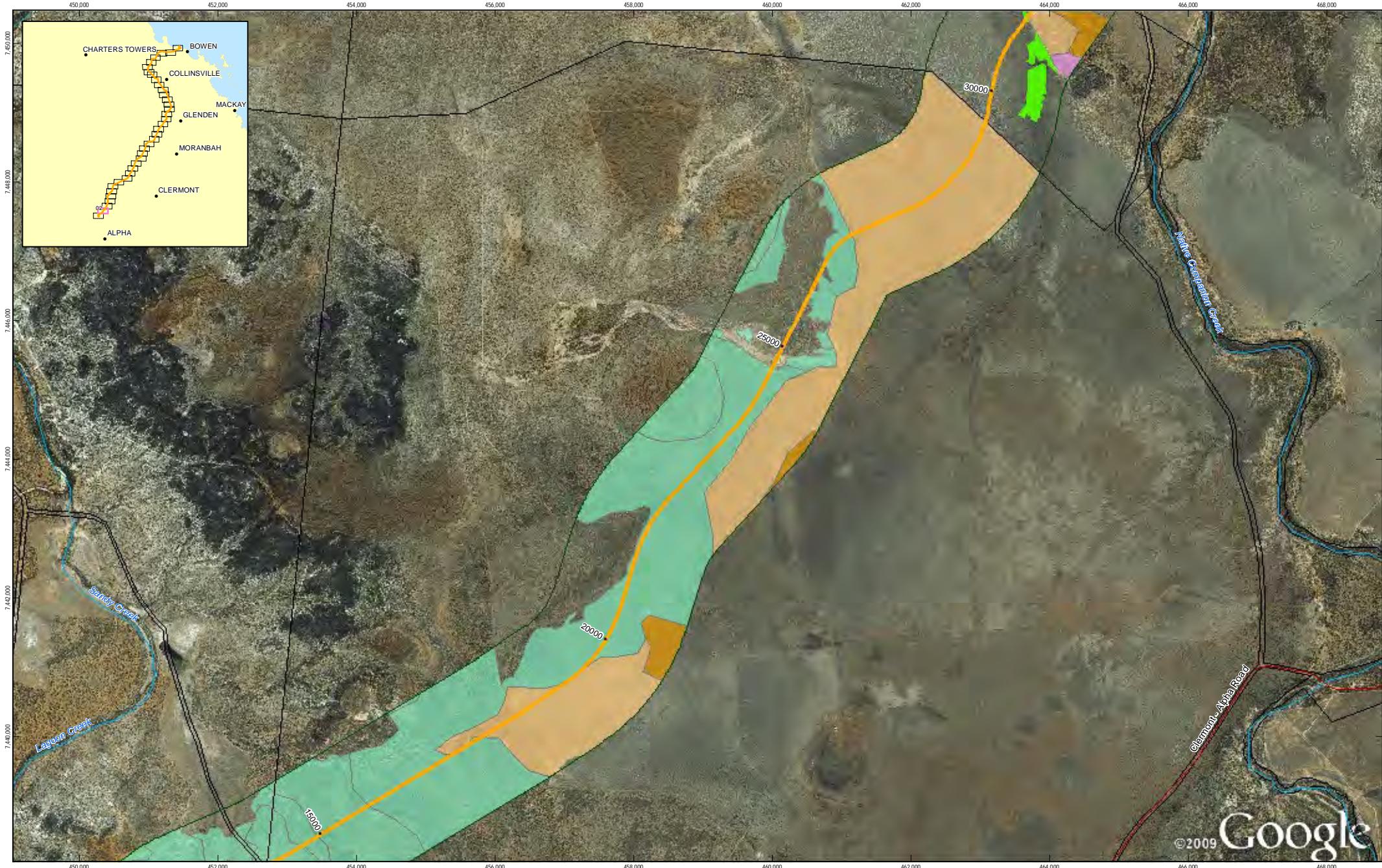
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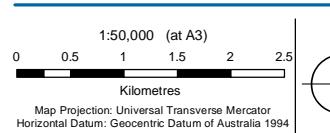
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Figure: 3-3  
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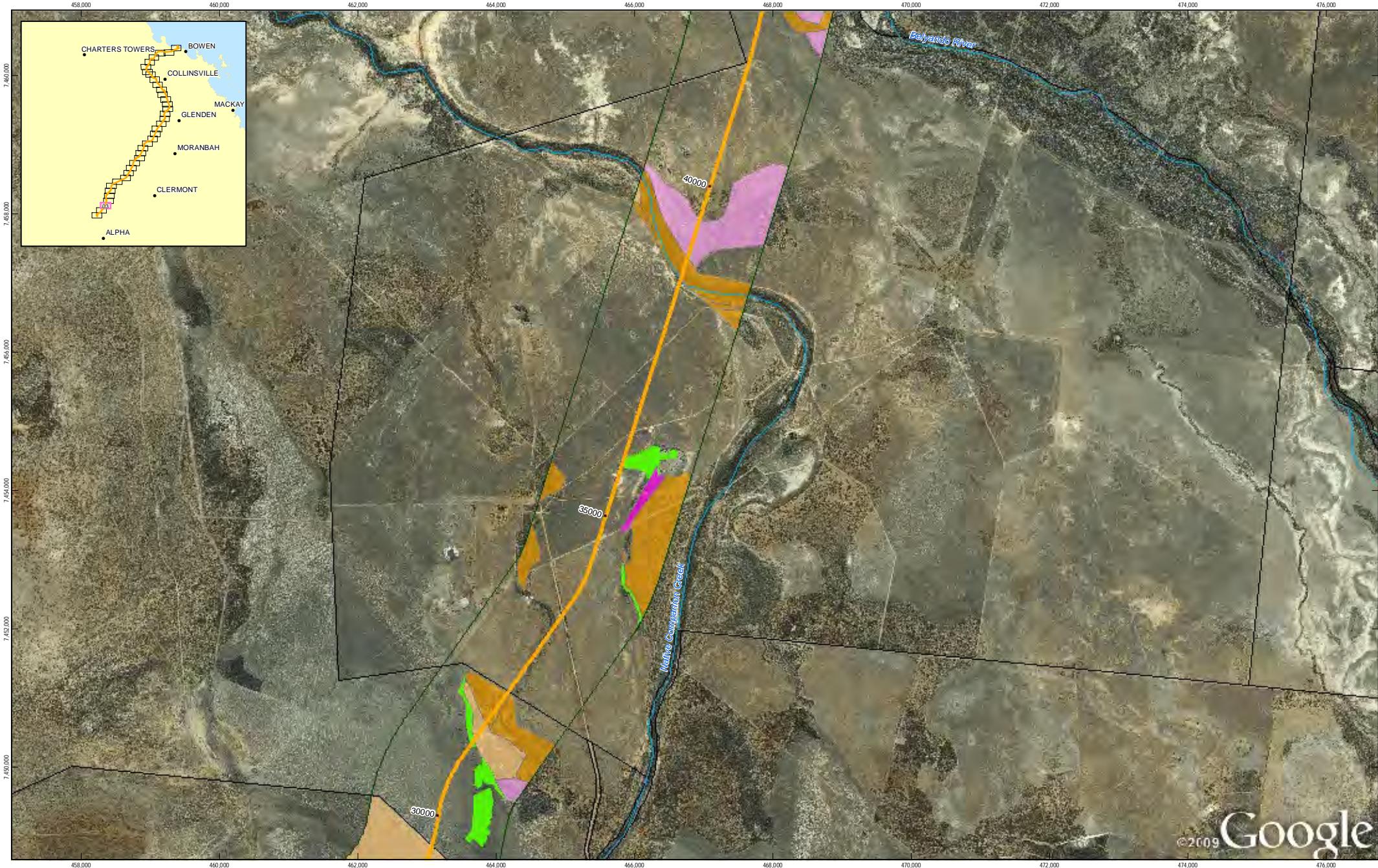


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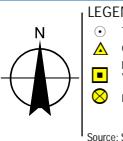
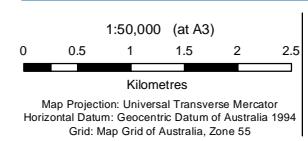
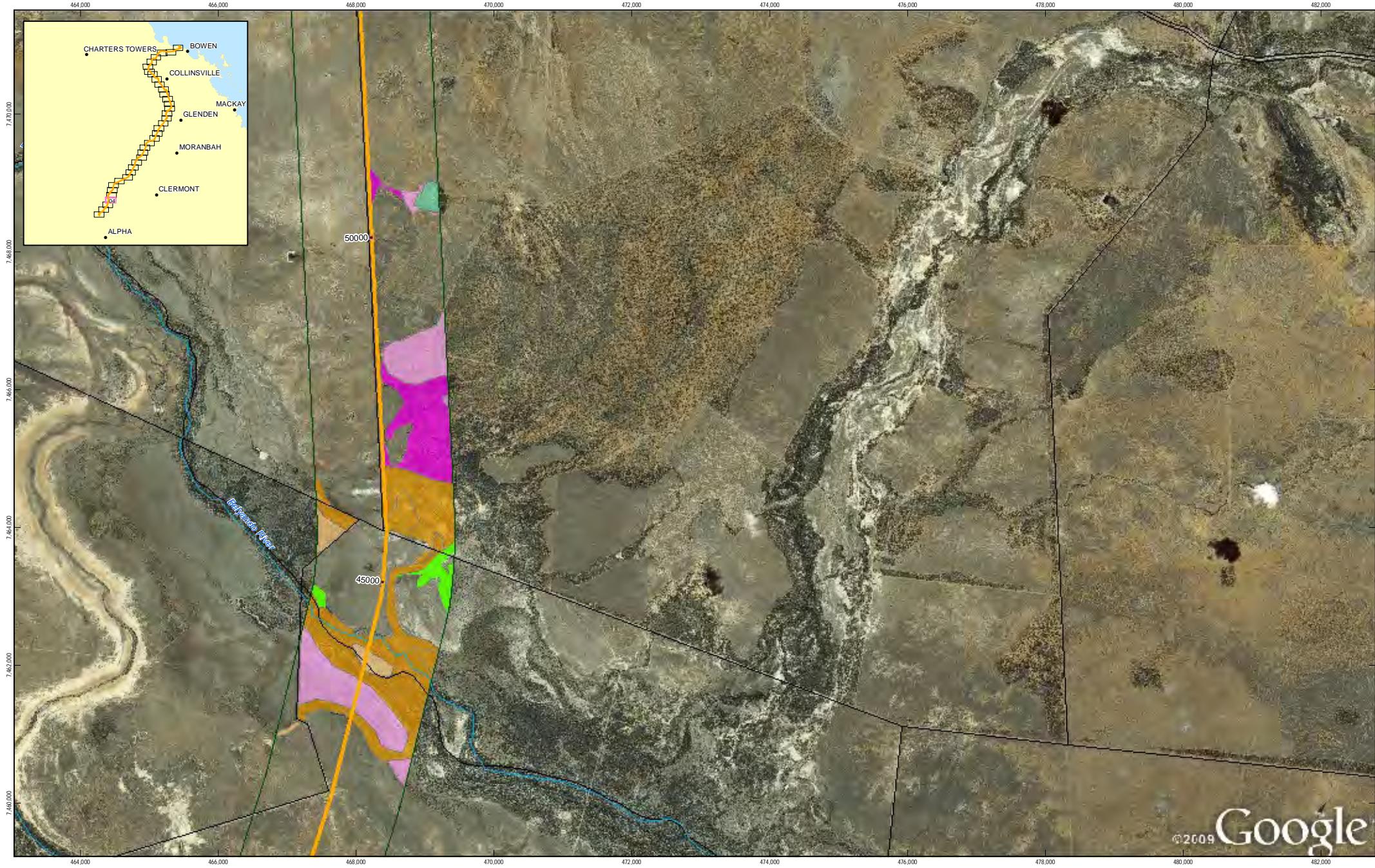


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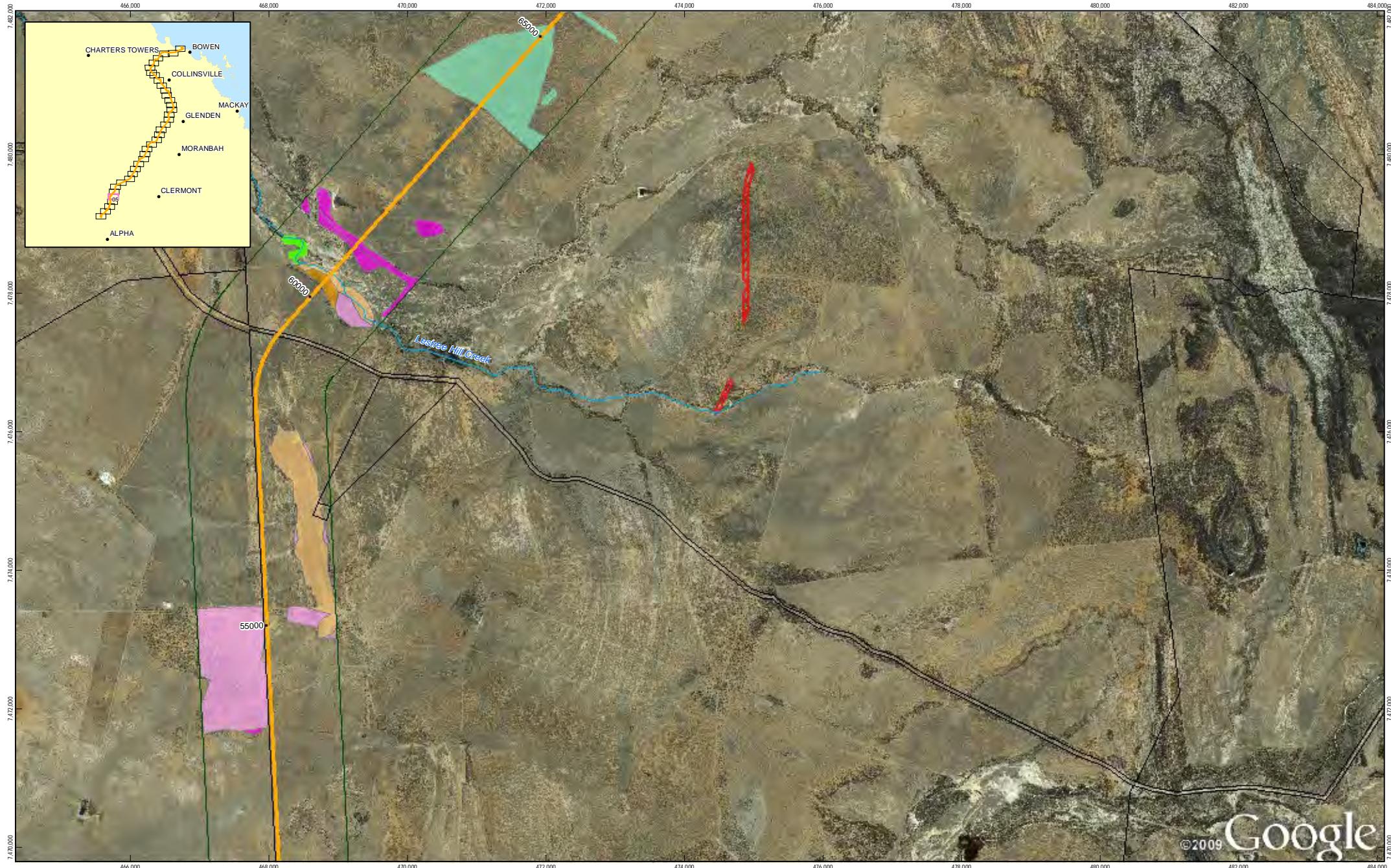
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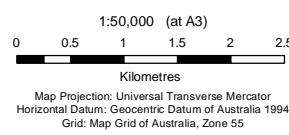
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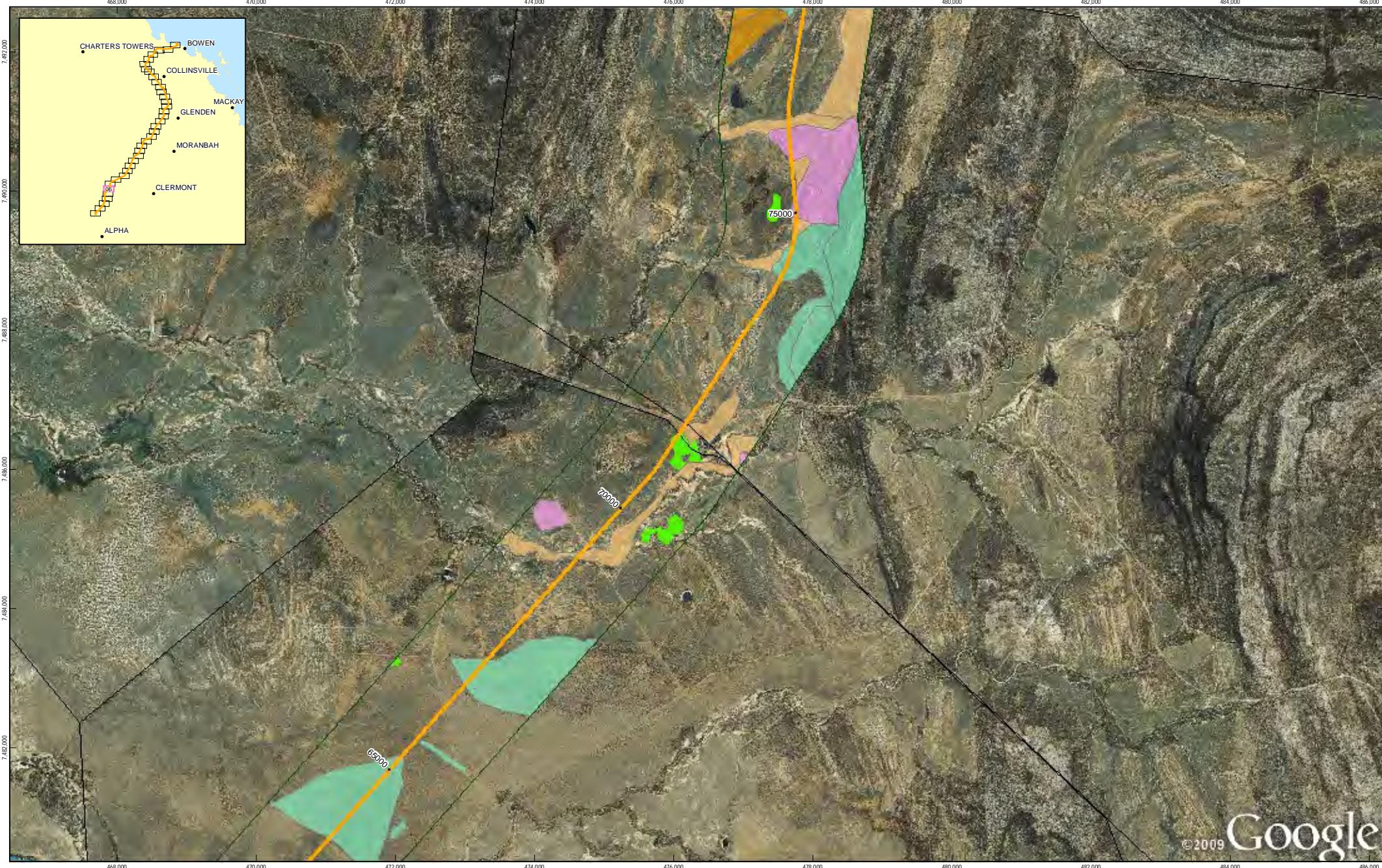
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N  
Legend  
Town  
Camp  
Marshalling Yards  
Depot  
State Road  
Existing Railway  
Watercourse  
Waterbody  
Cadastre  
2km Corridor

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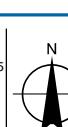
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Legend:  
 • Town  
 ▲ Camp  
 ■ Marshalling Yards  
 ○ Depot  
 — Proposed Alignment  
 — State Road  
 — Existing Railway  
 — Watercourse  
 — Cadastre  
 — 2km Corridor  
 ■ Essential Habitat  
 ■ High Value  
 ■ Regrowth  
 ■ Amended RE  
 ■ Waterbody  
 ■ Regional Ecosystems  
 ■ Not Of Concern  
 ■ Plantation Forest  
 ■ Endangered - Dominant  
 ■ Endangered - Sub-dominant  
 ■ Of Concern - Dominant  
 ■ Of Concern - Sub-dominant  
 ■ Non-Remnant / Regrowth

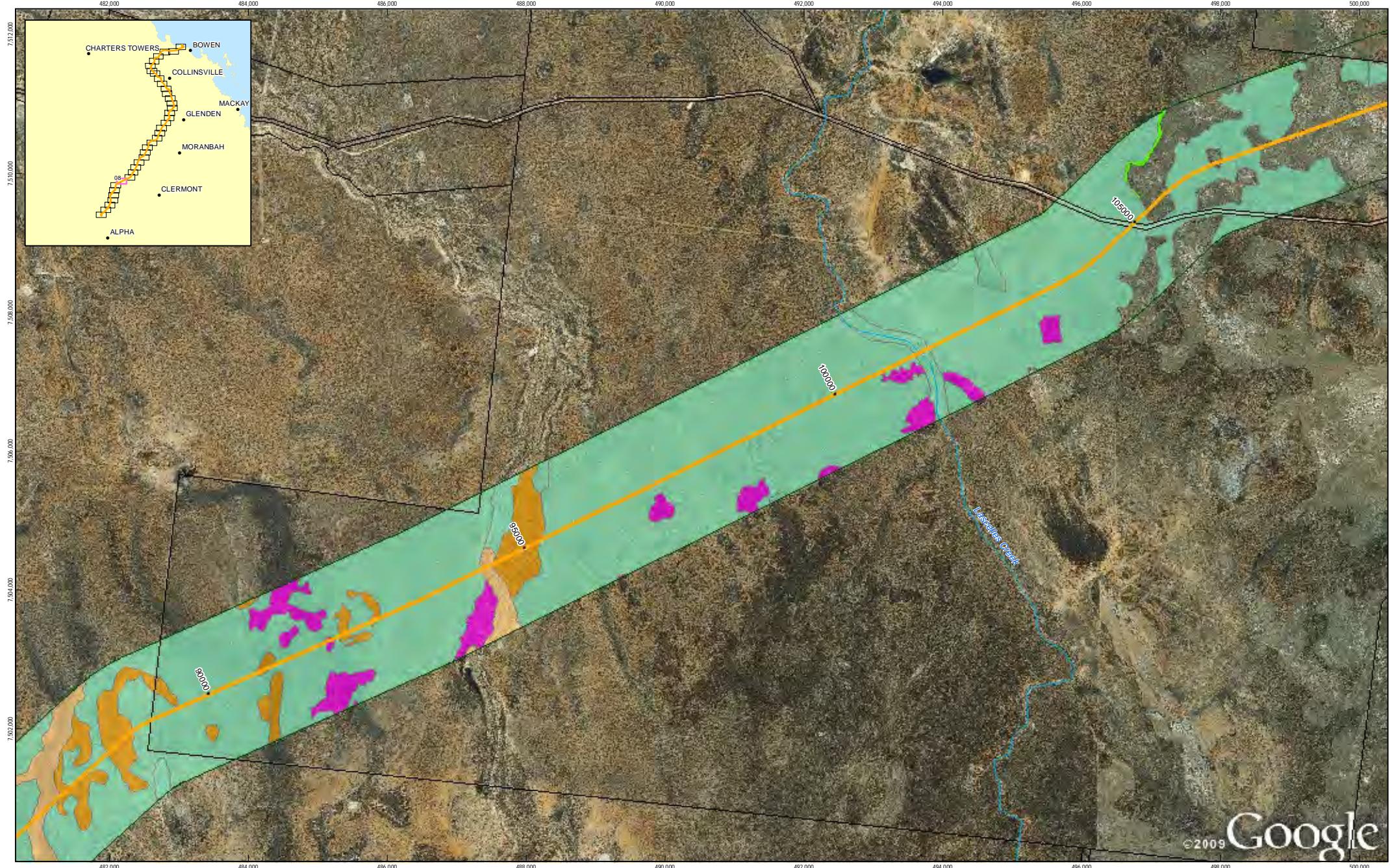
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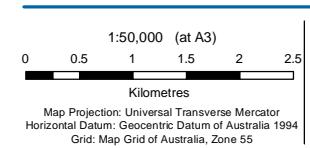
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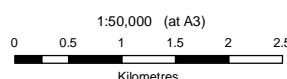
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## LEGEND

- This legend provides a key for the symbols used in the map:

  - Town**: Circle with dot
  - Camp**: Circle with cross
  - Marshalling Yards**: Circle with square
  - Depot**: Circle with circle
  - Proposed Alignment**: Yellow line
  - State Road**: Orange line
  - Existing Railway**: Black line
  - Watercourse**: Blue line
  - Waterbody**: Light blue line
  - Essential Habitat**: Green box
  - High Value**: Yellow box
  - Amended RE**: Red box with diagonal line
  - Cadastral**: White box with black border
  - Oasis Corridor**: White box with orange border
  - Regional Ecosystems**: Box with green border
  - Endangered -**: Box with red border
  - Endangered - Sub-dominant**: Box with pink border
  - Of Concern - Dominant**: Box with orange border
  - Of Concern - Sub-dominant**: Box with light orange border
  - Net Of Concern**: Green box
  - Plantation**: Yellow box
  - Non-Renaturalized**: White box
  - Regrowth**: Light grey box

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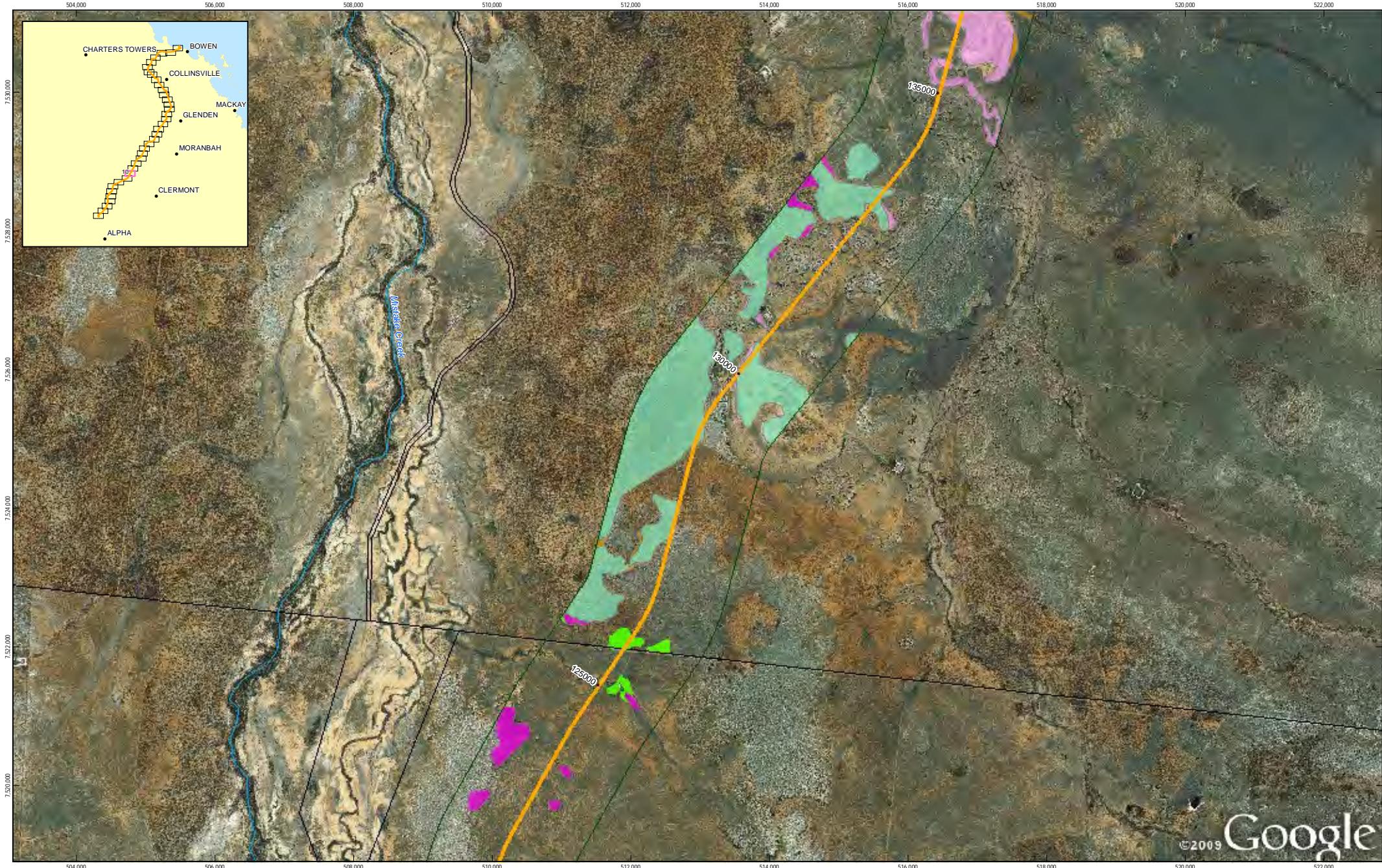
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LEGEND

- Town
- Camp
- State Road
- Marshalling Yards
- Existing Railway
- Watercourse
- Waterbody
- Depot
- Proposed Alignment
- Essential Habitat
- High Value Regrowth
- Endangered - Dominant
- Endangered - Sub-dominant
- Plantation Forest
- Regional Ecosystems
- Not Of Concern
- Of Concern - Dominant
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- Cadastre
- 2km Corridor
- Amended RE

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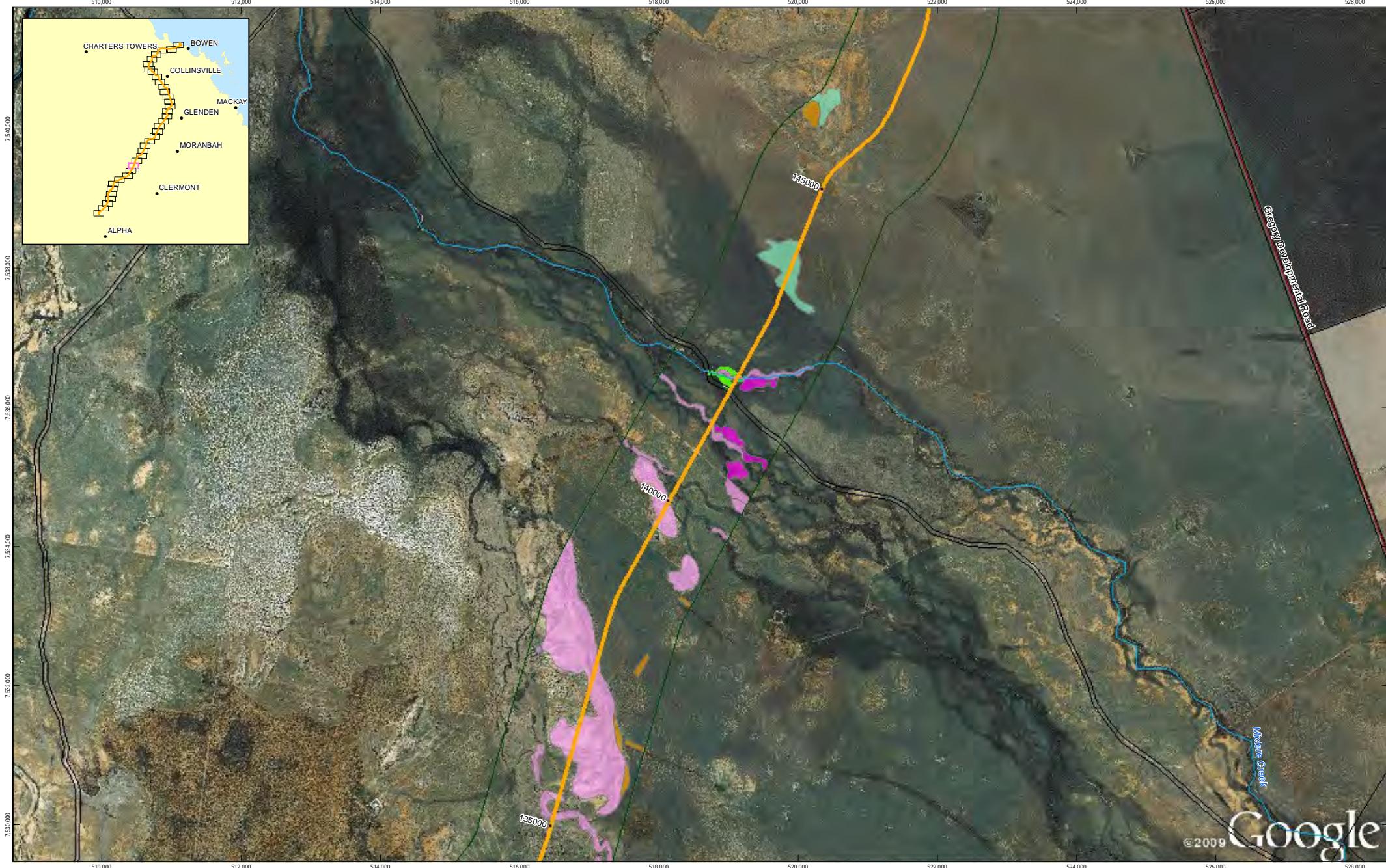
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LEGEND

- |                     |                      |                           |                        |
|---------------------|----------------------|---------------------------|------------------------|
| ● Town              | ○ Proposed Alignment | ■ Essential Habitat       | Regional Ecosystems    |
| ▲ Camp              | — State Road         | High Value                | Not Of Concern         |
| ■ Marshalling Yards | — Existing Railway   | Regrowth                  | Plantation Forest      |
| ● Depot             | — Watercourse        | Endangered - Dominant     | Non-Remnant / Regrowth |
|                     | — Cadastre           | Endangered - Sub-dominant |                        |
|                     | — 2km Corridor       | Of Concern - Dominant     |                        |
|                     |                      | Of Concern - Sub-dominant |                        |

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Job Number 41-22090  
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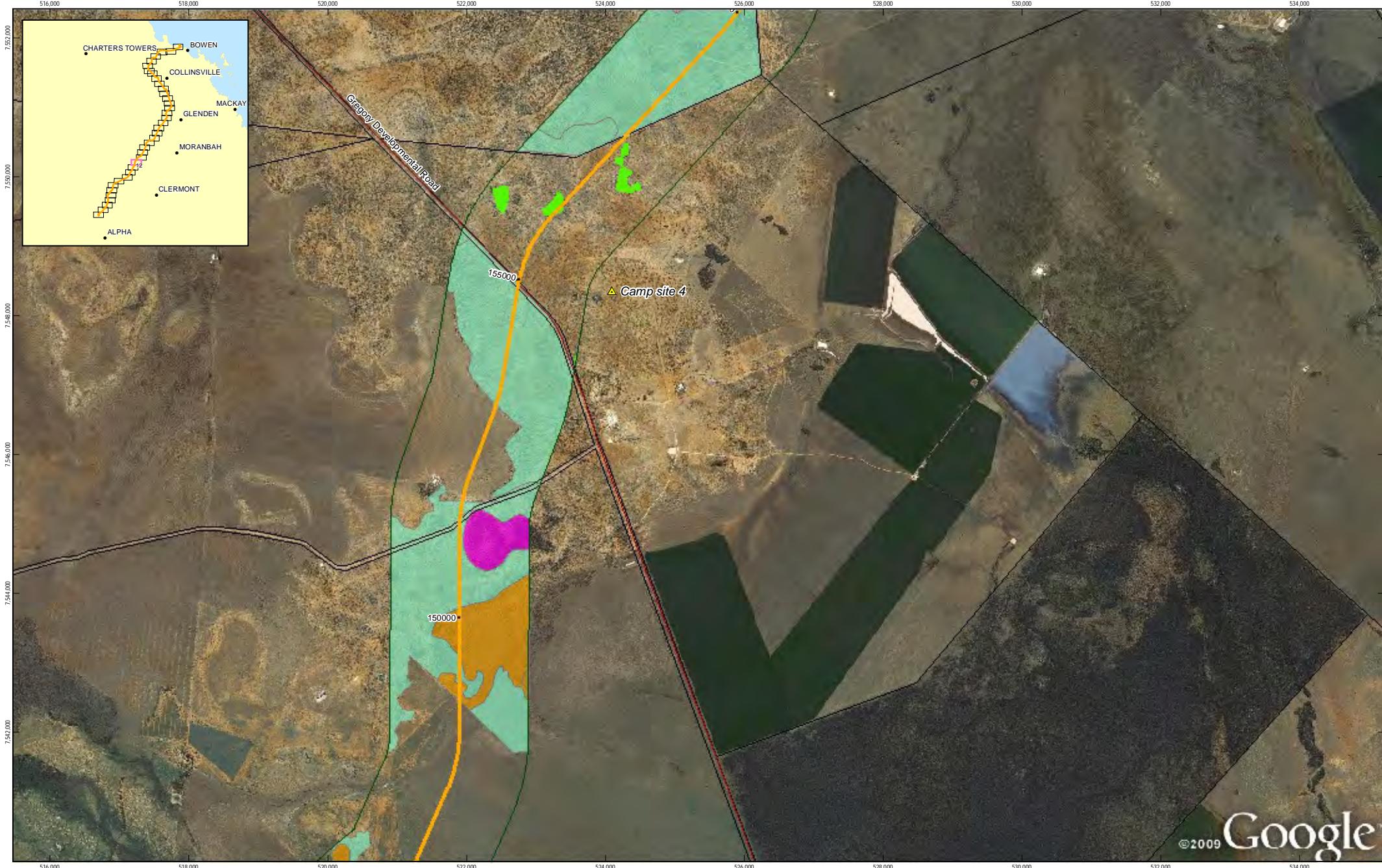
Figure: 3-3  
Sheet 11 of 37

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Horizontal Datum: Geocentric Datum of Australia 1994  
Grid: Map Grid of Australia, Zone 55

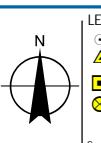


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## AMENDED REGIONAL ECOSYSTEMS AND HIGH VALUE REGROWTH



1:50,000 (at A3)  
0 0.5 1 1.5 2 2.5 Kilometres  
Map Projection: Universal Transverse Mercator  
Horizontal Datum: Geocentric Datum of Australia 1994  
Grid: Map Grid of Australia, Zone 55



LEGEND  
 ● Town  
 ▲ Camp  
 ■ Marshalling Yards  
 ○ Depot  
 — Proposed Alignment  
 — State Road  
 — Existing Railway  
 — Watercourse  
 — Waterbody  
 ■ Essential Habitat  
 ■ High Value Regrowth  
 ■ Endangered - Dominant  
 ■ Amended RE  
 ■ Watercourse  
 ■ 2km Corridor  
 ■ Regional Ecosystems  
 ■ Not Of Concern  
 ■ Plantation Forest  
 ■ Non-Renrant / Regrowth  
 ■ Of Concern - Dominant  
 ■ Of Concern - Sub-dominant

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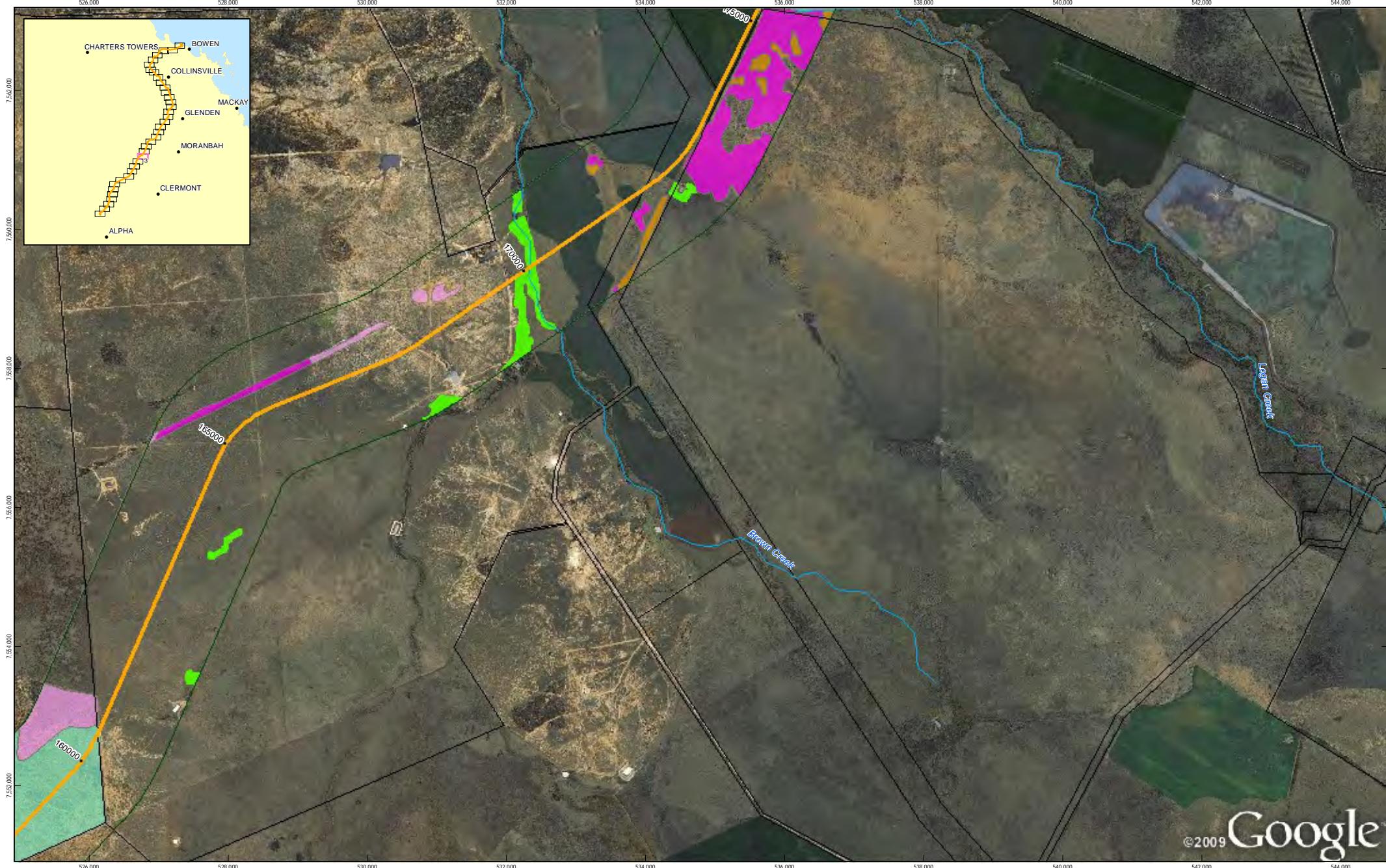
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Figure: 3-3  
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#### LEGEND

|                     |                      |                       |                             |                             |
|---------------------|----------------------|-----------------------|-----------------------------|-----------------------------|
| ● Town              | ○ Proposed Alignment | ■ Essential Habitat   | ■ Regional Ecosystems       | ■ Not Of Concern            |
| ▲ Camp              | — State Road         | ■ High Value Regrowth | ■ Endangered - Dominant     | ■ Plantation Forest         |
| ■ Marshalling Yards | — Existing Railway   | ■ Regrowth            | ■ Endangered - Sub-dominant | ■ Non-Remnant / Regrowth    |
| ● Depot             | ■ Watercourse        | ■ Amended RE          | ■ Of Concern - Dominant     | ■ Of Concern - Sub-dominant |
|                     | ■ Waterbody          | ■ Cadastre            |                             |                             |
|                     |                      | ■ 2km Corridor        |                             |                             |

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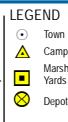
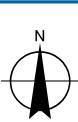
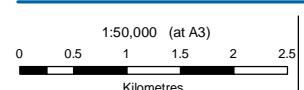
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## AMENDED REGIONAL ECOSYSTEMS AND HIGH VALUE REGROWTH

Figure: 3-3  
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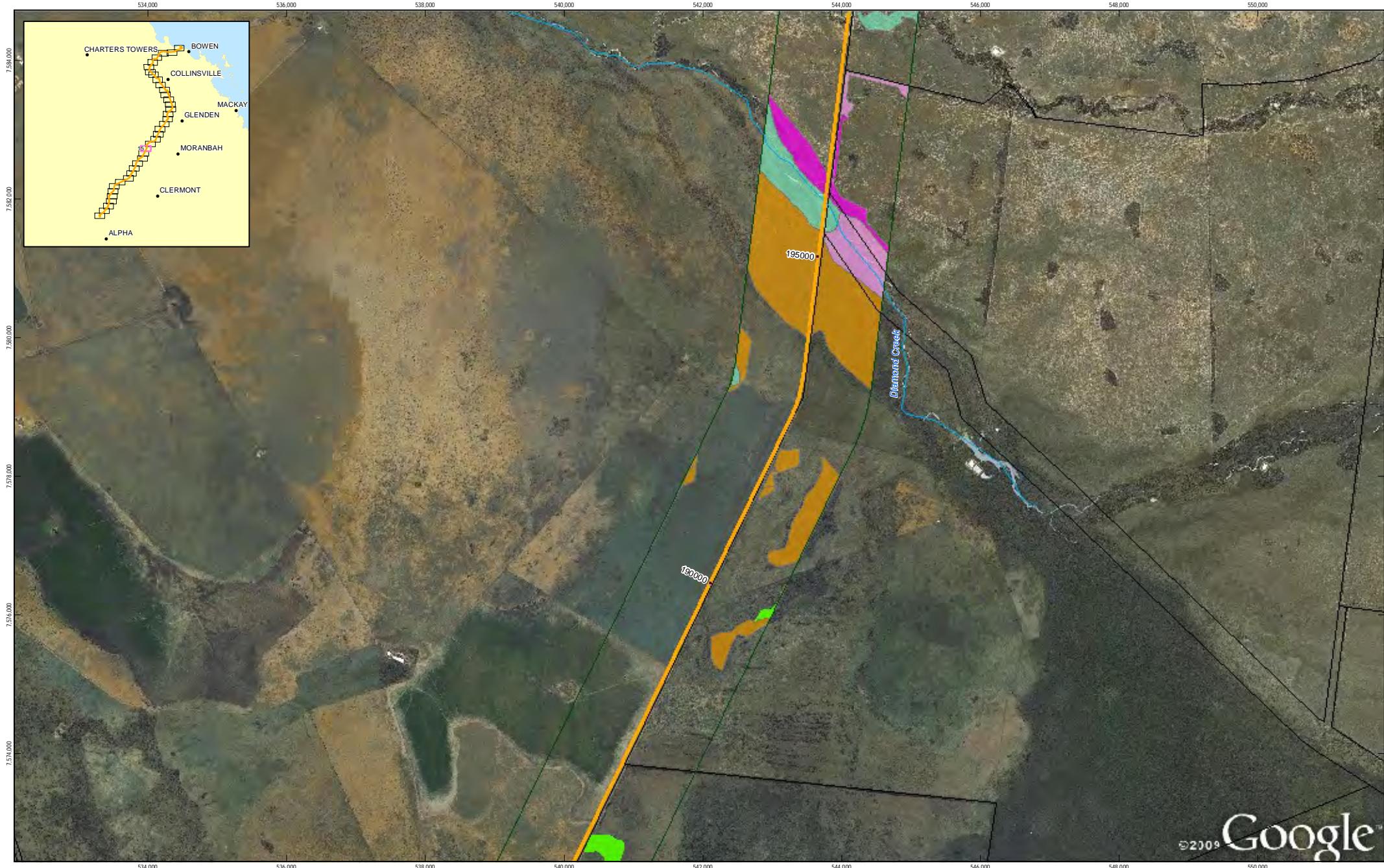
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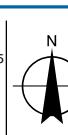
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1:50,000 (at A3)  
0 0.5 1 1.5 2 2.5 Kilometres  
Map Projection: Universal Transverse Mercator  
Horizontal Datum: Geocentric Datum of Australia 1994  
Grid: Map Grid of Australia, Zone 55



**LEGEND**

- Town
- Camp
- Marshalling Yards
- Depot
- Proposed Alignment
- State Road
- Existing Railway
- Watercourse
- Cadastre
- 2km Corridor
- Essential Habitat
- High Value Regrowth
- Amended RE
- Waterbody
- Regional Ecosystems
- Not Of Concern
- Plantation Forest
- Endangered - Dominant
- Endangered - Sub-dominant
- Of Concern - Dominant
- Of Concern - Sub-dominant
- Regrowth
- Non-Remnant / Non-Regrowth

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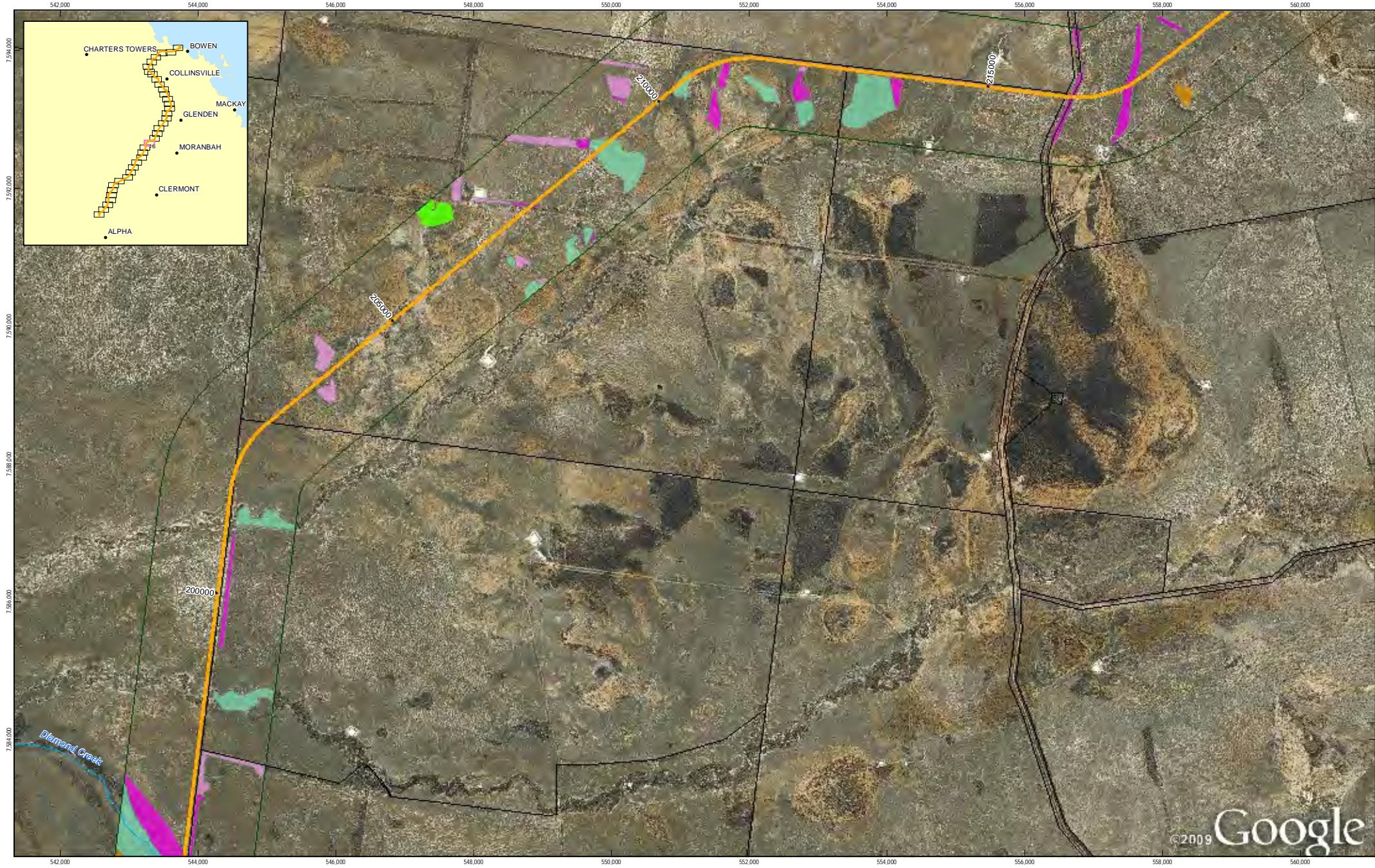
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1:50,000 (at A3)  
0 0.5 1 1.5 2 2.5 Kilometres  
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LEGEND  
● Town  
▲ Camp  
— State Road  
■ Marshalling Yards  
◆ Depot  
○ Existing Railway  
— Watercourse  
■ Waterbody  
■ 2km Corridor

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■ Essential Habitat  
■ High Value Regrowth  
■ Endangered - Dominant  
■ Endangered - Sub-dominant  
■ Amended RE  
■ Cadastre  
■ Plantation Forest  
■ Non-Remnant / Non-Regrowth  
■ Of Concern - Dominant  
■ Of Concern - Sub-dominant

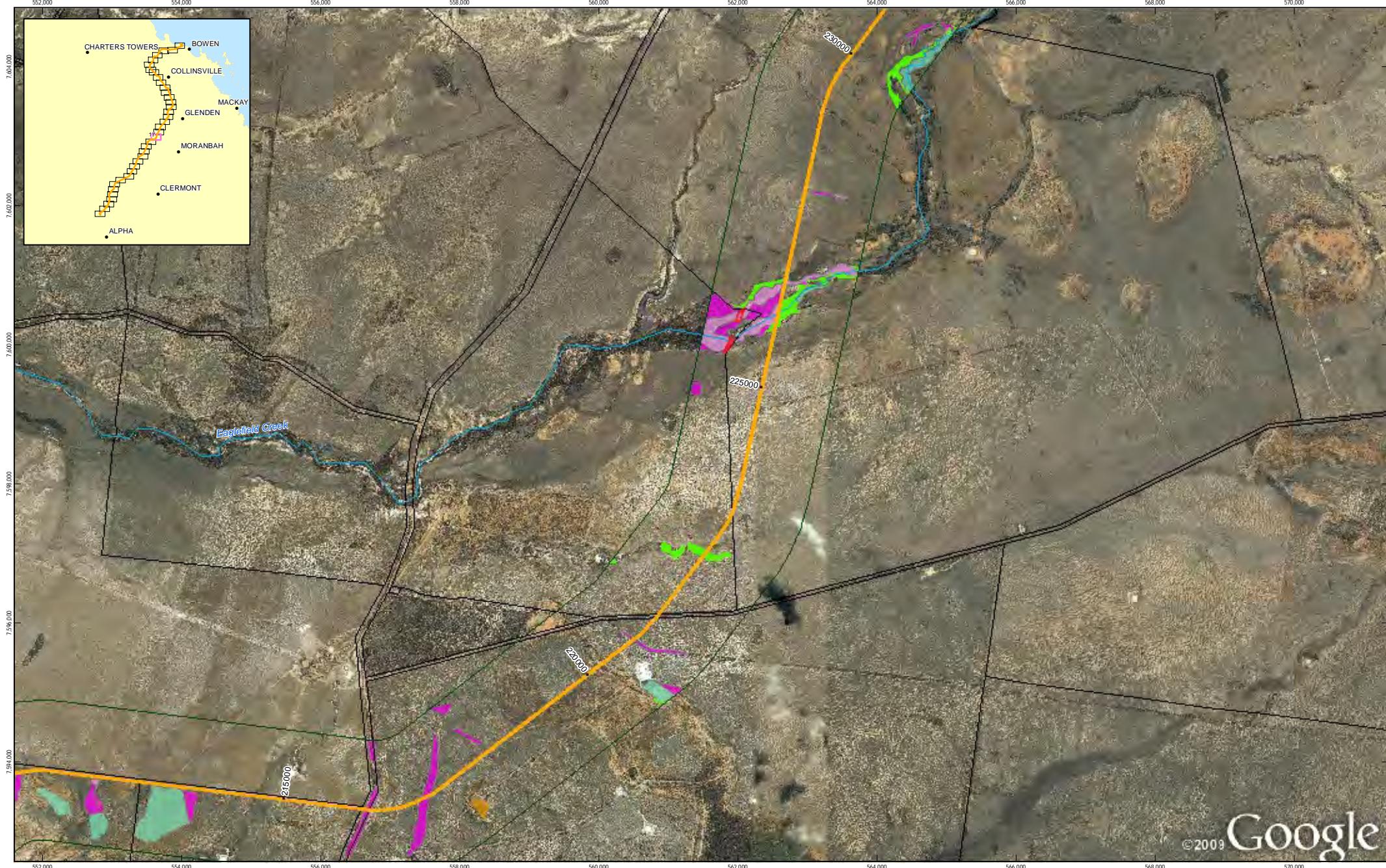
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1:50,000 (at A3)  
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Kilometres

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Horizontal Datum: Geocentric Datum of Australia 1994  
Grid: Map Grid of Australia, Zone 55

**LEGEND**

|                     |                      |                             |                             |                          |
|---------------------|----------------------|-----------------------------|-----------------------------|--------------------------|
| ● Town              | ○ Proposed Alignment | ■ Essential Habitat         | Regional Ecosystems         | Not Of Concern           |
| ▲ Camp              | — State Road         | ■ High Value Regrowth       | ■ Endangered - Dominant     | ■ Plantation Forest      |
| ■ Marshalling Yards | — Existing Railway   | ■ Endangered - Sub-dominant | ■ Of Concern - Dominant     | ■ Non-Remnant / Regrowth |
| ○ Depot             | — Watercourse        | ■ Cadastre                  | ■ Of Concern - Sub-dominant | ■ Regrowth               |
|                     | ■ Waterbody          | ■ 2km Corridor              |                             |                          |

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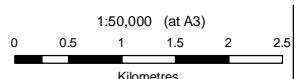
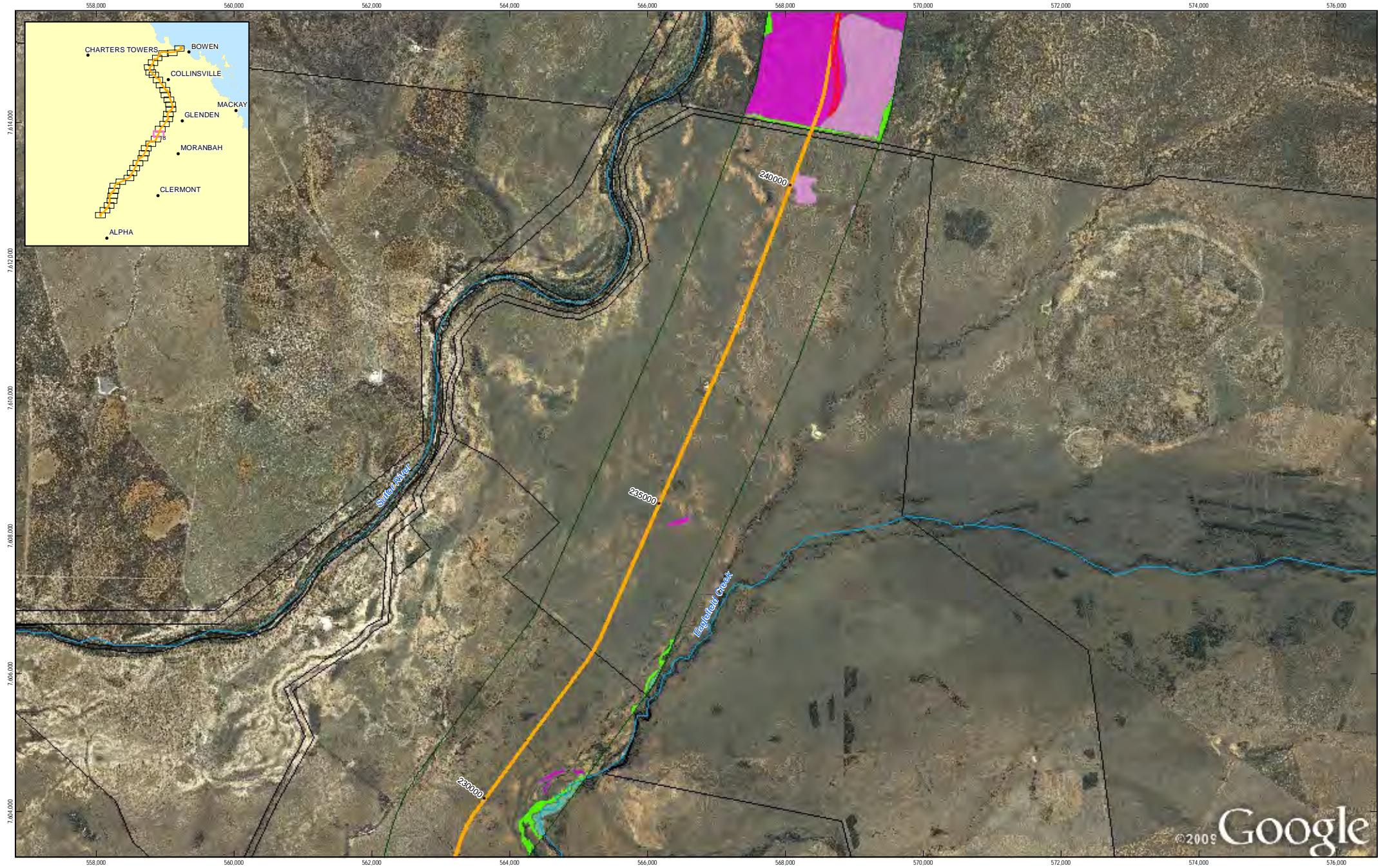
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## AMENDED REGIONAL ECOSYSTEMS AND HIGH VALUE REGROWTH

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The legend includes:  
 • Town  
 ▲ Campground  
 ■ Marshland  
 △ Yards  
 ○ Depot

Source: See C

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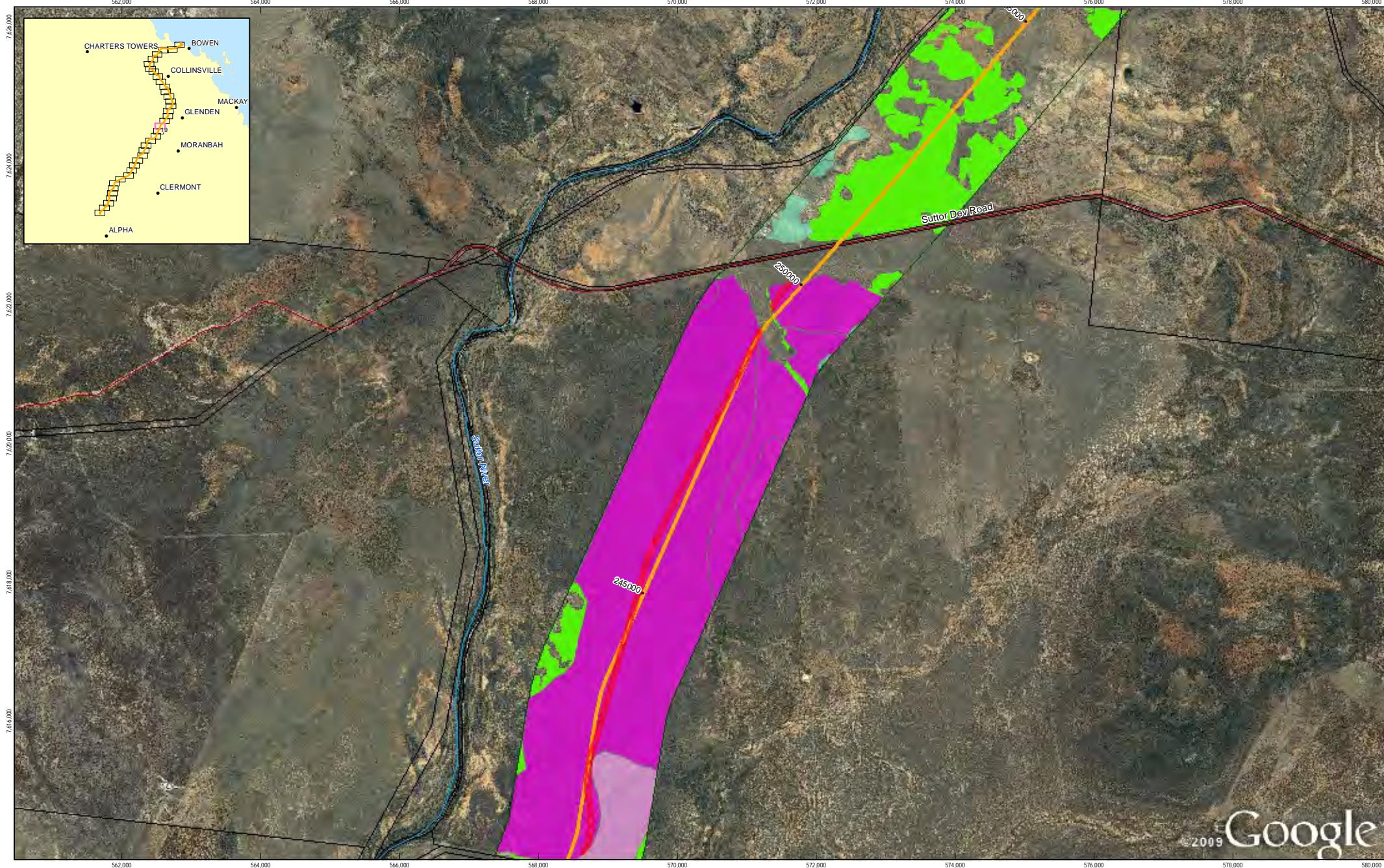
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# AMENDED REGIONAL ECOSYSTEMS AND HIGH VALUE REGROWTH

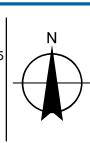
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| Job Number | 41-22090   |
| Revision   | A          |
| Date       | 10-08-2010 |

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1:50,000 (at A3)  
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Map Projection: Universal Transverse Mercator  
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Grid: Map Grid of Australia, Zone 55



LEGEND  
Town  
Camp  
Marshalling Yards  
Depot  
Proposed Alignment  
State Road  
Existing Railway  
Watercourse  
Waterbody  
Essential Habitat  
High Value  
Regrowth  
Endangered - Dominant  
Endangered - Sub-dominant  
Not Of Concern  
Plantation Forest  
Non-Remnant / Non-Of Concern  
Of Concern - Dominant  
Of Concern - Sub-dominant  
Regional Ecosystems  
2km Corridor

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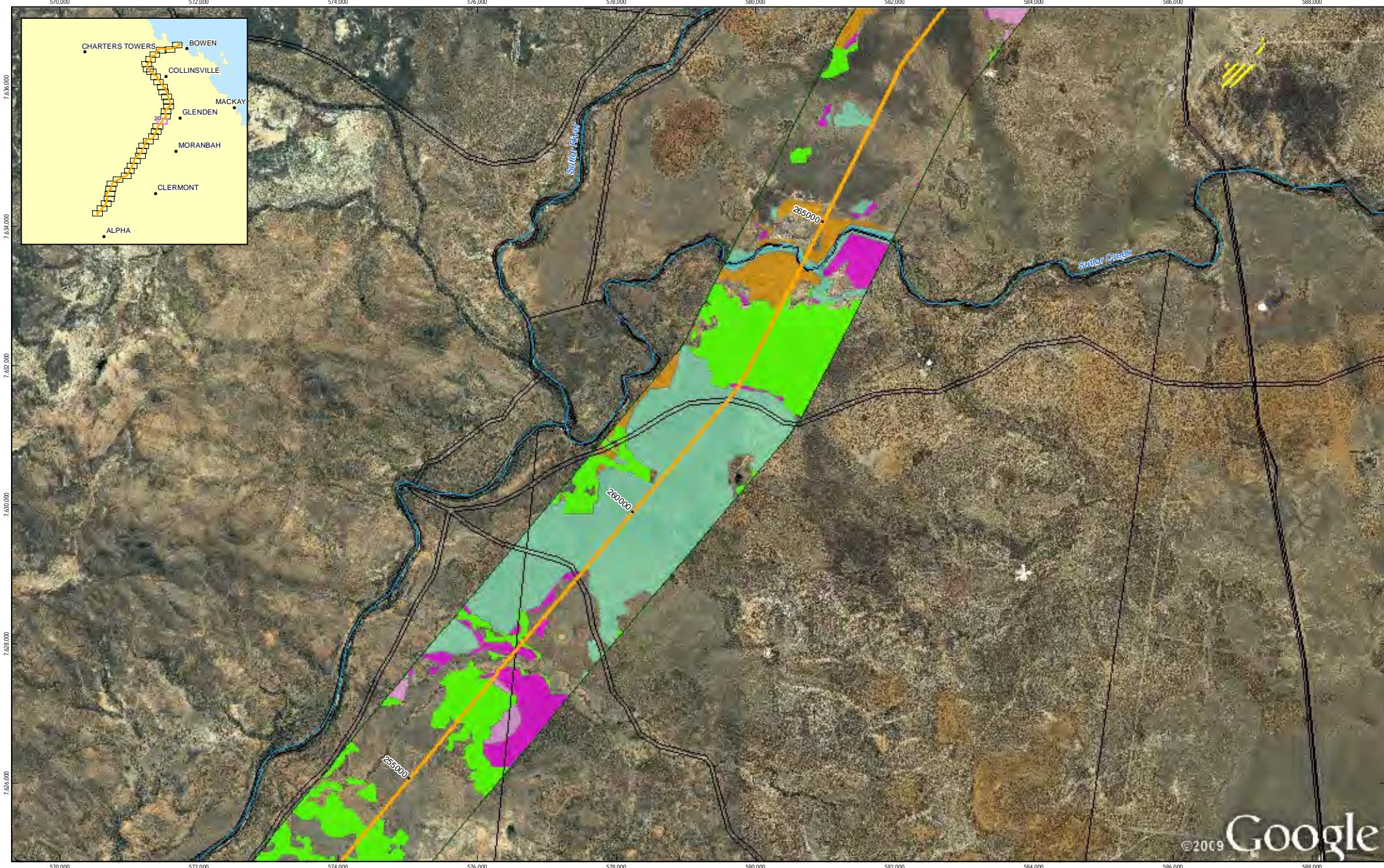
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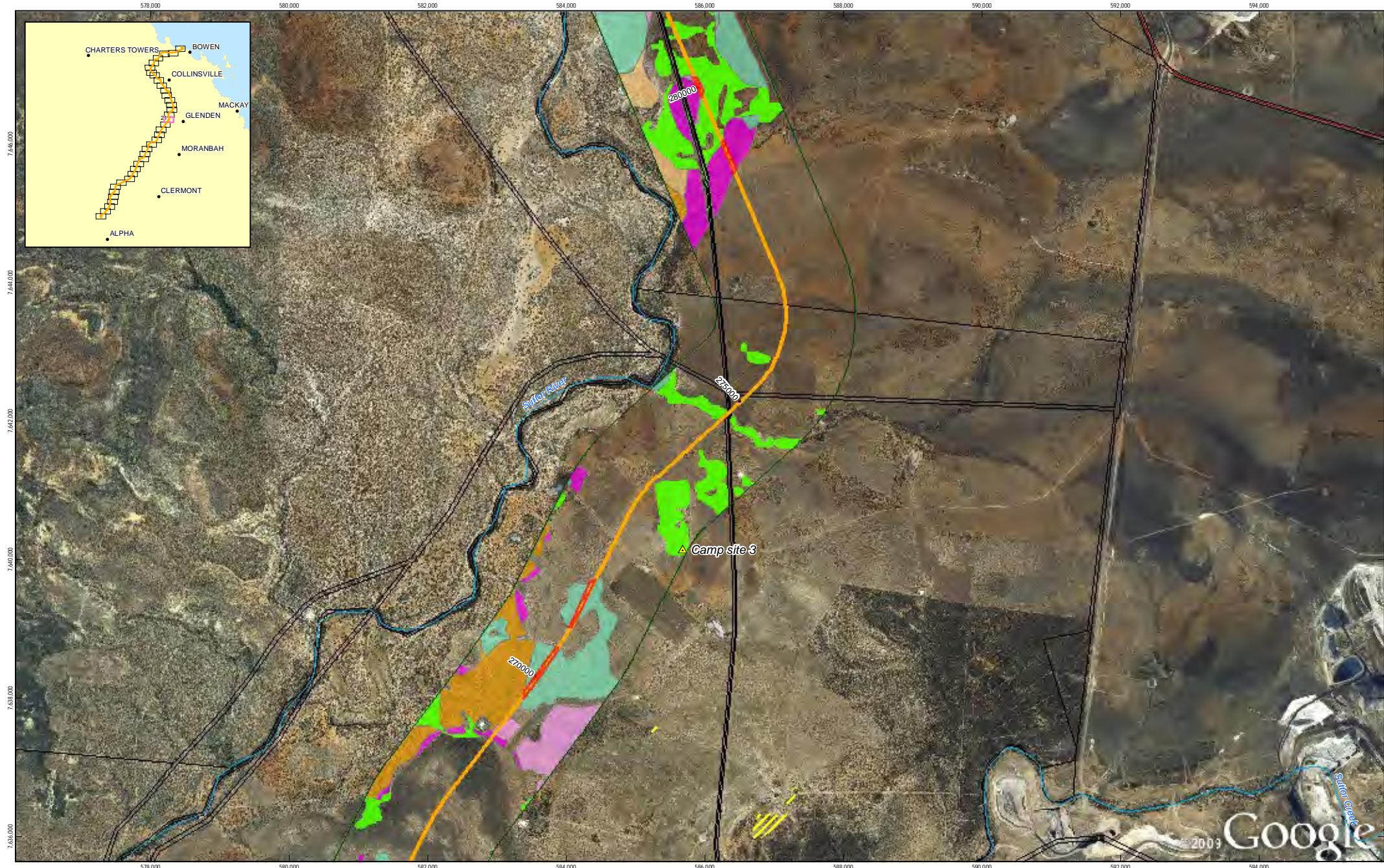
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1:50,000 (at A3)  
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Map Projection: Universal Transverse Mercator  
Horizontal Datum: Geocentric Datum of Australia 1994  
Grid: Map Grid of Australia, Zone 55



**LEGEND**  
 ● Town  
 ▲ Camp  
 ■ Marshalling Yards  
 ○ Depot  
 ○ Proposed Alignment  
 ━ State Road  
 ━ Existing Railway  
 ━ Watercourse  
 ━ Waterbody  
 △ Essential Habitat  
 □ High Value Regrowth  
 □ Amended RE  
 □ Cadastre  
 □ 2km Corridor  
 □ Regional Ecosystems  
 □ Not Of Concern  
 □ Plantation Forest  
 □ Endangered - Dominant  
 □ Endangered - Sub-dominant  
 □ Of Concern - Dominant  
 □ Of Concern - Sub-dominant  
 □ Non-Remnant / Non-Regrowth

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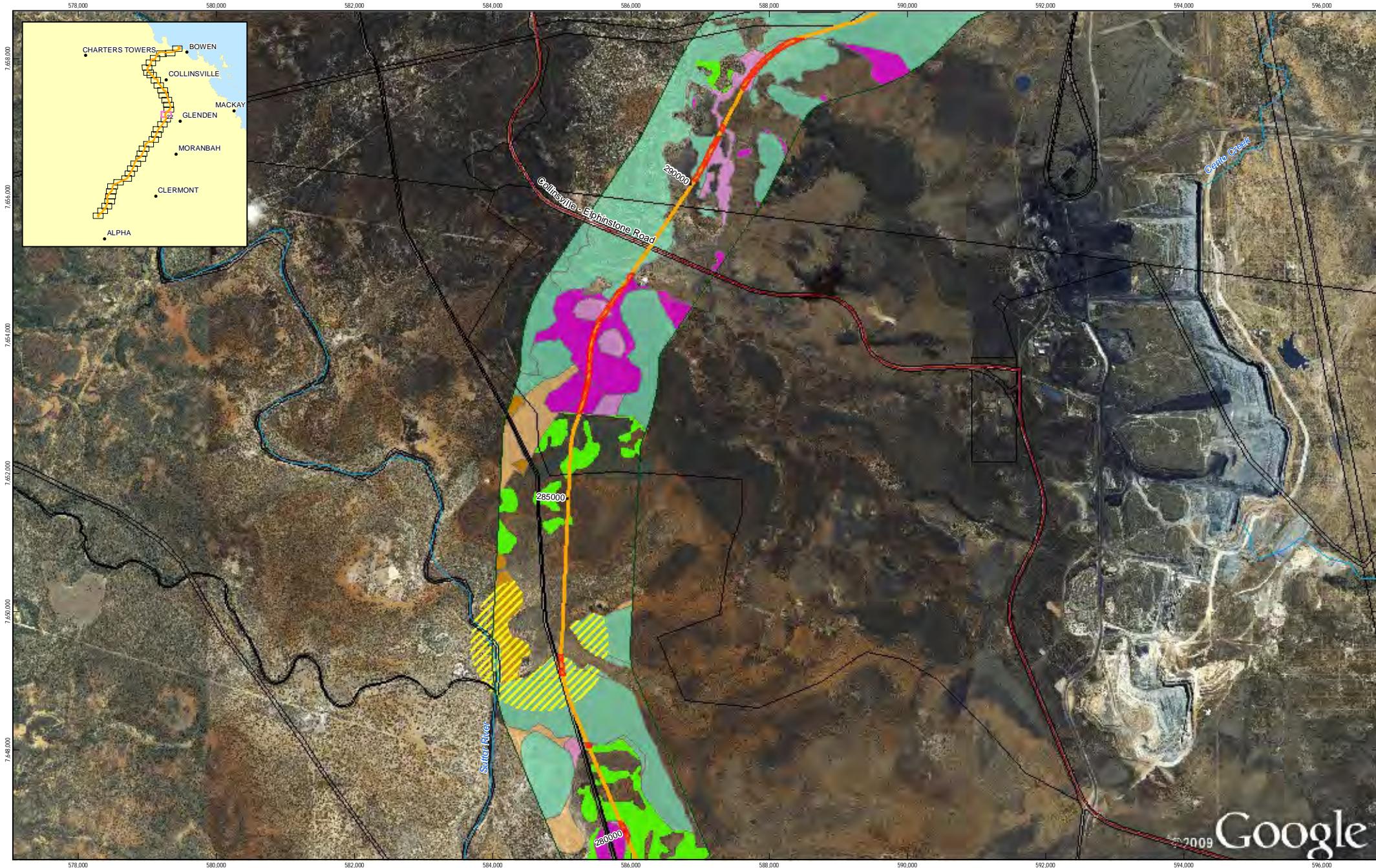
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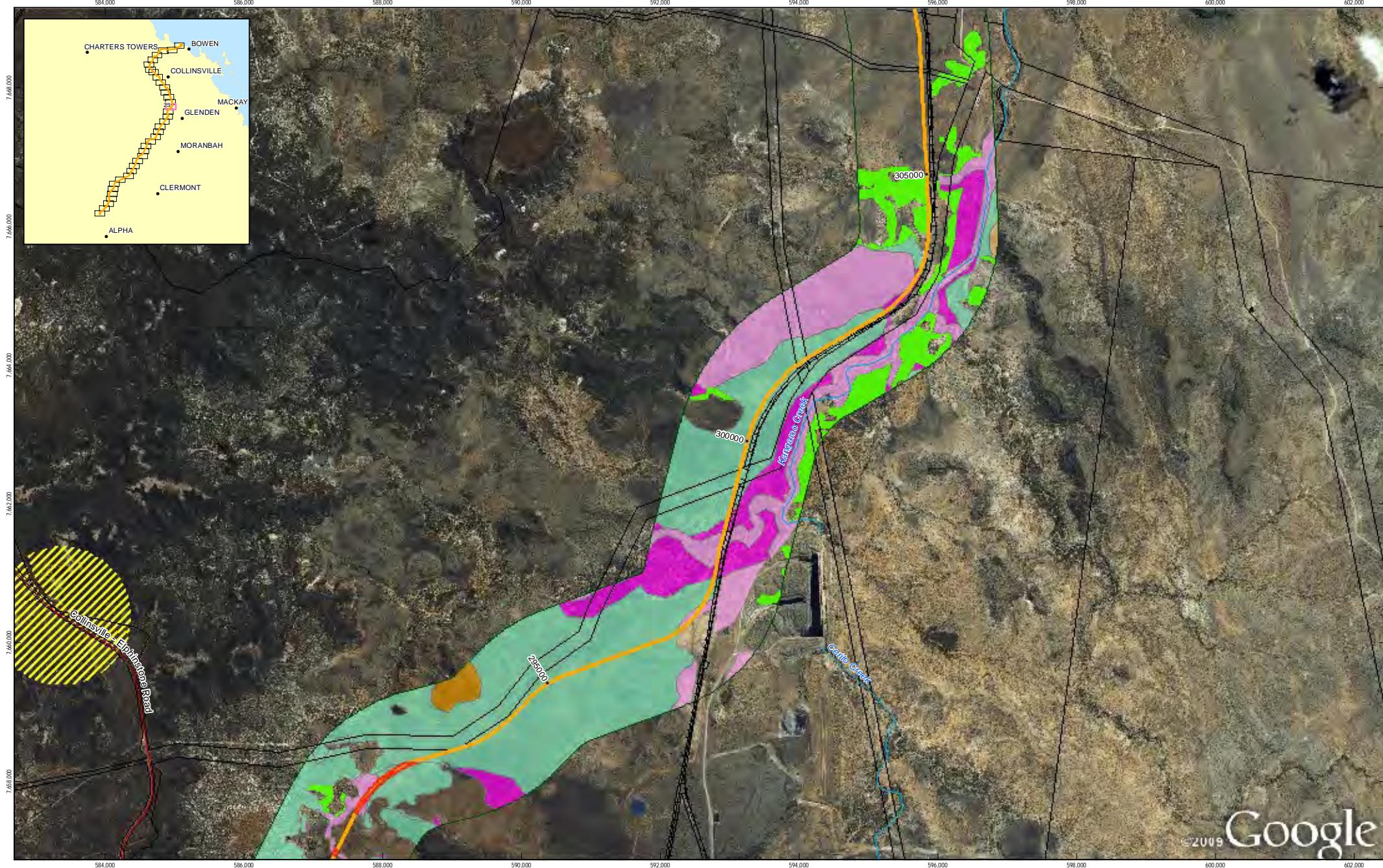
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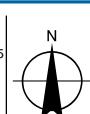
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Revision A  
Date 10-08-2010

Figure: 3-3  
Sheet 22 of 37



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Map Projection: Universal Transverse Mercator  
Horizontal Datum: Geocentric Datum of Australia 1994  
Grid: Map Grid of Australia, Zone 55



LEGEND  
Town  
Camp  
Marshalling Yards  
Depot  
Proposed Alignment  
State Road  
Existing Railway  
Watercourse  
Waterbody  
Essential Habitat  
High Value Regrowth  
Regional Ecosystems  
Plantation Forest  
Endangered - Dominant  
Endangered - Sub-dominant  
Of Concern - Dominant  
Of Concern - Sub-dominant  
Not Of Concern  
Non-Remnant / Non-Restored  
Regrowth  
Amended RE  
Cadastre  
2km Corridor

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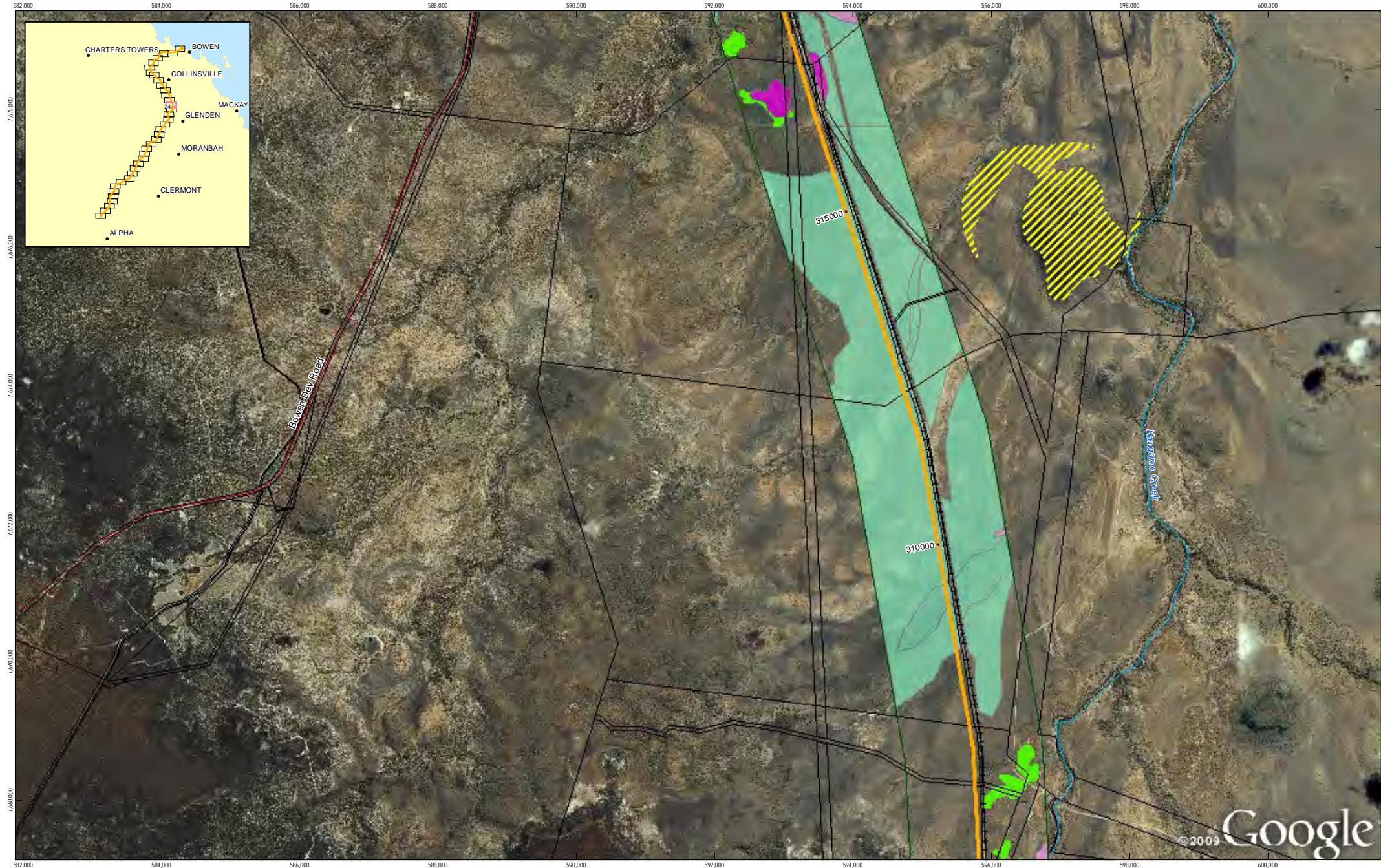
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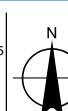
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0 0.5 1 1.5 2 2.5 Kilometres  
Map Projection: Universal Transverse Mercator  
Horizontal Datum: Geocentric Datum of Australia 1994  
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LEGEND  
 ● Town  
 ▲ Camp  
 □ Marshalling Yards  
 ○ Depot  
 ○ Proposed Alignment  
 ■ State Road  
 ┌ Existing Railway  
 └ Amended RE  
 ─ Watercourse  
 ┌ Cadastre  
 └ 2km Corridor  
 ◻ Essential Habitat  
 ■ High Value Regrowth  
 ■ Endangered - Dominant  
 ■ Endangered - Sub-dominant  
 ■ Plantation Forest  
 ■ Non-Remnant / Non-Regrowth  
 ■ Of Concern - Dominant  
 ■ Of Concern - Sub-dominant  
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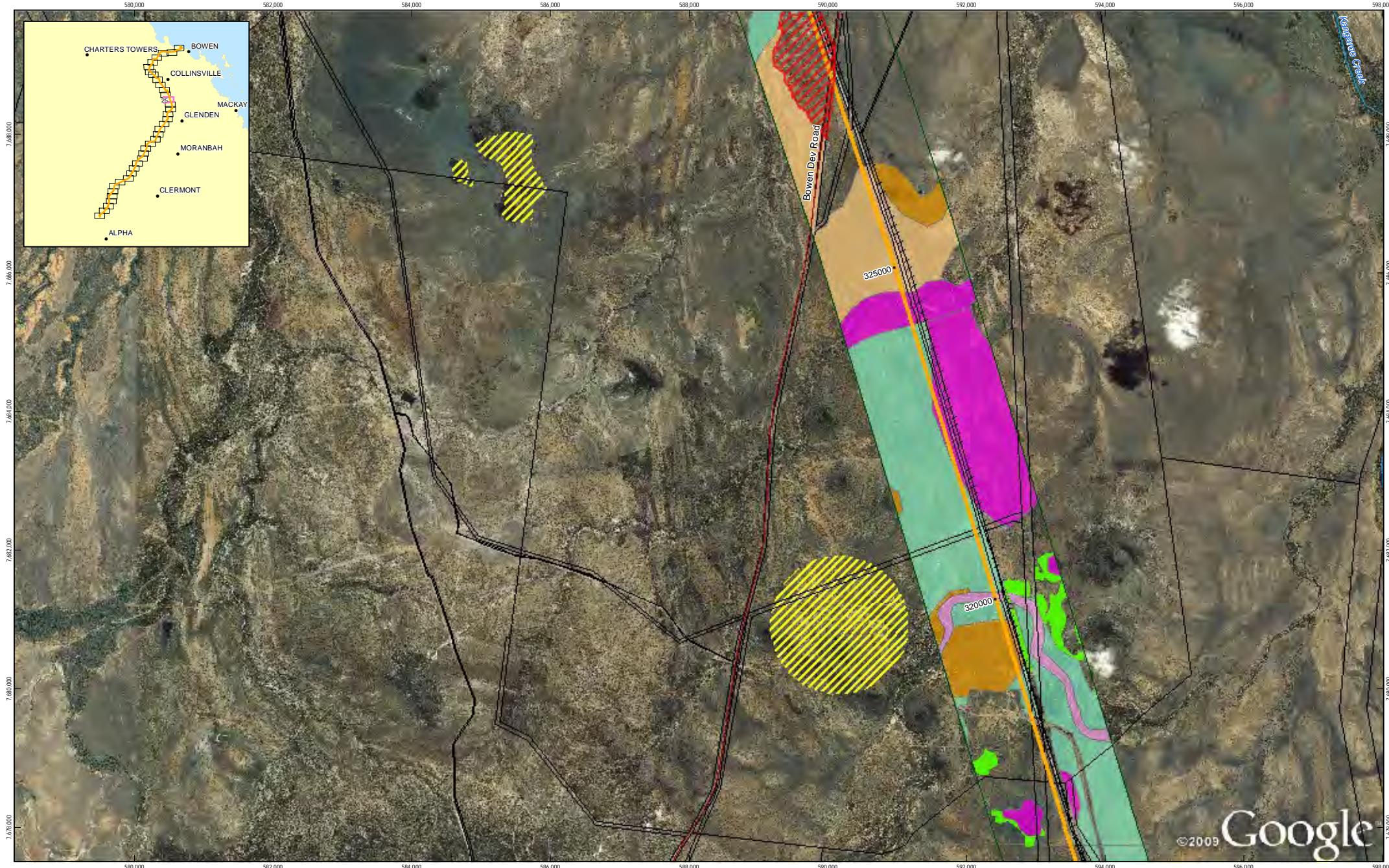
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## AMENDED REGIONAL ECOSYSTEMS AND HIGH VALUE REGROWTH

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Grid: Map Grid of Australia, Zone 55



**LEGEND**  
 • Town  
 ▲ Camp  
 ■ Marshalling Yards  
 ○ Depot  
 — State Road  
 — Existing Railway  
 — Watercourse  
 — Cadastre  
 — 2km Corridor  
 ■ Proposed Alignment  
 ■ Essential Habitat  
 — Existing Railway  
 — Watercourse  
 — Waterbody  
 ■ High Value Regrowth  
 ■ Endangered - Dominant  
 ■ Endangered - Sub-dominant  
 ■ Of Concern - Dominant  
 ■ Of Concern - Sub-dominant  
 ■ Regional Ecosystems  
 ■ Not Of Concern  
 ■ Plantation Forest  
 ■ Non-Remnant / Regrowth  
 ■ Regrowth

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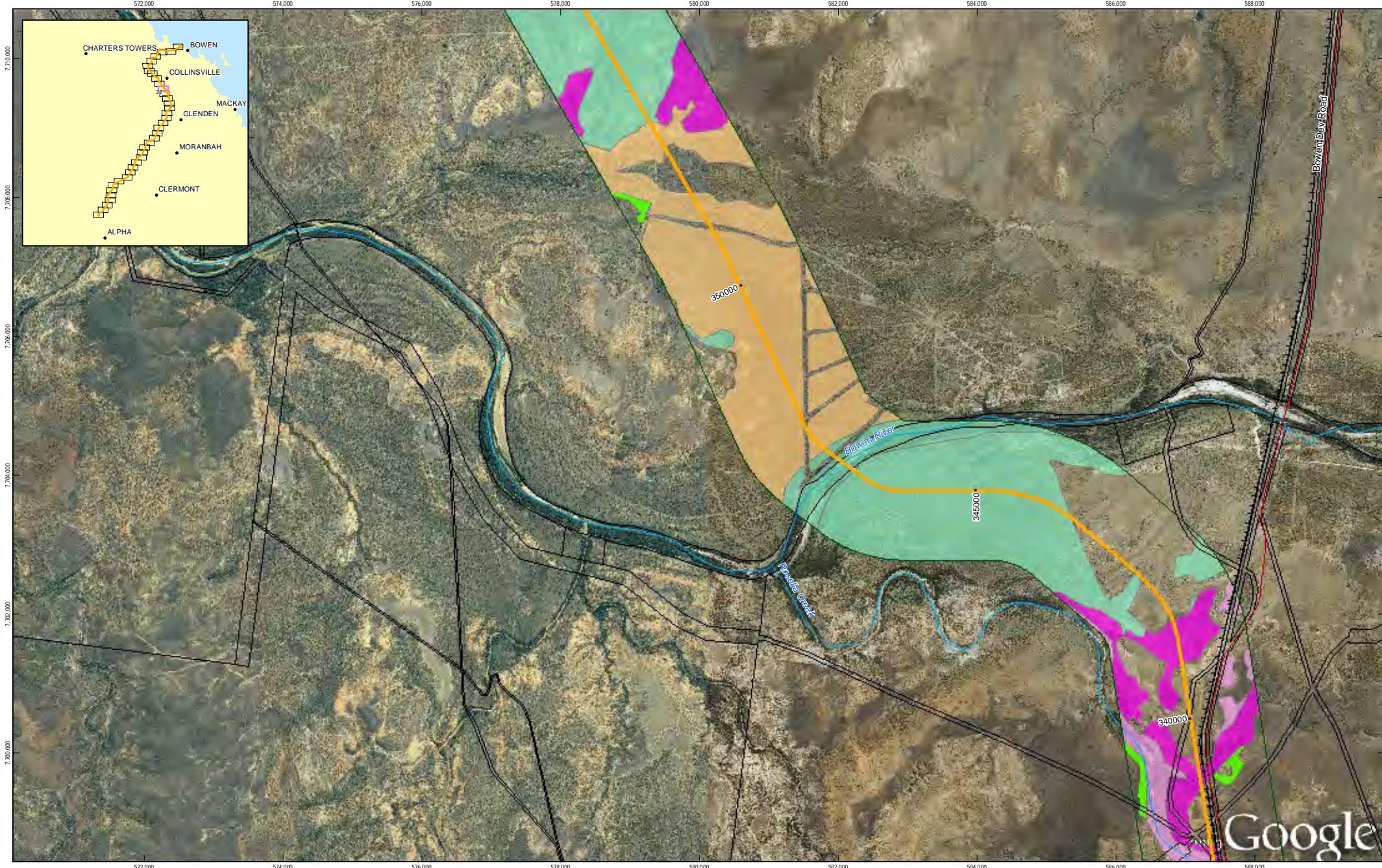
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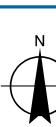
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 ■ Marshalling Yards  
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 ○ Proposed Alignment  
 — State Road  
 ┌ Existing Railway  
 └ Watercourse  
 ■ Cadastre  
 └ 2km Corridor  
 ■ Essential Habitat  
 ■ High Value Regrowth  
 ■ Amended RE  
 ■ Waterbody  
 ■ Regional Ecosystems  
 ■ Not Of Concern  
 ■ Plantation Forest  
 ■ Endangered - Dominant  
 ■ Endangered - Sub-dominant  
 ■ Of Concern - Dominant  
 ■ Of Concern - Sub-dominant  
 ■ Non-Remnant / Regrowth

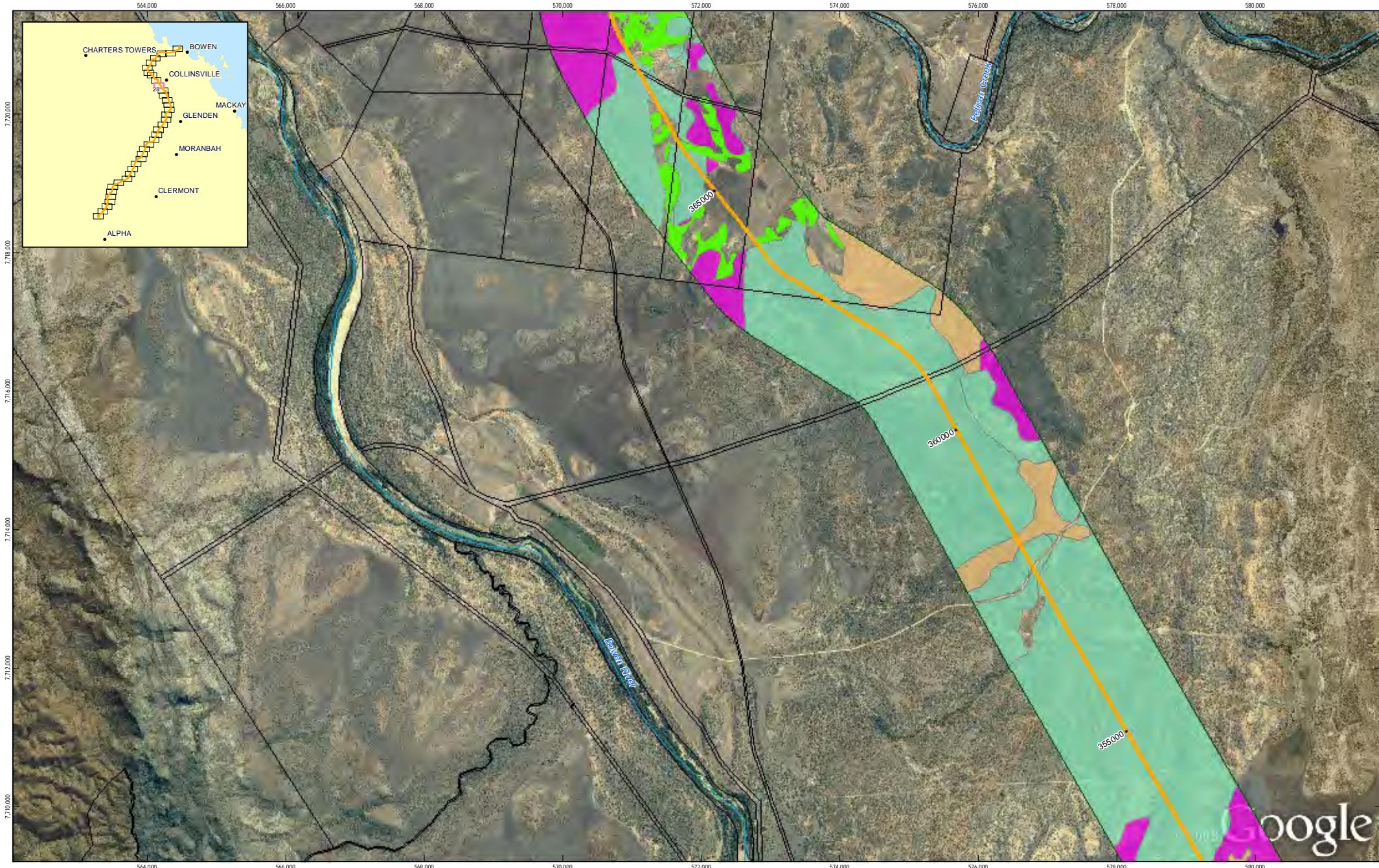
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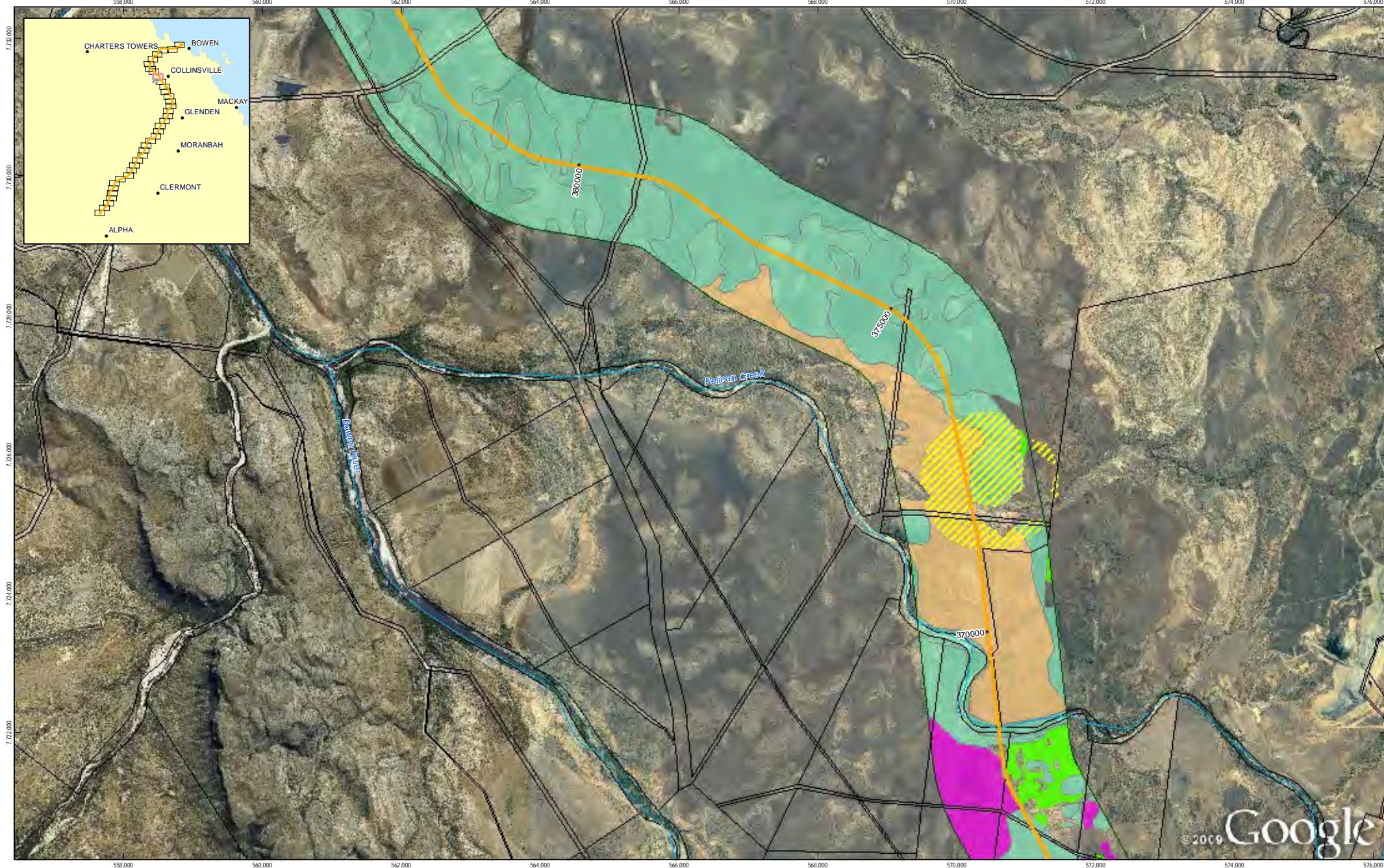
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Grid: Map Grid of Australia, Zone 55

**LEGEND**  
 • Town  
 ▲ Camp  
 ■ Marshalling Yards  
 ○ Depot  
 — State Road  
 — Existing Railway  
 — Watercourse  
 — Cadastre  
 — 2km Corridor  
 ■ Proposed Alignment  
 ■ Essential Habitat  
 — Existing Railway  
 — Waterbody  
 ■ High Value Regrowth  
 ■ Endangered - Dominant  
 ■ Endangered - Sub-dominant  
 ■ Regional Ecosystems  
 ■ Not Of Concern  
 ■ Plantation Forest  
 ■ Amended RE  
 ■ Cadastre  
 ■ 2km Corridor  
 ■ Non-Remnant / Non-Regrowth  
 ■ Of Concern - Dominant  
 ■ Of Concern - Sub-dominant

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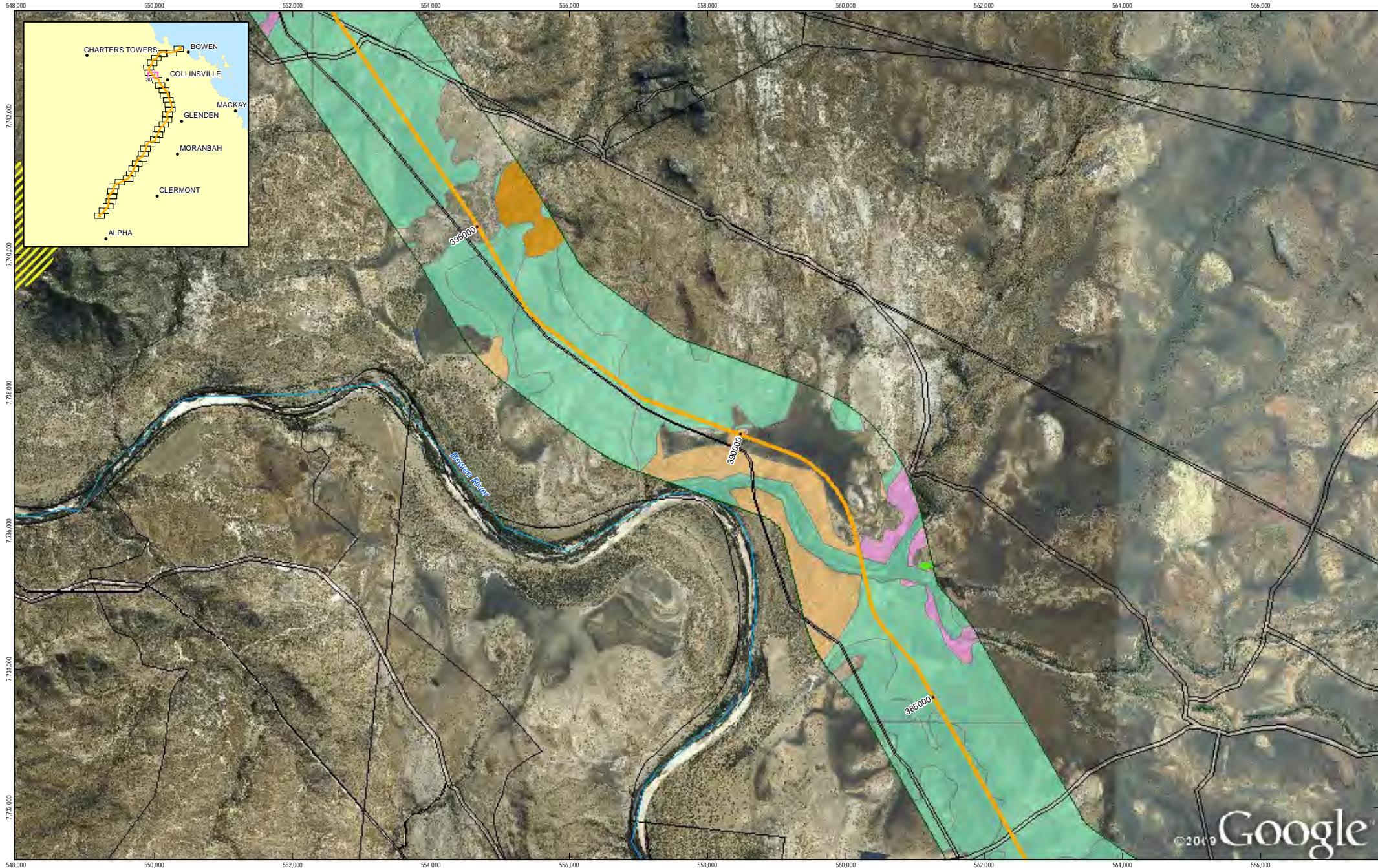
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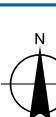
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**LEGEND**  
 • Town  
 ▲ Camp  
 ■ Marshalling Yards  
 ○ Depot  
 — State Road  
 — Existing Railway  
 — Watercourse  
 — Waterbody  
 ■ Essential Habitat  
 — 2km Corridor  
 Regional Ecosystems  
 ■ High Value Regrowth  
 ■ Endangered - Dominant  
 ■ Endangered - Sub-dominant  
 ■ Of Concern - Dominant  
 ■ Of Concern - Sub-dominant  
 ■ Not Of Concern  
 ■ Plantation Forest  
 ■ Non-Remnant / Regrowth  
 ■ Cadastre

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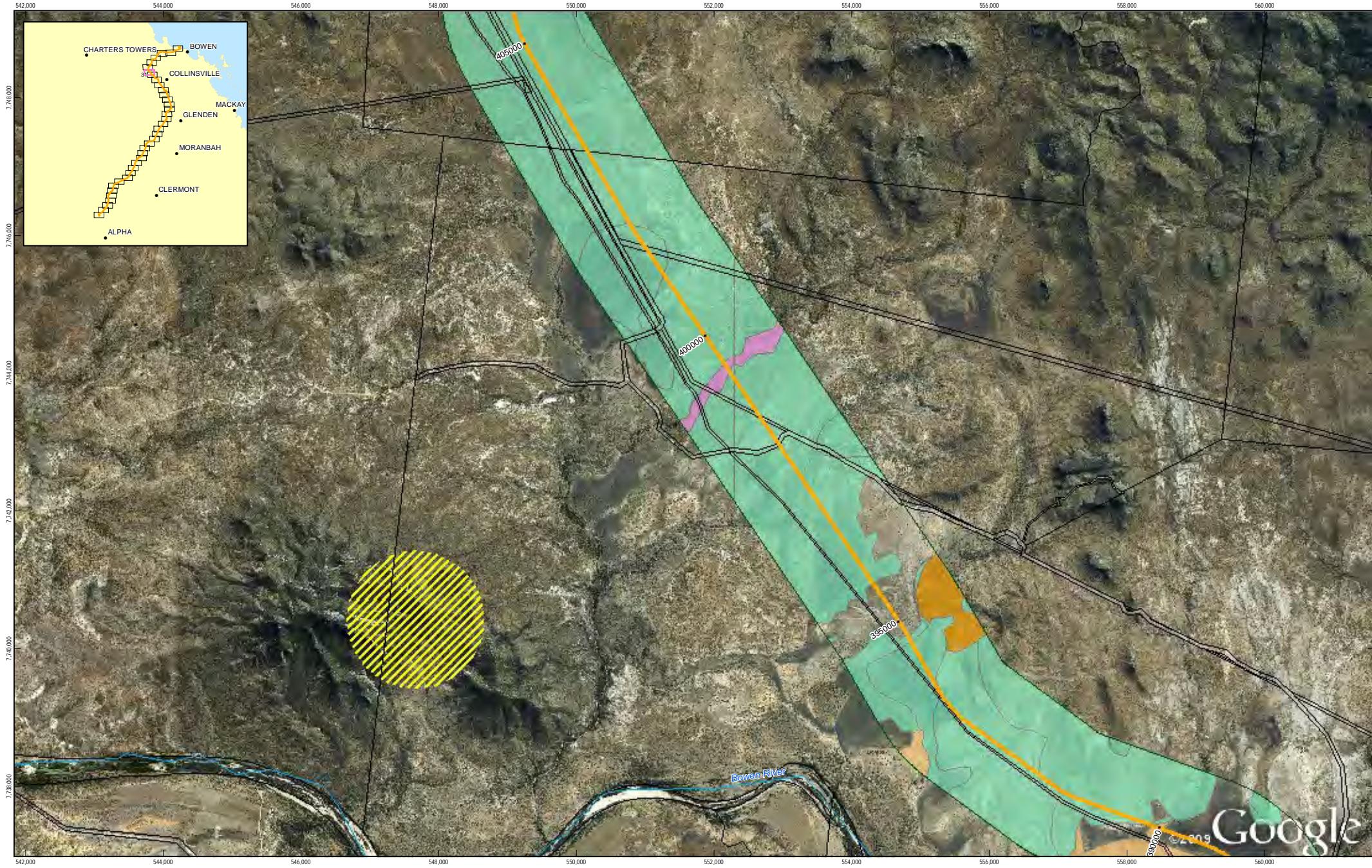
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LEGEND  
Town  
Camp  
Marshalling Yards  
Depot  
State Road  
Existing Railway  
Watercourse  
Cadastral  
2km Corridor  
Proposed Alignment  
Essential Habitat  
High Value Regrowth  
Endangered - Dominant  
Endangered - Sub-dominant  
Regional Ecosystems  
Not Of Concern  
Plantation Forest  
Non-Remnant / Non-Restored  
Of Concern - Dominant  
Of Concern - Sub-dominant

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#### LEGEND

- Town
- Camp
- Marshalling Yards
- Camp
- Existing Railway
- Watercourse
- Waterbody
- Cadastre
- 2km Corridor
- Proposed Alignment
- Essential Habitat
- State Road
- Amended RE
- Watercourse
- Waterbody
- Regional Ecosystems
- High Value Regrowth
- Endangered - Dominant
- Endangered - Sub-dominant
- Of Concern - Dominant
- Of Concern - Sub-dominant
- Not Of Concern
- Plantation Forest
- Non-Remnant / Regrowth

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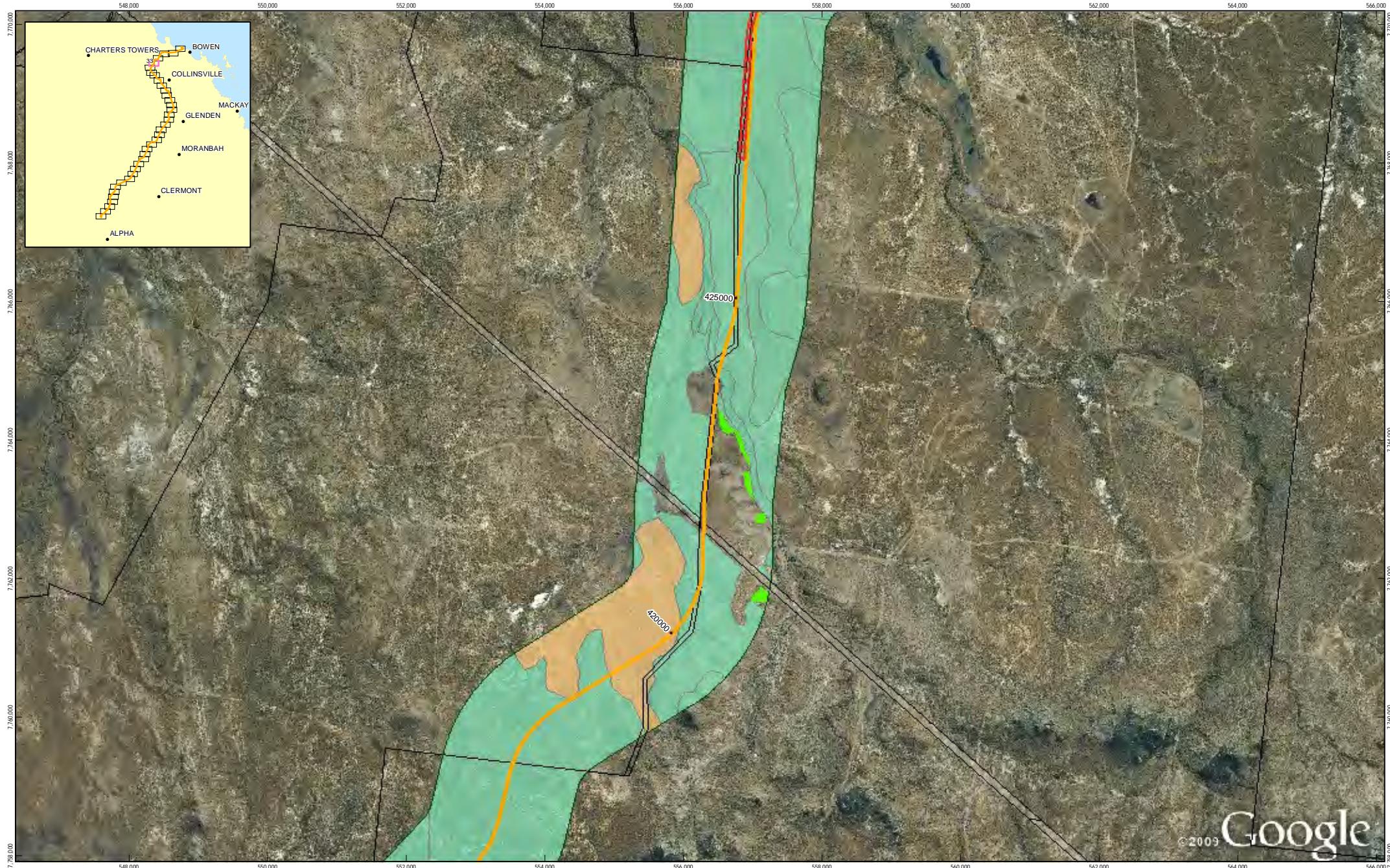
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Grid: Map Grid of Australia, Zone 55

#### LEGEND

- Town
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- Marshalling Yards
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- Proposed Alignment
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- 2km Corridor
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- Endangered - Sub-dominant
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- Of Concern - Sub-dominant
- Not Of Concern
- Non-Remnant / Regrowth
- Regrowth

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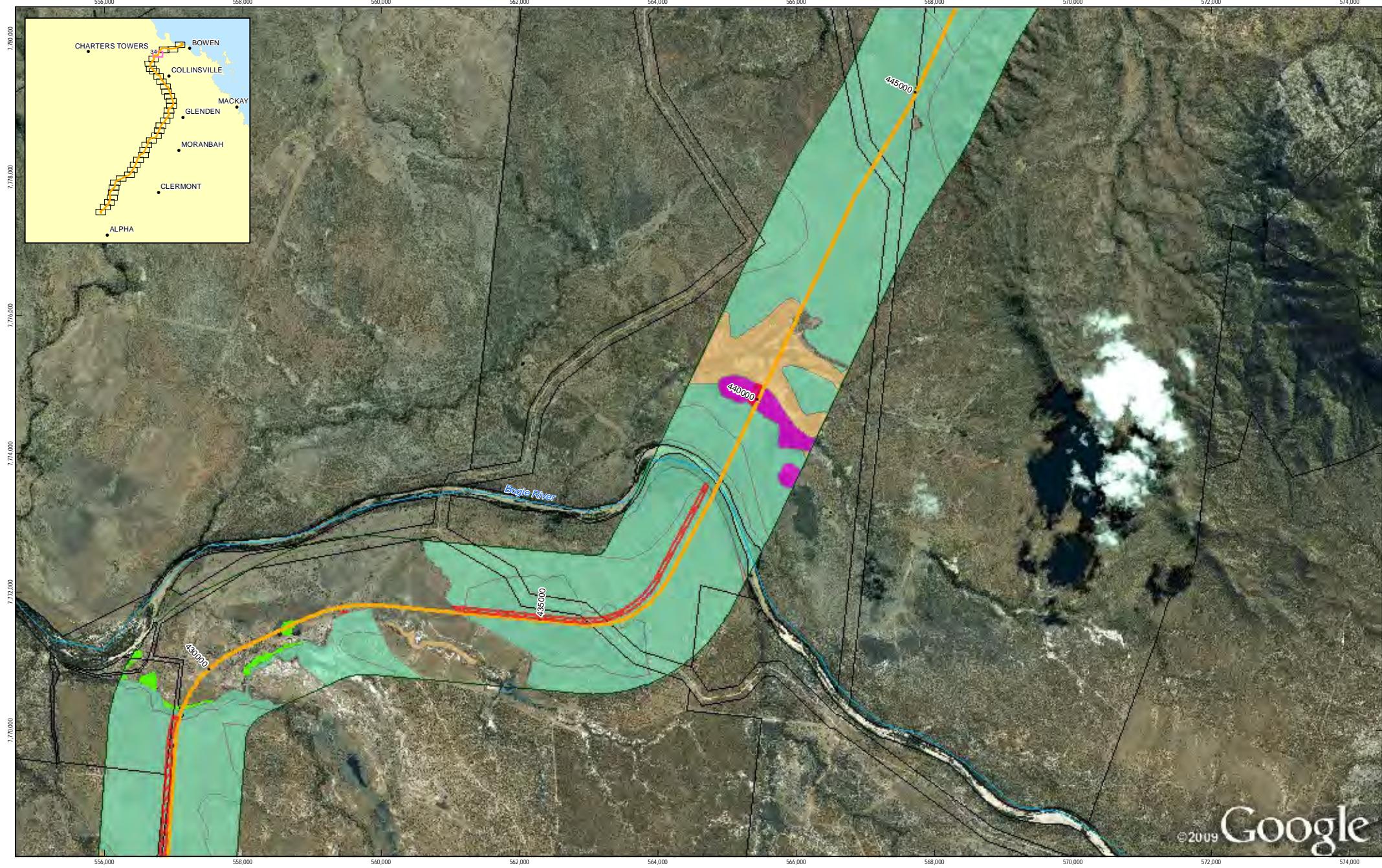
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## AMENDED REGIONAL ECOSYSTEMS AND HIGH VALUE REGROWTH

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**LEGEND**  
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 — 2km Corridor  
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 ■ High Value Regrowth  
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 ■ Plantation Forest  
 ■ Non-Remnant / Non-Restored  
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 ■ Endangered - Sub-dominant  
 ■ Of Concern - Dominant  
 ■ Of Concern - Sub-dominant

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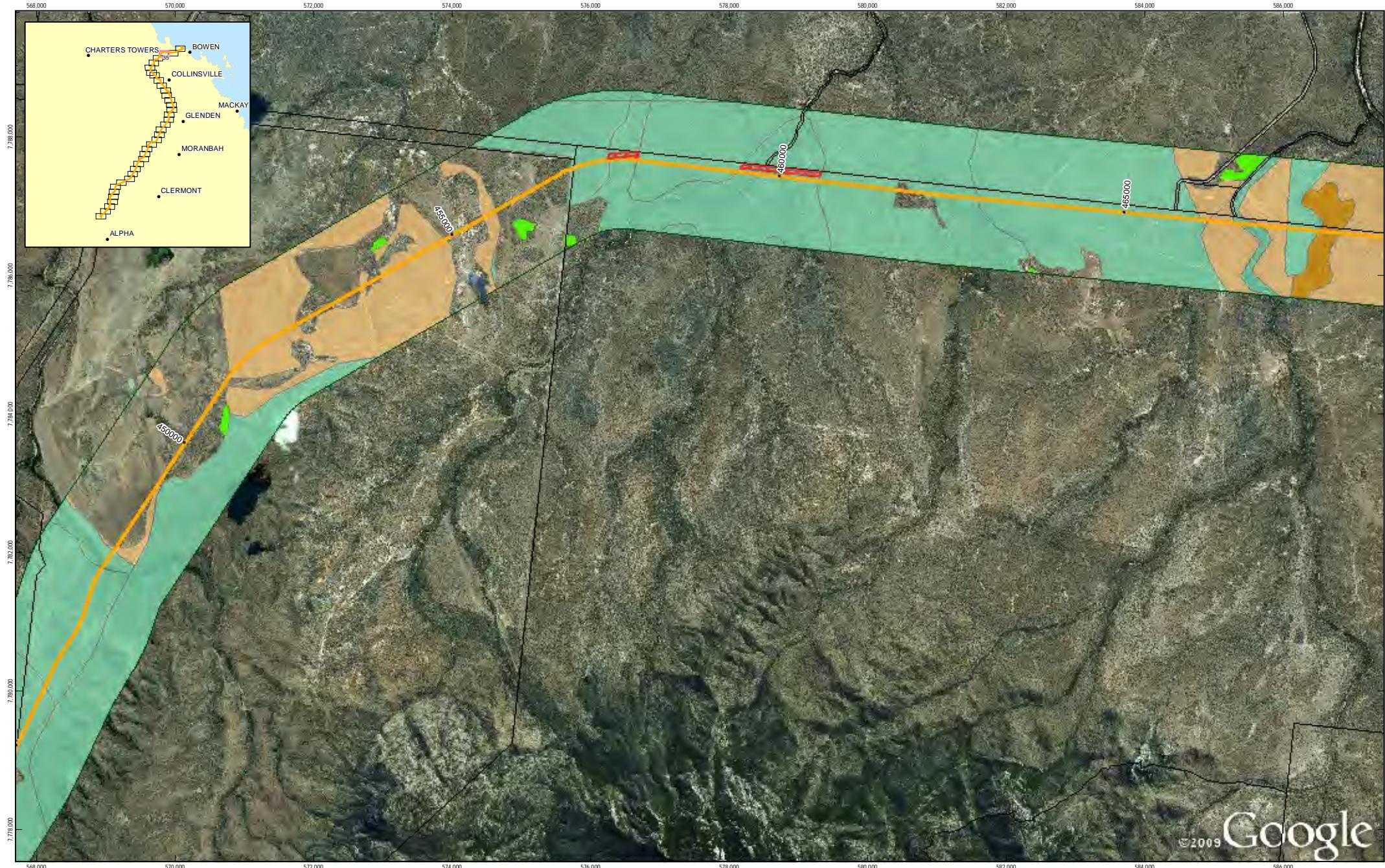
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**LEGEND**  
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 ■ Existing Rail  
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 ■ Of Concern - Sub-dominant  
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 ■ Plantation Forest  
 ■ Non-Remnant / Regrowth  
 ■ Regrowth

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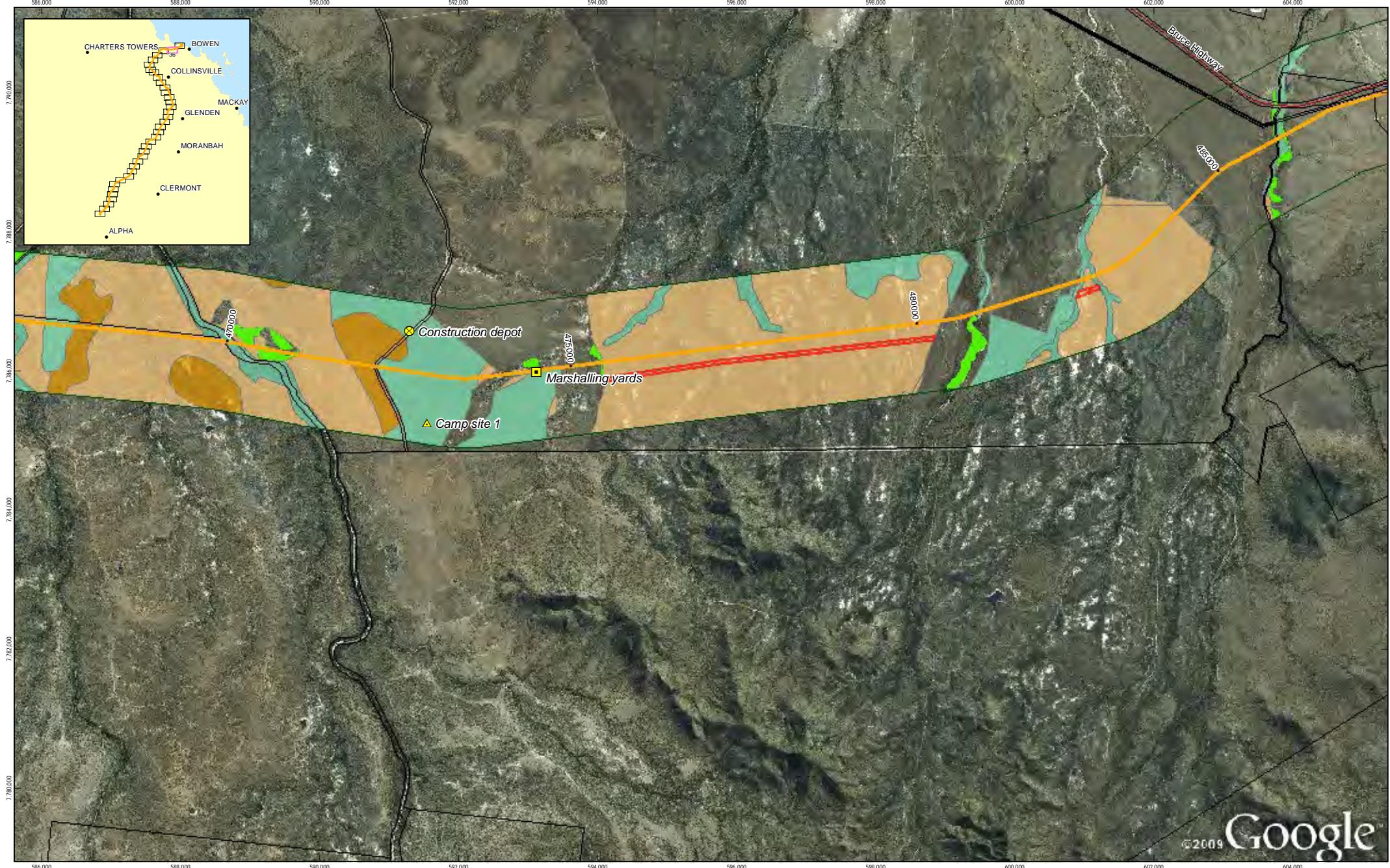
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Horizontal Datum: Geocentric Datum of Australia 1994  
Grid: Map Grid of Australia, Zone 55

**LEGEND**

- Town
- ▲ Camp
- Marshalling Yards
- Depot
- Proposed Alignment
- State Road
- Existing Railway
- Amended RE
- Cadastre
- Watercourse
- Waterbody
- 2km Corridor
- ◆ Essential Habitat
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- Endangered - Dominant
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- Plantation Forest
- Non-Remnant / Non-Regrowth
- Of Concern - Dominant
- Of Concern - Sub-dominant
- Regional Ecosystems

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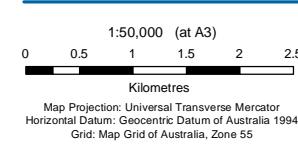
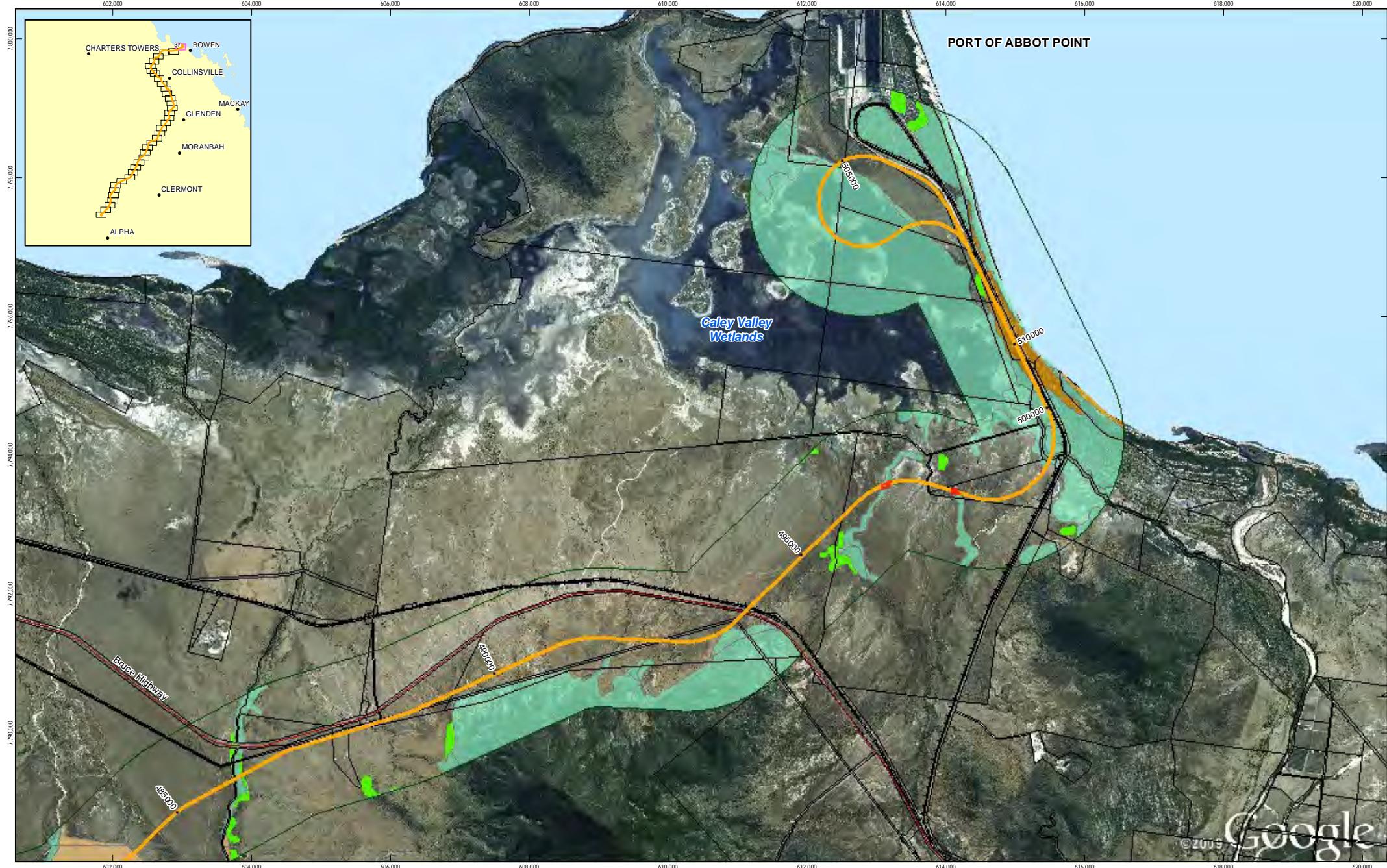
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**Table 12 Terrestrial fauna habitat types within the study area and likely ecological value for terrestrial fauna**

| Habitat Type           | Characteristics   | Value for Wildlife   | Dry Season Photo   | Wet Season Photo   |
|------------------------|---|--|--|--|
| <b>Grasslands</b>      | <ul style="list-style-type: none"> <li>▶ Trees and shrubs &lt; 5% cover</li> <li>▶ Native grassland and areas established and maintained through clearing</li> <li>▶ Minor to severe grazing and trampling impacts</li> <li>▶ Erosion and declared weeds evident at some locations</li> </ul> | <ul style="list-style-type: none"> <li>▶ Low to moderate resource diversity</li> <li>▶ Habitat for snakes, reptiles, rodents, macropods</li> <li>▶ Foraging value for raptors</li> <li>▶ Low to moderate species diversity, value depends on grazing pressure</li> <li>▶ 1 listed species possible – squatter pigeon.</li> <li>▶ <b>Ecological value:</b> Low to Medium</li> </ul> |   |   |
| <b>Sparse regrowth</b> | <ul style="list-style-type: none"> <li>▶ Shrubs and low trees comprise a sparse canopy layer</li> <li>▶ Grazing impacts moderate to severe</li> <li>▶ Exotic grasses often dominate ground layer, with very low species diversity</li> </ul>  | <ul style="list-style-type: none"> <li>▶ Limited resource diversity</li> <li>▶ Few microhabitats</li> <li>▶ Low species diversity</li> <li>▶ Some habitat value for birds, lizards, snakes, macropods and small ground mammals</li> <li>▶ Low species diversity</li> <li>▶ 1 listed species possible – squatter pigeon</li> <li>▶ <b>Ecological value:</b> Low</li> </ul>          |  |  |

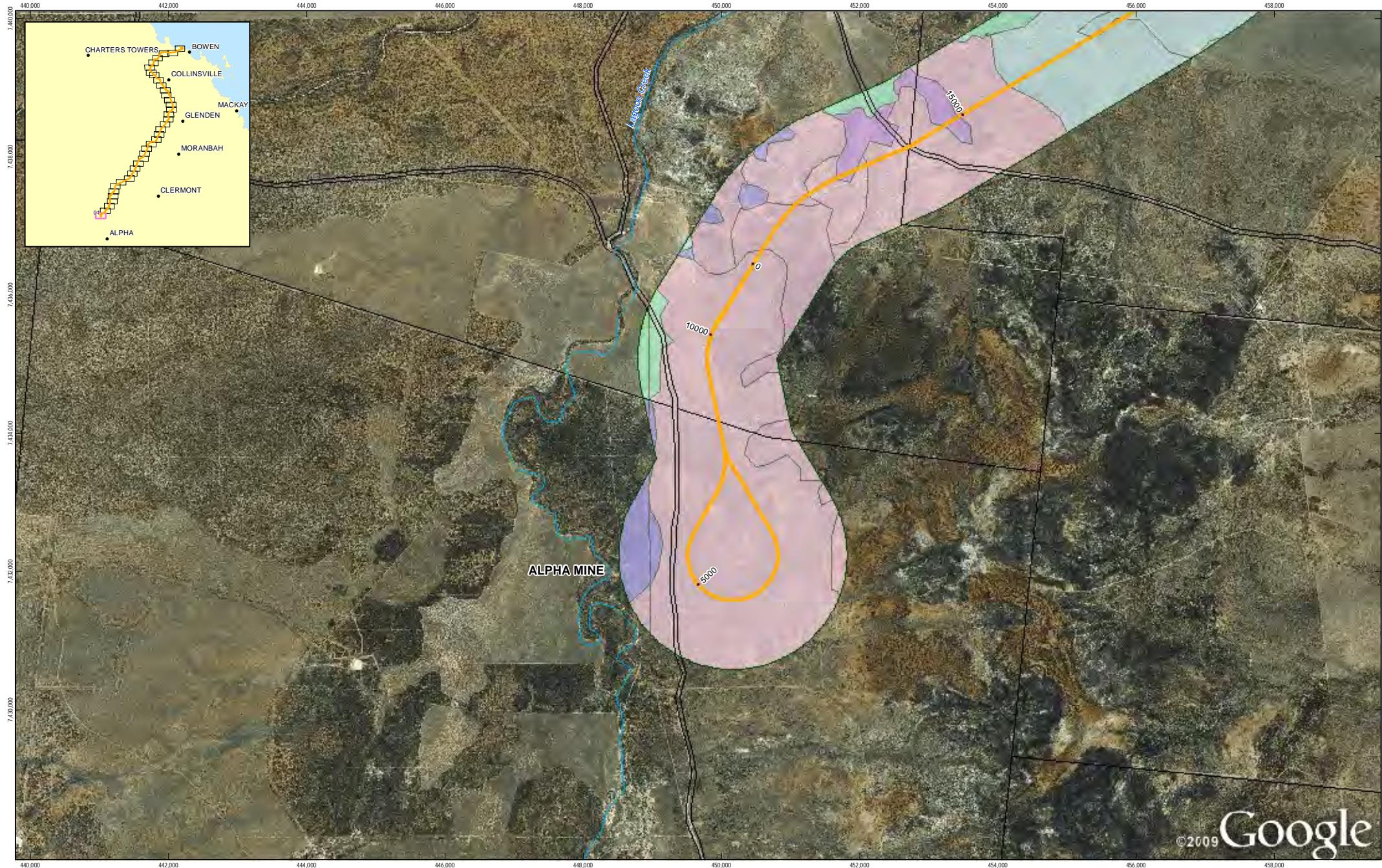
| Habitat Type   | Characteristics  | Value for Wildlife  | Dry Season Photo   | Wet Season Photo   |
|--|--|---|--|--|
| <b>Mature woodland with variable shrub and understorey</b> | <ul style="list-style-type: none"> <li>▶ Intact canopy of mature eucalypts, often with dieback evident</li> <li>▶ Mid-dense to sparse shrub layer</li> <li>▶ Mid-dense to sparse understorey</li> <li>▶ Fallen logs, woody debris</li> </ul> | <ul style="list-style-type: none"> <li>▶ Moderate-high resource diversity</li> <li>▶ Moderate-high structural complexity</li> <li>▶ Habitat for shrub and understorey nesting birds, reptiles and ground mammals</li> <li>▶ Moderate species diversity</li> <li>▶ 8 listed species possible - squatter pigeon, yakka skink, ornamental snake, common death adder, brigalow scaly-foot, Dunnall's snake, little pied bat, northern quoll.</li> <li>▶ <b>Ecological value:</b> Low to High</li> </ul> |   |   |
| <b>Semi-evergreen vine thicket</b>                         | <ul style="list-style-type: none"> <li>▶ Dense, sometimes low canopy with moderate to high species diversity</li> <li>▶ Shrub layer sparse to mid-dense</li> <li>▶ Open ground layer</li> </ul>  | <ul style="list-style-type: none"> <li>▶ Moderate resource diversity</li> <li>▶ Moderate structural complexity</li> <li>▶ Habitat for canopy-nesting birds, macropods, skinks and burrowing reptiles</li> <li>▶ Low-moderate species diversity</li> <li>▶ 1 listed species possible – squatter pigeon</li> <li>▶ <b>Ecological value:</b> Medium</li> </ul>   |  |  |

| Habitat Type                          | Characteristics  | Value for Wildlife  | Dry Season Photo | Wet Season Photo |
|---------------------------------------|--|---|------------------|------------------|
| <b>Mixed low woodland</b>             | <ul style="list-style-type: none"> <li>▶ Mid-dense to sparse tree layer</li> <li>▶ Sparse shrub layer</li> <li>▶ Sparse understorey</li> </ul>   | <ul style="list-style-type: none"> <li>▶ Low resource diversity</li> <li>▶ Low structural complexity</li> <li>▶ Habitat for cleared land birds, and reptiles</li> <li>▶ Low species diversity</li> <li>▶ 1 listed species possible – squatter pigeon</li> <li>▶ <b>Ecological value:</b> Low</li> </ul>   |                  |                  |
| <b>Melaleuca-dominated shrublands</b> | <ul style="list-style-type: none"> <li>▶ Mid-dense to absent low canopy</li> <li>▶ Sparse to very sparse shrub layer</li> <li>▶ Mid-dense to very sparse understorey</li> <li>▶ Sandy substrate</li> </ul> | <ul style="list-style-type: none"> <li>▶ Moderate resource diversity</li> <li>▶ Low structural complexity</li> <li>▶ Habitat for grassland birds, raptors, lorikeets, flying foxes, possums and gliders</li> <li>▶ Moderate species diversity</li> <li>▶ 2 possible listed species – squatter pigeon and black-throated finch</li> <li>▶ <b>Ecological value:</b> Medium</li> </ul> |                  |                  |

| Habitat Type  | Characteristics  | Value for Wildlife   | Dry Season Photo | Wet Season Photo |
|---|--|--|------------------|------------------|
| <b>Beach and coastal wetlands</b>                       | <ul style="list-style-type: none"> <li>▶ Tidal flats without canopy vegetation and mangrove areas with dense canopy vegetation</li> <li>▶ Shrub layer mid-dense to absent</li> <li>▶ Dense to absent</li> <li>▶ Tidally inundated</li> <li>▶ Refer to aquatic report for further detail on Caley Valley</li> </ul> | <ul style="list-style-type: none"> <li>▶ Moderate to high resource diversity</li> <li>▶ Low to high structural complexity</li> <li>▶ Habitat for shrub, canopy and wading birds, specialist reptiles and mammals</li> <li>▶ Moderate species diversity</li> <li>▶ 2 possible listed species – water mouse and saltwater crocodile</li> <li>▶ Ecological value: Medium</li> </ul>                         |                  |                  |
| <b>Sparse woodland/grassland on cracking clay soils</b> | <ul style="list-style-type: none"> <li>▶ Very sparse tree layer (usually &lt; 5%)</li> <li>▶ Sparse shrub layer</li> <li>▶ Dense ground layer</li> <li>▶ Frequently on level to undulating landforms with cracking clay soils</li> <li>▶ Some sites may be seasonally inundated</li> </ul>                         | <ul style="list-style-type: none"> <li>▶ Moderate resource diversity</li> <li>▶ Low - moderate structural complexity</li> <li>▶ Habitat for understorey nesting birds, snakes, lizards, small ground mammals, macropods and burrowing frogs</li> <li>▶ Moderate species diversity</li> <li>▶ 2 listed species possible – squatter pigeon, Dunmall's snake</li> <li>▶ Ecological value: Medium</li> </ul> |                  |                  |

| Habitat Type                                 | Characteristics  | Value for Wildlife   | Dry Season Photo | Wet Season Photo |
|--|--|--|------------------|------------------|
| <b>Open woodland with grassy understorey</b> | <ul style="list-style-type: none"> <li>▶ Very sparse canopy of eucalypts or ironbarks</li> <li>▶ Sparse to very sparse shrub layer</li> <li>▶ Ground layer dominated by exotic and native grasses</li> <li>▶ Various substrates</li> <li>▶ Hollows, fallen logs and woody debris commonly present</li> </ul>   | <ul style="list-style-type: none"> <li>▶ Moderate resource diversity</li> <li>▶ Moderate structural complexity</li> <li>▶ Habitat for canopy and ground-nesting birds, snakes, lizards and treefrogs and hollow-associated fauna (possums, gliders, parrots, owls, microbats)</li> <li>▶ 7 listed species possible – squatter pigeon, little pied bat, yakka skink and to a lesser extent ornamental snake, common death adder, Dunmall's snake and brigalow scaly-foot</li> <li>▶ <b>Ecological value:</b> High</li> </ul>                    |                  |                  |
| <b>Acacia dominated shrubland</b>            | <ul style="list-style-type: none"> <li>▶ Canopy dominated by one or two wattle species and generally less than 15 m tall</li> <li>▶ Sparse shrub layer</li> <li>▶ Sparse to very sparse ground layer</li> <li>▶ Fallen logs and woody debris common</li> <li>▶ Cracking clay soils</li> <li>▶ Gilgai commonly present</li> <li>▶ Some areas, including gilgai, seasonally inundated</li> <li>▶ Gilgai provide wet season wetland vegetation</li> </ul> | <ul style="list-style-type: none"> <li>▶ Moderate to high resource diversity</li> <li>▶ Moderate structural complexity</li> <li>▶ Habitat for canopy nesting birds, listed snakes and lizards</li> <li>▶ Wet season habitat for wetland birds, frogs, snakes</li> <li>▶ Moderate species diversity</li> <li>▶ 7 listed species possible – squatter pigeon, yakka skink, ornamental snake, brigalow scaly-foot, Dunmall's snake and in wet season cotton pygmy goose and black-necked stork</li> <li>▶ <b>Ecological value:</b> High</li> </ul> |                  |                  |

| Habitat Type  | Characteristics   | Value for Wildlife   | Dry Season Photo | Wet Season Photo |
|---|---|--|------------------|------------------|
| <b>Eucalypt woodland on rocky rises</b>                                       | <ul style="list-style-type: none"> <li>▶ Sparse canopy dominated by eucalypts (primarily ironbarks)</li> <li>▶ Very sparse to sparse shrub layer</li> <li>▶ Grassy understorey of native and exotic species</li> <li>▶ Fallen logs and debris</li> <li>▶ Hollows present</li> <li>▶ Rocky outcrops, generally of granite or basalt</li> </ul> | <ul style="list-style-type: none"> <li>▶ High resource diversity</li> <li>▶ Moderate structural complexity</li> <li>▶ Habitat for canopy and understorey nesting birds, hollow-dependent fauna, snakes and lizards, small ground mammals, macropods</li> <li>▶ Moderate species diversity</li> <li>▶ 6 listed species possible – squatter pigeon, yakka skink, brigalow scaly-foot, common death adder, little pied bat, northern quoll</li> <li>▶ <b>Ecological value:</b> High</li> </ul>  |                  |                  |
| <b>Woodland and open forest fringing ephemeral and permanent watercourses</b> | <ul style="list-style-type: none"> <li>▶ Mid-dense to sparse canopy dominated primarily by eucalypts</li> <li>▶ Shrub layer with medium to high species diversity</li> <li>▶ Ground layer dense to very sparse</li> <li>▶ Declared weeds often present</li> <li>▶ Fallen logs and debris common</li> <li>▶ Hollows present</li> </ul>         | <ul style="list-style-type: none"> <li>▶ High resource diversity</li> <li>▶ High structural complexity</li> <li>▶ Habitat for canopy, shrub and understorey nesting birds, hollow-dependent fauna, macropods and small ground fauna, snakes, lizards and frogs</li> <li>▶ Important dry season refuge</li> <li>▶ High species diversity</li> <li>▶ 5 listed species possible – squatter pigeon, black-throated finch, northern quoll, little pied bat, common death adder</li> <li>▶ <b>Ecological value:</b> High (particularly those less affected by grazing activity)</li> </ul> |                  |                  |



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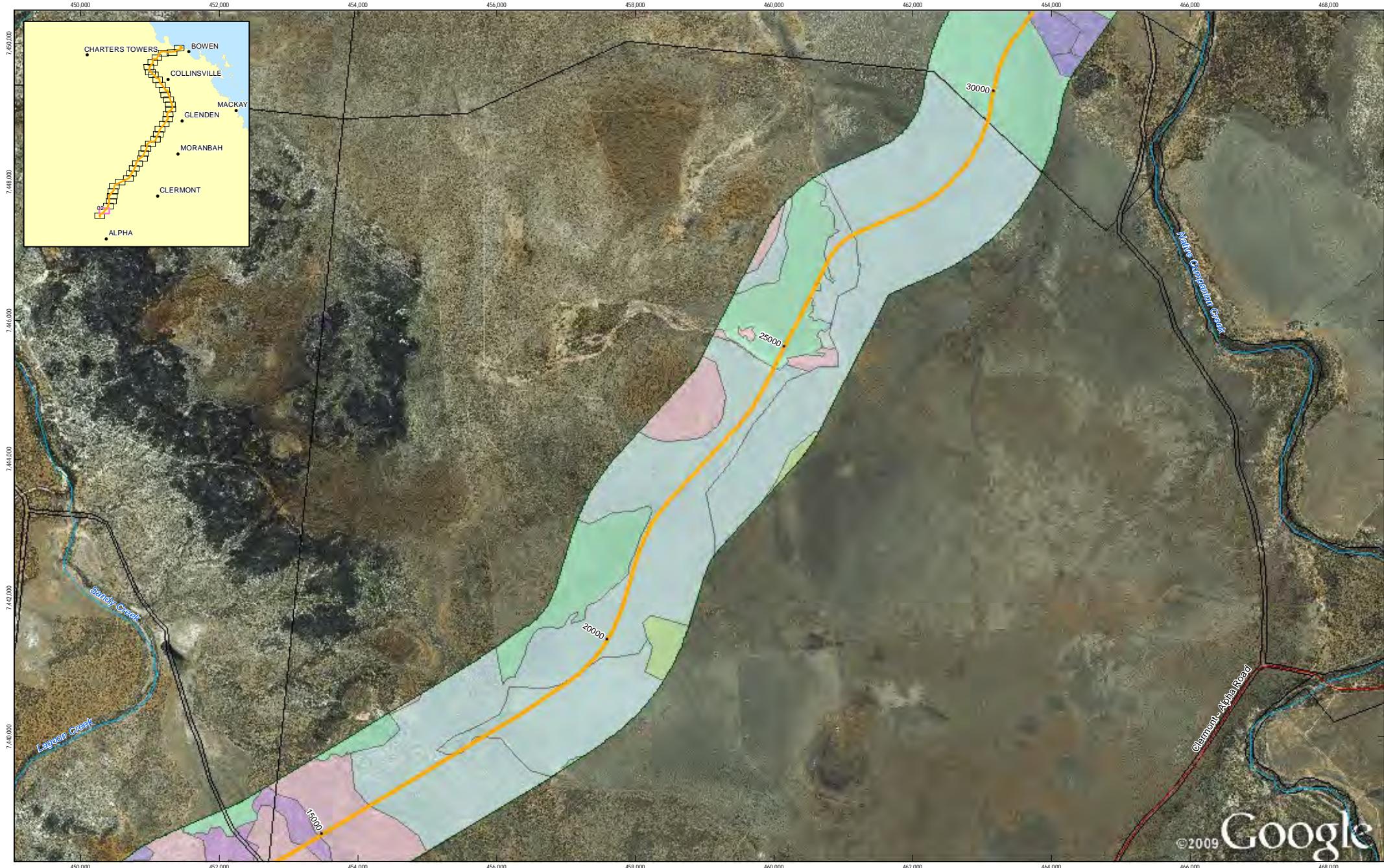
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Job Number 41-22090  
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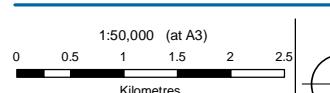
## FAUNA HABITAT AND VEGETATION COMMUNITIES

Figure: 3-4  
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#### LEGEND

- Town
- Proposed Alignment
- State Road
- Existing Railway
- Watercourse
- Cadastre
- Waterbody
- 2km Buffer

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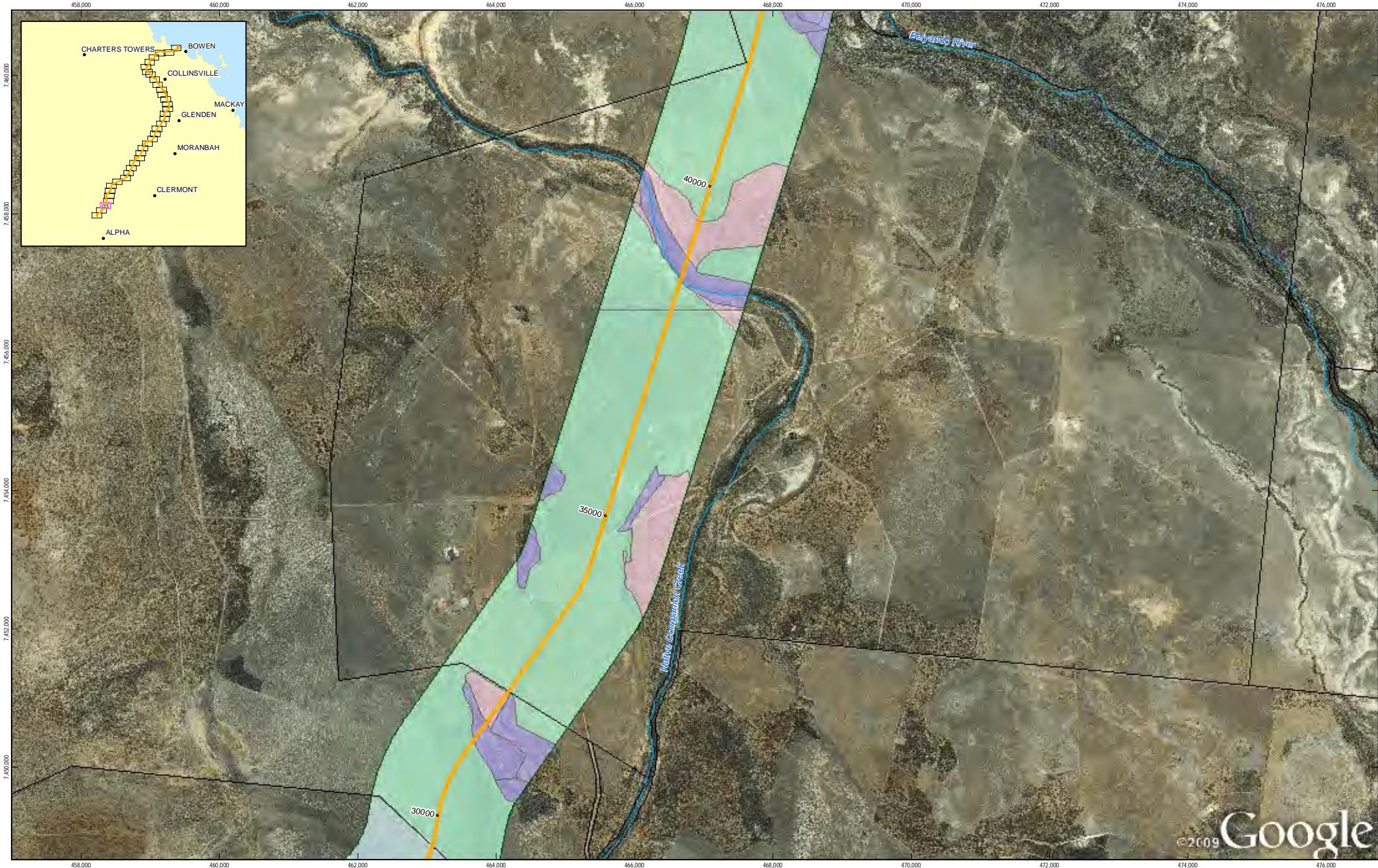
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#### FAUNA HABITAT AND VEGETATION COMMUNITIES

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#### LEGEND

- Town
- Proposed Alignment
- State Road
- Existing Railway
- Watercourse
- Cadastre
- Waterbody
- 2km Buffer

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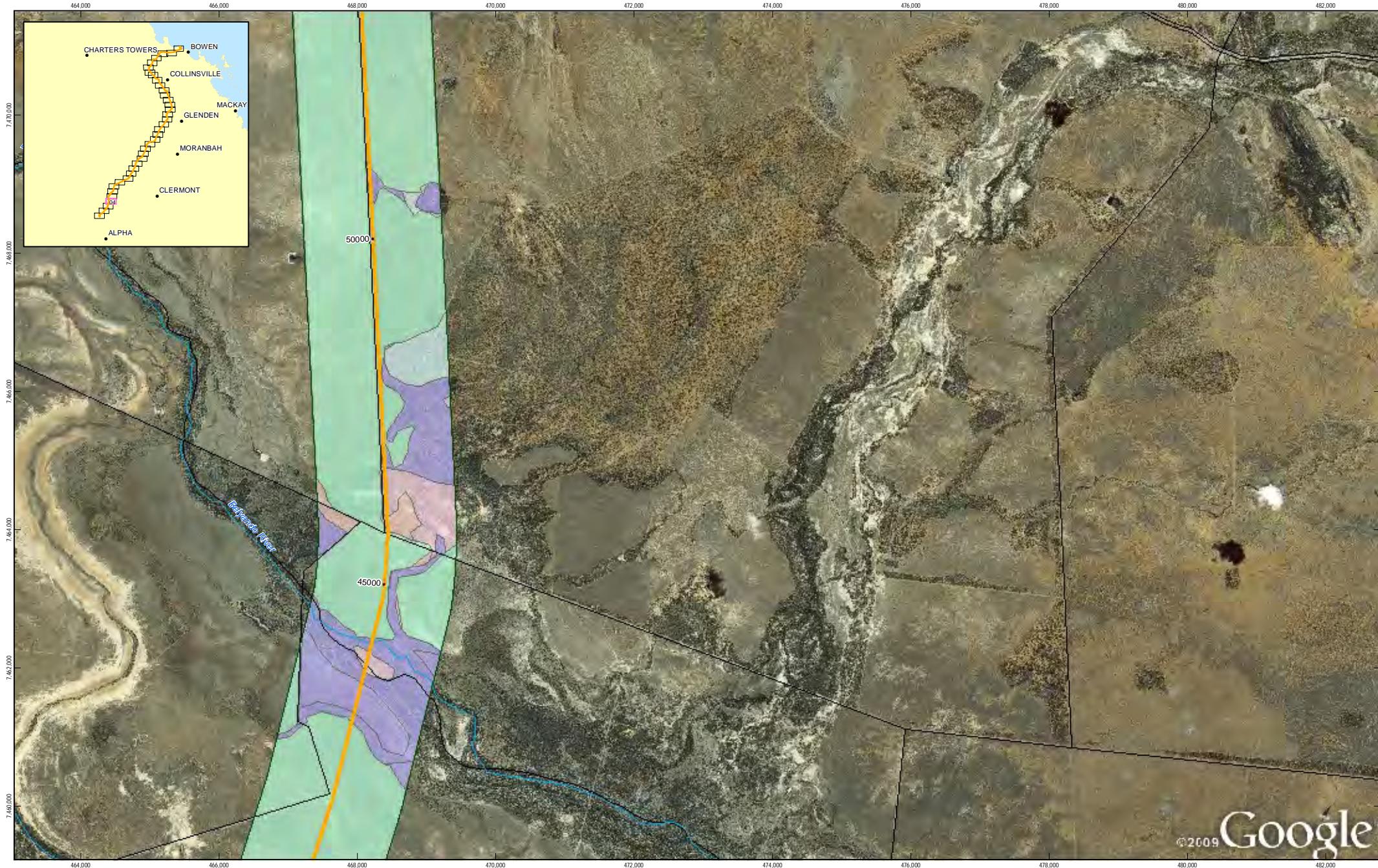
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#### FAUNA HABITAT AND VEGETATION COMMUNITIES

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#### LEGEND

- Town
- Proposed Alignment
- State Road
- Existing Railway
- Watercourse
- Cadastre
- Waterbody
- 2km Boundary

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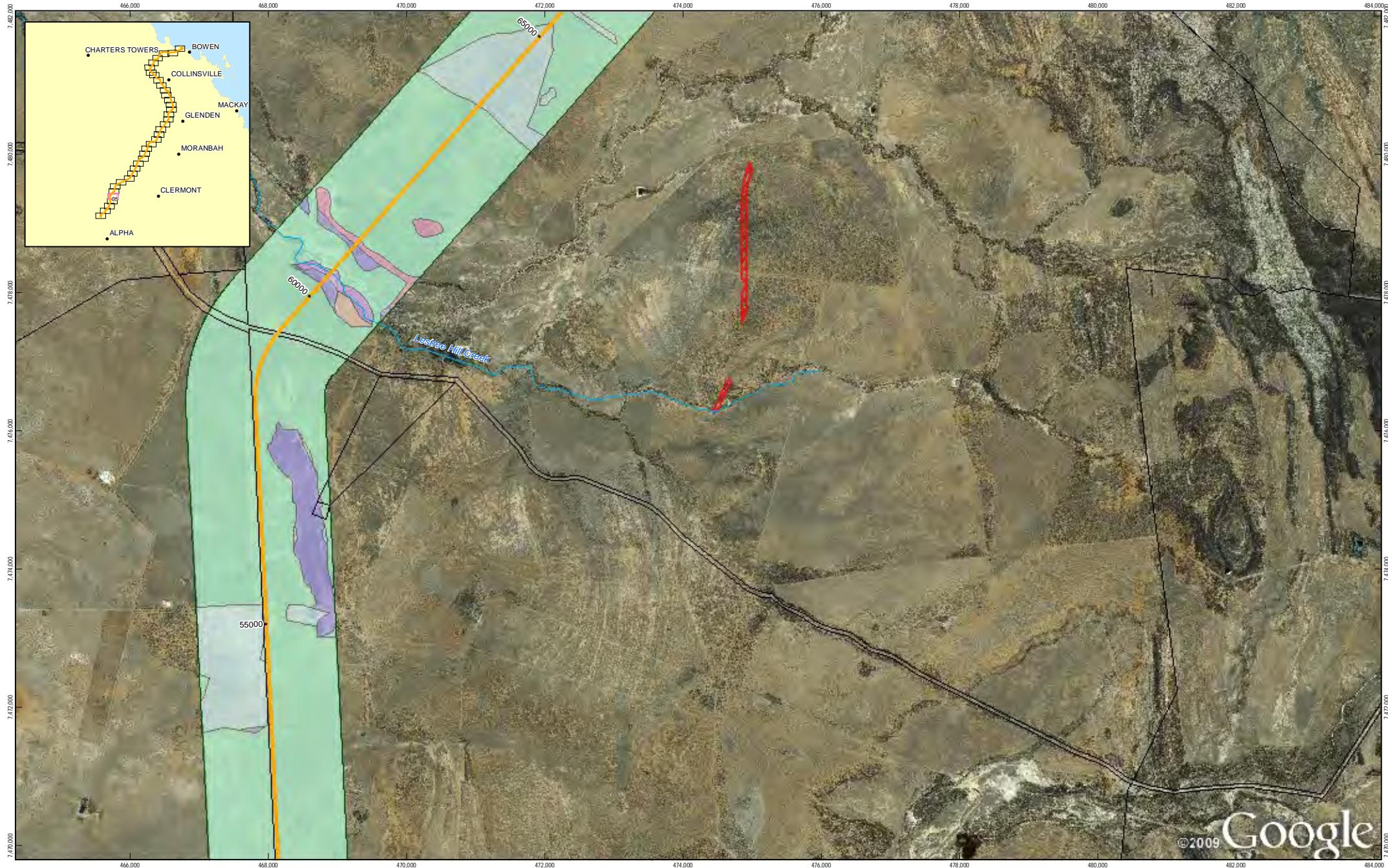
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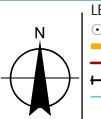
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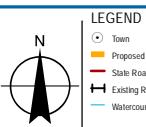
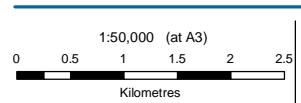
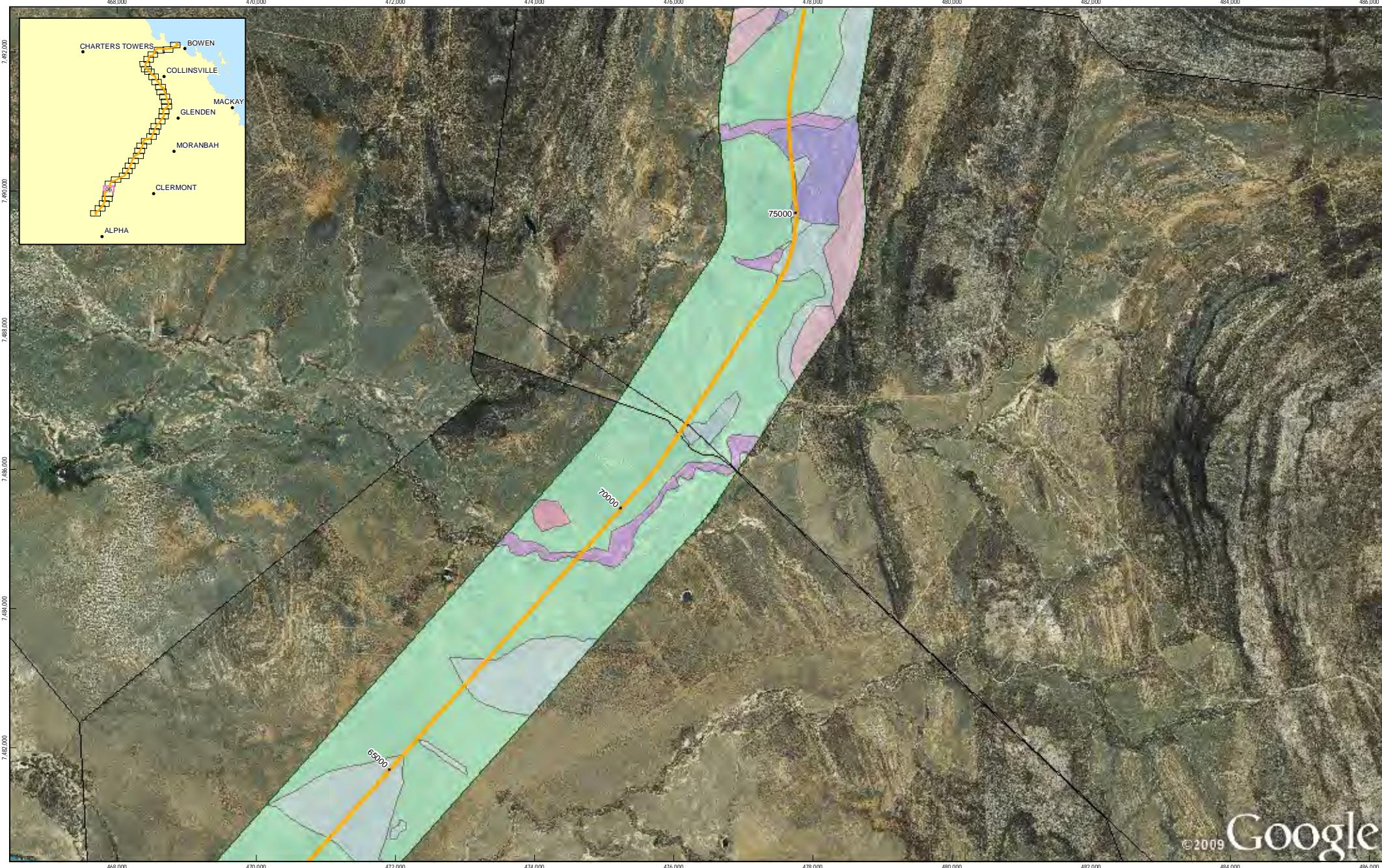
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|  | Essential Habitat   | Habitat Type  |
|--|---------------------|---|
|  | High Value Regrowth | Melaleuca shrubland                                 |
|  | Amended RE          | Mixed low woodland                                  |
|  |                     | Coastal Wetland                                     |
|  |                     | Open woodland with grassy understorey               |
|  |                     | Eucalypt woodland on rocky rises                    |
|  |                     | Semi-evergreen vine thicket                         |
|  |                     | Eucalypt/paperbark woodland along watercourses      |
|  |                     | Glossy paperbark                                    |
|  |                     | Mangroves and tidal saltmarsh                       |
|  |                     | Mature woodland with variable shrub and understorey |

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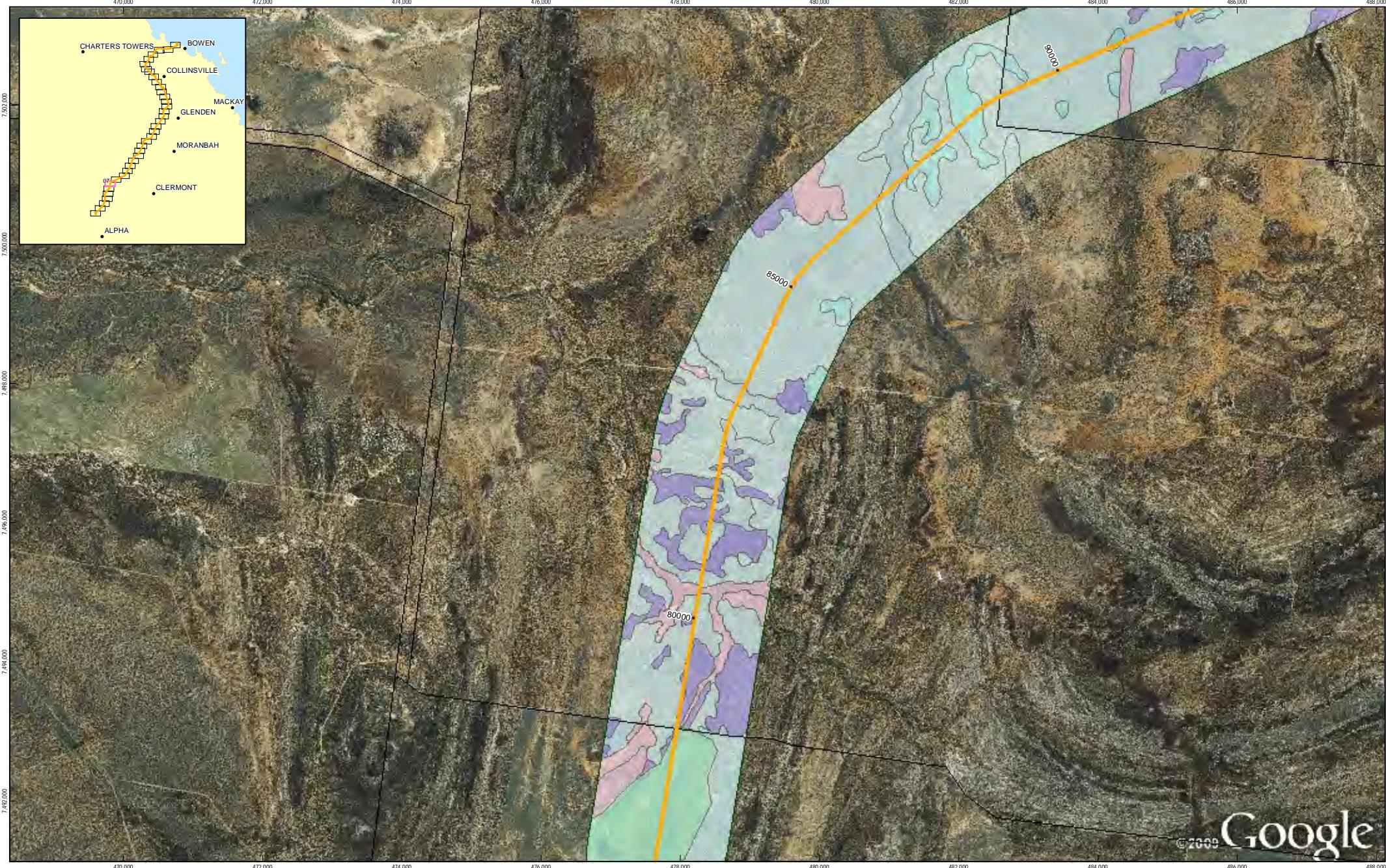
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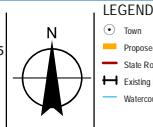
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**LEGEND**

- Town
- Proposed Alignment
- State Road
- Existing Railway
- Watercourse
- Cadastre
- Waterbody
- 2km Corridor
- Essential Habitat
- High Value Regrowth
- Amended RE
- Habitat Type
- Acacia dominated shrubland
- Coastal Wetland
- Eucalypt woodland on rocky rises
- Eucalypt/paperbark woodland along watercourses
- Grassland
- Mangroves and tidal saltmarsh
- Mature woodland with variable shrub and understorey
- Melaleuca shrubland
- Mixed low woodland
- Open woodland with grassy understorey
- Semi-evergreen vine thicket
- Sparse woodland/grassland on cracking clay soils
- Woodland and open forest fringing watercourses
- Non-remnant

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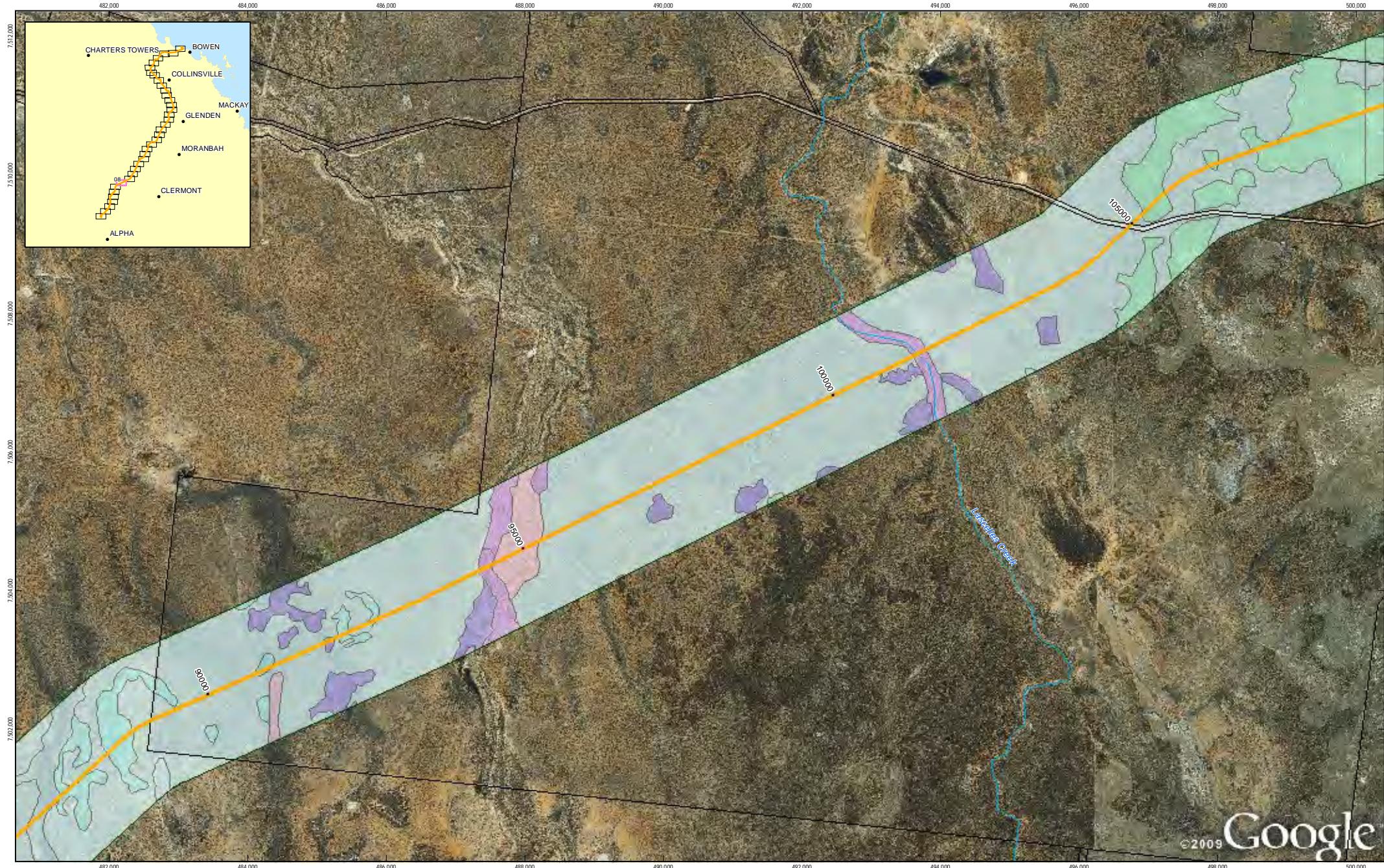
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## FAUNA HABITAT AND VEGETATION COMMUNITIES

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| Legend               | Essential Habitat | Habitat Type                                   |
|----------------------|-------------------|--|
| ● Town               | Yellow dot        | Melaleuca shrubland                            |
| — Proposed Alignment | Orange line       | Mixed low woodland                             |
| — State Road         | Red line          | Coastal Wetland                                |
| — Existing Railway   | Black line        | Open woodland with grassy understorey          |
| — Watercourse        | Cyan line         | Eucalypt woodland on rocky rises               |
| — Cadastre           | White box         | Semi-evergreen vine thicket                    |
| — 2km Boundary       | Green box         | Eucalypt paperbark woodland along watercourses |

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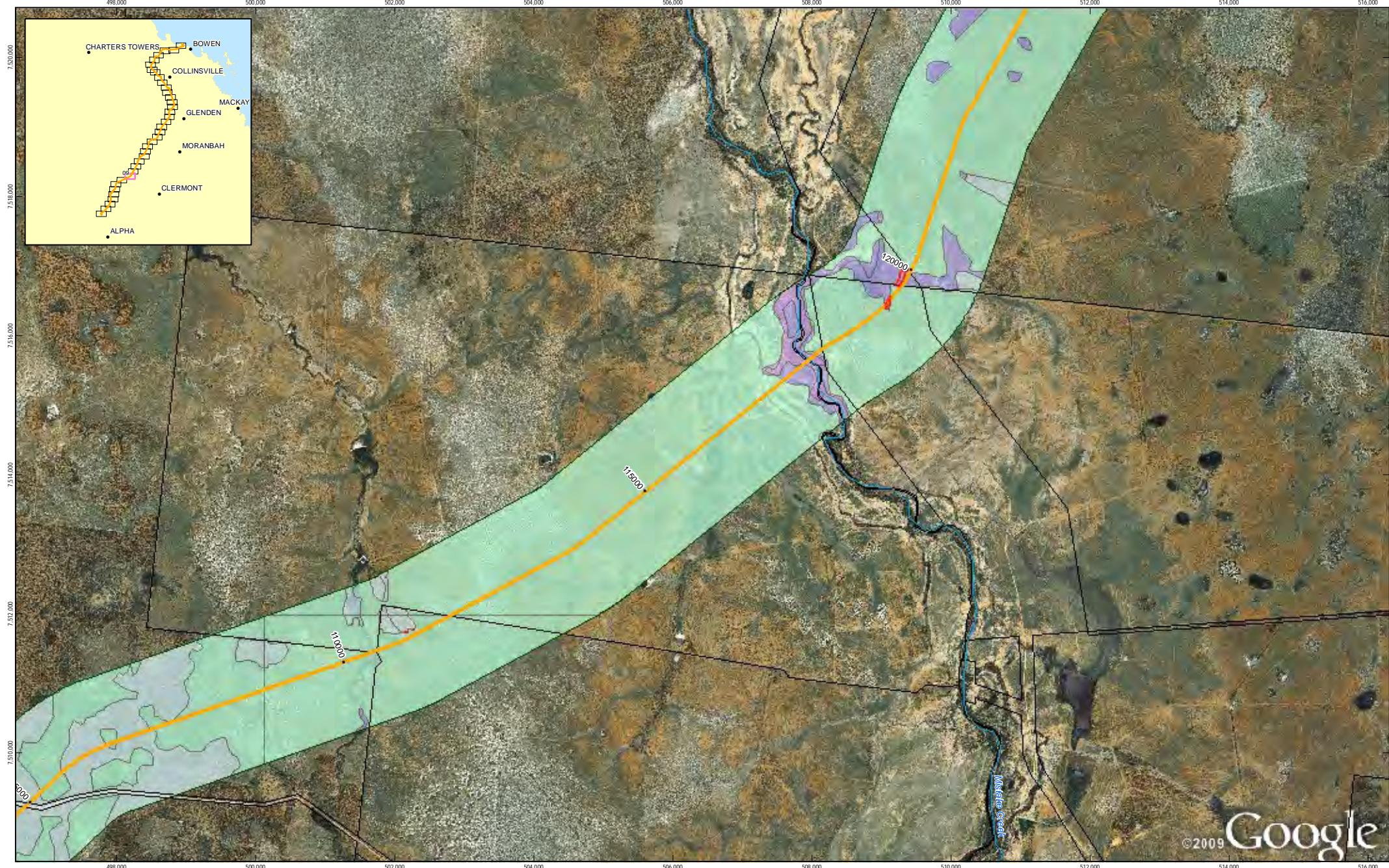
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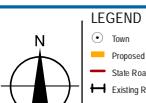
## FAUNA HABITAT AND VEGETATION COMMUNITIES

Figure: 3-4  
Sheet 8 of 37

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1:50,000 (at A3)  
0 0.5 1 1.5 2 2.5 Kilometres  
Map Projection: Universal Transverse Mercator  
Horizontal Datum: Geocentric Datum of Australia 1994  
Grid: Map Grid of Australia, Zone 55



Source: See Copyright Details below and for full disclosure please read Section 18.2 - References in the EIS

| Legend               | Essential Habitat | Habitat Type      |
|----------------------|-------------------|-------------------|
| ○ Town               | Yellow icon       | Essential Habitat |
| — Proposed Alignment | Orange line       | High Value        |
| — State Road         | Red line          | Regrowth          |
| — Existing Railway   | Blue line         | Amended RE        |
| — Watercourse        | Blue line         | Cadastre          |
| □ 2km Buffer         | Green shaded area | Waterbody         |

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## FAUNA HABITAT AND VEGETATION COMMUNITIES

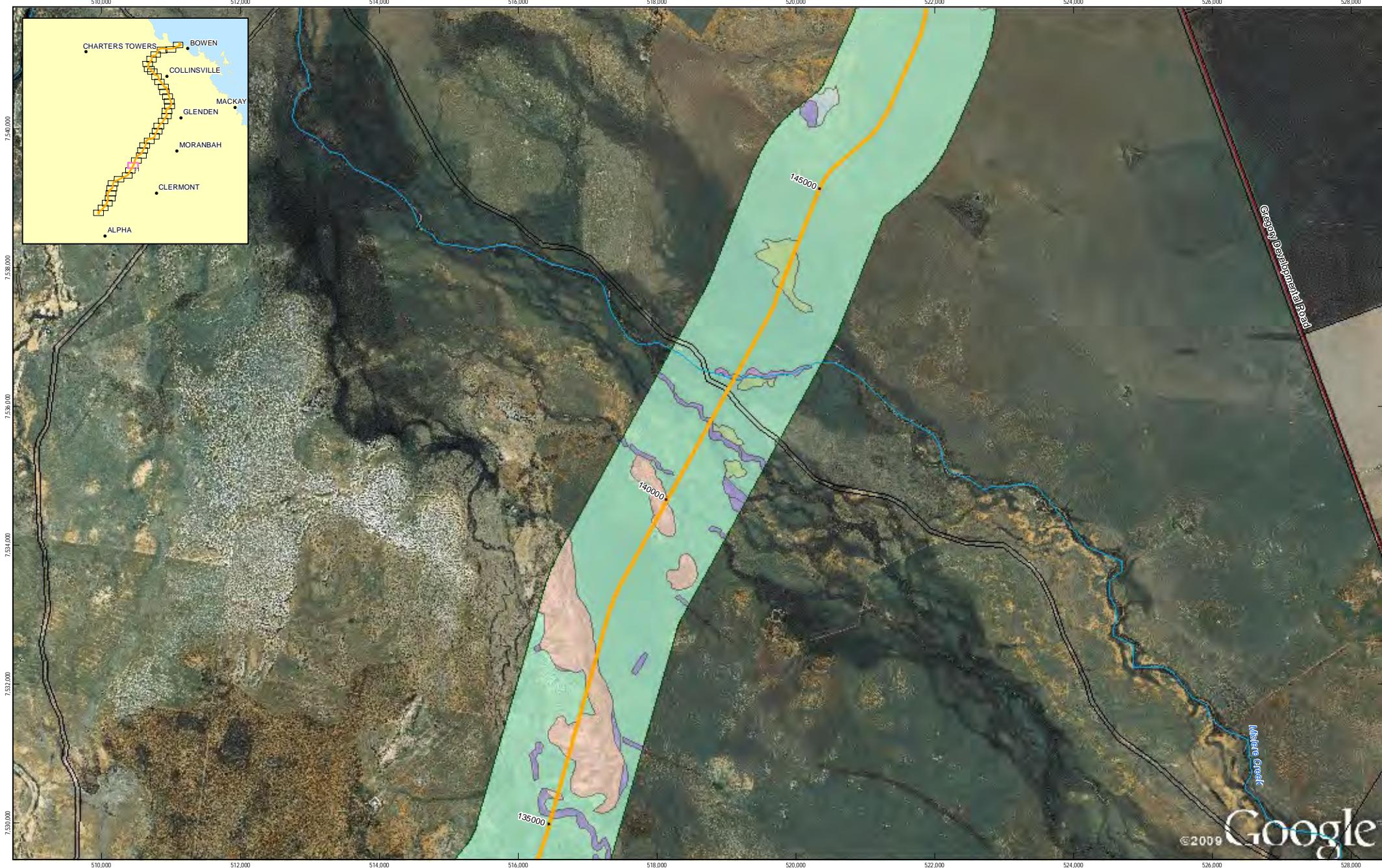
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Date 04-08-2010

Figure: 3-4  
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Job Number 41-22090  
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Grid: Map Grid of Australia, Zone 55  
Horizontal Datum: Geocentric Datum of Australia 1994  
Vertical Datum: Australian Height Datum 1985  
Scale: 1:50,000 (at A3)  
Kilometres  
Source: See Copyright Details below and for full disclosure please read Section 18.2 - References in the EIS

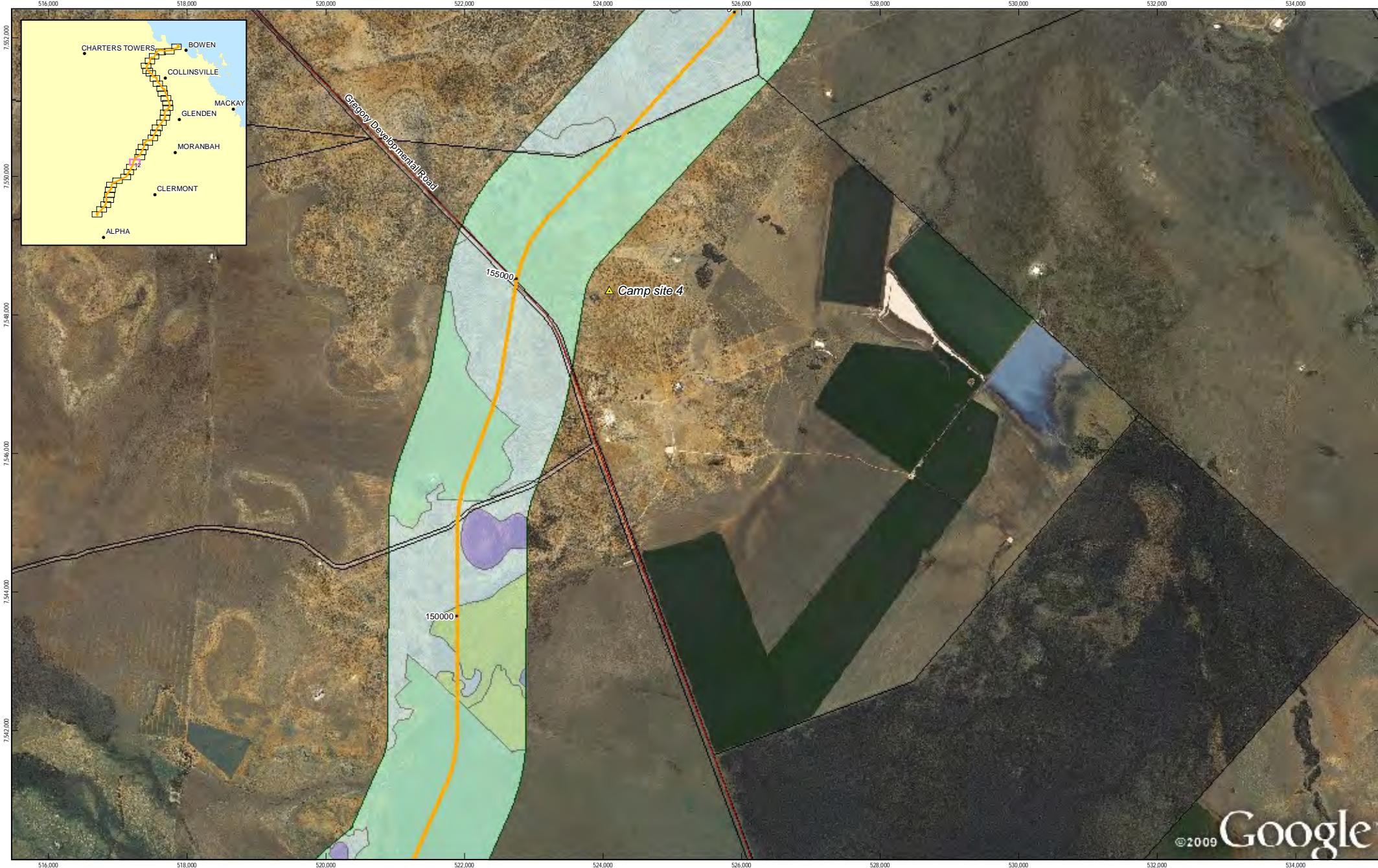
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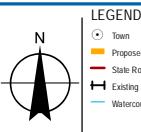
## FAUNA HABITAT AND VEGETATION COMMUNITIES

Figure: 3-4  
Sheet 11 of 37

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0 0.5 1 1.5 2 2.5 Kilometres  
Map Projection: Universal Transverse Mercator  
Horizontal Datum: Geocentric Datum of Australia 1994  
Grid: Map Grid of Australia, Zone 55



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|                    | Legend | Habitat Type                                   |
|--------------------|--------|--|
| Town               | ○      | Melaleuca shrubland                            |
| Proposed Alignment | —      | Mixed low woodland                             |
| State Road         | —      | Coastal Wetland                                |
| Existing Railway   | —      | Open woodland with grassy understorey          |
| Watercourse        | —      | Semi-evergreen vine thicket                    |
| Cadastre           | —      | Eucalyptopiperbank woodland along watercourses |
| Waterbody          | —      | Glossy paperbark                               |
| 2km Contour        | —      | Mangroves and tidal saltmarsh                  |

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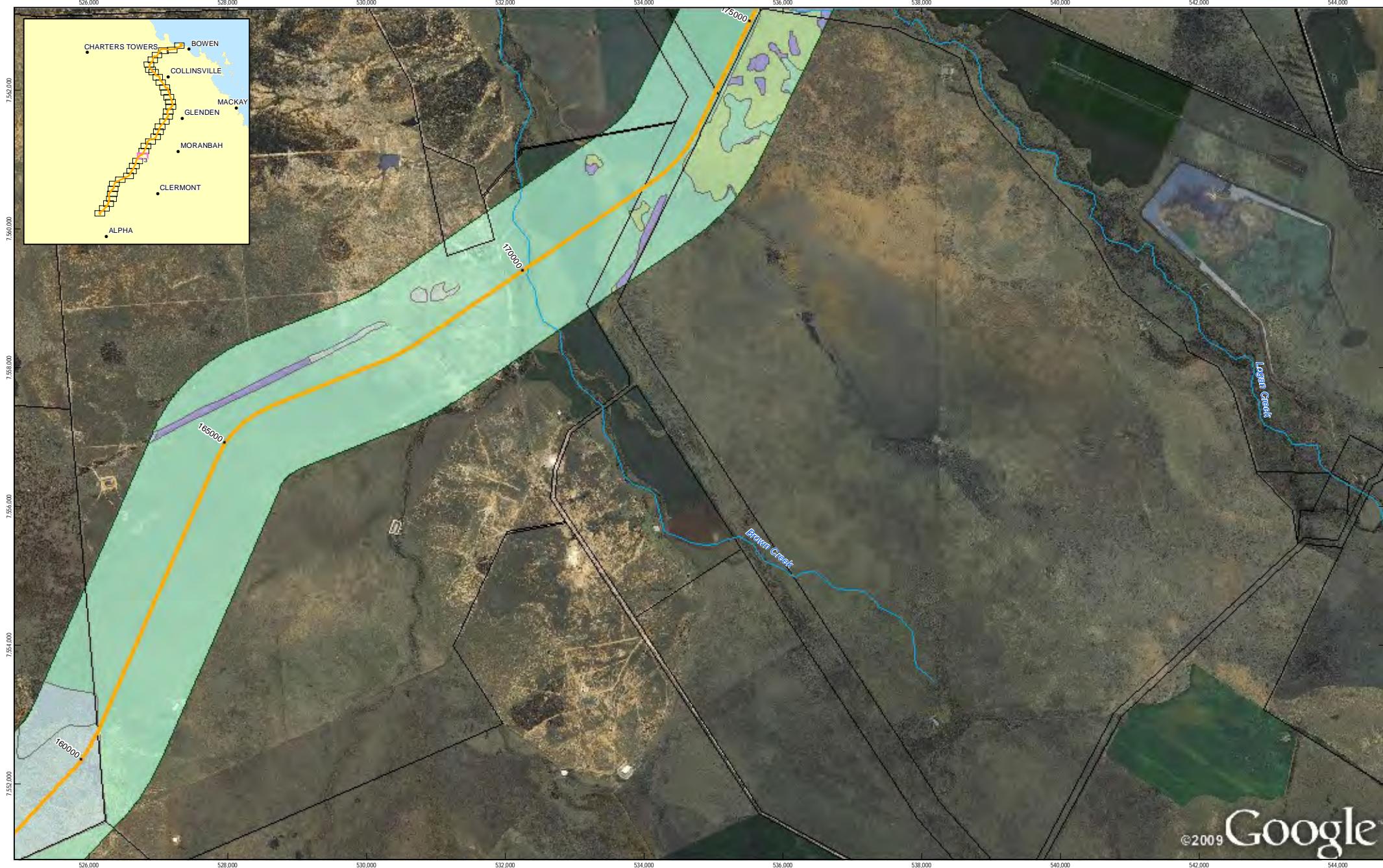
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Revision A  
Date 04-08-2010

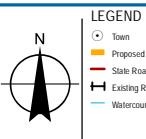
## FAUNA HABITAT AND VEGETATION COMMUNITIES

Figure: 3-4  
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0 0.5 1 1.5 2 2.5 Kilometres  
Map Projection: Universal Transverse Mercator  
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LEGEND

- Town
- Proposed Alignment
- State Road
- Existing Railway
- Watercourse
- Cadastre
- 2km Buffer

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- Yellow dots: Essential Habitat
- Green dots: High Value Regrowth
- Red checkmark: Amended RE
- Blue line: Waterbody
- Black line: 2km Buffer

Habitat Type

Melaleuca shrubland

Acacia dominated shrubland

Coastal Wetland

Mixed low woodland

Eucalypt woodland on rocky rises

Open woodland with grassy understorey

Semi-evergreen vine thicket

Eucalyptopiperbank woodland along watercourses

Glossyine

Mangroves and tidal saltmarsh

Mature woodland with variable shrub and understorey

Non-remnant

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## FAUNA HABITAT AND VEGETATION COMMUNITIES

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0 0.5 1 1.5 2 2.5 Kilometres

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Horizontal Datum: Geocentric Datum of Australia 1994  
Grid: Map Grid of Australia, Zone 55

N

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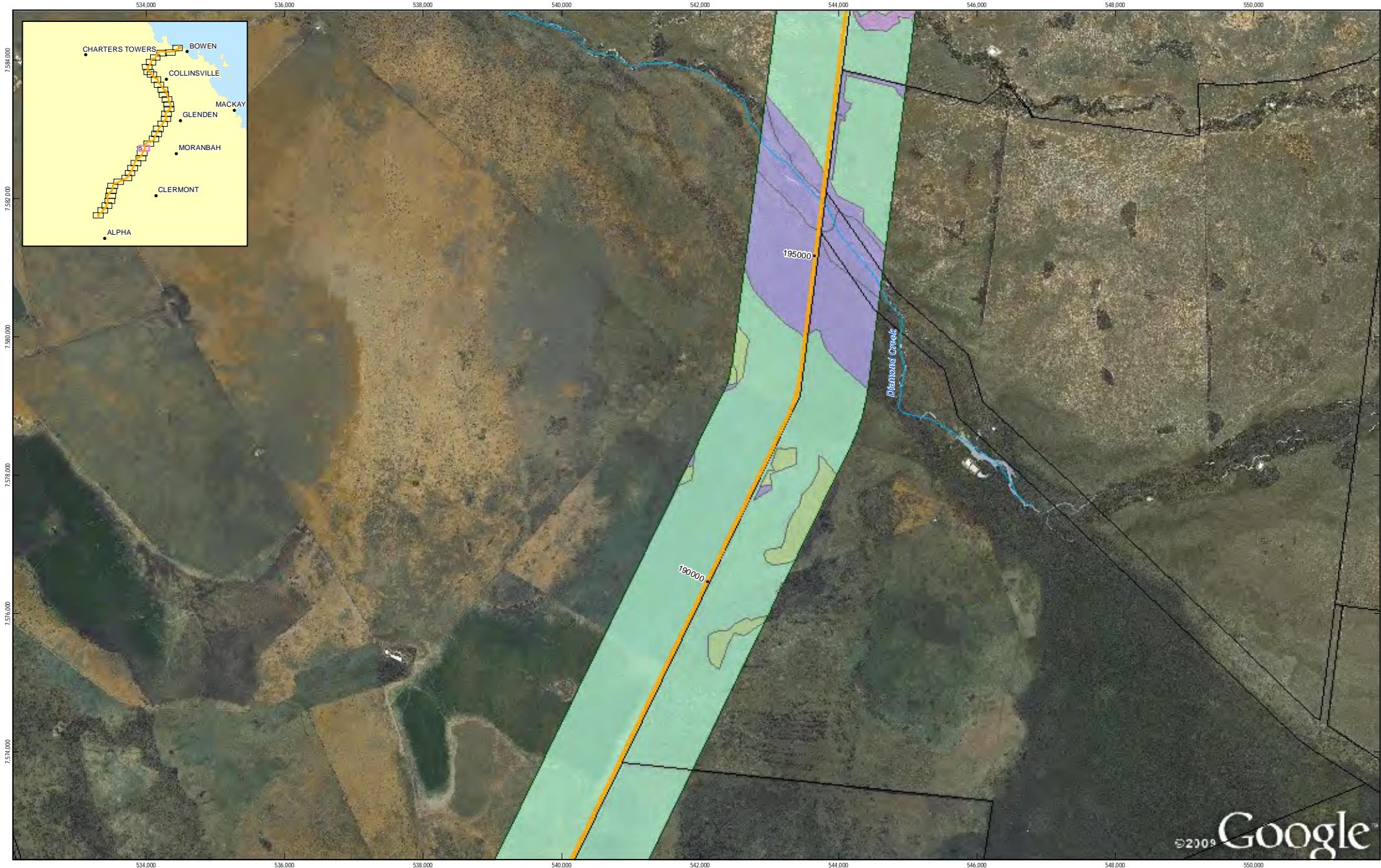
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**FAUNA HABITAT AND  
VEGETATION COMMUNITIES**

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Kilometres  
Map Projection: Universal Transverse Mercator  
Horizontal Datum: Geocentric Datum of Australia 1994  
Grid: Map Grid of Australia, Zone 55

#### LEGEND



- Town
- Proposed Alignment
- State Road
- Existing Railway
- Watercourse
- Kilometres
- 1:50,000 (at A3)
- N
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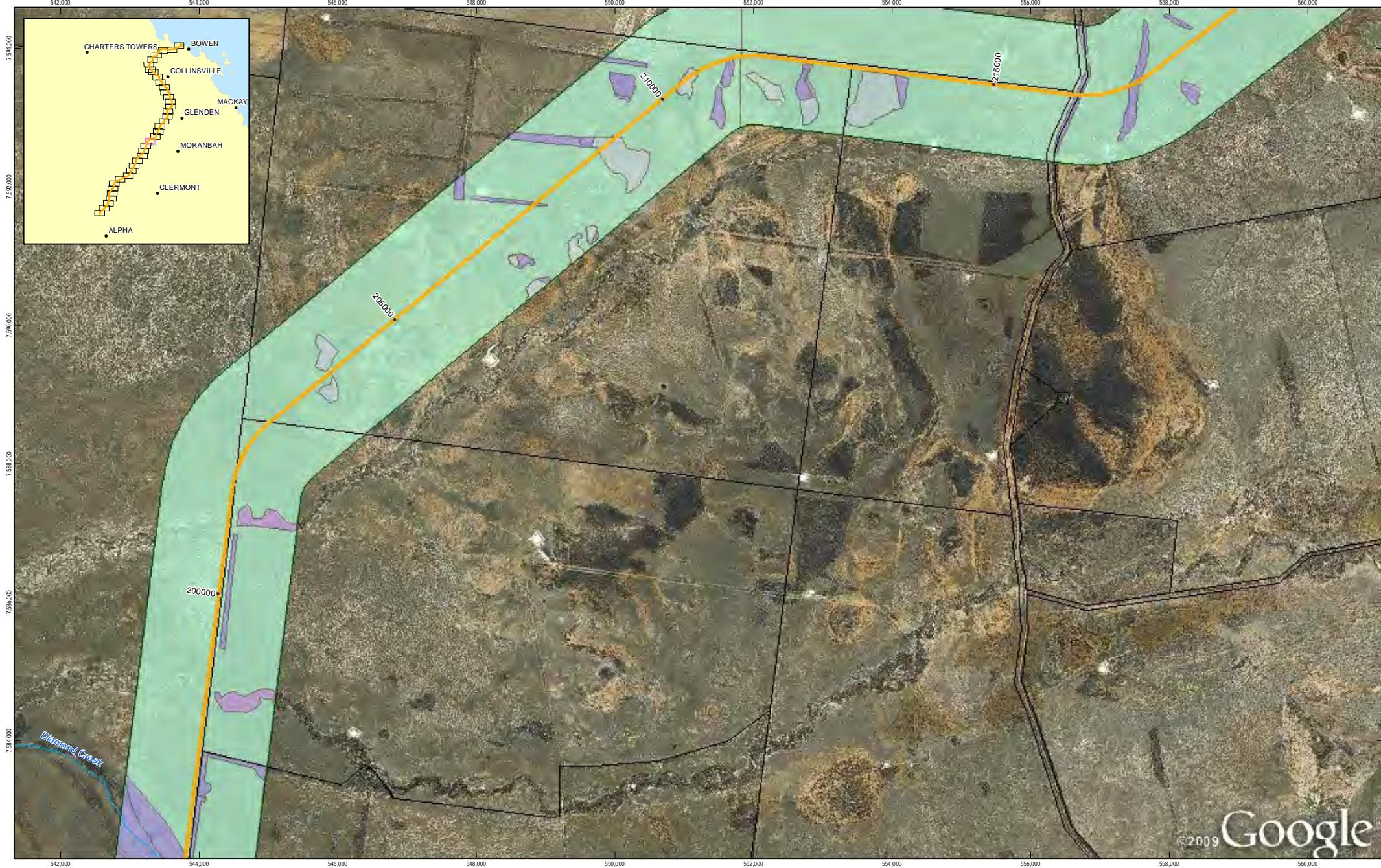
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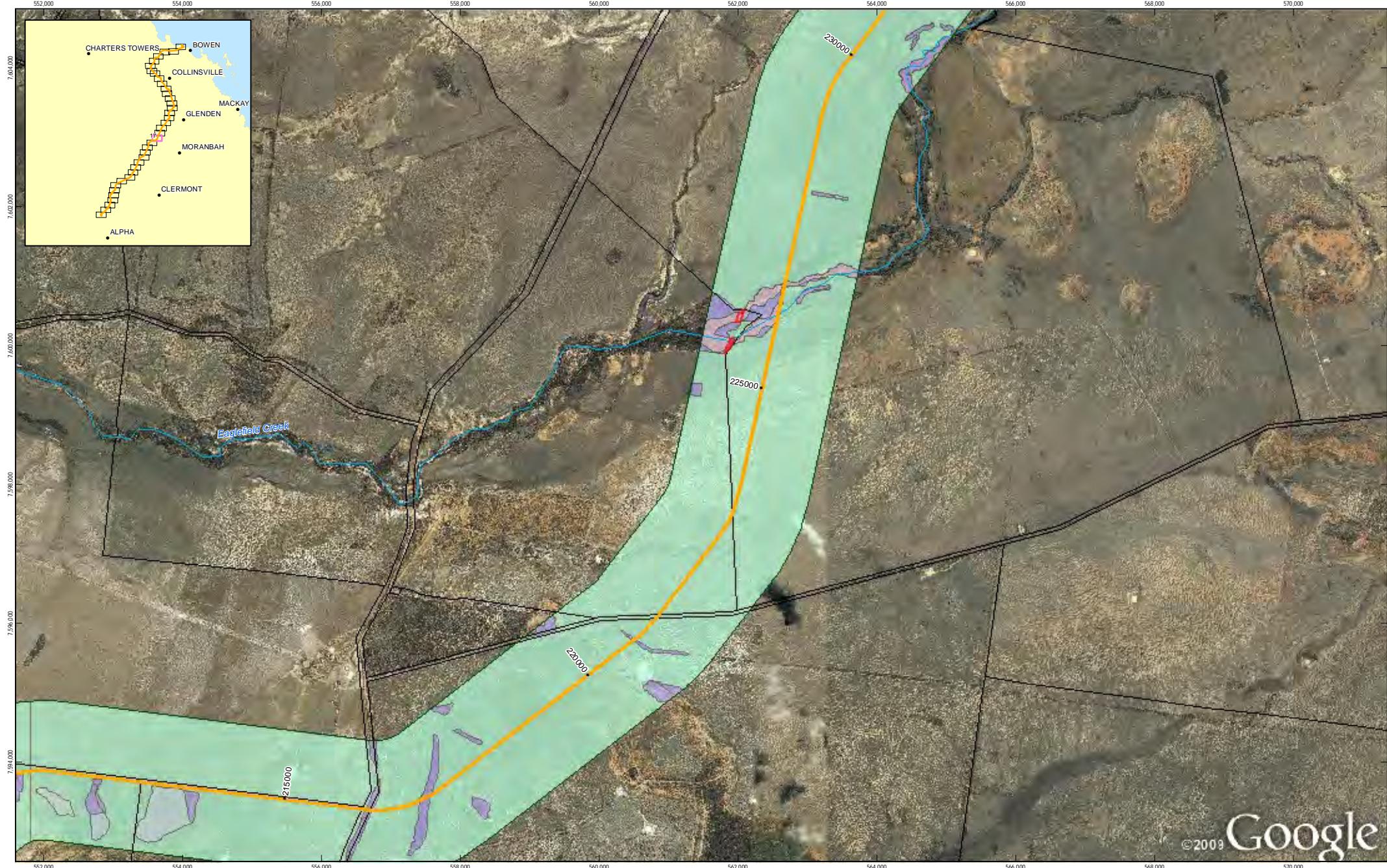
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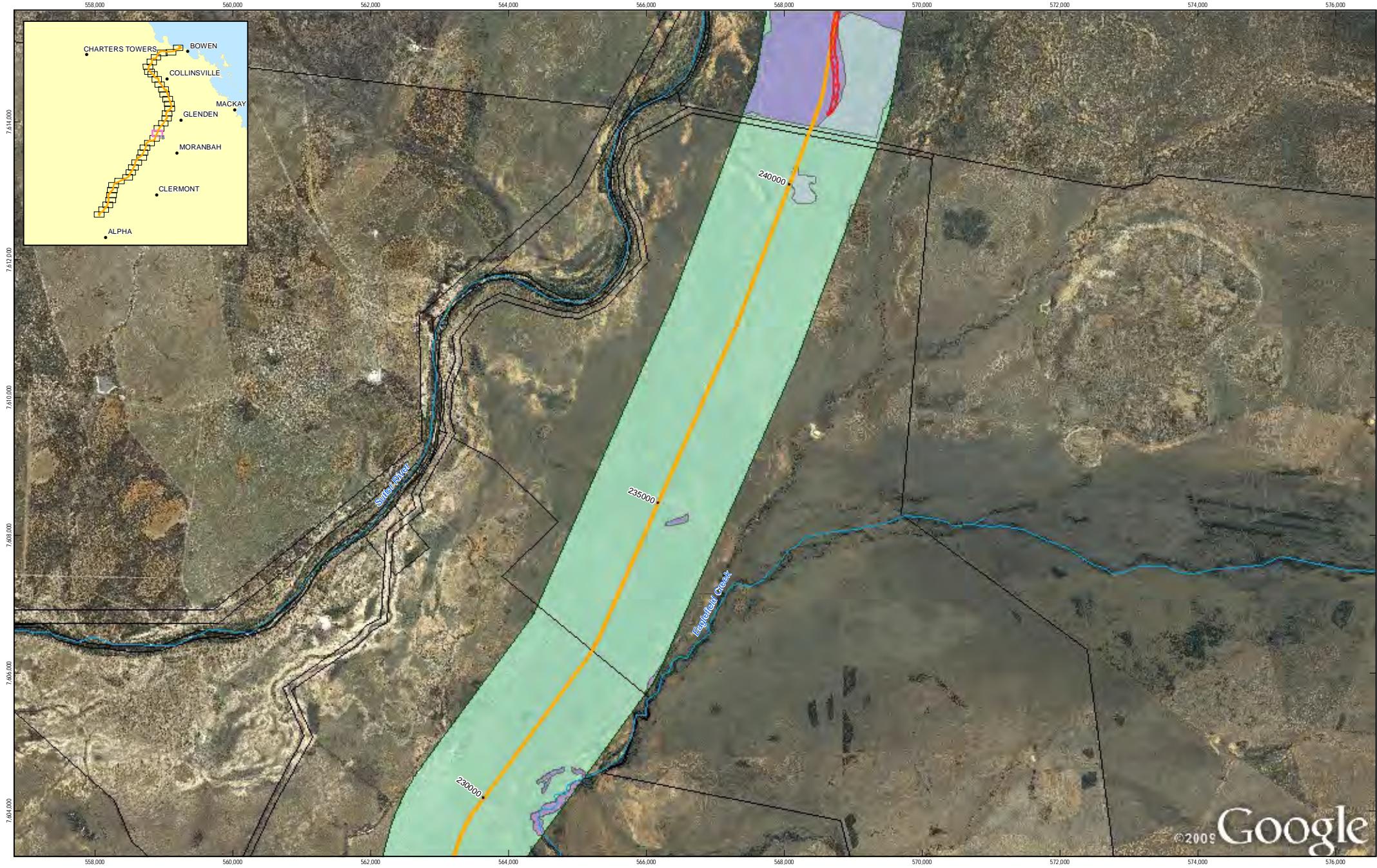
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## FAUNA HABITAT AND VEGETATION COMMUNITIES

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1:50,000 (at A3)

0 0.5 1 1.5 2 2.5 Kilometres

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Horizontal Datum: Geocentric Datum of Australia 1994  
Grid: Map Grid of Australia, Zone 55

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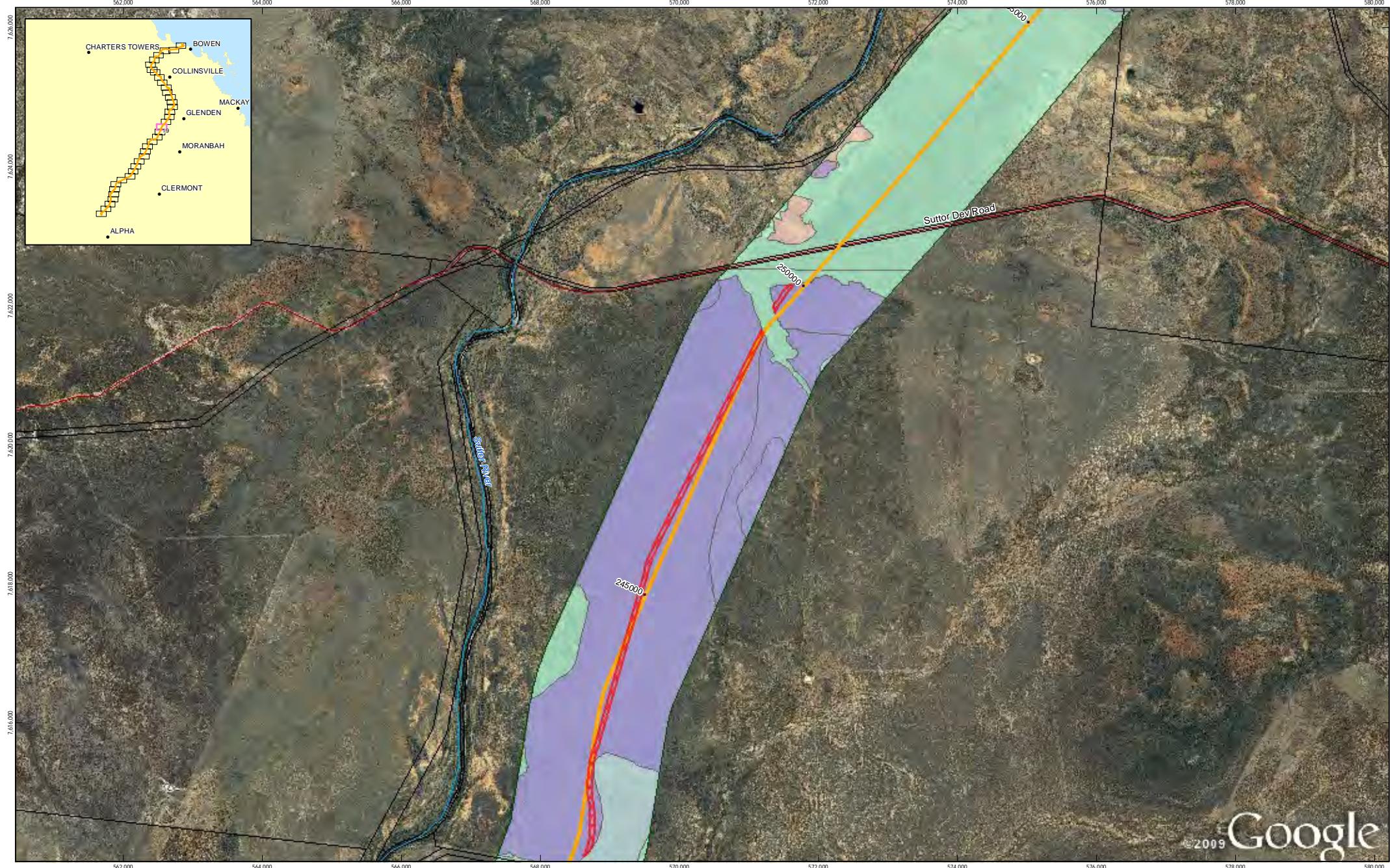
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## FAUNA HABITAT AND VEGETATION COMMUNITIES

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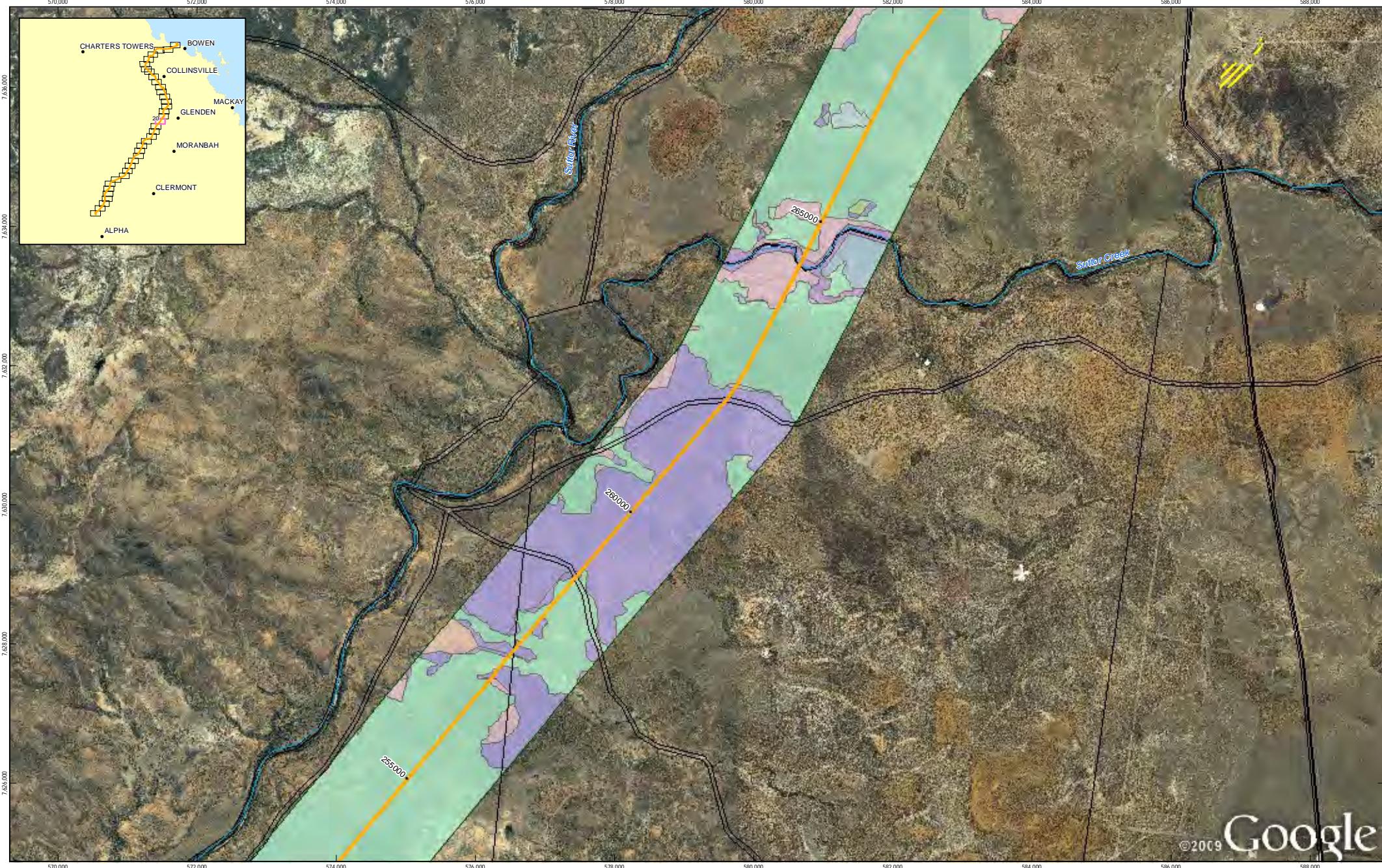
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LEGEND

- Town
- Proposed Alignment
- State Road
- Existing Railway
- Watercourse
- Cadastre
- Waterbody
- 2km Buffer

Source: See Copyright Details below and for full disclosure please read Section 18.2 - References in the EIS

Map Projection: Universal Transverse Mercator  
Horizontal Datum: Geocentric Datum of Australia 1994  
Grid: Map Grid of Australia, Zone 55

1:50,000 (at A3)

N



Kilometres

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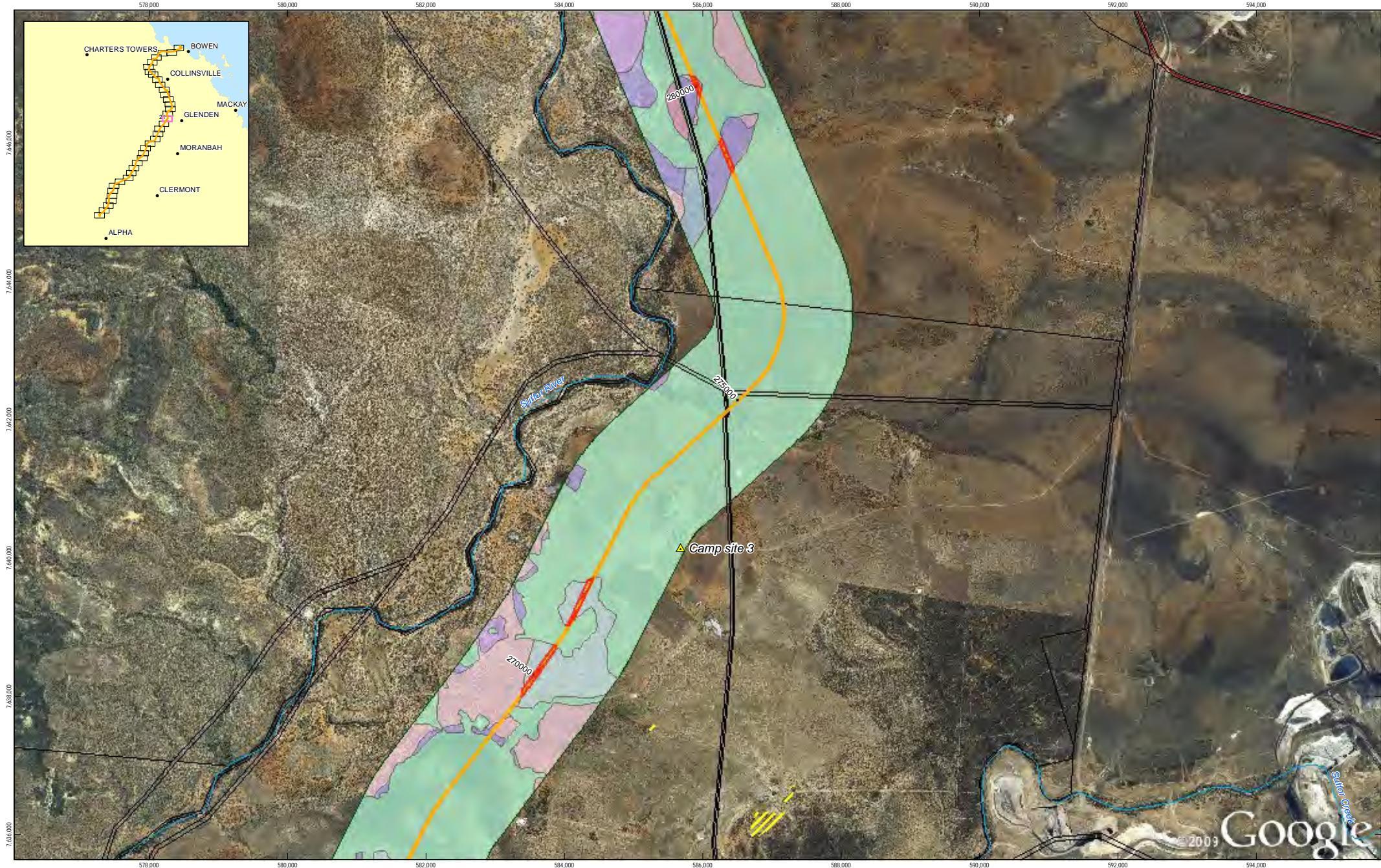
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## FAUNA HABITAT AND VEGETATION COMMUNITIES

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LEGEND

- |                      |  |  |
|----------------------|--|--|
| ● Town               | ● Essential Habitat  | ● Habitat Type                                 |
| — Proposed Alignment | ● High Value Regrowth  | ■ Acacia dominated shrubland                   |
| — State Road         | ■ Amended RE   | ■ Coastal Wetland                              |
| — Existing Railway   | ■ Cadastre   | ■ Eucalypt woodland on rocky rises             |
| — Watercourse        | ■ Waterbody  | ■ Eucalyptopenbank woodland along watercourses |
| — 2km Buffer         | Source: See Copyright Details below and for full disclosure please read Section 18.2 - References in the EIS | ■ Glossyine                                    |

Map Projection: Universal Transverse Mercator  
Horizontal Datum: Geocentric Datum of Australia 1994  
Grid: Map Grid of Australia, Zone 55  
Grid Reference: 578,000 to 594,000 (Easting), 742,000 to 746,000 (Northing)  
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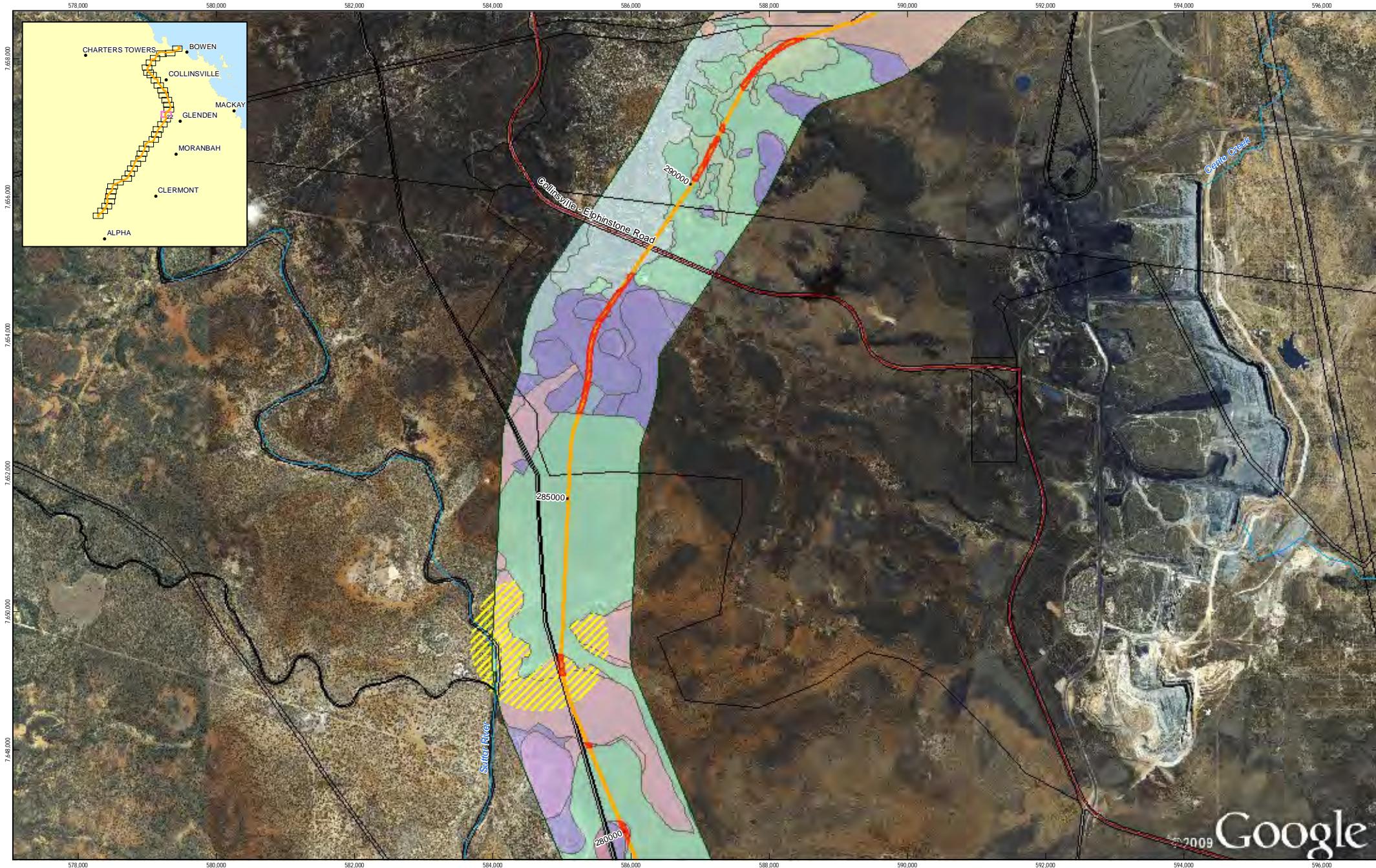
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## FAUNA HABITAT AND VEGETATION COMMUNITIES

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LEGEND

- Town
  - Proposed Alignment
  - State Road
  - Existing Railway
  - Watercourse
  - Cadastre
  - 2km Buffer
  - Essential Habitat
  - High Value Regrowth
  - Amended RE
  - Cadastre
  - Waterbody
  - 2km Buffer
- Source: See Copyright Details below and for full disclosure please read Section 18.2 - References in the EIS

1:50,000 (at A3)  
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Map Projection: Universal Transverse Mercator  
Horizontal Datum: Geocentric Datum of Australia 1994  
Grid: Map Grid of Australia, Zone 55

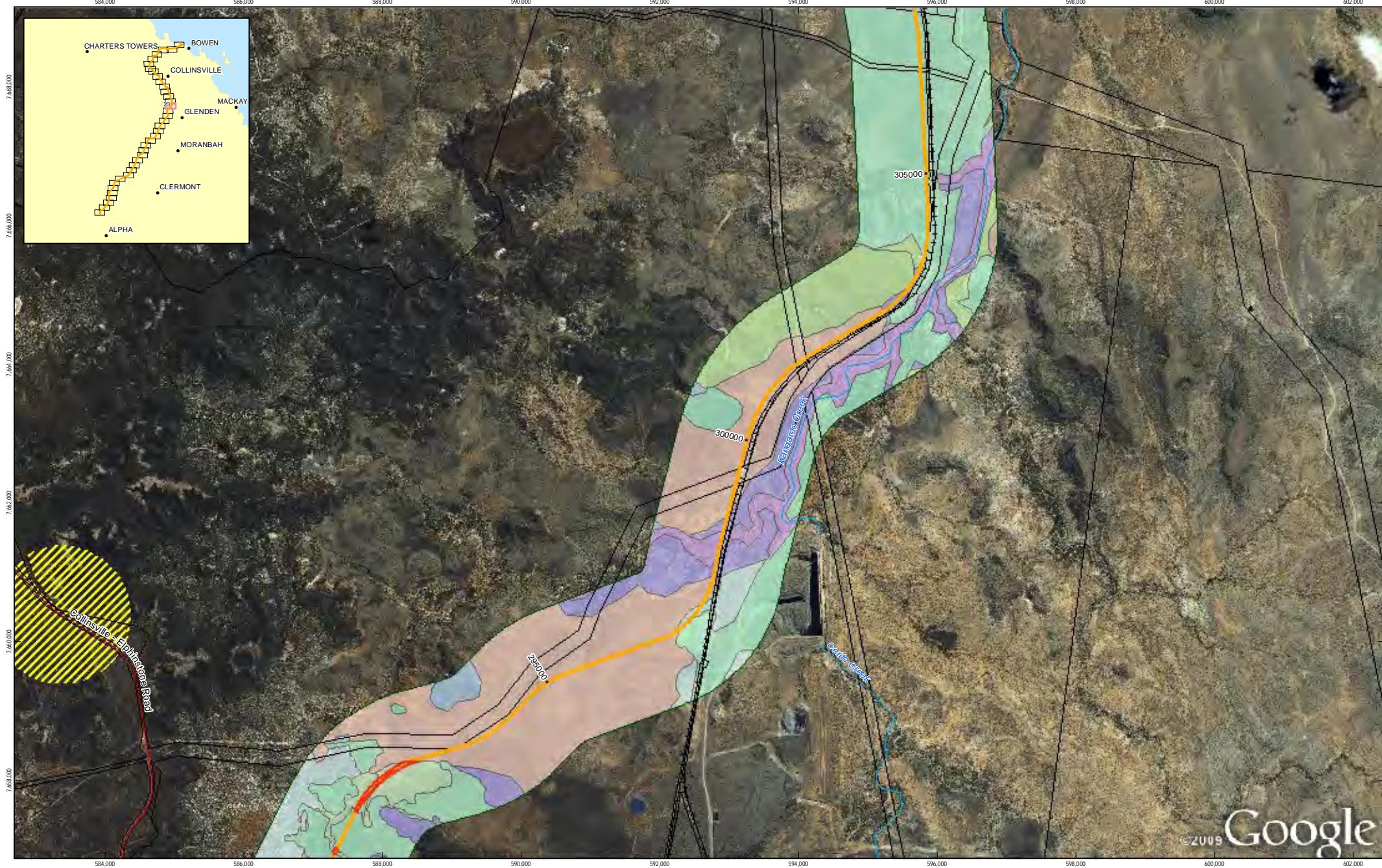


- Habitat Type
- Acacia dominated shrubland
  - Coastal Wetland
  - Eucalypt woodland on rocky rises
  - Eucalyptopiperbank woodland along watercourses
  - Grassland
  - Melaleuca shrubland
  - Mixed low woodland
  - Open woodland with grassy understorey
  - Semi-evergreen vine thicket
  - Sparse woodland/grassland on cracking clay soils
  - Woodland and open forest fringing watercourses
  - Non-remnant

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## FAUNA HABITAT AND VEGETATION COMMUNITIES

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LEGEND



Kilometres

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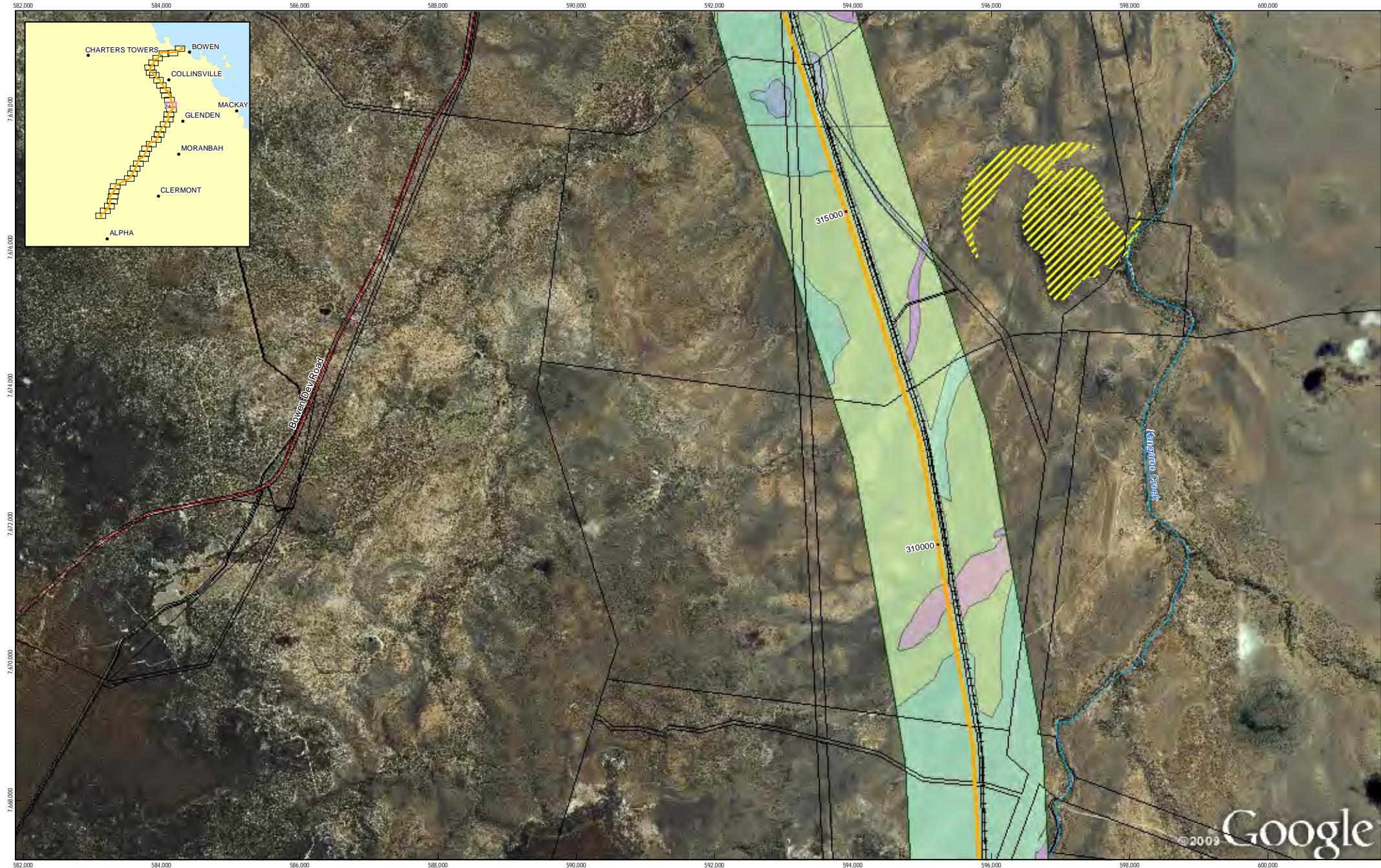
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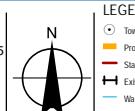


1:50,000 (at A3)

0 0.5 1 1.5 2 2.5 Kilometres

N

Map Projection: Universal Transverse Mercator  
Horizontal Datum: Geocentric Datum of Australia 1994  
Grid: Map Grid of Australia, Zone 55



**LEGEND**

- Town
- Proposed Alignment
- State Road
- Existing Railway
- Watercourse
- Regrowth
- Amended RE
- Cadastre
- Waterbody
- 2km Buffer
- Essential Habitat
- High Value
- Acacia dominated shrubland
- Coastal Wetland
- Mixed low woodland
- Open woodland with grassy understorey
- Eucalypt woodland on rocky rises
- Semi-evergreen vine thicket
- Eucalypt/paperbark woodland along watercourses
- Glossy paperbark
- Mangroves and tidal saltmarsh
- Mature woodland with variable shrub and understorey
- Melaleuca shrubland
- Pink
- Light Green
- Medium Green
- Dark Green
- Light Blue
- Medium Blue
- Dark Blue
- Non-remnant

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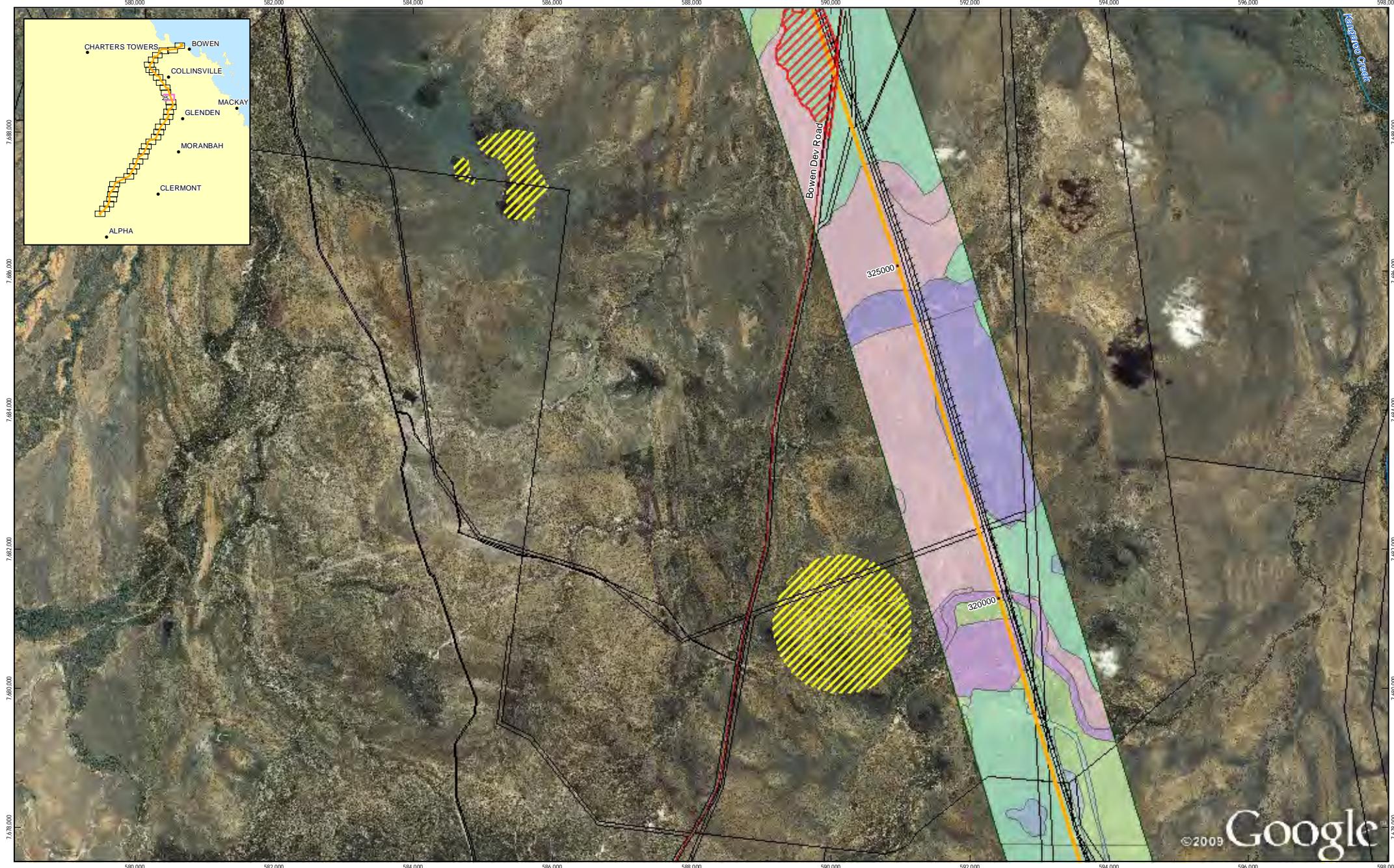
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#### LEGEND

|                       |                       |   |  |
|-----------------------|-----------------------|---|--|
| ● Town                | ○ Proposed Alignment  | ■ High Value Regrowth                                 | ■ Habitat Type                                     |
| — State Road          | — Existing Railway    | ■ Amended RE  | ■ Acacia dominated shrubland                       |
| — Watercourse         | — Cadastre            | □ Cadastre  | ■ Mixed low woodland                               |
| — Waterbody           | — Waterbody           | □ Waterbody   | ■ Coastal Wetland                                  |
| — 2km Corridor        | — 2km Corridor        | □ 2km Corridor  | ■ Eucalypt woodland on rocky rises                 |
| — Essential Habitat   | — Essential Habitat   | ■ Eucalypt/paperbark woodland along watercourses      | ■ Open woodland with grassy understorey            |
| — High Value Regrowth | — High Value Regrowth | ■ Grassland   | ■ Semi-evergreen vine thicket                      |
| — Amended RE          | — Amended RE          | ■ Mangroves and tidal saltmarsh                       | ■ Sparse woodland/grassland on cracking clay soils |
| ■ Habitat Type        | ■ Habitat Type        | ■ Mature woodland with variable shrub and understorey | ■ Woodland and open forest fringing watercourses   |
| ■ Melaleuca shrubland | ■ Melaleuca shrubland | ■ Non-remnant   | ■ Non-remnant                                      |

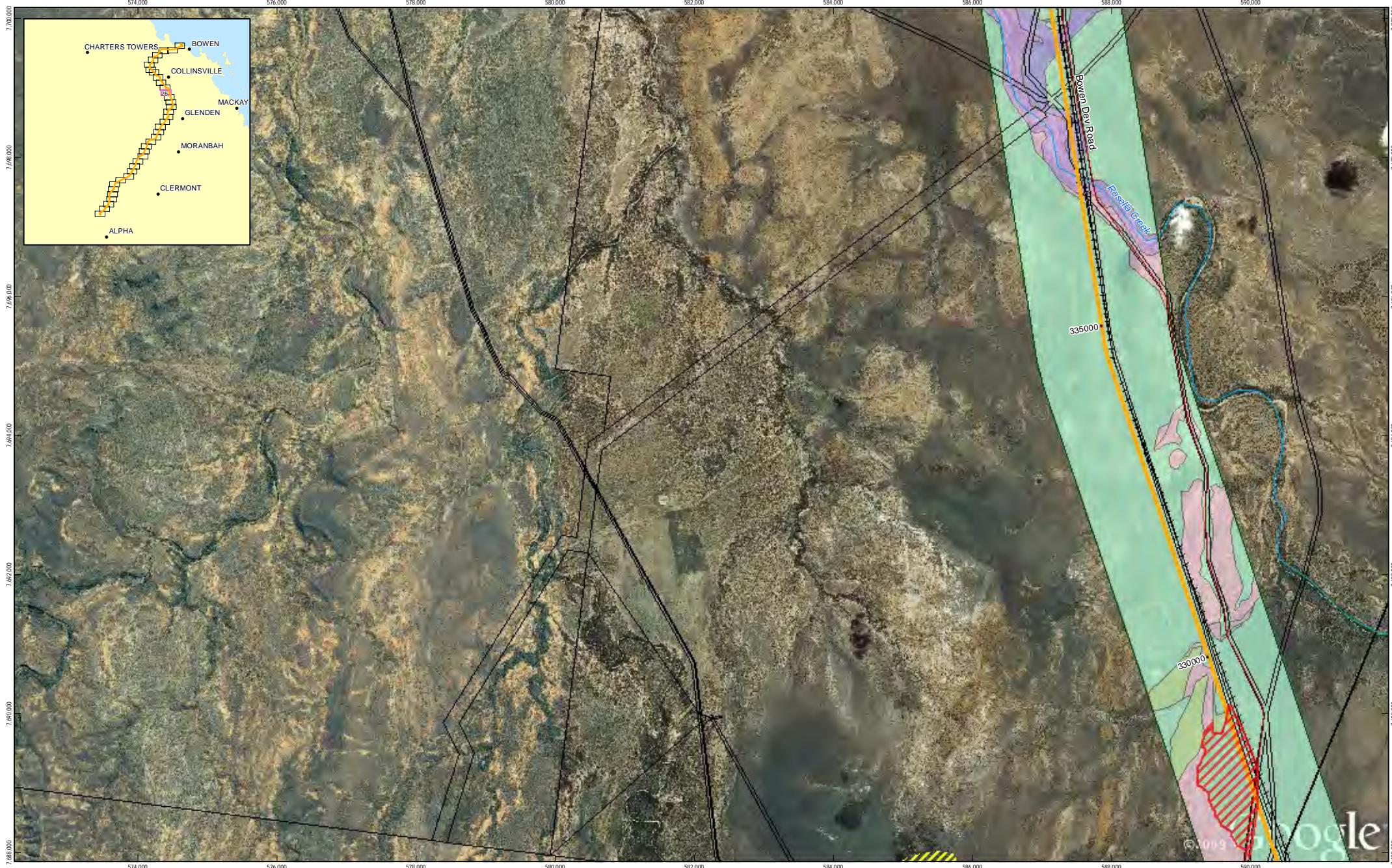
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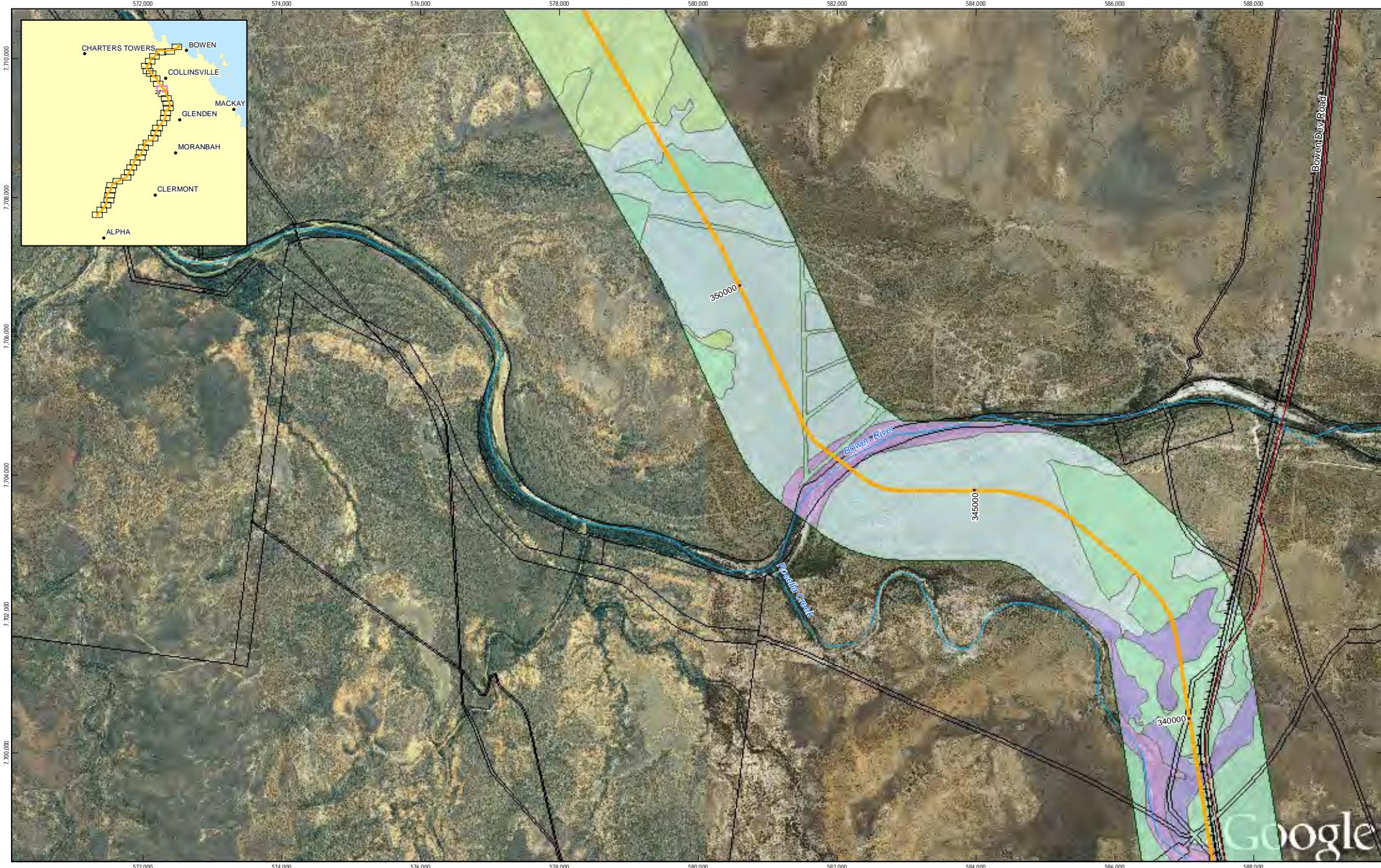
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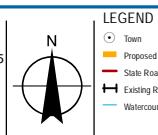
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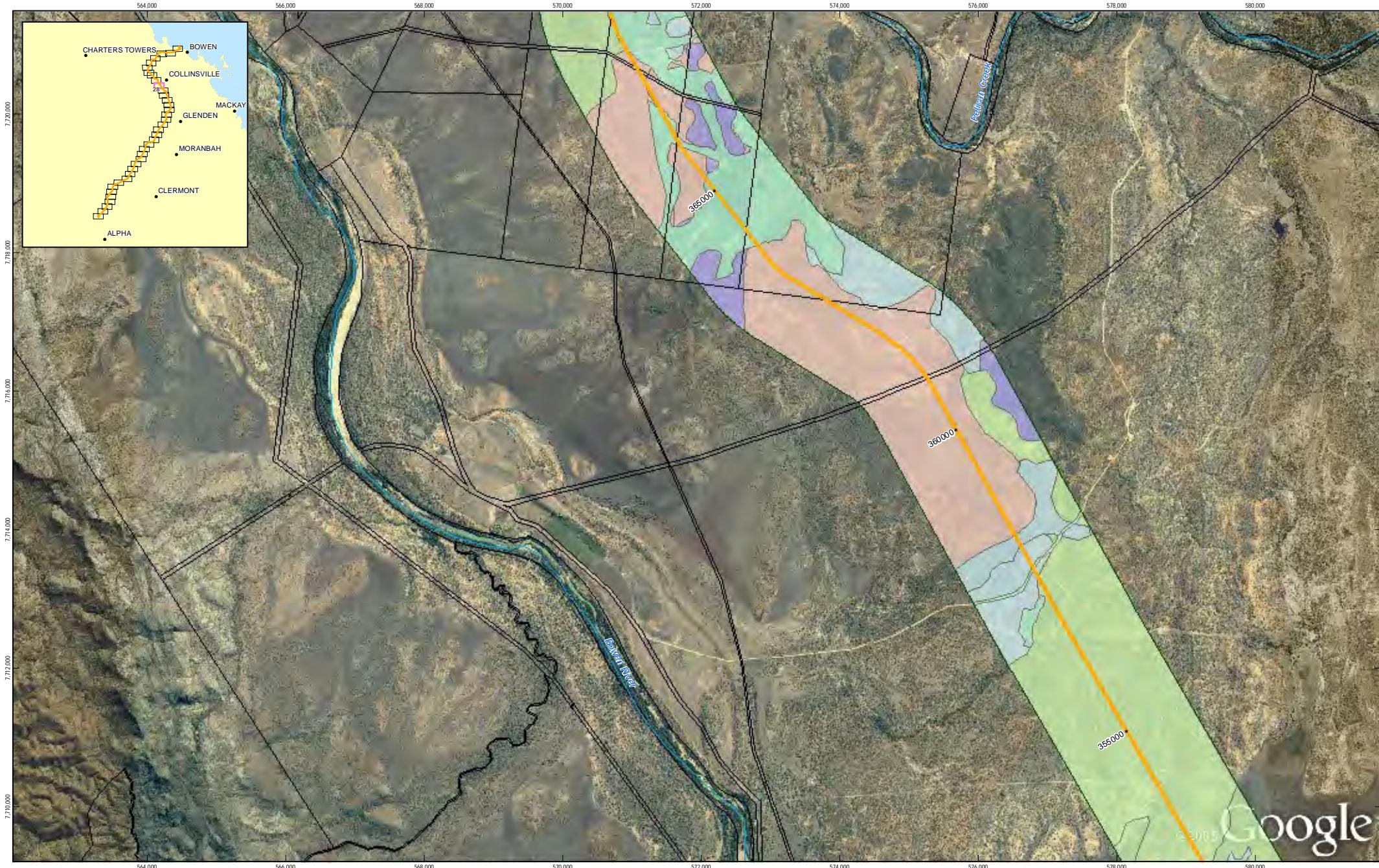
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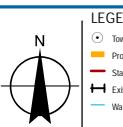
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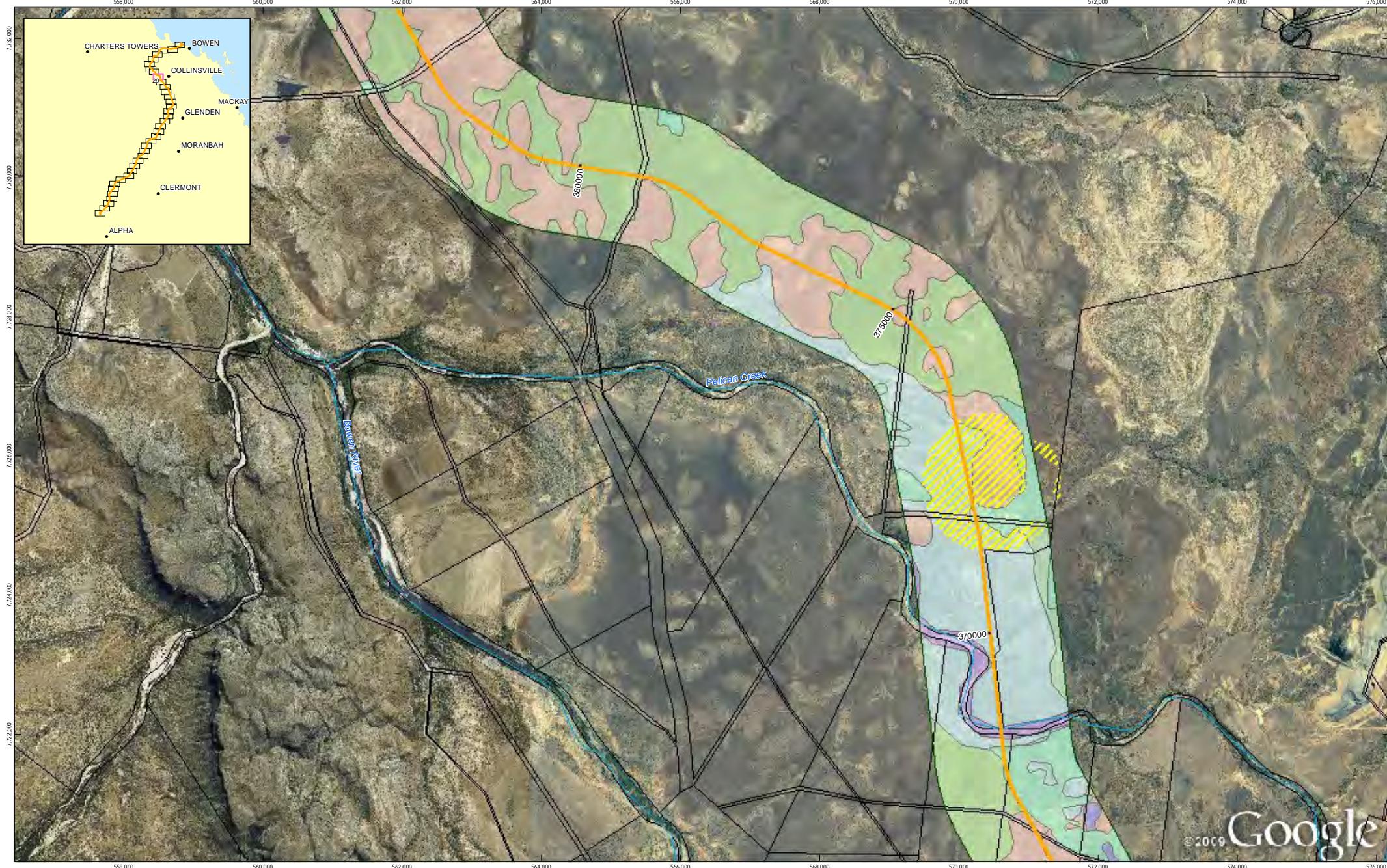
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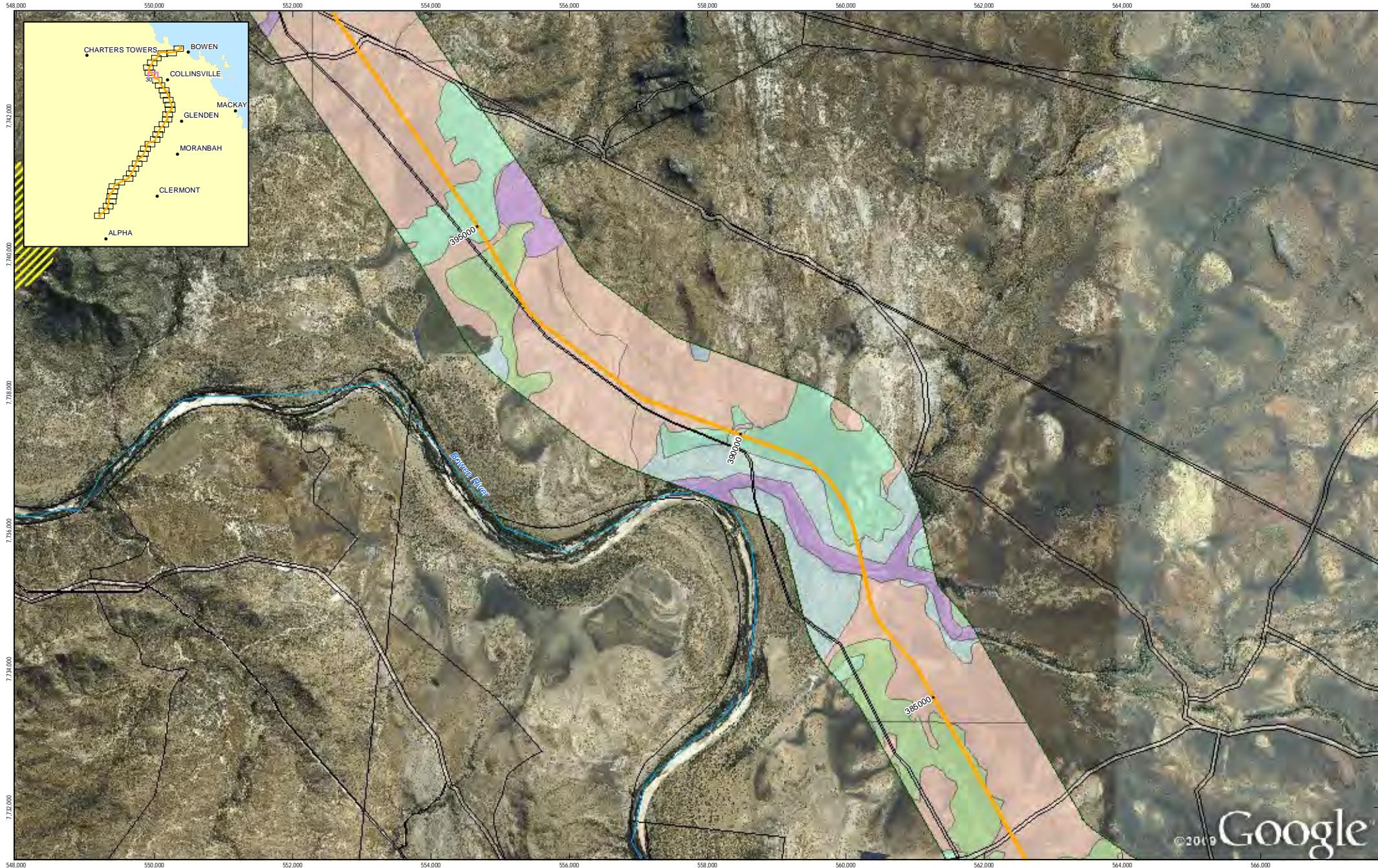
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 • Town  
 — Proposed Alignment  
 — State Road  
 — Existing Railway  
 — Watercourse  
 □ Cadastre  
 ■ Waterbody  
 □ 2km Buffer  
 ◆ Essential Habitat  
 ■ Regrowth  
 □ Amended RE  
 ◇ Habitat Type  
 ■ Acacia dominated shrubland  
 ■ Coastal Wetland  
 ■ Open woodland with grassy understorey  
 ■ Semi-evergreen vine thicket  
 ■ Eucalyptopenbank woodland along watercourses  
 ■ Grassland  
 ■ Mangroves and tidal saltmarsh  
 ■ Mature woodland with variable shrub and understorey  
 ■ Melaleuca shrubland  
 ■ Mixed low woodland  
 ■ Open woodland with grassy understorey  
 ■ Sparse woodland/grassland on cracking clay soils  
 ■ Woodland and open forest fringing watercourses  
 ■ Non-remnant

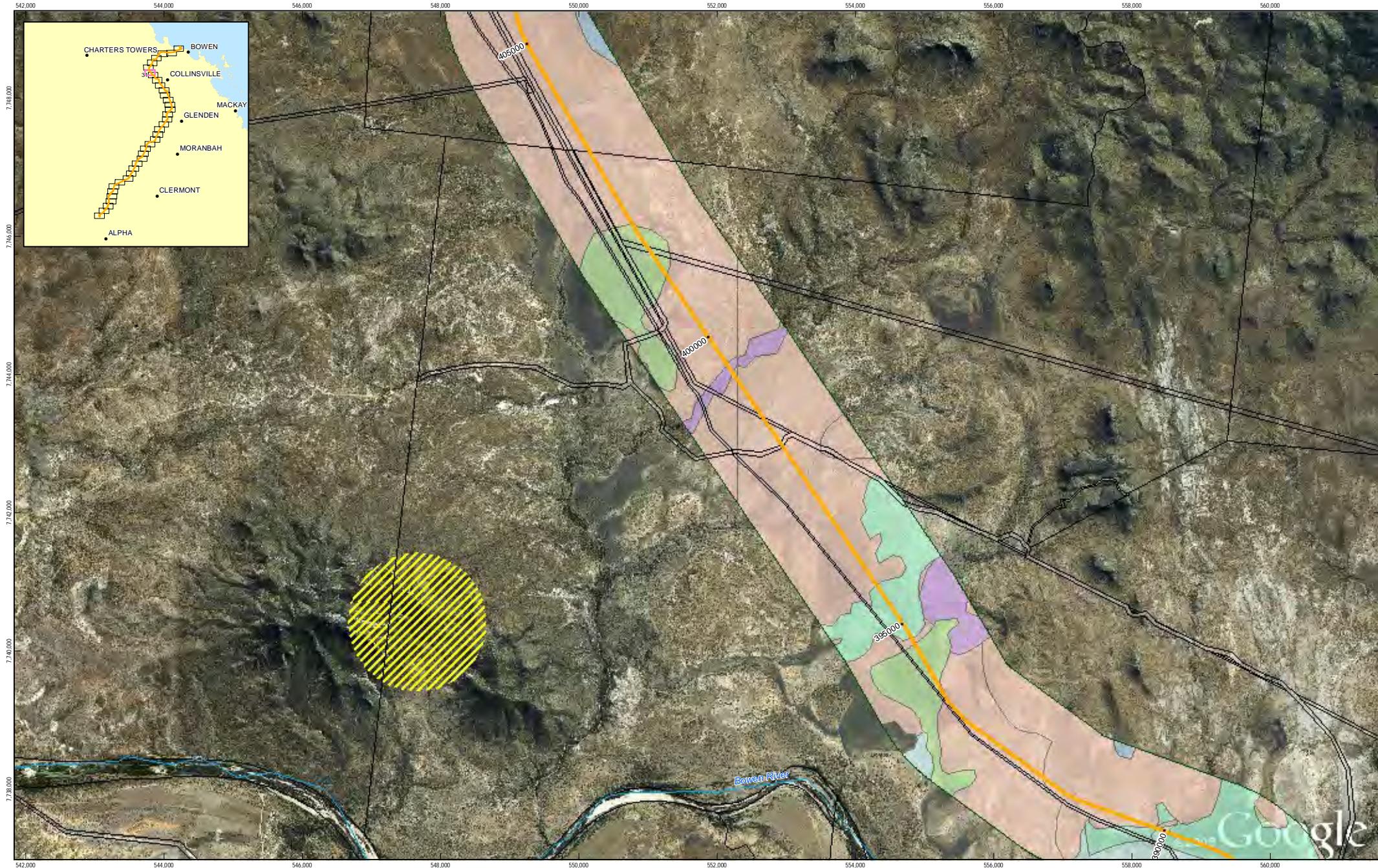
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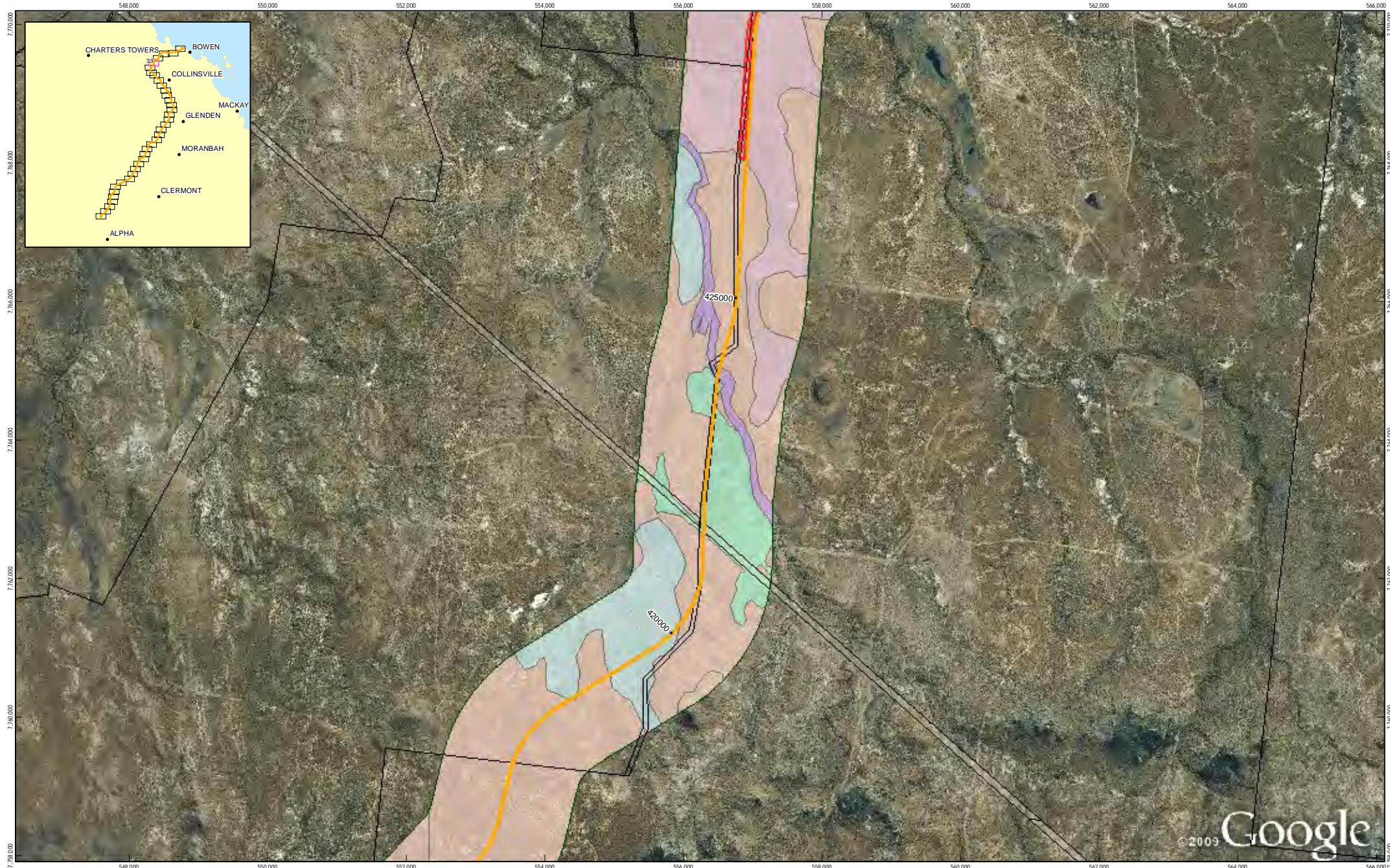
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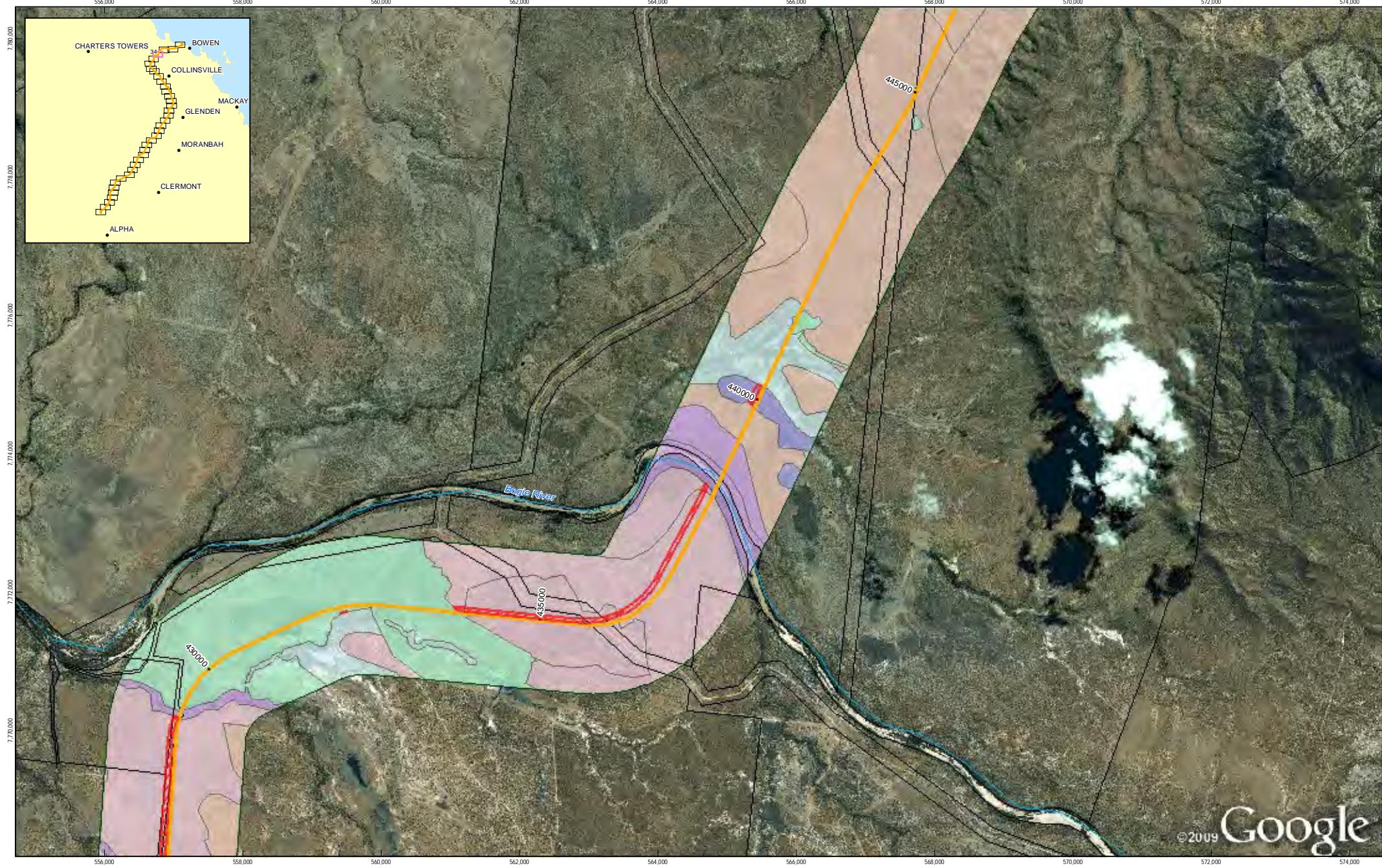
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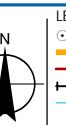
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#### LEGEND

Town

## Proposed

— State Road

Existing R  
Watercourt

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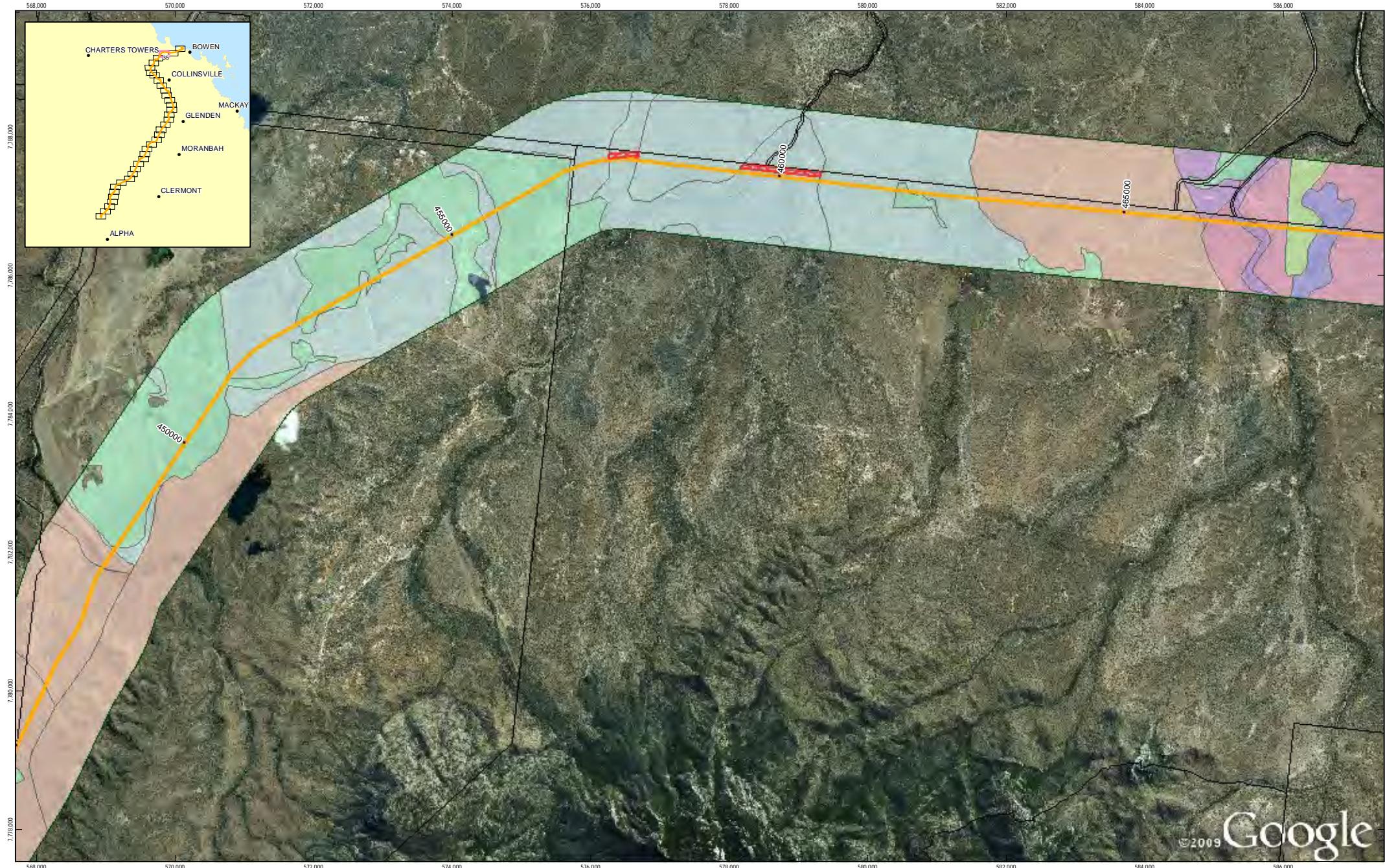
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## FAUNA HABITAT AND VEGETATION COMMUNITIES

|            |            |
|------------|------------|
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#### LEGEND

|                      |                   |   |
|----------------------|-------------------|---|
| ● Town               | Essential Habitat | Habitat Type  |
| — Proposed Alignment | High Value        | Acacia dominated shrubland                          |
| — State Road         | Regrowth          | Coastal wetland                                     |
| — Existing Railway   | Amended RE        | Eucalypt woodland on rocky rises                    |
| — Watercourse        |                   | Open woodland with grassy understorey               |
| — Cadastre           |                   | Semi-evergreen vine thicket                         |
| — Waterbody          |                   | Eucalypt/paperbark woodland along watercourses      |
| ■ 2km Corridor       |                   | Grassland   |
|                      |                   | Mangroves and tidal saltmarsh                       |
|                      |                   | Mature woodland with variable shrub and understorey |
|                      |                   | Mixed low woodland                                  |
|                      |                   | Sparse woodland/grassland on cracking clay soils    |
|                      |                   | Woodland and open forest fringing watercourses      |
|                      |                   | Non-remnant   |

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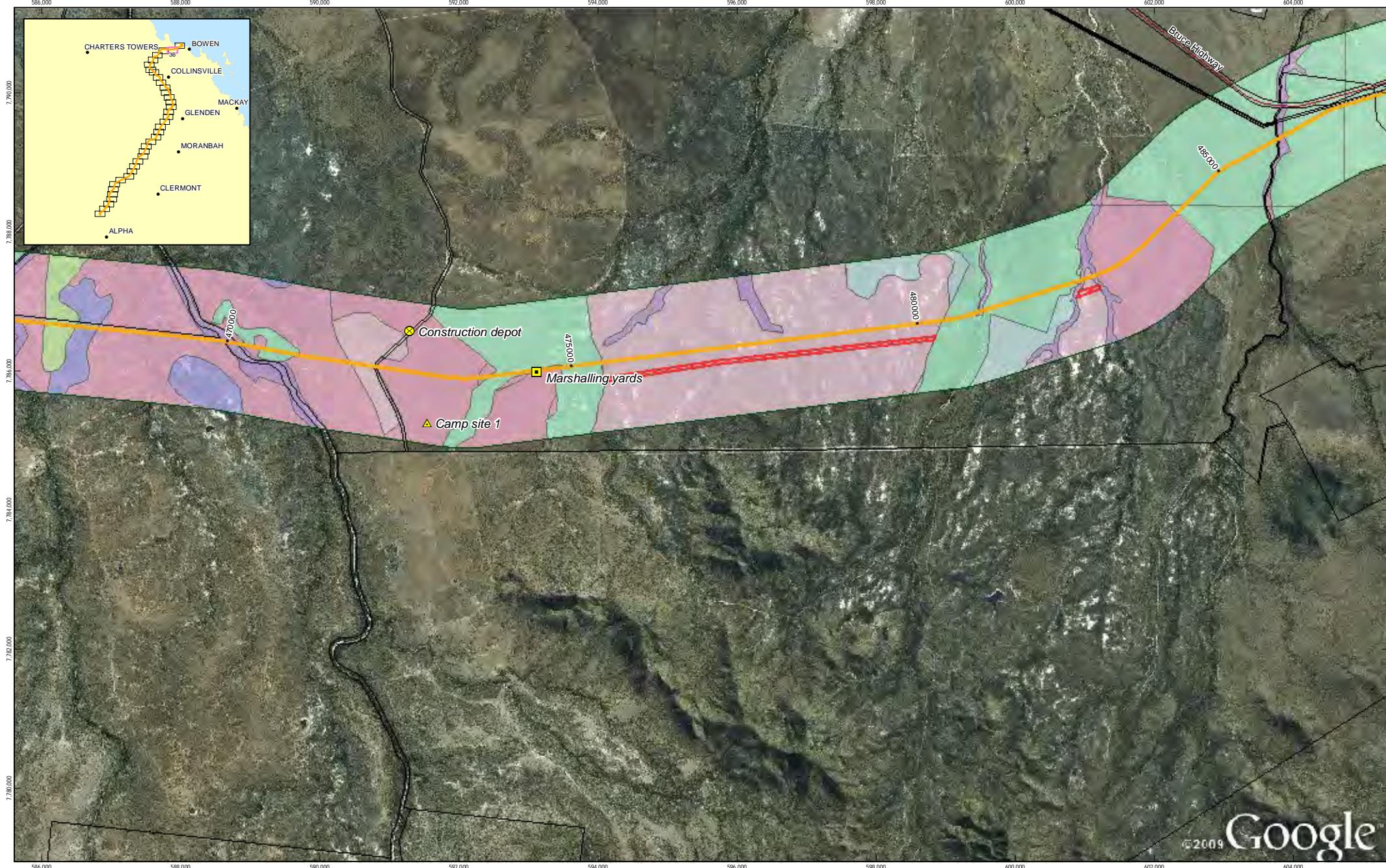
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FAUNA HABITAT AND  
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LEGEND

- Town
- Proposed Alignment
- State Road
- Existing Railway
- Watercourse
- Cadastre
- 2km Buffer

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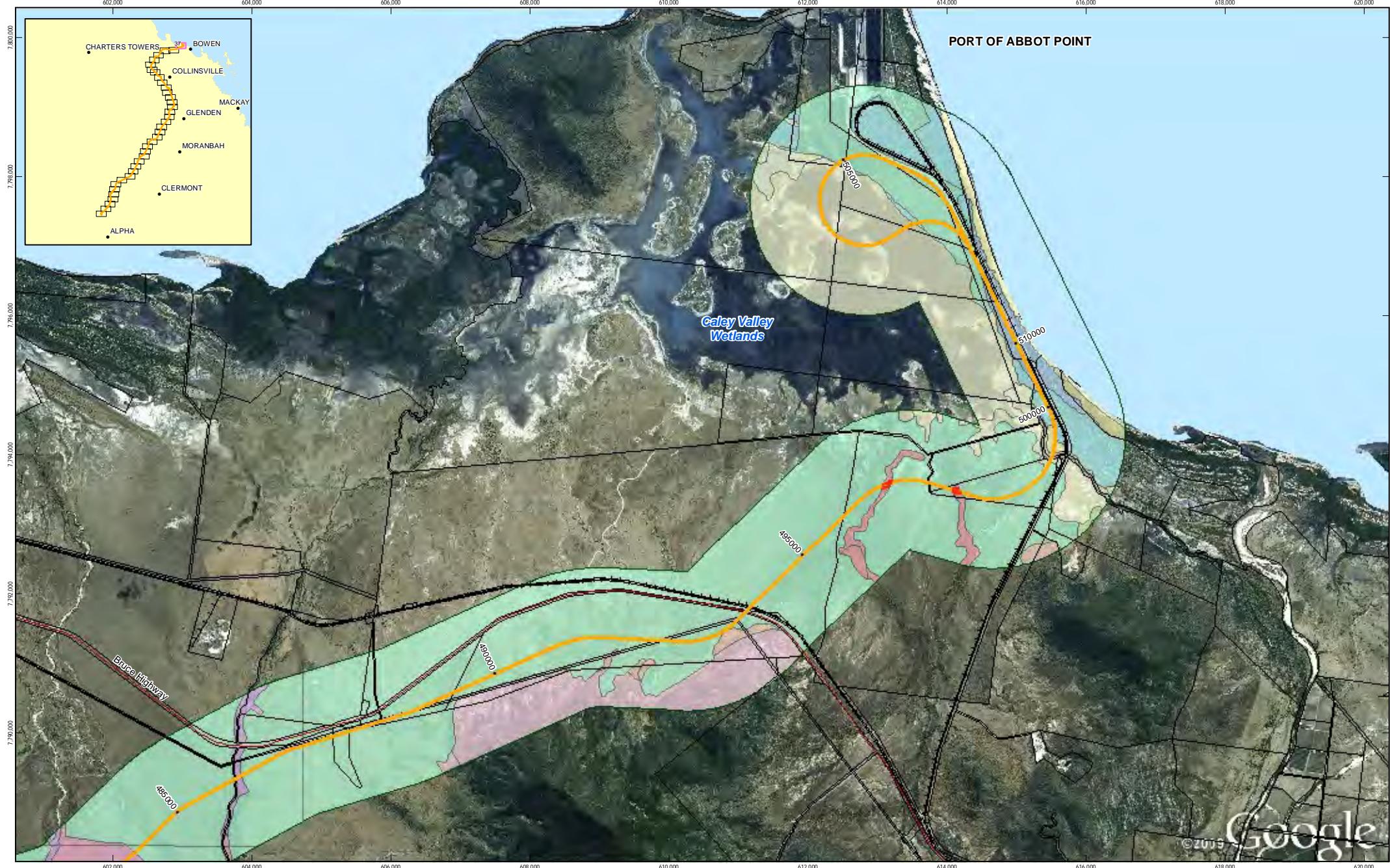
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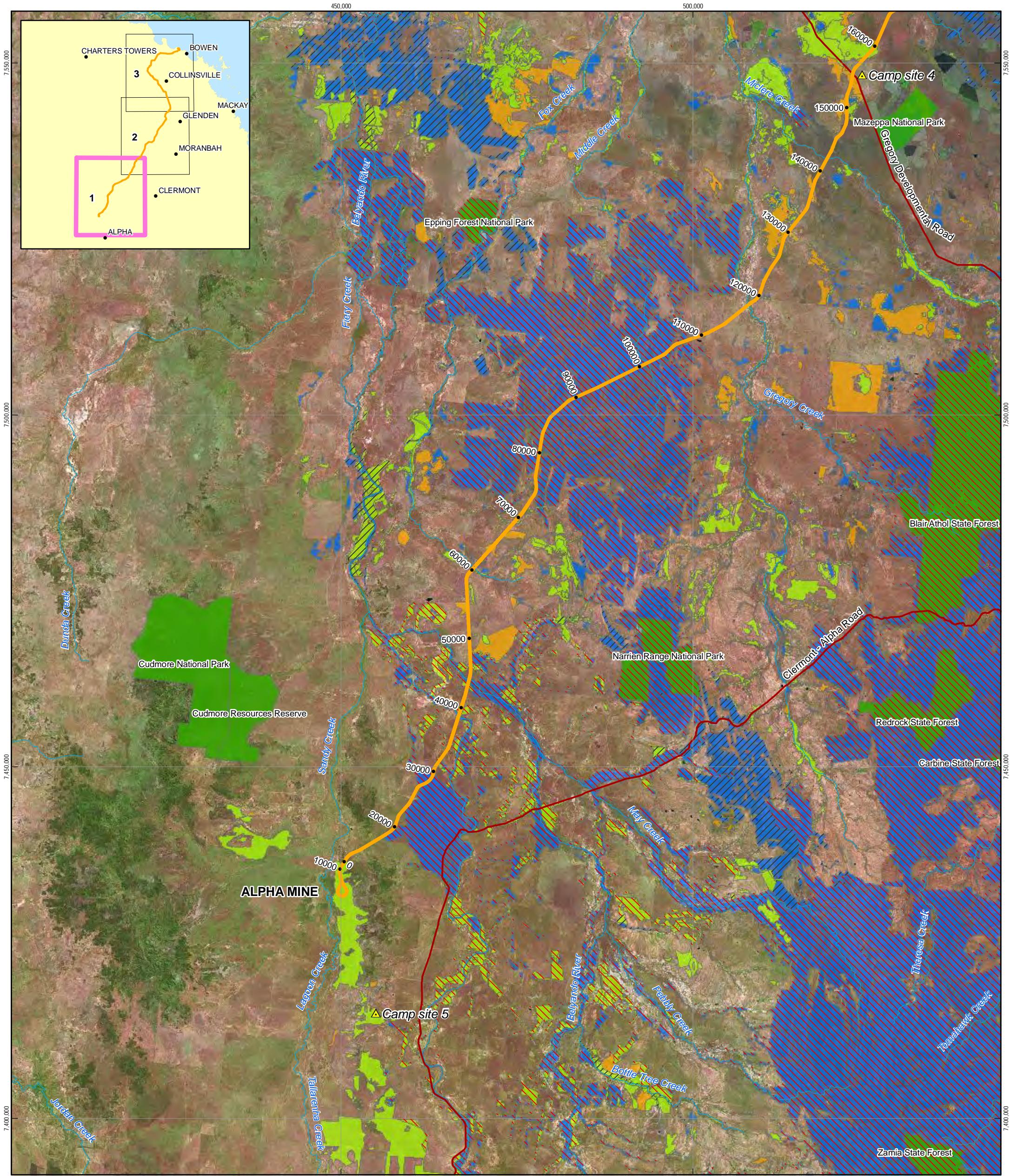
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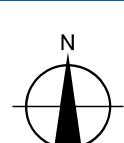
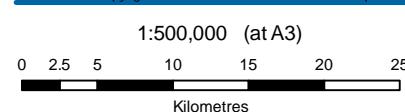
- Town
- Camp
- Marshalling Yards
- Depot
- Proposed Alignment
- State Road
- Existing Railway
- Watercourse

- Waterbody
- National Park
- Reserve
- Watercourse
- BPA Qualifying Information
- Bioregional Corridor
- Habitat Remnant

- Significant Biodiversity
- State Habitat for EVR taxa
- State
- Regional
- Local or Other Values

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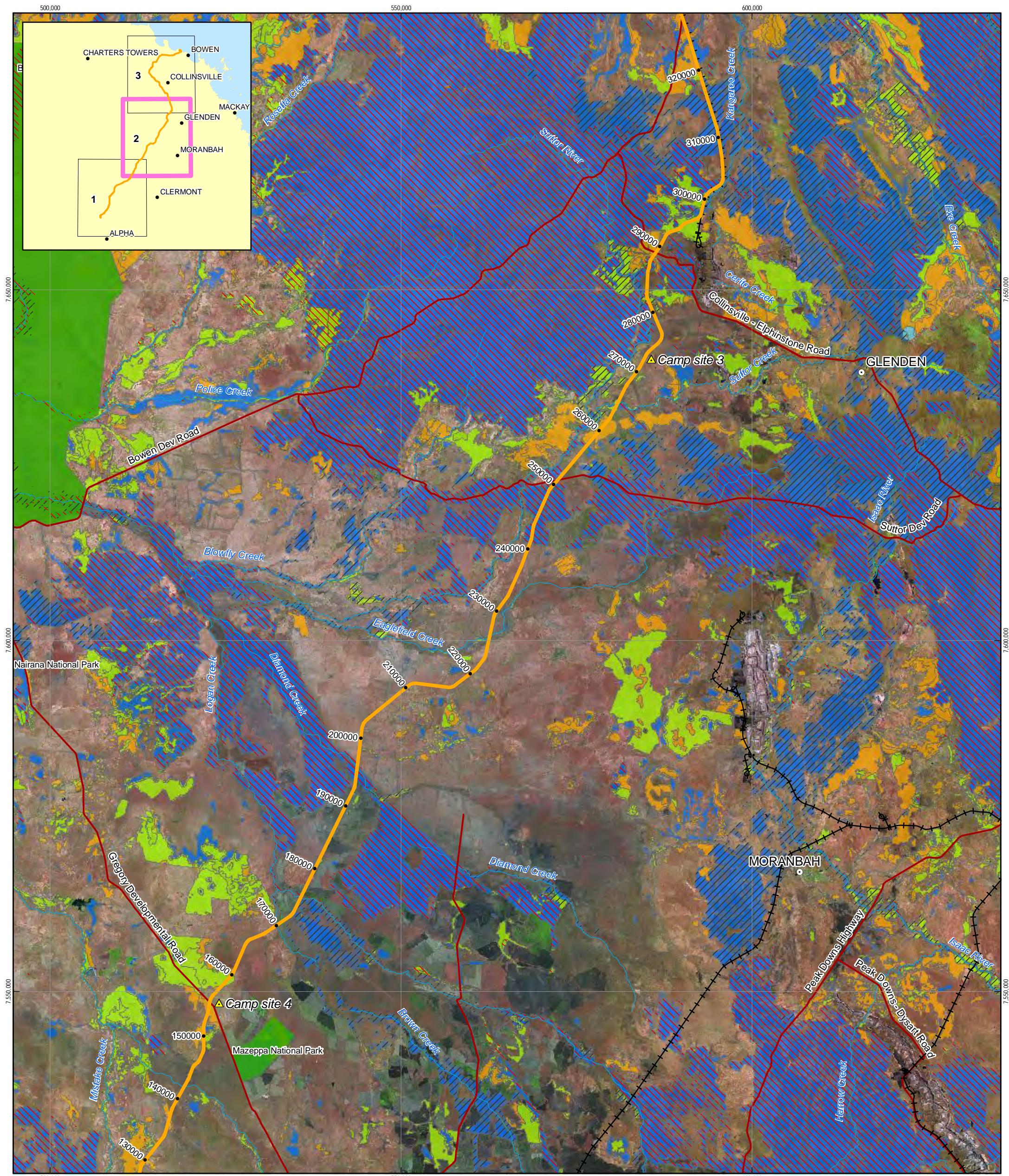


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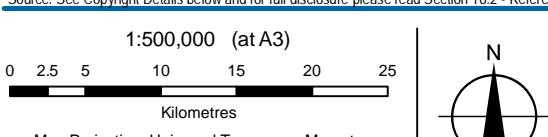
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## BIODIVERSITY PLANNING ASSESSMENT MAPPING

Figure: 3-5  
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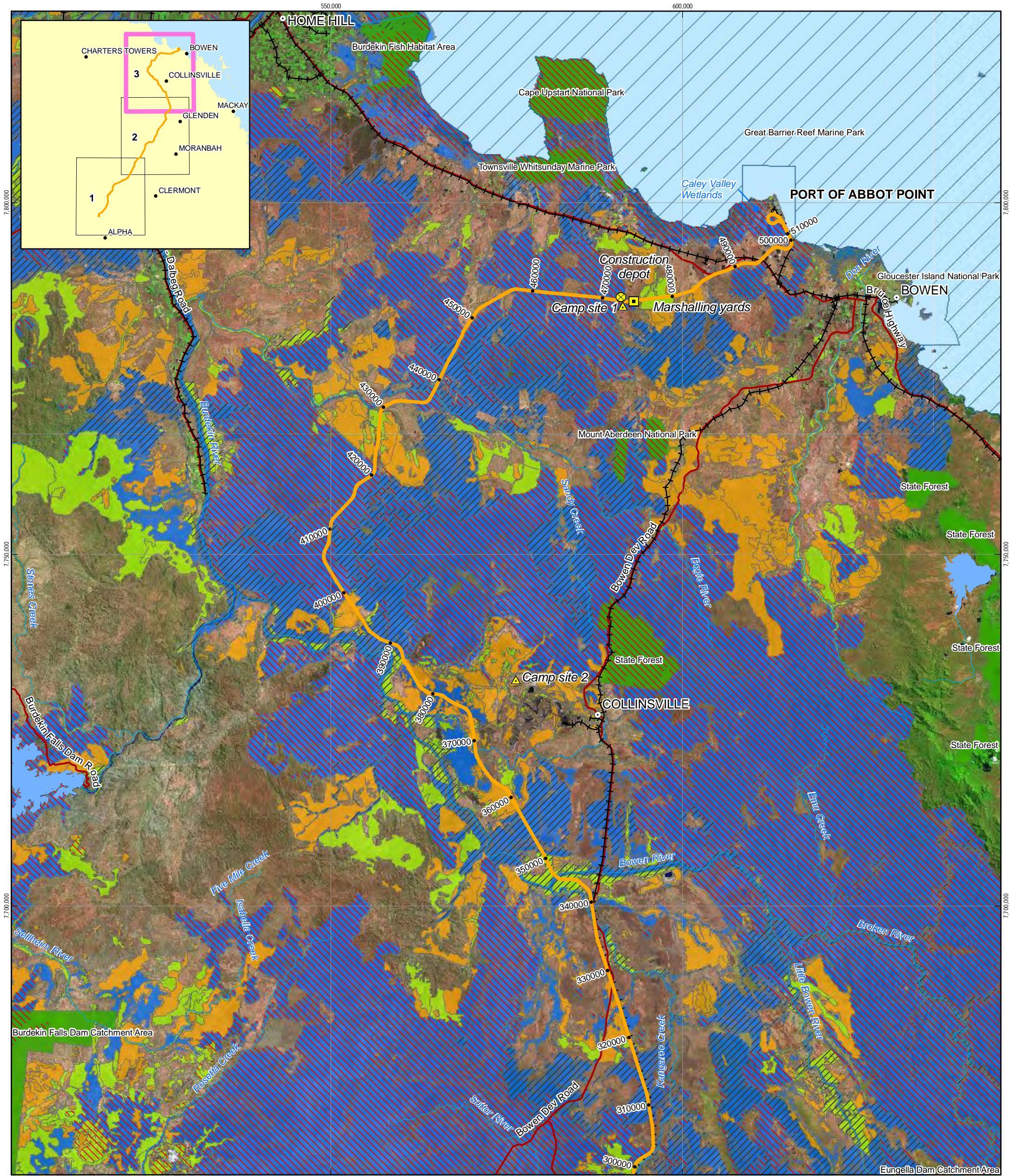
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## BIODIVERSITY PLANNING ASSESSMENT MAPPING

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Kilometres

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## BIODIVERSITY PLANNING ASSESSMENT MAPPING

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### 3.6.3 Flora Species

Searches of relevant databases (see Appendix A) and existing reports for the area identified a broad diversity of flora species within the study area and broader region. These investigations were combined and summarised below:

- ▶ Wildlife Online: 1862 vascular taxa of which 239 were introduced species; and
- ▶ HERBRECS: 1960 vascular taxa of which 242 were introduced species.

Field surveys recorded 367 plant species, of which 334 were native (91%) (see Appendix A). 175 of these species (including 15 introduced species) were recorded in the dry season.

Overall, 76 families are represented. The most species rich families represented were:

- ▶ Poaceae (92 taxa)
- ▶ Fabaceae (40 taxa)
- ▶ Cyperaceae (13 taxa)
- ▶ Mimosaceae (19 taxa)
- ▶ Myrtaceae (29 taxa)

During the field surveys 33 introduced species were recorded, of which eight species are 'declared plants' under the *Land Protection (Pest and Stock Route Management) Act 2002* (LP Act). These species are listed in Table 13.

**Table 13 Declared plants recorded in the Study Area**

| Species                         | Common Name       | Distribution   |
|---------------------------------|-------------------|--|
| <b>Class 2 weeds</b>            |                   |  |
| <i>Harrisia</i> sp.             | harrisia cactus   | Sclerophyll woodland throughout the study area.<br>Not common in any location.   |
| <i>Parkinsonia aculeata</i>     | parkinsonia       | Port area. Not common.   |
| <i>Parthenium hysterophorus</i> | parthenium        | Beside roads throughout the study area wherever black clays were found.  |
| <i>Opuntia stricta</i>          | prickly pear      | Scattered throughout the study area.   |
| <i>Cryptostegia grandiflora</i> | rubber vine       | Beds and banks of creeks and rivers and on alluvial plains and flats.<br>Can occur in dense stands, creating an almost impenetrable barrier. |
| <i>Opuntia tomentosa</i>        | velvety tree pear | Scattered throughout the study area.   |
| <i>Ziziphus mauritania</i>      | chinee apple      | Present as isolated individual trees in the Port area.   |
| <b>Class 3 weeds</b>            |                   |  |



| Species               | Common Name | Distribution  |
|-----------------------|-------------|---|
| <i>Lantana camara</i> | Lantana     | In the northern half of the study area only.<br>Not common. |

Landowners must take reasonable steps to control class two pest plants on their land under the LPA. However, landowners are only required to control class three pest plants on their land if they adjoin an environmentally significant area (e.g. a National Park or other area defined by Council).

### 3.7 Fauna Species

#### 3.7.1 Overview

Fauna species diversity, including terrestrial threatened species, marine and/or migratory species and introduced species, were recorded from desktop analyses and field fauna surveys. Table 14 summarises the number of amphibians, reptiles, mammals and birds recorded according to survey method.

**Table 14 Total number of fauna species predicted to occur or recorded from the study area**

|  | Environmental Reporting Tool<br>(Predicted to occur) | Wildlife Online<br>(Historically recorded)              | Field Surveys<br>(Confirmed on study area)              |
|--|--|---|---|
| <b>Species Diversity</b>               |  | 24 amphibians<br>99 reptiles<br>63 mammals<br>330 birds | 13 amphibians<br>36 reptiles<br>41 mammals<br>131 birds |
| <b>Threatened Species</b>              | 5 reptiles<br>4 mammals<br>5 birds                   | 1 amphibian<br>7 reptiles<br>3 mammals<br>13 birds      | 0 amphibians<br>1 reptile<br>2 mammals<br>2 birds       |
| <b>Marine and/or Migratory Species</b> | 1 reptile<br>13 birds                                | 2 reptiles<br>96 birds                                  | 26 birds  |
| <b>Introduced/ Pest Species</b>        | 1 amphibian<br>5 mammals                             | 1 amphibian<br>1 reptile<br>8 mammals<br>9 birds        | 1 amphibians<br>0 reptiles<br>6 mammals<br>1 bird       |

A full species list of terrestrial fauna recorded within the study area during the wet and dry season field surveys is presented in Appendix D. Note: species identified only to genus level are not included in species totals unless the genus has not previously been recorded.



### 3.7.2 Amphibians

Thirteen amphibian species were recorded in the study area during wet and dry season surveys. No listed amphibian species were recorded or considered likely to occur. During the dry season, the exotic cane toad *Rhinella marina* was most abundant, followed by *Litoria caerulea* (green tree frog), *Litoria rubella* (desert tree frog), *Litoria inermis* (bumpy rocket frog), *Limnodynastes tasmaniensis* (spotted marsh frog), *Litoria latopalmata* (broad-palmed rocket frog) and *Crinia deserticola* (desert froglet). Frogs were most abundant adjacent to rivers and creeks such as the Suttor River, Belyando River, Suttor Creek and Native Companion Creek where permanent water was located. Frog activity during the dry season was higher than expected as a result of localised heavy rainfall initiating an unseasonal increase in frog activity.

Amphibian abundance and diversity was found to be higher during the wet season. Eleven amphibian species were recorded in wet season surveys. The most abundant amphibian recorded during the wet season surveys was *Cyclorana alboguttata* (green striped burrowing frog), followed by *Rhinella marina* (cane toad), *Platyplectrum ornatum* (ornate burrowing frog) and *Litoria caerulea* (green tree frog).

Differences in the diversity and abundance of amphibians between the wet and dry season surveys indicate the change of environmental conditions to warmer and wetter conditions favourable for amphibian reproduction. Wetter conditions during the wet season also enable burrowing frog species such as *Cyclorana alboguttata* and *Platyplectrum ornatum* to end long periods of dormancy for reproduction (Barker et al. 1995).

**Plate 3** *Litoria caerulea* (green tree frog) (top left), *Cyclorana alboguttata* (green striped burrowing frog) (top right), *Cyclorana novaehollandiae* (New Holland frog) (bottom left) and *Limnodynastes tasmaniensis* (spotted grass frog) (bottom right) observed in the study area



### 3.7.3 Reptiles

A total of 36 reptile species were recorded in the study area during wet and dry season surveys. This is relatively high and likely to be attributed to the diversity of habitats along the length of the alignment. One listed reptile species *Denisonia orientalis* (ornamental snake) was recorded in the study area. However, two listed reptiles, *Egernia rugosa* (yakka skink) and *Paradelma orientalis* (brigalow scaly-foot), are considered likely to occur based on historic data collected from desktop searches and the habitat types found at survey sites. Four other listed reptiles *Furina dunmalli* (Dunmall's snake), *Acanthophis antarcticus* (Common Death Adder), *Ctenotus capricorni* (Capricorn Ctenotus) and *Crocodylus porosus* (saltwater crocodile) have the potential to occur based on bioclimatic modelling and the habitat types found in the study area.

A total of 25 reptile species were recorded during dry season surveys. Abundant species included skinks such as *Carlia pectoralis pectoralis*, *Cryptoblepharus plagicephalus*, *Cryptoblepharus virgatus*, the geckoes *Heteronotia binoei* and *Gehyra dubia* and dragon *Amphibolurus nobbi*. Reptiles that were widely distributed but at lower abundances included the skinks *Ctenotus robustus*, *Ctenotus taeniatus*,

*Morethia taeniopleura*, *Morethia boulengeri*, *Oedura rhombifer* (zigzag velvet gecko) and pythons *Aspidites melanocephalus* and *Morelia spilota*. Individuals of *Brachyurophis australis* (coral snake), *Nephrurus asper* (prickly knob-tailed gecko) and *Varanus tristis* (freckled monitor) were also recorded.

Reptile diversity was found to be equivalent in the wet season to the dry season surveys. Although little variation in species diversity and abundance was detected between surveys, reptile activity is expected to be substantially higher during the warmer, wet season months than in the cool dry season. Twenty-six reptile species were recorded in the wet season. Dominant species such as *Heteronotia binoei*, *Carlia pectoralis pectoralis*, *Cryptoblepharus plagioccephalus*, *Cryptoblepharus virgatus* and *Gehyra dubia* were still abundant and widespread in the wet season. Reptile species that were only recorded in the wet season were *Chlamydosaurus kingii* (frilled lizard), *Delma tincta*, *Pseudonaja textilis* (eastern brown snake), *Oxyuranus scutellatus* (taipan), *Ctenotus pantherinus*, *Eulamprus tenuis*, *Glaophyromorphous punctulatus*, *Tiliqua scincoides* (eastern blue tongue), *Oedura monilis* (ocellated velvet gecko) and *Strophurus williamsi* (eastern spiny tailed gecko). *Nephrurus asper*, *Brachyurophis australis*, *Morethia boulengeri*, *Amphibolurus burnsii*, *Diplodactylus steindachneri*, *Morelia spilota*, *Carlia foliorum*, *Carlia schmeltzii* and *Varanus tristis* were only recorded in the dry season.

**Plate 4** *Ctenotus robustus* (eastern striped skink) (top left), *Nephrurus asper* (prickly knob-tailed gecko) (top right), *Aspidites melanocephalus* (black headed python) (bottom left) and *Varanus tristis* (freckled monitor) (bottom right) observed in the study area



### 3.7.4 Mammals

Forty-one mammal species were recorded within the study area during wet and dry season surveys. Two listed mammal species, *Chalinolobus picatus* (little pied bat), (listed as near threatened under the NCA) and *Taphozous troughtoni* (Troughton's sheathtail bat) (listed as endangered under the NCA), were detected from Anabat recordings. *Chalinolobus picatus*, (detected at 5 locations), was considered a "definite" identification. The identification of *T. troughtoni* (detected at a single site), was considered "probable". In total, nineteen microbat species were detected. Commonly detected species were the *Saccopteryx flaviventris* (yellow-bellied sheathtail bat), *Chaerephon jobensis* (northern freetail bat) and *Scotorepens greyii/sanborni* (little broad-nosed bat).

A total of twenty-two mammal species (not including bat species) were detected included *Trichosurus vulpecula* (common brushtail possum), *Macropus giganteus* (eastern grey kangaroo), *Macropus dorsalis* (black striped wallaby), *Isoodon macrourus* (northern brown bandicoot), *Canis lupus dingo* (dingo), *Tachyglossus aculeatus* (echidna), *Rattus fuscipes* (bush rat), *Macropus parryi* (pretty faced wallaby), *Wallabia bicolor* (swamp wallaby), *Macropus rufus* (red kangaroo) and *Macropus robustus* (Euro). *Petrogale assimilis* (allied rock wallaby) were relatively abundant at the northern end of the study area. *Aepyprymnus rufescens* (rufous bettong) and *Lagorchestes conspicillatus* (spectacled hare wallaby) were recorded at individual locations at the southern end of the alignment. However both species can be difficult to detect and are also likely to occur in other parts of the study area.

Six introduced mammal species were observed including *Sus scrofa* (feral pig), *Mus musculus* (house mouse), *Oryctolagus cuniculus* (European rabbit), *Felis catus* (house cat), *Cervus dama* (fallow deer) and *Canis lupus dingo* (Dingo/dog).

**Plate 5** *Isoodon macrourus* (northern brown bandicoot) (top left), *Tachyglossus aculeatus* (echidna) (top right), *Lagorchestes conspicillatus* (spectacled hare-wallaby) (bottom left) and *Macropus rufus* (red kangaroo) (bottom right) observed in the study area.





### 3.7.5 Birds

Bird abundance and diversity was relatively high and is likely a reflection of the diversity of habitats along the rail alignment. A total of 131 species were recorded in wet and dry season surveys. This included two EPBC Act or NCA listed species and twenty-six species listed as Migratory and/or Marine under the EPBC Act. Listed species recorded were:

- ▶ *Geophaps scripta scripta* (squatter pigeon), listed as vulnerable under the EPBC Act and NCA;
- ▶ *Nettapus coromandelianus* (cotton pygmy-goose), listed as near threatened under the NCA.

The squatter pigeon was ubiquitous within grassland and grassy woodland habitats across the length of the study area. The cotton pygmy-goose was recorded from a well-vegetated permanent pond/dam at Rapid Assessment Site, Star of Hope in the southern quarter of the rail alignment.

A total of 109 bird species were recorded during dry season surveys. Bird diversity was generally concentrated in areas of remnant vegetation. Grazed, open grassland areas had low bird diversity, supporting species adapted to open plains such as *Anthus novaeseelandiae* (Richard's pipit), *Cincloramphus curalis* (brown songlark), *Cincloramphus mathewsi* (rufous songlark) and raptors such as *Haliastur sphenurus* (whistling kite), *Aquila audax* (wedgetail eagle), *Falco berigora* (brown falcon), *Falco cenchroides* (nankeen kestrel) and *Falco longipennis* (Australian hobby).

Woodlands with grassy or complex understorey and woodlands adjacent to water sources had higher bird diversity. Common birds in the woodland communities included the *Pachycephala rufiventris* (rufous whistler), *Philemon corniculatus* (noisy friarbird), *Colluricinclla harmonica* (grey shrike-thrush), *Eurystomus orientalis* (dollarbird), *Lichmera indistincta* (brown honeyeater), *Malurus melanocephalus* (red-backed wren), *Smicrornis brevirostris* (weebill), *Coracina papuensis* (white-bellied cuckoo-shrike), *Coracina novaehollandiae* (black-faced cuckoo-shrike), *Lichenostomus virescens* (singing honeyeater), *Platycercus adscitus* (pale-headed rosella), *Pomatostomus temporalis* (grey crowned babbler) and *Pardalotus striatus* (striated pardalote).

A total of 94 bird species were recorded from the study area during wet season surveys including one EPBC and NCA listed vulnerable bird. The listed bird species recorded during wet season surveys was *Geophaps scripta scripta* (squatter pigeon - southern race) listed as vulnerable under the EPBC Act and NCA.

Twenty-two wet season bird species had not been detected in the previous dry season survey (Appendix A). Due to the greater availability of water, the additional birds recorded during the wet season were mostly breeding wetland birds or other water-dependent species including *Alcedo azurea* (Azure kingfisher), *Pelecanus conspicillatus* (Australian pelican), *Grus rubicunda* (brolga), *Rallus philippensis* (buff-banded rail), *Dendrocygna eytoni*, (plumed whistling duck) and *Haliaeetus leucogaster* (white-bellied sea eagle).

**Plate 6** *Dendrocygna eytoni* (plumed whistling duck) (top left), *Dromaius novaehollandiae* (emu), (top right), *Merops ornatus* (rainbow bee-eater) (bottom left) and *Geophaps scripta scripta* (squatter pigeon - southern race) (bottom right) observed in the study area.





## 4. Conservation Significant Areas and Species

### 4.1 Introduction

Conservation significant areas and species in relation to this Project include those classified as having state, regional or local biodiversity significance. The conservation significant aspects identified during desktop and field investigation of the study area is summarised in Table 15 and discussed in detail in this section.

**Table 15 Summary of ecologically sensitive areas within the study area**

| Significance Classification                                    | Summary  | Discussion Section Reference                        |
|--|--|---|
| <b>Federal</b>   |  |   |
| <b>EPBC Act Matters of National Environmental Significance</b> |  |   |
| World Heritage properties                                      | None present   |   |
| Australian Heritage places                                     | Mazeppa National Park<br><br>Note: Located 3.2 km from the study area<br><br>Mount Abbot QLD<br><br>Note: Located 4 km from the study area   | Section 4.2.2                                       |
| Wetlands of international importance (Ramsar Wetlands)         | None present   |   |
| Threatened species and ecological communities                  | Threatened ecological communities – four listed in EPBC search: Brigalow, Natural Grasslands, Semi-evergreen vine thicket, and Weeping Myall Woodlands. Only Weeping Myall Woodland TEC was absent<br><br>Threatened flora species – One species recorded during surveys ( <i>Eucalyptus raveretiana</i> ) but 13 species potentially occur<br><br>Threatened fauna species – Two species were recorded; a total of 18 species have the potential to occur | Section 4.2.1<br><br>Section 4.3<br><br>Section 4.3 |
| Migratory species  | 26 migratory or marine bird species were found within the study area (11 birds and 1 reptile predicted to occur)   | Section 4.3   |
| Commonwealth marine areas                                      | None present   |   |
| Nuclear actions  | Not applicable to this Project   |   |



| Significance Classification   | Summary  | Discussion Section Reference |
|---|--|------------------------------|
| <b>DEWHA's Directory of Important Wetlands Database</b>                             |  |                              |
| Caley Valley Wetland  | Rail loop intercepts 14.5 ha of wetland  | Section 4.2.3                |
| Bowen River: Birralee - Pelican Creek<br><br>Note: Located 2 km from the study area |  | Section 4.2.3                |
| <b>State</b>  |  |                              |
| <b>VMA</b>  |  |                              |
| Regional ecosystems   | 10 endangered REs are present within the project footprint, comprising 111 ha<br><br>19 of concern REs are present within the project footprint, comprising 104 ha<br><br>5 Threshold REs are present within the project footprint. A threshold RE represents an area that is considered to be in a transitional stage between two different REs | Section 3.4                  |
| Regrowth Mapping  | Several locations within the study area contain regrowth vegetation  | Section 4.4.2                |
| <b>NCA</b>  |  |                              |
| Threatened flora species  | Twenty-five NCA listed species potentially occur<br><br>Two species was recorded during surveys  | Section 4.3                  |
| Threatened fauna species  | Four species were recorded during surveys  | Section 4.3                  |
| Protected areas   | Mazeppa National Park<br><br>Note: Located 3.2 km from the study area  |                              |
| <b>Fisheries Act</b>  |  |                              |
| Marine Plants   | A number of marine plants are expected to occur in the project footprint   | Section 4.4.3                |
| <b>DERM Essential Habitat</b>   |  |                              |
|   | Two essential habitat areas mapped within the study area; four within two kilometres of the study area   | Section 4.4.4                |
| <b>DERM Biodiversity Planning Assessment</b>  |  |                              |
|   | The study area avoids some areas of land mapped as state significant habitat remnant and bioregional corridor. However in the northern section of the alignment the study area does bisect land mapped as state and regionally significant   | Section 4.4.5                |



## 4.2 EPBC Act Matters of National Environmental Significance

### 4.2.1 EPBC Act Listed Threatened Ecological Communities

Ecological communities are naturally occurring biological assemblages that comprise a particular habitat type. Threatened ecological communities (TECs) are ecological communities that have been assessed under the EPBC Act and assigned to one of five categories related to the status of the threat to the community, i.e. conservation dependant, vulnerable, endangered, critically endangered and extinct in the wild.

Four TECs listed under the EPBC Act were identified to potentially occur in the study area, all of which are classified as endangered. These are:

- ▶ Brigalow (*Acacia harpophylla* dominant and codominant);
- ▶ Natural Grasslands of the Queensland Central Highlands and the northern Fitzroy Basin;
- ▶ Semi Evergreen Vine Thickets of the Brigalow Belt (North and South) and Nandewar Bioregions; and
- ▶ Weeping Myall Woodlands.

These TECs are described in more detail below.

#### **Brigalow (*Acacia harpophylla* dominant and codominant)**

The Brigalow TEC has been nominated because brigalow communities have undergone a severe decline since the 1940s, and now occupy 10% of their former range (DEH 2001). The main threatening process is broadscale clearing, a practice that saw massive swathes of brigalow and other acacia communities on the fertile clay plains of Central Queensland and northern New South Wales cleared over a number of decades in the post-World War Two period (with the arrival of the bulldozer). This was done primarily to create grasslands for grazing, which are now dominated by the exotic pasture grasses buffel grass and creeping bluegrass.

The Brigalow TEC is comprised of vegetation communities dominated or co-dominated by brigalow (*Acacia harpophylla*), which is a wattle growing to 25 m tall (Maslin 2001). Other species commonly present as emergents or co-dominants include Dawson's gum (*Eucalyptus cambageana*) and belah (*Casuarina cristata*). Brigalow generally occurs on level and gently undulating land forms in clay soils, and is a relatively dense vegetation community, forming open forests. The understorey is shrubby and often relatively dense, and the denser forms of brigalow are referred to as 'scrubs'.

The majority of brigalow is located in the central sections of the study area with 101.4 ha of three endangered REs – 11.3.1 (*A. harpophylla* open forest on alluvial plains), 11.4.8 (*E. cambageana* woodland/open forest with *A. harpophylla*) and 11.4.9 (*A. harpophylla* shrubby open forest with *Terminalia oblongata*) (see Table 18). The patches of these REs within the project footprint are generally in poor to moderate ecological condition, having been modified from natural state through landscape fragmentation, weed incursion (parthenium, buffel grass and creeping bluegrass in particular) and the impacts of decades of grazing.

#### **Natural Grasslands of the Queensland Central Highlands and northern Fitzroy Basin**

The Natural Grassland TEC is estimated to have declined by 64% since European settlement. Of the 36% remaining, 60% is considered to be in a degraded state, and only 10% is in condition considered



sustainable. Parthenium in particular is considered to be a major factor in this decline, with buffel grass, parkinsonia and prickly acacia (*Acacia nilotica*) also of concern as invasive weeds (TSSC 2008adq).

This TEC is comprised of grasslands dominated by native grasses occurring on cracking clay plains or undulating rises. The soils are generally dark and relatively deep, and trees and shrubs are very sparse to absent (projective foliage cover for trees is typically less than 10%, and shrubs less than 50%). A set of native tussock grass species have been nominated as indicator species (mostly *Aristida* spp., *Astrebla* spp., *Dichanthium* spp. and *Panicum* spp.) – at least three to four of these indicator species must be present within at least a one hectare patch for the TEC to be present (among other factors) (TSSC 2008adq).

Six REs are nominated as meeting the description of this TEC (TSSC 2008adq), all of which are mapped within the study area (see Table 18). Overall, the project footprint is estimated to encompass 108.4 ha of these REs, the majority of which is located within two REs, 11.4.4 and 11.9.3. However, it is important to note that the standard a vegetation community must meet to be mapped as remnant vegetation under the Queensland VMA is generally lower than that required by the EPBC Act. For example, grasslands that have a high coverage of exotic species but that are expected to recover to a more natural species diversity within 15 years will be mapped as remnant by the Queensland Herbarium (Nelder *et al.*, 2005). By contrast, the diagnostic criteria for the Central Queensland Natural Grassland TEC requires that perennial, non-woody exotic species comprise less than 30% of the total projected perennial plant cover (TSSC 2008adq). This means that many areas within the project footprint mapped as one of the seven REs listed above may not satisfy the criteria for the Natural Grassland TEC.

In general, it was noted during the survey that many areas with the highest potential for containing the Natural Grassland TEC are now dominated by the pasture grasses buffel grass and creeping bluegrass, or the declared weed parthenium. If such areas within the project footprint are consistently dominated by either of these exotic grasses in excess of 30% of the area of the grassland patch, they are unlikely to qualify for the TEC.

### **Semi Evergreen Vine Thickets of the Brigalow Belt (North and South) and Nandewar Bioregions**

The Semi Evergreen Vine Thicket TEC is a dry rainforest variant that occurs in areas with soils of moderate to high fertility with a seasonally dry climate. It contains a mixture of evergreen, semi-deciduous and deciduous plants, has a generally low (to 10 m), uneven canopy in which vines and scramblers are prominent, and is frequently characterised by the presence of an emergent layer of bottle trees (*Brachychiton australis* and *B. rupestris*) (McDonald 2010). This vegetation community is estimated to have been reduced to 9-30% of the pre-European extent (TSSC 2001o).

A list of 10 REs have been included as meeting the definition of this TEC. Five of these REs are mapped as occurring within the study area, of which the most significant in terms of area is the RE 11.2.3. In total, an estimated 13.9 ha of the Semi-evergreen vine thicket TEC may occur within the project footprint, 12.17 ha of which is located in the RE 11.2.3. This TEC is located on soils of moderate to high fertility and does not occur on granite landscapes or in soils derived from granite, such as the vine thicket REs that occur on landzone 12 (including the vegetation communities at the base of Mt Roundback near Abbot Point) (Bill McDonald pers. comm. 17 May 2010). No semi-evergreen vine thicket was identified in areas to be traversed by the alignment during the field investigations. It should be noted that the vegetation alliance 'Semi-evergreen vine thicket' identified in Table 11 encompasses a broader range of communities than that included in this TEC.



### Weeping Myall Woodlands

The Weeping Myall Woodland TEC is a woodland to open woodland community with a canopy to 12 m tall dominated by the weeping myall tree (*Acacia pendula*). As this community occurs on fertile soils there has been a trend towards clearing for agricultural purposes, and it is estimated that approximately 75% of this TEC has been lost in Queensland since Europeans arrived. Weeping myall woodlands cycle through stages where the canopy is partly to completely dead, then move into a recovery period in which the weeping myall trees re-establish. However, if the weeping myall species is not present, this TEC is likewise not present (TSSC, 2009ads). The main stronghold of the Weeping Myall Woodland TEC is in New South Wales, and in Queensland it is mostly found in the Darling River catchment. It is known to occur within the REs 11.3.2 and 11.3.28 (TSSC, 2008ads), of which RE 11.3.2 was confirmed to be present at many locations in the south of the alignment. However, the weeping myall species was not located during the survey and consequently this TEC is not considered to be present in the study area.

#### 4.2.2 Australian Heritage Places

##### Mazeppa National Park

Mazeppa National Park is listed as a natural heritage place in the Australian Heritage Database. Located approximately 72 km north-west of Clermont the National Park has an approximate size of 4126 ha and contains a large, undisturbed stand of gidgee (*Acacia cambagei*) scrub. The stand is an important remnant of this vegetation type that was once widespread across the region and is significant for its research potential (DEWHA 2008c). Mazeppa National Park is located approximately 3.2 km from the proposed railway alignment.

##### Mount Abbot

Mount Abbot is a prominent, isolated, mountain massif that is regarded as a 'spectacular landscape feature' and is listed as a natural heritage place in the Australian Heritage Database. Located approximately 50 km west-south-west of Bowen, Mount Abbot covers an area of approximately 5393 ha. Mount Abbot is home to a diversity of vegetation types, flora, vertebrate and insect fauna species including a high proportion of rare or regionally significant vegetation communities and taxa. Three flora species are endemic to the Mount Abbot and many species have been recorded as remote outliers from other populations. Mount Abbot is in its natural condition, with few introduced species, and is remote from road access and settlements. It has a high potential as a research, reference and educational site (DEWHA 2008d). Mount Abbot is located approximately 4 km from the proposed railway alignment.

#### 4.2.3 DEWHA Directory of Important Wetlands Database

Wetland areas of national importance are listed under the Federal Government's Directory of Important Wetlands (DIWA). The DIWA is an inventory of important wetland areas throughout Australia. The directory aims to protect important wetland habitat by providing information on wetland values and locations. Two wetlands of national importance are located within the vicinity of the study area.

##### Caley Valley Wetland

The Caley Valley Wetland covers an area of approximately 5150 ha and is located immediately adjacent to the Abbot Point Coal Loading facility, approximately 21 km north northwest of Bowen. The wetland system comprises a mixture of permanent estuarine waters, intertidal mud and sand flats, mangroves, saltmarshes, freshwater marshes and freshwater impoundments and provides and a good example of



wetlands on a tropical prograding coast. The site is important for waterbirds and migratory species due to its mix of permanent water, a wide range of wetland habitats, very rich food resources and sheltered roosting and breeding sites.

The wetland experiences distinct seasonal changes, with wet-season filling driving a freshwater system that provides habitat for a number of species, including large numbers of migratory wetland species. The drying out period (during the dry season) creates a more saline environment, and restricts freshwater areas to pools that may persist depending on the duration of the dry season. Extensive grazing occurs across the wetland complex and the adjacent Coal Terminal is listed as a disturbance to the site. The proposed railway loop intersects 14.5 ha of the Caley Valley Wetlands. Refer to aquatic report for further details.

#### **Bowen River: Birralee - Pelican Creek**

The Bowen River: Birralee - Pelican Creek Aggregation is a 15 km section of the Bowen River covering an area of 1342 ha approximately 27 km west of Collinsville. This site provides a good example of a range of riverine wetlands. The main feature of this nationally important wetland is a large permanent clear waterhole in the central part of the site approximately 3.4 km in length and about 150 m wide at its widest point. Rapids, sand, rock or rubble bars, terraces and small waterholes are also present at the upstream and downstream ends. The large permanent waterhole is likely to be of importance as a drought refuge. Eight species of conservation significance have been recorded on the site. A large number of migratory bird species have also been previously recorded (DEWHA 2008b). This wetland site is approximately 2.6 km away from the proposed railway alignment.

#### **4.3 Conservation Significant Species – EPBC Act and NC Act listed**

Desktop surveys identified 28 threatened flora and 26 threatened fauna species as previously recorded in the region (Wildlife Online, Herbrecs) or predicted to occur based on bioclimatic modelling (EPBC Protected Matters Search) (Appendix A).

Field surveys identified two species of flora, two bird species, one reptile and two bat species listed as threatened or near threatened under the EPBC Act or the NCA. No other conservation significant species were observed. However, based on the likelihood of occurrence assessment, which analyses the species distribution, habitat preferences and previous records, a number of additional species may occur in the study area where suitable habitat has been identified. The likelihood of occurrence assessment is provided in Appendix D and summarised below and in Table 16:

- ▶ Twenty-eight listed flora species are predicted to occur in the region: 11 species may occur, one species is likely to occur, and two species are present - black ironbox, listed as vulnerable under both the EPBC Act and the NCA, and *Bonamia dietrichiana*, listed as near threatened under the NCA
- ▶ Seven listed reptiles are predicted to occur in the region - four species may occur and two species are likely to occur and one species (*Denisonia orientalis*) does occur within the study area
- ▶ One listed amphibian species (*Litoria revelata*) is predicted to occur in the region though it is unlikely to occur within the study area
- ▶ Five listed mammal species are predicted to occur in the region - one species (*Dasyurus hallucatus*) may occur and two species (*Chalinolobus picatus* and *Taphozousroughtoni*) do occur within the study area



- ▶ Thirteen listed bird species are predicted to occur in the region - seven species may occur, two species are likely to occur and two species (*Geophaps scripta scripta* and *Nettapus coromandelianus*) do occur within the study area
- ▶ An additional twenty-six EPBC listed Marine and/or Migratory bird species were recorded in the study area. Twenty- three bird species listed as Marine or Migratory under the EPBC Act were recorded during dry season surveys. Fifteen bird species listed as Marine or Migratory under the EPBC Act were recorded during wet season surveys.



**Table 16 Conservation Significant Species which may occur or are likely to occur in the study area**

| Name   | Conservation Status  | Likelihood of Occurrence  |
|--|----------------------|---|
| <b>Plants</b>  |                      |   |
| <i>Acacia jackesiana</i> (Betsy's wattle)              | NT – NCA             | May Occur: this species has been historically recorded in the region surrounding the northern half of the study area (Wildlife Online). Suitable habitat may exist in open eucalypt woodlands on hill slopes within the study area.   |
| <i>Bonamia dietrichiana</i> (Dietrich's morning glory) | NT – NCA             | <b>Present:</b> this species was located in narrow leaved ironbark woodland with a dense understory at the foot of Mt Roundback. It has also been historically recorded in the region surrounding the study area (Wildlife Online and Herbrebs). Limited suitable habitat may exist elsewhere in the project area in semi-evergreen vine thicket communities within the study area. |
| <i>Cerbera dumicola</i>                                | NT – NCA             | May Occur: this species has been historically recorded in the northern and southern thirds of the study area (Wildlife Online and Herbrebs). Limited suitable habitat may exist within dry rainforests and open lancewood forests of the study area.  |
| <i>Croton magneticus</i> (Magnetic Island croton)      | V – EPBC<br>V – NCA  | May Occur: this species was predicted to occur in the region (Protected Matters Database) and has been historically recorded in the region surrounding the study area (Wildlife Online and Herbrebs). Suitable habitat is present in vine thicket areas within the study area.  |
| <i>Desmodium macrocarpum</i>                           | NT – NCA             | May Occur: this species has been historically recorded in the region surrounding the study area (Wildlife Online and Herbrebs). Potential suitable habitat exists on sandy soils in eucalypt woodlands within the study area.   |
| <i>Dichanthium queenslandicum</i> (king-blue grass)    | V – EPBC<br>V - NCA  | Likely to Occur: this species was predicted to occur in the region (Protected Matters Database) and has been historically recorded in the region surrounding the study area (Wildlife Online and Herbrebs). Suitable habitat exists in natural grasslands on black cracking clay soils between Collinsville and Alpha.  |
| <i>Dichanthium setosum</i> (bluegrass)                 | V – EPBC<br>NT - NCA | May Occur: this species has been historically recorded in the northern and southern thirds of the study area (Wildlife Online and Herbrebs). Suitable habitat for this species exists across most of the study area particularly on heavy black clay soils or in moderately disturbed areas.  |



| Name  | Conservation Status | Likelihood of Occurrence   |
|---|---------------------|--|
| <i>Eucalyptus raveretiana</i><br>(black ironbox)          | V – EPBC<br>V - NCA | <b>Present:</b> this species was predicted to occur in the region (Protected Matters Database) and has been historically recorded in the northern part of the study area (Wildlife Online and Herbrecs). Suitable habitat exists on river banks and stream lines in the study area. This species was recorded along the banks of the Elliot River during the dry season survey and this identification has been confirmed by the Queensland Herbarium (voucher specimen SFDanielsen147).                       |
| <i>Marsdenia pumila</i>                                   | V - NCA             | May Occur: this species has been historically recorded in the region surrounding the study area (Wildlife Online and Herbrecs). Potential suitable habitat exists in the study area within dry sclerophyll woodlands.  |
| <i>Ozothamnus eriocephalus</i>                            | V – EPBC<br>V - NCA | May Occur: this species was predicted to occur in the region (Protected Matters Database) and has been historically recorded in the region surrounding the study area (Wildlife Online and Herbrecs). Suitable habitat may occur within rocky sclerophyll forests in the study area.   |
| <i>Paspalidium scabrifolium</i>                           | NT – NCA            | May Occur: this species has been historically recorded immediately adjacent to the study area (Wildlife Online and Herbrecs). Potential suitable habitat exists in the study area within open forest/woodland environments.  |
| <i>Peripleura scabra</i>                                  | NT – NCA            | May Occur: this species has been historically recorded in the region surrounding the study area (Wildlife Online and Herbrecs). Suitable habitat for this species exists in open woodland on rocky hills or ridges.  |
| <i>Solanum adenophorum</i>                                | E – NCA             | May Occur: this species has been historically recorded immediately adjacent to the study area (Wildlife Online and Herbrecs). Abundant suitable habitat within the central and southern sections of the study area exists on black clay soil in remnant and cleared <i>Acacia cambagei</i> 'scrub'.  |
| <i>Trioncinia retroflexa</i><br>(Belyando cobbler's pegs) | E – NCA             | May Occur: known from only 6 natural populations, 3 of which are clustered immediately to the north and east of Clermont within stock routes, approx 80 km from the project footprint. Occurs in native grasslands, and is now only found along road verges and in stock routes that are not subject to constant ongoing trampling and grazing (Fensham, Fairfax and Holman, 2002). Local landowner believes previous surveys have located this species on his property (in the vicinity of chainage 25, 000). |
| <b>Reptiles</b>   |                     |  |



| Name  | Conservation Status      | Likelihood of Occurrence  |
|---|--------------------------|---|
| <i>Acanthophis antarcticus</i> (common death adder) | NT – NCA                 | May Occur: this species has been historically recorded in the region surrounding the study area (Wildlife Online). Suitable habitat exists within the wet and dry eucalypt forests, woodlands and coastal heaths in the northern half of the study area.  |
| <i>Ctenotus capricorni</i> (Capricorn Ctenotus)     | NT – NCA                 | May Occur: this species has been historically recorded in the region surrounding the study area (Wildlife Online). Habitat may be present in semi-arid sandy areas with spinifex in the southern portion of the study area.   |
| <i>Crocodylus porosus</i> (estuarine crocodile)     | V - NCA<br>Marine - EPBC | May Occur: some suitable habitat occurs mainly in the larger river systems containing permanent water in the north of the study area. This species has been historically recorded within the study area (Wildlife Online), however, no individuals or signs of presences (eg. mud slides) were observed in the field surveys. |
| <i>Denisonia maculata</i> (ornamental snake)        | V – EPBC<br>V - NCA      | <b>Present:</b> this species has been historically recorded in the region surrounding the study area (Wildlife Online). Suitable habitat exists within the study area particularly around the Dawson River catchment area.  |
| <i>Egernia rugosa</i> (yakka skink)                 | V – EPBC<br>V - NCA      | Likely to Occur: this species was predicted to occur in the region (Protected Matters Database) and has been historically recorded in the region surrounding the study area (Wildlife Online). Suitable habitat is present in dry sclerophyll forest and open woodlands surrounding the southern half of the study area.      |
| <i>Furina dunmalli</i> (Dunmall's snake)            | V – EPBC<br>V - NCA      | May Occur: this species was predicted to occur in the region (Protected Matters Database) however, has not been historically recorded in the region surrounding the study area. Habitat is present within remnant brigalow woodland vegetation.   |
| <i>Paradelma orientalis</i> (brigalow scaly-foot)   | V – EPBC<br>V - NCA      | Likely to Occur: this species was predicted to occur in the region (Protected Matters Database) and has been historically recorded in the region surrounding the study area (Wildlife Online). Suitable habitat is present in open forests and remnant brigalow woodlands.  |
| <b>Mammals</b>                                      |                          |   |
| <i>Dasyurus hallucatus</i> (northern quoll)         | E – EPBC                 | May Occur: this species was predicted to occur in the region (Protected Matters Database) and has been historically recorded in the region surrounding the study area (Wildlife Online). Habitat is present within rocky woodland vegetation.   |



| Name  | Conservation Status | Likelihood of Occurrence  |
|---|---------------------|---|
| <i>Chalinolobus picatus</i><br>(little pied bat)                          | NT – NCA            | <b>Present:</b> records of this species were obtained at a number of sites during surveys and has historically been recorded in the study area (Wildlife Online). The little pied bat occurs in dry sclerophyll forest, woodland and scrub areas. This species roosts in caves, tree hollows and abandoned buildings, often forages along watercourses (Menkhorst and Knight 2004). |
| <i>Taphozous troughtoni</i><br>(Troughton's sheathtail bat)               | E -- NCA            | <b>Present:</b> Known only from a small area in central Queensland typified by outcropping rocks, hilly areas with drainage channels often lined with river red gums ( <i>Eucalyptus camaldulensis</i> ). Roosts in caves, cracks, and small solution pipes in rocky outcrops (Van Dyck & Strahan, 2008).   |
| <b>Birds</b>  |                     |   |
| <i>Ephippiorhynchus asiaticus</i><br>(black-necked stork)                 | NT – NCA            | Likely to Occur: Black necked storks have historically been recorded in the study area (Wildlife Online). The black necked stork occurs in a range of wetland and inundated habitats, from the coast to irrigated inland regions (Pizzey and Knight, 2007).   |
| <i>Erythrotriorchis radiatus</i><br>(red goshawk)                         | V – EPBC<br>E – NCA | May Occur: this species was predicted to occur in the region (Protected Matters Database) and has been historically recorded in the region surrounding the study area (Wildlife Online). Nesting habitat is present in trees taller than 20 m and within one km of water.   |
| <i>Falco hypoleucus</i><br>(grey falcon)                                  | NT – NCA            | May Occur: this species has been historically recorded in the region surrounding the study area (Wildlife Online). Habitat in the study area may be present within lightly treed inland plains, gibber deserts, sand ridges, pastoral lands and timbered watercourses.  |
| <i>Geopaps scripta scripta</i><br>(squatter pigeon - southern subspecies) | V - EPBC            | <b>Present:</b> squatter pigeons were observed at numerous locations along the study area during both the wet and dry season surveys. This species has abundant habitat throughout the Brigalow Belt bioregion. It was predicted to occur in the region (Protected Matters Database) and has been historically been recorded in the study area (Wildlife Online).                   |
| <i>Grantiella picta</i> (painted honeyeater)                              | V – NCA             | May Occur: this species has been historically recorded in the region surrounding the study area (Wildlife Online). This species inhabits mistletoes in a range of forest and woodland environments. Habitat in the Study Area may be present.   |



| Name   | Conservation Status               | Likelihood of Occurrence   |
|--|-----------------------------------|--|
| <i>Lophoictinia isura (square-tailed kite)</i>                             | NT – NCA                          | May Occur: this species has been historically recorded in the region surrounding the study area (Wildlife Online). This species inhabits a range of habitat types and may be present within the southern portion of the study area.  |
| <i>Melithreptus gularis</i> (black-chinned honeyeater)                     | NT – NCA                          | Likely to occur: this species has been historically recorded in the region surrounding the study area (Wildlife Online). Suitable habitat may exist within the study area in dry eucalypt forests and woodlands, and well wooded margins of watercourses.  |
| <i>Nettapus coromandelianus</i> (cotton pygmy goose)                       | Marine – EPBC<br>NT – NCA         | <b>Present:</b> Two individuals of this species were observed nesting among floating vegetation on a dam on a property during both the dry and the wet season surveys. This species has been historically recorded in the region surrounding the study area (Wildlife Online). Suitable habitat exists around farm dams located close to the study area. |
| <i>Poephila cincta cincta</i> (black-throated finch - southern subspecies) | E – EPBC<br>V – NCA               | May Occur: this species was predicted to occur in the region (Protected Matters Database), however has not been historically recorded in the region surrounding the study area. Suitable habitat exists in the study area, particularly along creeks in the northern sections of the study area.   |
| <i>Rostratula australis</i> (Australian painted snipe)                     | V and migratory – EPBC<br>V – NCA | May Occur: this species was predicted to occur in the region (Protected Matters Database), however has not been historically recorded in the region surrounding the study area. Suitable habitat exists in the study area among a variety of vegetation types and in association with wetlands and dams.   |
| <i>Tadorna radjah</i> (Radjah shelduck)                                    | NT - NCA                          | May Occur: this species has been historically recorded in the region surrounding the study area (Wildlife Online). Suitable habitat exists within the northern half of the study area around larger waterbodies.   |



## 4.4 Conservation Significance – State matters

### 4.4.1 Threshold Regional Ecosystems

There are five ‘threshold’ REs located within the project footprint. A threshold RE is an RE that is on the threshold of a new conservation status under the VMA if any more area is cleared.

Threshold REs are listed in Table 5 of the *Regional Vegetation Management Code for Brigalow Belt and New England Bioregions* (DERM, 2009). Of these REs, four are least concern REs on the threshold of becoming of concern REs, and one is an of concern RE on the threshold of endangered status. Three of the threshold REs are also listed as components of TECs – of concern RE 11.4.11 is part of the Natural Grassland of Central Queensland TEC and least concern REs 11.5.15 and 11.8.3 are components of the Semi-evergreen vine thicket TEC.

### 4.4.2 Regrowth Mapping

High value regrowth is advanced non-remnant vegetation with the species composition of an endangered, of concern or least concern RE. Areas mapped as regrowth vegetation under the VMA occur within the study area. Approximately 62 ha of high value regrowth mapped under the VMA occur within the project footprint. Of this, 29.8 ha is endangered high value regrowth, 8.8 ha is of concern high value regrowth, and 23.2 ha is least concern high value regrowth.

### 4.4.3 Marine Plants

A marine plant is defined in s. 8 of the *Fisheries Act 1994* as a plant that usually grows on or adjacent to tidal land, whether it is living or dead, or material of that plant, or a plant prescribed to be a marine plant. The study area terminates at the Abbot Point coal-loading facility near Bowen, and the proposed railway will be immediately adjacent to the coast at this point, where it will intersect a small number of tidal creeks at the highest extent of tidal influence. The vegetation along these creeks includes species that are considered to be marine plants under the Fisheries Act.

These species include salt couch (*Sporobolus virginicus*), which is present in narrow fringing meadows in low lying overflow areas beside the creeks, and grey mangrove (*Avicennia marina*) which is present along the edges of a tidal creek in the Port area. Weeping paperbark (*Melaleuca leucadendra*) is the main riparian species in these areas, and is also considered to be a marine plant when it is growing in such situations. No other marine plants were observed in these locations although large meadows of *Halosarcia* sp., *Tecticornia australasica* and *Sarcocornia quinqueflora* are known to occur in this area (Louise Johns, Dept. Fisheries. pers. comm. 20 May 2010).

### 4.4.4 DERM Essential Habitat

Essential Habitat is vegetation in which a threatened species is believed to occur. A total of four Essential Habitat polygons were mapped within two kilometres of the study area. Of these only one actually occurs within the project footprint. Figure 3-2 shows the location of the Essential Habitat polygons. Table 17 provides details on the species and habitat requirements. It is important to note that Essential Habitat is compiled from a combination of species habitat models and buffered species records.



**Table 17 DERM Essential Habitat within 2 km of the study area**

| Chainage Location                   | Scientific name                                 | NCA Status | Habitat requirements (vegetation community, soils etc)  |
|-------------------------------------|---|------------|---|
| Bisects between 370,000 and 375,000 | <i>Bonamia dietrichiana</i>                     | NT         | Semi-evergreen microphyll-notophyll vine thicket; microphyll/notophyll vine forest; hermland/grassland on coastal island; beach scrub; open eucalypt woodland                                       |
| Within 2 km of 317,000              | <i>Croton magneticus</i>                        | V          | Deciduous vine thicket  |
| Within 2 km of 312,000              | <i>Croton magneticus</i>                        | V          | Deciduous vine thicket  |
| Bisects between 280,000 and 285,000 | <i>Denisonia maculata</i><br>(Ornamental Snake) | V          | Under litter/fallen timber and in wide soil cracks, in riparian woodland/open forest and shrub/woodland including Brigalow Acacia harpophylla.<br><br>Deep cracking clay and sandy loam substrates. |

#### **4.4.5 DERM Biodiversity Planning Assessment**

The significance of biodiversity values in a particular mapped area are ranked at various spatial scales (Local, Regional, State). BPA mapping for the study area was acquired, to determine whether mapped bioregional corridors and / or habitat remnants (at various scales of biodiversity significance) were prevalent in the project footprint. The Project crosses bioregional corridors and / or habitat remnants that are mapped as state and regionally significant. The majority of this occurs near the northern end of the alignment (Figure 3-5).



## 5. Potential Impacts and Mitigation Measures

### 5.1 Introduction

Following the ecological assessments, and based on the description of ecological features in Section 3 and 4 of this report, a number of potential direct and indirect impacts were identified within the project footprint of the proposed rail development. These are summarised below.

**Note:** ecological assessments were conducted in February 2011 at two properties (south of Collinsville) not surveyed during the EIS due to access constraints. Potential impacts to the observed terrestrial ecological values at these locations are discussed in Appendix G.

### 5.2 Summary of Identified Impacts

Potential impacts to flora and fauna associated with the construction phase of the Project include:

- ▶ Direct loss of vegetation, habitat and resources as a result of vegetation clearing
- ▶ Direct mortality of terrestrial fauna
- ▶ Disruption of wildlife behaviour due to light, noise and vibration disturbance
- ▶ Effects of dust
- ▶ Introduction of exotic weed and pest species
- ▶ Alteration to fire regimes
- ▶ Indirect habitat degradation

Potential impacts to flora and fauna associated with the operational phase include:

- ▶ Direct mortality of terrestrial fauna
- ▶ Disruption of wildlife behaviour due to light, noise and vibration disturbance
- ▶ Effects of dust
- ▶ Introduction of exotic weed and pest species
- ▶ Alteration to fire regimes
- ▶ Indirect habitat degradation
- ▶ Potential indirect effects to nearby protected areas

Each of the potential impacts and proposed mitigation measures are described in the following sections.

### 5.3 Construction Phase Impacts

#### 5.3.1 Loss of Vegetation, Habitat and Resources

The area of vegetation to be cleared has been minimised in the design phase by locating the project footprint in areas that have been previously cleared or degraded by past land use practices. However, substantial removal of native vegetation is still required. Loss of vegetation represents one of the most substantial impacts associated with the Project, causing localised reductions in



vegetation community extent and a reduction in the diversity and abundance of habitats and resources for flora and fauna. Impacts on environmental Matters of National Significance and state significance associated with vegetation clearing are described in the following sections.

**Note:** all calculations presented in this report relating to the predicted loss of vegetation (including REs and TECs) through vegetation clearing are based upon the alignment as of September 2010. Furthermore, they relate only to the 495 km by 60 m wide corridor through which the alignment traverses. Possible vegetation loss related to ancillary infrastructure (i.e. laydown areas, access tracks, construction camps) has not been considered in the calculations, due to the uncertainty over the locations of this associated infrastructure. Due to the evolving nature of the project, it is recognised that with changes to the alignment, and with the addition of clearance areas relating to associated infrastructure, the numbers presented in this report will vary until such point that the final alignment and location of associated infrastructure has been confirmed. As such, the calculations presented hereabouts should not be considered final, and are primarily intended to provide an indication of the extent of impact to various mapped vegetation assemblages.

### 5.3.2 Impact on EPBC Act Matters of National Environmental Significance

#### EPBC Act Listed Threatened Ecological Communities

Four TECs listed under the EPBC Act were identified within the study area, all of which are classified as endangered. These are:

- ▶ Brigalow (*Acacia harpophylla* dominant and codominant)
- ▶ Natural Grasslands of the Queensland Central Highlands and the northern Fitzroy Basin
- ▶ Semi Evergreen Vine Thickets of the Brigalow Belt (North and South) and Nandewar Bioregions
- ▶ Weeping Myall Woodlands

The REs present within the project footprint that form part of these TECs are listed in Table 18 with the location within the project footprint and the estimated area of direct impact.



**Table 18 Areas of Impact for Threatened Ecological Community REs**

| RE   | VMA Status | Short Description <sup>1</sup> | Location  | Area <sup>2</sup>    |
|--|------------|--------------------------------|---|----------------------|
| <b>Brigalow (<i>Acacia harpophylla</i> dominant and codominant)</b>                          |            |                                |   |                      |
| 11.3.1   | E          |                                | Between Bowen and Belyando Rivers   | 24.45 ha (24.13 ha)  |
| 11.4.8   | E          |                                | Between Suttor Creek and Belyando River                                       | 25.45 ha (1.41 ha)   |
| 11.4.9   | E          |                                | Between Suttor Creek and Belyando River                                       | 51.55 ha (15.77 ha)  |
| 11.5.16  | E          |                                | Area immediately north of Suttor Creek crossing                               | 1.13 ha <sup>3</sup> |
| 11.9.1   | E          |                                | Between Leichhardt Range and Bowen River                                      | 7.25 ha              |
| 11.9.5   | E          |                                | Between Leichhardt Range and Bowen River                                      | 0.57 ha              |
| <b>Brigalow TEC TOTAL</b>  |            |                                |   | <b>110.00 ha</b>     |
| <b>Natural Grasslands of the Queensland Central Highlands and the northern Fitzroy Basin</b> |            |                                |   |                      |
| 11.3.21  | E          |                                | Central section of project footprint  | 0.09 ha              |
| 11.4.4   | LC         |                                | Centred on Pelican Creek, west of Collinsville                                | 54.58 ha             |
| 11.4.11  | LC         |                                | Mostly between Gregory Devt. Rd and Eaglefield Creek                          | 8.48 ha              |
| 11.8.11  | OC         |                                | South of Native Companion Creek, and between Leichhardt Range and Bowen River | 2.90 ha              |
| 11.9.3   | LC         |                                | Between Leichhardt Range and Pelican Creek                                    | 41.90 ha             |



| RE   | VMA Status | Short Description <sup>1</sup> | Location  | Area <sup>2</sup>   |
|--|------------|--------------------------------|---|---------------------|
| 11.9.12  | E          |                                | Between Pelican Creek and the Bowen River   | 0.45 ha             |
| <b>Natural Grassland TEC TOTAL</b>   |            |                                |   | <b>108.40 ha</b>    |
| <b>Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions</b> |            |                                |   |                     |
| 11.2.3   | OC         |                                | Near Abbot Pnt railhead   | 12.16 ha            |
| 11.4.1   | E          |                                | In the vicinity of the Suttor Creek crossing  | 0.42 ha             |
| 11.5.15  | LC         |                                | Adjacent to the Newlands Mine, just north of the Leichhardt Range                                   | 1.32 ha (8.98 ha)   |
| 11.8.3   | LC         |                                | In 'gorges' of the Leichhardt Range, and plains to the north of the range                           | 0.001 ha (2.46 ha)  |
| 11.8.13  | E          |                                | Between Suttor Creek and Bowen River crossings  | 0.07 ha (14.31 ha)  |
| <b>Semi evergreen vine thicket TEC TOTAL</b>   |            |                                |   | <b>13.97 ha</b>     |
| <b>Weeping myall woodland</b>  |            |                                |   |                     |
| 11.3.2   | OC         |                                | Between Bowen River and Eaglefield Creek, and between Clermont-Laglan Rd and Native Companion Creek | 25.42 ha (43.53 ha) |
| <b>OVERALL TOTAL</b>   |            |                                |   | <b>257.79 ha</b>    |

Notes:

<sup>1</sup> From REDD (Queensland Herbarium, 2009);

<sup>2</sup> Area as calculated based on ground-truthed RE mapping. Figure in brackets is the area according to the official version 6 RE mapping (only provided where there is disagreement between the sources);

<sup>3</sup> RE 11.5.16 does not occur in the project footprint under the version 6 RE mapping.



### 5.3.3 Clearing of Endangered Regional Ecosystems

The alignment crosses 10 endangered REs, comprising 111.4 ha in total (see Table 19 for a summary). All of these REs are listed as components of a TEC under the EPBC Act (see the discussion in Section 4.2.1, and a summary of the clearing impacts in Table 18). The majority of these endangered REs, six in all, are brigalow communities, two are grasslands, two are semi-evergreen vine thicket communities and one is a gidgee (*Acacia cambagei*) woodland (the short descriptions for all the REs in the project footprint are provided in Table 3 to Table 9 (Queensland Herbarium, 2009). The land zones four and nine are particularly well represented among the endangered REs within the study area, accounting for seven REs.

Table 19 provides a summary of the higher conservation status REs within the project footprint, the expected clearing area, and the current extent of these REs across the bioregion and within the subregions traversed by the Project. The current extent of each RE, as of 2005, is the latest publicly available figure and this was obtained from Accad et al. (2008). Column six in the table expresses the total clearing extent as a percentage of the subregional extent. This provides a basic quantitative assessment of likely impact on that RE. In addition, the final column provides the current extent of each RE in the protected area estate, which includes National Park, State Forest, Timber Reserves and Conservation Parks.

The endangered REs within the Project that are most vulnerable to impacts from clearing are those with low overall current extents, and those with low representation within the protected area estate. Of the 10 REs within the project footprint, four have a current extent of less than 10,000 ha (shown in bold in column four in Table 19), and three had less than 5,000 ha in 2005 (Accad et al. 2008). Of the latter, the RE with the lowest remnant coverage in 2005 was 11.4.1, with 2,312 ha. However, this RE has a relatively high representation within the protected area estate (60% of the current extent), and less than 0.11% of the current extent is located within the project footprint (Accad et al., 2008).

The remaining REs with current extents less than 5,000 ha are 11.5.16 (3,027 ha, with 156 ha in the protected area estate) and 11.9.12 (4,135 ha, and with 8 ha in the protected area estate). Of these, the RE 11.9.12 (a native grassland RE that is also part of the Natural Grassland TEC under the EPBC Act) (Queensland Herbarium, 2009; TSSC 2008adq) is particularly poorly protected, with only 0.19% of its total current extent in the protected area estate (REs with no representation or less than 500 ha within the protected area estate are in bold).

The nomination advice for the Brigalow TEC lists 16 REs that are considered to constitute this TEC, of which six are mapped within the study area, occupying an area within the project footprint of 110 ha. Approval under the EPBC Act will be required for this clearing.



**Table 19 Higher conservation status REs showing expected clearing impacts**

| REs                                     | VMA/ EPBCA status                          | Proposed clearing area | Bioregion current extent <sup>1</sup> | Subregion <sup>2</sup> current extent <sup>1</sup> | % <sup>3</sup> | Protected area estate (% of total current extent) <sup>4</sup> |
|---|--|------------------------|---------------------------------------|--|----------------|--|
| <b>Endangered REs (Total 111.43 ha)</b> |  |                        |                                       |  |                |  |
| 11.3.1                                  | Endangered<br><b>Brigalow TEC</b>          | 24.45 ha               | 80, 679 ha                            | 23, 811 ha   | 0.10 %         | 30, 702 ha (39.05 %)   |
| 11.3.21                                 | Endangered<br><b>Natural grassland TEC</b> | 0.09 ha                | 54, 459 ha                            | 7, 581 ha  | 0.00 %         | <b>196 ha (0.36 %)</b>   |
| 11.4.1                                  | Endangered<br><b>SEVT TEC</b>              | 0.42 ha                | <b>2, 312 ha</b>                      | 381 ha   | 0.11 %         | 1, 388 ha (60.03 %)  |
| 11.4.8                                  | Endangered<br><b>Brigalow TEC</b>          | 25.45 ha               | 71, 909 ha                            | 40, 088 ha   | 0.06 %         | 7, 032 ha (9.78 %)   |
| 11.4.9                                  | Endangered<br><b>Brigalow TEC</b>          | 51.55 ha               | 96, 425 ha                            | 43, 699 ha   | 0.12 %         | 25, 851 ha (26.81 %)   |
| 11.5.16                                 | Endangered<br><b>Brigalow TEC</b>          | 1.13 ha                | <b>3, 027 ha</b>                      | 888 ha   | 0.13 %         | <b>156 ha (5.15 %)</b>   |
| 11.8.13                                 | Endangered<br><b>SEVT TEC</b>              | 0.07 ha                | <b>6, 327 ha</b>                      | 4, 826 ha  | 0.00 %         | <b>383 ha (6.05 %)</b>   |
| 11.9.1                                  | Endangered<br><b>Brigalow TEC</b>          | 7.25 ha                | 55, 195 ha                            | 5, 245 ha  | 0.14 %         | 6, 930 ha (12.56 %)  |
| 11.9.5                                  | Endangered<br><b>Brigalow TEC</b>          | 0.57 ha                | 168, 841 ha                           | 11, 402 ha   | 0.00 %         | 32, 049 ha (18.98 %)   |



| REs                                     | VMA/ EPBCA status                                 | Proposed clearing area | Bioregion current extent <sup>1</sup> | Subregion <sup>2</sup> current extent <sup>1</sup> | % <sup>3</sup> | Protected area estate (% of total current extent) <sup>4</sup> |
|---|---|------------------------|---------------------------------------|--|----------------|--|
| 11.9.12                                 | Endangered<br><br>Native grassland TEC            | 0.45 ha                | <b>4, 135 ha</b>                      | 2, 914 ha  | 0.02 %         | <b>8 ha (0.19 %)</b>   |
| <b>Of Concern REs (Total 104.16 ha)</b> |   |                        |                                       |  |                |  |
| 11.2.3                                  | Of concern<br><br>Semi-evergreen vine thicket TEC | 12.16 ha               | <b>2, 513 ha</b>                      | 158 ha   | 7.70 %         | <b>319 ha (12.69 %)</b>  |
| 11.3.2                                  | Of concern<br><br>Myall woodland TEC              | 25.42 ha               | 528, 081 ha                           | 107, 484 ha  | 0.02 %         | 142, 824 ha (27.04 %)  |
| 11.3.3                                  | Of concern  | 15.40 ha               | 282, 541 ha                           | 113, 706 ha  | 0.01 %         | 33, 025 ha (11.69 %)   |
| 11.3.4                                  | Of concern  | 7.17 ha                | 186, 652 ha                           | 37, 528 ha   | 0.02 %         | 39, 442 ha (21.13 %)   |
| 11.3.13                                 | Of concern  | 0.15 ha                | <b>2, 853 ha</b>                      | 1, 488 ha  | 0.01 %         | 562 ha (19.70 %)   |
| 11.3.33                                 | Of concern  | 7.61 ha                | <b>1, 672 ha</b>                      | 1, 294 ha  | 0.59 %         | <b>Not represented</b>   |
| 11.3.34                                 | Of concern  | 3.38 ha                | <b>9, 044 ha</b>                      | 9, 024 ha  | 0.04 %         | <b>Not represented</b>   |
| 11.4.2                                  | Of concern  | 0.97 ha                | 34, 633 ha                            | 10, 307 ha   | 0.01 %         | 849 ha (2.45 %)  |
| 11.4.5                                  | Of concern  | 0.45 ha                | 13, 260 ha                            | 12, 911 ha   | 0.00 %         | 2, 866 ha (21.61 %)  |
| 11.4.6                                  | Of concern  | 0.68 ha                | 34, 851 ha                            | 29, 268 ha   | 0.00           | 9, 339 ha (26.80 %)  |



| REs  | VMA/ EPBCA status           | Proposed clearing area | Bioregion current extent <sup>1</sup> | Subregion <sup>2</sup> current extent <sup>1</sup> | % <sup>3</sup> | Protected area estate                    |
|--|-----------------------------|------------------------|---------------------------------------|--|----------------|--|
|  |                             |                        |                                       |  |                | (% of total current extent) <sup>4</sup> |
| 11.4.11  | Of concern                  | 8.48 ha                | 23, 372 ha                            | 22, 767 ha   | 0.04 %         | <b>200 ha (0.86 %)</b>                   |
|  | <b>Threshold RE</b>         |                        |                                       |  |                |  |
|  | <b>Native grassland TEC</b> |                        |                                       |  |                |  |
| 11.5.10  | Of concern                  | 7.80 ha                | <b>9, 901 ha</b>                      | 2, 052 ha  | 0.38 %         | <b>Not represented</b>                   |
| 11.8.3   | Of concern                  | 0.001 ha               | 26, 458 ha                            | 2, 738 ha  | 0.00 %         | 3411 ha (12.89 %)                        |
| 11.8.11  | Of concern                  | 2.90 ha                | 176, 127 ha                           | 22, 366 ha   | 0.01 %         | 1, 858 ha (1.05 %)                       |
|  | <b>Native grassland TEC</b> |                        |                                       |  |                |  |
| 11.9.10  | Of concern                  | 4.95 ha                | 83, 507                               | 19, 526  | 0.02 %         | 6, 937 ha (8.31 %)                       |
| 11.11.10   | Of concern                  | 0.13 ha                | 88, 109 ha                            | 50, 060 ha   | 0.00 %         | 7, 656 ha (8.69 %)                       |
| 11.11.13   | Of concern                  | 4.30 ha                | 53, 711 ha                            | 24, 737 ha   | 0.02 %         | 1, 101 ha (2.05 %)                       |
| 11.11.16   | Of concern                  | 0.09 ha                | 18, 085 ha                            | 8, 975 ha  | 0.00 %         | 1, 589 ha (8.79 %)                       |
| 11.12.10   | Of concern                  | 2.12 ha                | <b>8, 918 ha</b>                      | 730 ha   | 0.29 %         | <b>Not represented</b>                   |
| <b>Least Concern REs of High Conservation Significance – TECs or Threshold REs (Total 108.81 ha)</b> |                             |                        |                                       |  |                |  |
| 11.3.5   | Least concern               | 8.39 ha                | 56, 064 ha                            | 44, 464 ha   | 0.02 %         | 6, 036 ha (10.77 %)                      |
|  | <b>Threshold RE</b>         |                        |                                       |  |                |  |



| REs     | VMA/ EPBCA status                                       | Proposed clearing area | Bioregion current extent <sup>1</sup> | Subregion <sup>2</sup> current extent <sup>1</sup> | % <sup>3</sup> | Protected area estate (% of total current extent) <sup>4</sup> |
|---------|---|------------------------|---------------------------------------|--|----------------|--|
| 11.4.4  | Least concern<br><b>Brigalow TEC</b>                    | 54.58 ha               | 24, 917 ha                            | 20, 940 ha   | 0.26 %         | <b>Not represented</b>   |
| 11.5.5  | Least concern<br><b>Threshold RE</b>                    | 2.62 ha                | 134, 826 ha                           | 4, 938 ha  | 0.05 %         | 40, 865 ha (30.31%)  |
| 11.5.15 | Least concern<br><b>Threshold RE</b><br><b>SEVT TEC</b> | 1.32 ha                | 14, 955 ha                            | 2, 286 ha  | 0.06 %         | 1, 793 ha (12.00 %)  |
| 11.8.3  | Least concern<br><b>Threshold RE</b><br><b>SEVT TEC</b> | 0.001 ha               | 26, 458 ha                            | 2, 738 ha  | 0.00 %         | 3411 ha (12.89 %)  |
| 11.9.3  | Least concern<br><b>Natural grassland TEC</b>           | 41.90 ha               | 160, 830 ha                           | 9, 411 ha  | 0.45 %         | <b>484 ha (0.30%)</b>  |

<sup>1</sup>Figures calculated from Accad et al. 2008: ‘current extent’ is of 2005, where this is <10, 000 ha it is shown in bold; <sup>2</sup>This is the sum of each REs current extent from all of the subregions/provinces traversed by the alignment – Bogie River Hills (2), Northern Bowen Basin (6), Belyando Downs (7), South Drummond Basin (13), Upper Belyando Floodout (8) in the Brigalow Belt; <sup>3</sup>% = proposed clearing extent as % of subregion current extent – if less than 0.01% then 0.00% is shown; <sup>4</sup>Protected area estate = national park, state forest, conservation park, timber reserve – figures in bold highlight REs with no representation or less than 500 ha.



### 5.3.4 Clearing of Of Concern Regional Ecosystems

The alignment crosses 19 REs classed as of concern under the VMA, comprising 104.1 ha in total. One third of these REs are situated on alluvial plains, the most commonly encountered being the RE 11.3.2, which contains poplar box woodland to open woodland (Queensland Herbarium, 2009) (see Table 19). This RE was present in the alignment south of the Suttor Creek crossing, and is the of concern RE with the largest area within the project footprint (25 ha). Forms of RE 11.3.2 that contain weeping myall (*Acacia pendula*) can meet the description of the Weeping Myall Woodland TEC listed under the EPBC Act. However, no weeping myall trees were located within the alignment and this TEC is not considered likely to be present. The of concern REs within the project footprint also include two REs that are listed under the EPBC Act as components of the endangered TEC Natural Grasslands of the Queensland Central Highlands and Fitzroy Basin, and one RE that is listed as being a component of the endangered Semi Evergreen Vine Thicket of the Brigalow Belt bioregion TEC (see Table 19). This RE was present in the alignment south of the Suttor Creek crossing, and is the of concern RE with the largest area within the project footprint (33 ha). Forms of RE 11.3.2 that contain weeping myall (*Acacia pendula*) can meet the description of the Weeping Myall Woodland TEC listed under the EPBC Act. However, no weeping myall trees were located within the alignment and this TEC is not considered likely to be present. The of concern REs within the project footprint also include two REs that are listed under the EPBC Act as components of the endangered TEC Natural Grasslands of the Queensland Central Highlands and Fitzroy Basin, and one RE that is listed as being a component of the endangered Semi Evergreen Vine Thicket of the Brigalow Belt bioregion TEC (see Table 19).

As shown in Table 19, six of the 19 of concern RE's have a current extent less than 10,000 ha, and three have a current extent less than 5000 ha (Accad et al. 2008). Of these six, four have no representation in the protected area estate at all. However, with the exception of RE 11.2.3, the of concern REs are either well represented in the protected area estate relative to their current extent, or have a current extent in excess of 18,000 ha (generally much more). Although RE 11.2.3 has 12.7% of its current extent within protected areas, this only equates to 319 ha. This RE is the only RE of high conservation significance whose extent within the project footprint is greater than 2% of its subregional extent (it is a very high 7.7%). This Project would only involve the removal of 12.16 ha of RE 11.2.3, but as the RE has just 158 ha within the subregion this is a relatively significant figure.

It should be pointed out that the percentage figure for RE 11.2.3 is likely to be high in relation to other REs because RE 11.2.3 is a littoral community, confined to the coast. This project footprint traverses only one coastal subregion, the Townsville Plains subregion. By contrast, inland subregions are well-represented within the project footprint. Therefore, the subregional total for most REs affected by the Project is likely to be higher than for 11.2.3 simply because the project footprint is predominately located inland. This can be seen by examining the subregion column in Table 19. When the expected clearing extent is compared against the total current extent, the figure is 0.5%, which is not as low in relative terms, but which still places this RE as the second highest in terms of relative impact, behind RE 11.9.12 (whose project loss relative to overall current extent is expected to be 0.9%).



All other of concern REs within the project footprint have relative clearing areas of less than 0.5% of their subregional extent (see notes at base of Table 19 for explanation of how the subregional figure is attained).

### **5.3.5 Clearing of threshold Regional Ecosystems**

Of the five threshold REs located within the project footprint, two have less than two hectares located within the project footprint. Under the *Regional Vegetation Management Code for Brigalow Belt and New England Bioregions* (DERM, 2009), clearing of less than two hectares of a threshold RE is an acceptable solution for the performance requirement aimed at conserving such REs. Of the remainder, one (RE 11.5.5) has an extent within the project footprint of 2.62 ha and the other two have extents of 8.48 ha (RE 11.4.11) and 8.39 ha (RE 11.3.5). Clearing proposed for this Project will not result in any of these REs changing conservation status.

### **5.3.6 Clearing of High Value Regrowth**

The current alignment will result in the clearing of approximately 62 ha of high value regrowth mapped under the VMA. Of this, 29.8 ha is endangered high value regrowth, 8.7 ha is of concern high value regrowth, and 23.2 ha is least concern high value regrowth. High value regrowth is advanced non-remnant vegetation with the species composition of an endangered, of concern or least concern RE. Under recent changes to the VMA, the clearing of high value regrowth is now subject to a self assessable code. However, under Schedule 24 Part 2, clearing that occurs on freehold land (item 2(n)) or leasehold land (item 4 (1)(i)) in regulated regrowth vegetation for a significant community project is not required to address the regrowth clearing code, unless the vegetation is located in an area mapped as category A on a PMAV. Areas mapped as category A on a PMAV are generally subject to a revegetation or rehabilitation order, or are otherwise unable to be developed, and are not commonly encountered. It is to be assumed that this Project will be deemed by DERM to meet the definition of a significant community project under the VMA (s.10).

### **5.3.7 Summary of Vegetation Clearing Required**

The area to be cleared has been minimised in the design phase by locating the project footprint in areas that have been previously cleared or degraded by past land use practices. However, 68 REs - 10 endangered, 19 of concern, 39 least concern as well as regrowth vegetation will be affected by the Project. In addition (or concurrently), the project footprint will require the disturbance of approximately 233 ha of REs listed under the EPBC Act as constituents of TECs, including a potential 110 ha of the Brigalow TEC REs, 108 ha of the Natural Grasslands of the Queensland Central Highlands and the northern Fitzroy Basin TEC REs, and 14 ha of the Semi Evergreen Vine Thicket TEC REs (see Table 18). Table 18 indicates that approximately 25 ha of Weeping Myall Woodlands TEC occurs within the project footprint. This TEC is known to occur within the RE 11.3.2, which is present at many locations along the alignment. However, as the weeping myall species (*Acacia pendula*) was not present, this TEC was considered likewise not present. A summary of the total area of endangered, of concern, least concern and Regrowth RE is shown in Table 20 below.

**Table 20 Summary of area to be cleared for Regional Ecosystems and Regrowth Vegetation**

| Conservation status                 | Proposed area to be cleared (ha) | Indicative offset requirements (ha) |
|-------------------------------------|----------------------------------|-------------------------------------|
|                                     |                                  | Minimum 3.0 x area cleared          |
| Endangered                          | 111.44                           | 334                                 |
| Of concern                          | 104.15                           | 312                                 |
| Least concern<br>(Threshold or TEC) | 108.81                           | 326                                 |
| Least concern                       | 1213.2                           | 3640                                |
| Regrowth                            | 61.74                            | Exempt (to be confirmed)            |
| <b>Total</b>                        | <b>1599.34</b>                   |                                     |

### 5.3.8 Impact of clearing Regional Ecosystems

Overall, the REs that will be most heavily impacted in terms of area alone are the least concern REs 11.5.3 (225.5 ha) and 11.12.1 (226.1 ha). After these, the next most heavily impacted REs in terms of overall area all have less than 70 ha of clearing involved – these are the least concern REs 11.12.2 (66.7 ha), 10.5.5 (64.7 ha), 11.8.5 (59.9 ha), 11.9.2 (57.1 ha) and 11.4.4 (54.6 ha) (see Table 19).

When assessing impacts on REs from permanent declines in size it is important to consider the loss in terms that are relative to the current extent of the RE in question. Data on clearing areas relative to the current remnant area of each RE, and its area within the subregions traversed by the project footprint, is provided in Table 19. This table shows the clearing area expressed as a percentage of the subregional extent for each RE of higher conservation status within the project footprint. Representation in the protected area estate has also been provided for each of these REs. REs listed as Least Concern have generally not been included in Table 19 as they have, by definition, a relatively stable conservation status (being Least Concern – see Section 3.4.1). Exceptions are made for threshold REs and those Least Concern REs that are also listed as being TECs.

The data in Table 19 allows a better appreciation of the relative size of clearing impacts for the more vulnerable REs. As discussed in section 5.3.4, the largest impact relative to current extent is predicted for the of concern RE 11.2.3 (There are six REs within the corridor with current remnant extent's of less than 5000 ha (including RE 11.2.3), of which one has no representation within protected areas – the of concern RE 11.3.33 (*Eremophila mitchellii* open woodland on alluvial plains: Queensland Herbarium 2009) (see Table 19). However, only 7.61 ha is located within the project footprint, and although this RE has a very low current extent (1672 ha), this Project is predicted to require the removal of just 0.5% of this area.

Therefore, in general terms of the permanent removal of area, this Project will have an acceptable impact on the REs located within the project footprint. The highest clearing impact for an RE is



predicted to be 0.5% of the total current (2005) remnant extent, for the of concern RE 11.2.3. Most REs will have clearing rates of 0.5% of the total current remnant extent or less (in the vast majority of cases, the figure will be much less).

### 5.3.9 Landscape Fragmentation

Landscape fragmentation is a direct result of vegetation clearing for construction of the Project. This causes a reduction in the continuity of native vegetation through disturbance or loss. Impacts from landscape fragmentation can result from either direct loss of vegetation through clearing, thus isolating remaining patches of vegetation; or indirect impacts, such as increased predation on local native fauna from newly introduced pest predators (refer to section 5.3.15). Specific issues relating to landscape fragmentation as a result of the proposed rail alignment includes the removal of mature vegetation, hollow-bearing trees and hollow logs. Loss of these habitat features would therefore create a loss of perching, foraging and den/nesting resources for native species. A subsequent increase in competition for food and shelter in remaining habitats may follow. The loss of tree hollows, which are already a limited resource in most previously cleared rural and grazing lands, is recognised to be one of the major threats to Australia's biodiversity (Gibbons and Lindenmayer 2002).

The majority of the rail alignment passes through the Brigalow Belt Bioregion of Queensland. Remnant brigalow forest and woodland has been reduced to <10% of the original extent and as a result are classed as endangered ecological communities, which are protected from further clearing (DEH 2001). Large areas of the Burdekin catchment have been degraded in the past due largely to agricultural activities and the remaining vegetation is highly fragmented across the landscape. In fragmented landscapes, small patches of native woodland can have significant conservation values (Bowen *et al.* 2009). The remaining stands of brigalow support a considerable diversity of native fauna (Bowen *et al.* 2009), including the listed yakka skink and Dunmall's snake. Studies have shown that the richness, abundance and diversity of birds were higher in brigalow remnants than in the adjacent matrix (Bowen *et al.* 2008; Collard *et al.* 2009). Indeed both mature stands and regrowth of greater than 30 years old were capable of supporting a diverse and unique assemblage of native birds (Bowen *et al.* 2009). Furthermore, the clearing of brigalow has been found to significantly increase the volume and frequency of runoff leading to erosion which can further degrade available habitat for native fauna species (Thornton *et al.* 2007).

Therefore, it is likely that the preservation of brigalow and habitat-providing trees (eg. hollows) where possible would provide valuable resources and habitat for fauna. The extent of clearing and impacts on vegetation and fauna are detailed in Table 21.

**Table 21 Vegetation Removal Impacts**

| Vegetation Type                       | Amount Removed (ha) | Impacts on Fauna   |
|---------------------------------------|---------------------|--|
| <b>Remnant Vegetation</b>             |                     |  |
| Acacia dominated woodland/open forest | ~138 ha             | This vegetation community provides habitat for species listed under the NCA. Clearance of this vegetation will result in localised losses of habitat and local declines in listed fauna. The impact is |



| Vegetation Type   | Amount Removed (ha) | Impacts on Fauna  |
|---|---------------------|---|
|   |                     | localised and of low significance in a regional context. Listed fauna may be subject to direct mortality.   |
| Bloodwood woodland  | ~40 ha              | This vegetation community has moderate-high habitat value and as such, native species will be locally affected by loss of resources. This vegetation community is regionally abundant and supports few listed fauna species. The loss will have minimal impact on regional biodiversity.  |
| Box woodland on flats and plains                            | ~370 ha             | This vegetation community has moderate-high habitat value and as such, many native species will be locally affected by loss of resources. This vegetation community is regionally abundant and supports few listed fauna species. The loss will have minimal impact on regional biodiversity.   |
| Coolibah and gidgee open forest/woodland fringing waterways | ~16 ha              | This vegetation community has moderate-high habitat value and is important for maintaining landscape connectivity. Local losses of vegetation lining watercourses can have more substantial impact by restricting fauna movement. Waterways represent regionally important habitats for fauna particularly during dry periods. Provided measures are incorporated to allow for continued fauna movement, impacts are expected to be relatively localised. |
| Ironbark woodland on plains and rolling rises               | ~739 ha             | This vegetation community has moderate-high ecological value for terrestrial fauna, providing habitat for a range of shrub and canopy nesting birds, gliders, possums, macropods, rodents, reptiles and frogs.<br><br>Clearing of this habitat will result in localised displacement of individual animals and an increase in competition for resources in adjacent vegetation communities.   |
| Mangroves and tidal saltmarsh                               | ~2 ha               | This vegetation community has a high ecological value for marine and terrestrial fauna, providing important resource rich habitat for fish, crustaceans, reptiles, birds,   |



| Vegetation Type   | Amount Removed (ha) | Impacts on Fauna   |
|---|---------------------|--|
|   |                     | mammals and microbats. It provides habitat for EPBC listed marine and migratory birds. Although few areas of this vegetation type occur within the project footprint, those areas are regionally important for maintaining fauna diversity.  |
| Mountain coolibah open woodland on rocky plains and rolling rises | ~60 ha              | This vegetation community has moderate-high habitat value and as such, many native species will be locally affected by loss of resources. This vegetation community is regionally abundant and supports few listed fauna species. The loss will have minimal impact on regional biodiversity.      |
| Melaleuca dominated shrublands/woodlands                          | ~15 ha              | Melaleuca dominated shrublands represent a regionally important resource for nectar and flower-feeding birds, bats and gliders. Loss of this habitat may have wider impacts on the fauna communities in the surrounding landscape.   |
| Mixed eucalypt and paperbark open forest fringing watercourses    | ~94 ha              | This vegetation community provides habitat and resources for a wide range of birds, reptiles, mammals and frogs. These areas are particularly important during the dry season. Watercourses are also important corridors for fauna movement. Impacts are expected to have heightened significance. |
| Mixed species shrubland/low woodland                              | ~53 ha              | This vegetation community has moderate habitat value and as such, many native species will be locally affected by loss of resources. This vegetation community is regionally abundant and supports few listed fauna species. The loss will have minimal impact on regional biodiversity.           |
| Native grasslands   | ~116 ha             | Native grasslands provide habitat for rodents, macropods, snakes, and a range of grass dwelling birds including the EPBC listed <i>Geophaps scripta scripta</i> (squatter pigeon). This vegetation type is regionally abundant. Impacts are considered to have negligible                          |

| Vegetation Type  | Amount Removed (ha) | Impacts on Fauna  |
|--|---------------------|---|
| Poplar gum open woodland on alluvial plains  | ~74 ha              | influence on regional fauna diversity.  |
| Semi evergreen vine thicket  | ~14 ha              | This vegetation community has moderate-high habitat value and as such, many native species will be locally affected by loss of resources. This vegetation community is regionally abundant and supports few listed fauna species. The loss will have minimal impact on regional biodiversity. |
| <b>Regrowth Vegetation</b>   |                     |   |
| Areas of non-remnant vegetation with advanced regrowth   | ~62 ha              | Provides important habitat for scrub and ground nesting birds, reptiles and microbats. Although the area to be cleared is not of high quality, the clearance will have a minor localised impact on fauna due to the naturally small nature of semi evergreen vine thicket pockets.            |
| <b>Non-Remnant Vegetation</b>  |                     |   |
| Cleared pasture, roads etc   | ~1497 ha            | Non-remnant regrowth has relatively low habitat value for fauna. The loss of habitat is unlikely to result in substantial decline in fauna diversity at a local or regional level.  |
| Cleared pasture, roads etc   |                     |   |
| Grassland provides habitat for rodents, macropods, snakes, and a range of grass dwelling birds as well as foraging habitat for raptors. The loss of this habitat is considered to have a negligible impact, given its relative abundance and altered state in the surrounding landscape. |                     |   |

### 5.3.10 Mitigation Measures

Impact on native vegetation has been reduced by the rail alignment traversing large areas of previously cleared lands. Where native vegetation clearance cannot be avoided, the following mitigation measures are recommended:

- ▶ The extent of vegetation clearing must be clearly identified on construction plans and in the field. Areas that must not be cleared or damaged in any way must also be clearly identified.
- ▶ Clearing teams, in the early stages of work when working in vegetation to be retained after the Project, should be accompanied by an ecologist at all times. The ecologist's role is to mark out



'no-go' zones before work commences in a new area, and who is responsible for supervising compliance.

- ▶ The extent of clearing is to be restricted to the minimal amount necessary, particularly in the following locations:
  - REs listed as constituents of TECs protected under the EPBC Act;
  - Endangered and of concern REs;
  - Threshold REs.
- ▶ Any additional construction areas and construction sites, such as site offices, soil stockpiles, machinery/equipment storages and construction camps are to be located within existing cleared areas or disturbed areas to the greatest extent possible.
- ▶ Where clearing threatened ecological communities of conservation significant REs is absolutely unavoidable offsets will be required.
- ▶ Hollow logs and hollow bearing trees should be cleared of wildlife by a licensed wildlife spotter, and wherever possible these should be stockpiled for use in rehabilitation activities or otherwise carefully placed in adjoining bushland;
- ▶ Areas of high ecological value such as riparian corridors must be approached with care, and effort made to ensure connectivity is re-established to the highest realistic extent;
- ▶ Locate culverts in areas where the project footprint bisects important habitat. For example culverts to facilitate movement are advised where the Project bisects the DERM essential habitat located at chainage 280, 00 km. This should be done to maintain landscape permeability.
- ▶ Trees with large raptor nests should not be cleared, where possible, after consideration of safety, operational and maintenance issues. If this is not possible, removal should only occur after consultation with the fauna spotter, who should be given the longest possible lead time prior to clearing.

### 5.3.11 Offsets Obligations

Vegetation offsets will be required in most cases for proposed clearing of endangered or of concern REs, where ecological connectivity will be cut through clearing of remnant vegetation, and where remnant vegetation associated with wetlands, watercourses and essential habitat will be cleared. Under the current *Policy for Vegetation Management Offsets* (DERM, 2009a), areas offered as offsets must be ecologically equivalent to the area being cleared, and the total offset area required will be proportionate to the ecological value of the offset vegetation. The DERM Offset Policy no longer specifies ratios, and as a result it is impossible to state the total offset area that may be required. However, current indications are that offset proposals being accepted by the DERM are generally three to four times larger in area than the area being cleared (Alan Keys, offsets broker, pers. comm. 2 July 2010).

It should be noted that offsets will only be accepted when all reasonable attempts have been made to avoid clearing or to minimise impacts, and that if offsets are required, that they be legally secured (i.e. protected from future development through a legal mechanism such as a covenant or Nature Refuge Agreement). If the Project is gazetted a state significant project, the proponent has 12 months to legally secure offsets after development approval.



Offsets of marine plants may also be required under the Fish Habitat Management Operational Policy FHMOP 005 (Dixon & Beumer 2002). This would include areas mapped as RE 11.1.2 and 11.1.4. The Fish Habitat Management Operational Policy FHMOP 005 is recognised by the Queensland Government Environmental Offset Policy (QGEOP) (DERM, 2009) as a specific-issue offset policy. In keeping with the QGEOP, marine fish habitat offsets are applicable when impacts cannot be avoided, minimised or mitigated, and only after the proposed marine fish habitat loss is determined as justifiable, unavoidable and acceptable under departmental legislation and policy.

Clearance of TECs listed under the EPBC Act will also carry offset obligations under the *Draft Policy Statement: Use of Environmental Offsets under the EPBC Act* (DEWR, 2007). Despite three years elapsing since its release this policy is still a draft. Under the EPBC Act, environmental offsets can be used to maintain or enhance the health, diversity and productivity of the environment as it relates to matters protected by the Act. Offsets requirements under the EPBC Act differ significantly from those of the VMA in that indirect offsetting, such as the provision of cash, the removal of a threatening process, or assistance in implementing a recovery plan or similar, are allowable (among other differences). However, environmental offsets are not applicable to all approvals under the EPBC Act, and they should not be applied where the impacts of a development are considered to be minor in nature or could reasonably be mitigated.

Determination of the Project's precise offset obligations under either the VMA or the EPBC Act is impossible to calculate at this stage, as it depends to a large extent on the quality and landscape position of the offset vegetation, and the position of the respective departments in relation to their policies. The area of vegetation being cleared (which triggered the need for the offset) only serves as a starting point in the offset calculation process. Section 5.3.7 provides indicative areas to be cleared and possible minimum areas required for VMA offsets.

### 5.3.12 Mortality of Terrestrial Fauna

#### Potential Impacts

Any construction activity undertaken in an undisturbed environment has the potential to cause wildlife and livestock mortality if animals are present when vegetation is cleared or venture into active construction zones. Construction of the rail alignment will require clearance of native vegetation. Fauna residing in this vegetation may experience direct mortality. Animals that are particularly at risk include those that shelter in hollows, beneath rocks, logs and bark (i.e. arboreal mammals, nocturnal birds, monitors, small reptiles and frogs) and ground animals that tend to hide rather than flee at approaching danger (i.e. bandicoots, quails and pigeons). Increased vehicular movements associated with construction activities have the potential to increase the incidence of wildlife strike and road kill. However, given vehicle movements are expected to be relatively slow, the risk is expected to be relatively low.

Similarly, livestock and wildlife that are highly mobile are at risk of being trapped or injured in open pits or trenches within the construction zone. Species most likely to be impacted by direct mortality during the construction phase are generally regionally abundant. However, conservation significant nocturnal reptiles such as the yakka skink, ornamental snake and brigalow scaly foot if present are also susceptible during vegetation clearing due to the specialised habitats they inhabit. The incidence of direct mortality can be reduced by implementing the mitigation measures outlined below.



## Mitigation Measures

These impacts can be mitigated by:

- ▶ Ensuring a fauna spotter is located on site prior to and during all vegetation removal to identify, capture and relocate fauna, including conservation significant fauna
- ▶ Developing a flora and fauna species relocation plan particularly for threatened species to allow individuals to be relocated according to species requirements (particularly if threatened species are encountered during clearing activities)
- ▶ Erecting temporary fencing around the construction zone to exclude mobile animals such as livestock, macropods, echidnas, snakes and lizards from the construction zone
- ▶ If any pits/trenches are to remain open after daily site works have completed, ensure they are securely covered by an impenetrable barrier, if possible, or fauna ramps (e.g. log ramps or wooden planks) are put in place to provide a potential means of escape for trapped fauna
- ▶ Work areas are to be checked for fauna that may have become trapped within the worksite before work commences each day
- ▶ Educating employees of environmental responsibilities during inductions including treating all native fauna species as protected
- ▶ Enforcing on-site speed limits to restrict the incidence of wildlife road kill
- ▶ Construction to occur during the dry season to minimise direct mortality of aquatic fauna or migratory species (Caley Valley and Bowen River between Birralee and Pelican Creek)
- ▶ A fauna mortality register is to be kept and maintained to determine the location, frequency of mortality, and types of species most susceptible to enable further modifications to fauna conservation mechanisms to be made where necessary

Following mitigation, the residual impact will be reduced.

### 5.3.13 Habitat Degradation – Light, Noise and Vibration Disturbance

#### Potential Impacts

Construction activities along the rail alignment will cause temporary and localised increases in noise, vibration and light disturbance. During the period of construction, there is expected to be localised disturbance to wildlife behaviours and dynamics (i.e. foraging, breeding and nesting) adjacent to the construction footprint. For example, exposure to unusual noise and light disturbance has been known to influence nesting behaviour and species richness in some sensitive species especially birds (Francis, Ortega and Cruz 2009). Increased lighting may also subject some native species to higher levels of predation. Impacts of light, noise and vibration disturbance can be reduced by locating the rail alignment and associated infrastructure away from sensitive habitats during the design period. For logistical reasons, project construction will occur during the dry. This will reduce impacts on the breeding activities relating to any wetland or migratory birds inhabiting areas within or adjacent to the study area. As such, the impacts of light, noise and vibration on fauna species are expected to be low. However, the following mitigation measures can further reduce the potential impacts to flora and fauna.



### Mitigation Measures

Proposed mitigation during the construction phase, include a range of standard construction techniques that can be implemented to minimise the impacts of noise, light and vibration disturbance. These include:

- ▶ Limiting lighting to work areas and employing directional lighting with protective guards (particularly adjacent to sensitive habitats including permanent water sources)
- ▶ Ensuring all plant and equipment is appropriately serviced and maintained to minimise machinery noise where possible
- ▶ Where practical, limit construction near sensitive areas. For example limiting construction near wetland environments during the wet season is likely to minimise impact to breeding wetland and migratory birds

Following implementation of the mitigation measures, the residual impact is expected to be low.

#### 5.3.14 Dust

##### Potential Impacts

Vegetated areas adjacent to the construction area may become affected by dust from construction activities and earthworks. Excessive dust settling on vegetation could suppress vegetation growth by limiting the photosynthesis potential of plants in close proximity to the construction area (Nanos & Ilias, 2007). The impact of dust from roads has been known to change the vegetation composition for some distance away from roads (Coffin 2007).

Dust is likely to be a more significant impact where earthworks occur adjacent to sensitive habitats (Caley Valley and Bowen River between Birralee and Pelican Creek) and vegetation types (i.e. riparian vegetation, areas of permanent water and other sensitive habitat types). Excessive dust settling on waterbodies could affect water quality which may indirectly affect aquatic flora and fauna. However, given that the majority of the study area is already to a large extent degraded by cattle grazing, the severity of this impact is less pronounced. Nevertheless, the impacts of dust can be reduced by implementing the mitigation measures below.

##### Mitigation Measures

- ▶ Incorporate dust suppression techniques into construction activities, e.g. tankers spraying down dirt roads
- ▶ Ensure soil stockpiles are appropriately stored and covered/located in areas not susceptible to wind erosion
- ▶ Minimise vegetation clearing and the area of bare ground required for construction to only that which is necessary within and adjacent to sensitive habitats and vegetation types
- ▶ Ensure construction vehicles and machinery are kept clean from dust
- ▶ Restricting speed limits and other traffic control mechanisms to minimise the generation of dust

Following mitigation, the residual impact will be reduced.



### 5.3.15 Introduced species

#### Potential Impacts

Increased access to previously undisturbed areas through vegetation clearing and soil disturbance can facilitate the introduction and spread of new pest species, and can increase the incursion rate and spread of existing pests. Pest species can have significant detrimental impacts on the flora and fauna diversity in a region by preying on or out competing native populations for resources, with the potential for significant ecological, social and commercial disruption.

The most important pest species likely to benefit by the actions proposed for this Project is *\*Parthenium hysterophorus* (parthenium). Parthenium is a significant class two weed which was observed at many sites during field surveys throughout the study area, and is well-established across the Brigalow Belt. Parthenium spreads aggressively in wastelands, degraded areas, native and improved pastures and along linear corridors, particularly those subject to frequent vehicle movements (roads, powerline easements etc) (Parsons and Cuthbertson 2001). This species is particularly well established on the black soils of the region. Parthenium will not threaten undisturbed native vegetation communities, including intact native pastures. However, areas that have been overgrazed or otherwise disturbed are highly susceptible (Parsons and Cuthbertson 2001). Pathenium is often spread by vehicle and stock movement and rigid washdown procedures should be implemented at all locations along the project footprint, with particular vigilance in locations where parthenium was growing before construction commenced.

Parthenium and Harrisia are both declared weeds that were located during the field surveys and these have potential for being spread by construction machinery. In addition, introduction of new weed species can occur through activities associated with the Project, such as the use of contaminated materials (such as fill required for construction) or machinery. Other invasive weeds of concern include the class two weeds giant rat's tail grass (*\*Sporobolus pyramidalis* and related *Sporobolus* sp.), mother-of-millions (*\*Bryophyllum* spp.) and annual ragweed (*\*Ambrosia artemisiifolia*), among others. Riparian corridors in particular are sensitive receptors for these weeds and small infestations can be spread far and wide if seeds enter the waterway system.

Likewise, vegetation clearing through large areas of continuous habitats, such as for linear infrastructure projects such as this one, can create the potential for fauna pests and feral predators to penetrate further into bushland areas.

The impacts of weed and pest species can be managed by implementing the mitigation measures below.

#### Mitigation Measures

- ▶ Development of a Weed and Pest Management Plan for implementation throughout the construction phase including:
  - Vehicle wash down stations located along the study area, particularly wherever the project footprint enters/leaves known parthenium 'hotspots' such as black soil plains, or ecologically sensitive areas such as major waterways (the Belyando River, the Suttor Creek, the Bowen River, Pelican Creek, the Bogie River, the Elliot River), wetlands, native grasslands
  - Training and orientation stressing the need to be thorough and conscientious in wash-down procedures



- Develop procedures for washdown and provide training to all staff
- Regular monitoring of pest species and weed inspections
- Weed and pest control where necessary
- ▶ A weed audit of up to 20 percent of the project footprint, at high risk locations, should be conducted after the project footprint has been marked out, and preferably at a time when annual weeds can be recognised (and when black soil country can be negotiated) eg late wet season (April to June). This audit would result in weed maps identifying hotspots for the various declared weeds inside the project footprint, with a focus on parthenium, and the preparation of a Weed Management Plan.
- ▶ All declared weeds within the project footprint should be removed (after mapping has occurred) and burnt or otherwise disposed of in such a way as to ensure the cleared material is neutralised, before construction occurs
- ▶ Signage should be in place throughout the project footprint where parthenium is prevalent advising staff to take care to arrest its spread, and advising when staff are entering or leaving infestation 'hotspots'
- ▶ Insist that all construction machinery and materials brought onto site are certified weed free and records are kept of compliance with this requirement
- ▶ Soil in areas known to contain parthenium and other declared weeds is not moved elsewhere

Following mitigation, the residual impact from pests is expected to be reduced.

### 5.3.16 Fire Hazards

#### Potential Impacts

The project footprint traverses numerous areas of high fire risk and construction involves activities (welding in particular) that can greatly increase the chance of bushfire. Bushfires can result in significant loss of life for native animals and flora, and for cattle. In particular, fire in grasslands during dry seasons can be catastrophic for landowners in periods of drought. Therefore, it is essential that effective measures are taken to prevent this occurrence.

The following mitigation measures can reduce the impact of fire on flora and fauna within the project footprint.

#### Mitigation Measures

Develop and implement a Fire Management Plan to address and minimise fire hazards. This may include:

- ▶ Onsite preventative measures, such as:
  - no smoking or fires during dry season
  - correct storage of flammable materials
  - clearing of fire breaks around work areas (particularly welding) and other high risk areas
- ▶ Onsite fire fighting equipment and training for staff in how to use it
- ▶ Inspection of fire affected areas for injured wildlife by suitably qualified wildlife spotters
- ▶ Following mitigation, the residual impact should be reduced



### 5.3.17 Restriction of Fauna Movement

#### Potential impacts

The presence of a rail alignment and associated access tracks and fencing infrastructure can create a linear barrier to local and regional fauna movement, fragment remaining habitat patches and can restrict access to water sources (Forman and Alexander 1998). Fauna species within the study area, particularly small ground dwelling and arboreal mammals and reptiles with high levels of site fidelity may be restricted from moving between local habitat areas intersected by the rail alignment. This in turn can reduce the availability in each fragmented habitat patch of essential resource such as food, shelter, and reproductive opportunities. The extent to which individual fauna will be impacted will be species specific. Although a rail easement represents a relatively narrow disturbance, particularly within widely spaced habitats such as open woodlands, the ecology of fauna species with small home ranges or specific habitual requirements could be greatly affected by the removal of or changes to niche habitats as a result of the location of the rail alignment. Restricting access to water sources could also threaten the viability of some resident local wildlife populations.

Fragmentation of regional and state significant bioregional wildlife corridors could occur as a result of vegetation clearing for the construction of the rail alignment. Regionally significant fauna corridors such as riparian vegetation corridors or smaller, yet somewhat evenly spaced, remnant vegetation patches act as important habitat linkages between larger vegetated habitat patches. Vegetation clearing can sever or severely reduce the size of these vegetation linkages which can stop or reduce fauna movement within the region potentially limiting the genetic diversity of native fauna species reliant of movement within these corridors. Ground animals, such as macropods and echidnas, which have larger habitat ranges, are likely to be particularly adversely affected.

The barrier effect can be reduced by incorporating fauna underpasses at all low points (i.e. watercourses) and also in areas close to important habitat such as brigalow and gulgais. Fauna underpasses have been effective in facilitating the movement of macropods and other large ground fauna beneath large motorways (Queensland Department of Main Roads 2000). Generally underpass effectiveness increases by maximising underpass height and width, by ensuring there is natural lighting and ground substrate and native vegetation leading to the underpass entrance (Queensland Department of Main Roads 2000).

Within the study area, underpasses are likely to be most effective if they are placed along ephemeral waterways as these are likely to represent existing pathways for wildlife movement and run perpendicular to the rail alignment. Although a restriction of fauna movement is likely to occur, the ecological consequence associated is likely to be reduced by incorporating fauna underpasses into the design.

#### Mitigation Measures

- ▶ Minimise the construction period
- ▶ Maximise the height of the rail alignment above watercourses to optimise the chances of wildlife movement along watercourses
- ▶ Ensure enough fauna underpasses are incorporated into the design within suitable habitats and mapped bioregional corridor areas to promote fauna movement. Fauna underpasses will require revegetation and fencing to promote fauna use.



- ▶ Minimise disturbance to wildlife corridors such as riparian vegetation corridors.

### 5.3.18 Sedimentation and Erosion

#### Potential Impacts

Construction activities will require substantial earthworks. This could result in point-source pollution from sedimentation and run-off. These can have a localised impact on wildlife through habitat degradation by reducing the quality and abundance of refuges, microhabitats and food availability by smothering native vegetation and water bodies with sediment.

As discussed in the aquatic report, sedimentation of aquatic habitats can result in increased turbidity; decreased oxygen levels; reduced light penetration; change in channel morphology and alteration of substrate composition. These impacts may have a localised effect on aquatic flora and fauna by reducing habitat value in the immediate downstream area. For this reason, areas of permanent water, such as Caley Valley, the Bowen River and adjacent farm dams, may require additional protective measures to minimise impacts from sedimentation and run-off.

The impacts of run-off and sedimentation can be reduced by implementing the mitigation measures below.

#### Mitigation Measures

The impacts of sedimentation and run-off can be mitigated by:

- ▶ Preparation and implementation of an Erosion and Sedimentation Management Plan which includes:
  - Installation and maintenance of sediment fences in appropriate locations around all earthworks (particularly important in areas adjacent to wetlands and watercourses), to be in place to the greatest extent possible before construction and clearing commences
  - Installation and maintenance of temporary sediment traps at key locations where run-off is expected throughout the course of the construction period
- ▶ Top soil should be stockpiled and marked appropriately in areas where it is to be redistributed after works are completed. In particular, care must be taken not to mix soil profiles as the subsurfaces of many soils in this region are likely to be sodic (ie highly erodible).
- ▶ Rehabilitating disturbed ground surfaces as soon as is practicable to minimise exposed surface periods

Further mitigation measures are discussed in the aquatic report. Following mitigation, the residual impact on both the terrestrial and aquatic flora and fauna is expected to be low.

## 5.4 Operational Impacts

### 5.4.1 Mortality of Terrestrial Fauna

#### Potential Impacts

Direct mortality of livestock and native wildlife can occur during the operational phase of the Project through train strikes and maintenance vehicle strikes. Whilst the occasional incident is likely, a



study has shown that animals can learn to avoid vehicle collusions after frequent exposure (Coffin 2007). Therefore it would be expected that animal mortality rates would reduce over time.

The role of barbed wire in catching and killing small birds, gliders and bats must also be considered. Every year thousands of Australian animals are killed after becoming entangled with barbed wire along fencelines, generally with the top strand (Booth 2006). It is not unknown for hundreds of animals to die in single storm events along a few kilometers of barbed wire fencing, and nocturnal species are particularly susceptible. Even birds as large as jabirus (*Ephippiorhynchus asiaticus*) have been recorded as entangled in barbed wire fencing (Booth 2006). Barbed wire suspended over waterways is particularly dangerous for animals (Allen and Ramirez 1990, in Booth 2006).

This is an animal welfare issue as well as representing a steady drain on population numbers of certain species, including species of conservation significance. A number of species recorded from the area during the field surveys or expected to occur here, including twenty species of microbat and the threatened species squatter pigeon, little pied bat and Troughton's sheathtail bat, are highly susceptible to this hazard. Experience from institutions that have had recurrent animal snaring issues with fences in North Queensland indicates that it is the top two strands in a fence that are generally the most dangerous to wildlife (except where the fence is located along the crest of a hill, or in other specific circumstances) (Booth 2006).

### **Mitigation Measures**

- ▶ The rail easement is to be appropriately fenced to restrict livestock movement within the rail alignment
- ▶ Fencing should be stout and well-constructed of durable materials, to an equivalent Queensland Rail standard. However, barbed wire *should not be used at all if possible*: alternatively, the top two strands at least should be plain wire.
- ▶ Fauna underpasses within important habitat areas are to be incorporated into the design of the rail alignment. Appropriate fencing and revegetation is required to encourage use by fauna species.
- ▶ Fauna strike and mortality is to be monitored during construction and operation. Dead carcasses are to be disposed of away from the rail alignment to reduce the occurrence of predators, such as raptors, also being struck by moving trains.

#### **5.4.2 Habitat Degradation – Light, Noise and Vibration Disturbance**

##### **Potential Impacts**

Light, noise and vibration disturbance can disrupt normal wildlife behaviours (i.e. foraging, feeding, breeding and nesting). Background levels of incidental noise will increase once the rail line commences operation.

The impact of operational lighting associated with the rail alignment infrastructure on flora and fauna is considered negligible as minimal operational lighting will be required. The main impact to fauna species from the alteration of light during operation will result from the high powered lights emitted by the trains travelling at night which may startle some fauna species that may be within the rail alignment, such as kangaroos. Direct mortality of fauna from train strike may result.



The main noise emissions during the operation phase of the Project will be train movement. The frequency of trains utilising the rail alignment is likely to be seven trains moving along the rail line twice a day. Noise impacts from passing trains may interfere with communication, mask predation or startle some fauna species displacing them into adjacent habitats. Extra species in such areas could then increase competition for resources such as food and shelter. The most significantly impacted by transport related noise are those species that incorporate sound into their basic behavior, such as birds (Coffin 2007). However some animals are likely to adapt to the infrequent noise emissions. For example wetland birds in the Caley Valley wetland have remained in areas impacted by noise from the existing port facility. The following mitigation measures will substantially reduce the localised disturbance to wildlife.

#### **Mitigation Measures**

- ▶ Fauna underpasses within important habitat areas are to be incorporated into the design of the rail alignment. Appropriate fencing and revegetation are required to encourage use by fauna species.
- ▶ Fauna strike and mortality is to be monitored during construction and operation. Dead carcasses are to be disposed of away from the rail alignment to reduce the occurrence of predators, such as raptors, also being struck by moving trains.
- ▶ Ensure any operational lights, such as at signalling stations, are not located within sensitive habitats or do not shine directly into vegetated areas which are potential habitats
- ▶ Where appropriate revegetate habitats disturbed during construction to create an environmental buffer to noise for surrounding habitats

Following mitigation, the residual impact of light and noise disturbance is expected to be low.

#### **5.4.3 Dust Pollution**

##### **Potential Impacts**

Coal dust emissions from loaded coal trains are potential issues within every railway system within central Queensland in terms of economic loss, public nuisance and potential impact on the environment. High levels of coal dust from trains, emitted either by train movement or wind erosion, have the potential to directly impact flora species and communities adjacent to railway systems. Dust deposition on leaves can reduce the photosynthetic quality of the flora and impede plant growth. Such an impact, in turn, could degrade the health of the vegetation community and cause plant dieback with prolonged exposure and also reduce the food resource availability for fauna species utilising the affected vegetation community. As discussed in the aquatic report, excessive dust settling on water bodies also has the potential to decrease aquatic habitat value within the immediate and downstream areas primarily as a result of reduced water quality.



An environmental evaluation, commissioned by QR, reviewed the available literature for the impacts of coal dust on flora and fauna, crops and livestock. The review, by Connell Hatch (2008), found that the air quality goals or standards to protect human health and amenity were sufficient for the protection of flora, fauna, crops and livestock against dust impacts, as no goals and standards have otherwise been set for these categories.

Studies reviewed by Connell Hatch (2008) on coal dust deposition on cotton crops concluded a dust deposition rate of 500 mg/m<sup>2</sup>/day can be used as a threshold for adverse impacts on crops and vegetation. Feed preference, palatability, quantity of feed eaten and quantity of milk produced were not affected when livestock were exposed to feed containing coal dust at rates of no dust, 4,000 and 8000 mg/m<sup>2</sup>/day. Records show that the highest coal deposition rates, of about 90 mg/m<sup>2</sup>/day, occur within the rail alignment with rates dropping quickly with distance from the corridor, down to 30 mg/m<sup>2</sup>/day at 10 m from the tracks (Connell Hatch 2008). These measured values are well below the values indicated in the literature as potentially having an impact on crops and livestock. Although no literature has been found on the impacts of coal dust on native flora and fauna communities, the same conclusions are likely to be appropriate. Thus, coal dust deposition is unlikely to have a major impact on the flora and fauna within the study area or surrounding region. Furthermore, the proposed train carriages used on this standard gauge rail line will not be piled above the carriage height and are expected to have structures above the carriage to minimise dust/particle loss.

An additional source of dust generation during the operational phase would be from the movement of maintenance vehicles along dirt access tracks of the rail alignment particularly during dry and windy conditions. Impacts of dust deposition on vegetation and fauna as a result of this activity would be the same as mentioned for coal dust above. Further indirect impacts on erosion and water quality of waterbodies within the study area may also exist. It is unlikely that dust deposition will have a major impact on flora and fauna values. Maintenance vehicles will only use access tracks at low frequencies and the indirect effects on erosion and water quality will be minimal when mitigation measures are considered.

### **Mitigation Measures**

- ▶ When developed by QR, the Coal Dust Management Plan, which will manage coal dust emissions from key dust sources (Connell Hatch 2008), should be adopted for coal trains utilising this rail alignment
- ▶ Development an Erosion and Sedimentation Management Plan which includes dust suppression techniques to address dust emissions from vehicles during the operational phase

Following mitigation, the residual impact of dust is expected to be negligible.

#### **5.4.4      Introduced species**

##### **Potential Impacts**

Vegetation clearance and increased human activities have the potential to further degrade the quality of adjoining habitats through edge effects. These typically lead to a localised increase in weed and pest fauna, changes in habitat microclimates, such as increased light penetration, and have the potential to change the species composition within the affected vegetation community.



Environments comprising much of the study area are already highly disturbed from current grazing land use practices with large areas already containing infestations of weeds such as parthenium and rubber vine and pest animals including the European rabbit and cane toad.

An increase in bare ground and open areas will favour weedy species, particularly parthenium, which can suppress the regeneration of native species and reduce the available habitat for native species. Pest species can also use the rail easement as a linear pathway for movement between populations. Competition and predation by feral animals has the potential to reduce the abundance and diversity of local terrestrial and aquatic fauna.

While the existing landholders are believed to undertake periodic weed and pest management actions including spraying, baiting and shooting, the entire rail alignment is not actively managed for weed and pest species. The impacts of weed and pest infestations can be reduced and potentially improved by developing and implementing a weed and pest management plan for the Project.

### **Mitigation Measures**

- ▶ A Pest Management Plan should be developed to minimise the impact of weed and pest species on the study area ecosystems. This may include a regular monitoring program of feral species and management measures to be employed to control feral species within the project footprint.
- ▶ A post-construction weed audit of the project footprint should be undertaken at the end of the first wet season following completion. The object of this audit is to map the location of any new infestations, and develop a Weed Management Plan for the operational stage of the railway.

#### **5.4.5      Restriction of Fauna Movement**

##### **Potential Impacts**

The presence of a rail alignment and associated fencing infrastructure could create a linear barrier to local and regional fauna movement, fragment remaining habitat patches and could restrict access to water sources (Forman and Alexander 1998). Fauna species within the study area, particularly small ground dwelling and arboreal mammals and reptiles may be restricted from moving between local habitat areas intersected by the rail alignment. This in turn could reduce the resources available such as food, shelter, ability to find a mate in each fragmented habitat patch. Although a rail easement is a relatively narrow disturbance, particularly within some widely spaced habitats such as open woodlands, the ecology of fauna species with small home ranges or specific habitual requirements could be greatly affected by the removal of or changes to niche habitats as a result of the location of the rail alignment. Restricting access to water sources could also threaten the viability of some resident local wildlife populations.

Fragmentation of regional and state significant bioregional wildlife corridors could occur as a result of vegetation clearing for the construction of the rail alignment. Regionally significant fauna corridors such as riparian vegetation corridors or smaller, yet somewhat evenly spaced, remnant vegetation patches act as important habitat linkages between larger vegetated habitat patches. Vegetation clearing can sever or severely reduce the size of these vegetation linkages which can stop or reduce fauna movement within the region potentially limiting the genetic diversity of native



fauna species reliant of movement within these corridors. Ground animals, such as macropods and echidnas, which have larger habitat ranges, are likely to be particularly adversely affected.

The barrier effect can be reduced by incorporating fauna underpasses at all low points (i.e. watercourses). Fauna underpasses have been effective in facilitating the movement of macropods and other large ground fauna beneath large motorways (Queensland Department of Main Roads 2000). Generally underpass effectiveness increases by maximising underpass height and width, by ensuring there is natural lighting and ground substrate and native vegetation leading to the underpass entrance (Queensland Department of Main Roads 2000).

Within the study area, underpasses are likely to be most effective if they are placed along ephemeral waterways as these are likely to represent existing pathways for wildlife movement and run perpendicular to the rail alignment. Although a restriction of fauna movement is likely to occur, the ecological consequence associated is likely to be reduced by incorporating fauna underpasses into the design.

#### **Mitigation Measures**

- ▶ Maximise the height of the rail alignment above watercourses to optimise the chances of wildlife movement along watercourses
- ▶ Ensure enough fauna underpasses are incorporated into the design within suitable habitats and mapped bioregional corridor areas to promote fauna movement. Fauna underpasses will require revegetation and fencing to promote fauna use.
- ▶ Minimise disturbance to wildlife corridors such as riparian vegetation corridors
- ▶ Ensure any disturbed wildlife corridors are rehabilitated after construction to repair damaged fauna habitat and promote fauna movement

#### **5.4.6 Sedimentation and Run-off**

##### **Potential Impacts**

There are potential indirect impacts to flora and fauna as a result of minor localised run-off and sedimentation throughout the operational life of the Project and associated all weather access road. Permanent water sources, e.g. adjacent farm dams and the Bowen River, are likely to be sensitive to indirect impacts from sedimentation and run-off including reduced water quality and introduction of contaminants or pollutants into the water supply. Such effects could impact on the health of riparian and water dependant vegetation or could prove toxic to fauna species. The incorporation of suitable vegetated drains and catch dams along the length of the rail alignment will substantially reduce the impacts of run-off and sedimentation. This can be further reduced by implementing the following mitigation measures.

#### **Mitigation Measures**

- ▶ Establish protective vegetation and sediment ponds to buffer sensitive flora and fauna habitats from run-off and sedimentation
- ▶ Establish sediment traps, silt fencing and biofilters were appropriate at strategic locations to protect waterbodies from sediment and pollutants



- ▶ Establish a water and sediment quality monitoring plan (adequate baseline information will be required) to monitor composition and condition of the important water sources with respect to potential pollution or contamination due to deposition of particulate matter in the water body and surrounds

Following mitigation, the residual impact of sedimentation and run-off is expected to be negligible.

#### 5.4.7 Changes to Floodplain Hydrology

##### Potential Impacts

The study area is located in a low gradient catchment with extensive floodplains. The construction of the rail line will cross these floodplains and create a barrier to the previous flow of water. Note that the previous flow may not be natural, as many of the flat expanses of land have been human altered. Despite this the alteration of floodplain hydrology may impact downstream locations and that may play an important role in the ecology of water reliant species.

##### Mitigation Measures

- ▶ Utilise culverts in order to allow the movement of water
- ▶ Conduct hydrology modelling of the relevant areas
- ▶ Identify areas that are potentially impacted

As discussed in the aquatic report, changes to flood plain hydrology have the potential to impact on the quality of aquatic habitats and the movement of species between viable water bodies.

Mitigation measures specific to the aquatic environment are discussed in this separate report.

### 5.5 Impacts on Conservation Significant Species

#### 5.5.1 Flora

One species of flora listed as being of conservation significance was detected during the field surveys – *Eucalyptus raveretiana* (black ironbox), which is listed as vulnerable under both the NCA and the EPBC Act. This species was one of the dominant components of fringing riparian open forest along the Elliot River, near the far northern terminus of the project footprint. The alignment is now located some four kilometres downstream of the location of this survey site, at a point that was not able to be reached during the field surveys. However, as black ironbox was the dominant species along the river it is considered highly likely that it will still be present at the location of the current crossing point.

Another species, *Dichanthium queenslandicum* (king bluegrass), is considered to be likely to occur within the project footprint. King bluegrass is listed as vulnerable under both the NCA and the EPBC Act. This species is known to occur in the central sections of the project footprint on native grasslands on self-mulching, black cracking clays, between chainage 285, 000 and 325, 000 (collected from adjacent to the project footprint by GHD previously - voucher specimen SD120308.1). It is also likely to occur in any native grassland south of Eaglefield Creek.

A further 12 species have suitable habitat within the project footprint and may occur. Of these, six have habitat requirements met by eucalypt woodland/open forest, three occur in acacia dominated woodland (brigalow or gidgee woodland), three occur in semi evergreen vine thicket or similar

communities, and two occur in native grasslands (note, some species occur in multiple habitats ie vine thicket and sclerophyll woodland). A fuller description of habitat requirements is provided in Appendix D. These species include:

- ▶ *Acacia jackesiana* (Betsy's wattle) (near threatened under the NCA) – occurs in eucalypt woodland on hill slopes (Calvert *et al.* 2005), but not recorded from within the general study area previously (see - see Appendix D)
- ▶ *Bonamia dietrichiana* (Dietrich's morning glory) (near threatened under the NCA) – occurs in semi-evergreen vine thicket (Calvert *et al.* 2005), and has been recorded from within the general study area twice previously (see Appendix D)
- ▶ *Cerbera dumicola* (near threatened under the NCA) – recorded from dry rainforest and open lancewood (*Acacia shirleyii*) forest (Herbrecs records - see Appendix D), and has been recorded within the general vicinity of the study area previously (see Appendix D)
- ▶ *Croton magneticus* (Magnetic Island croton) (vulnerable under the NCA and EPBC Act) – occurs in semi evergreen vine thicket no further inland than Collinsville (Calvert *et al.* 2005), and has been recorded from within the general vicinity of the study area previously (see )
- ▶ *Desmodium macrocarpum* (near threatened under the NCA) – occurs in eucalypt forest on sandy soils (Hacker 1990), and has been recorded in the vicinity of the study area previously (see Appendix D)
- ▶ *Dichanthium setosum* (near threatened under the NCA, vulnerable under the EPBC Act) – recorded in native grasslands on black clays from within the vicinity of the study area (Herbrecs records - see Appendix D)
- ▶ *Marsdenia pumila* (vulnerable under the NCA) – recorded in dry sclerophyll woodland on lateritised sedimentary rock from within the vicinity of the study area previously (Herbrecs records - see Appendix D)
- ▶ *Ozothamnus eriocephalus* (vulnerable under the NCA and EPBC Act) – recorded in rocky sclerophyll woodland/open forest from within the vicinity of the study area previously (TSSC 2008aas; also Herbrecs records - see Appendix D)
- ▶ *Paspalidium scabrifolium* (near threatened under the NCA) – recorded from within the study area in open forest/woodland with a tall shrub layer (Herbrecs records - see Appendix D), and known to occur in brigalow (Sharp and Simon 2002)
- ▶ *Peripleura scabra* (near threatened under the NCA) – occurs in association with narrow-leaved ironbark on rocky landforms, no further inland than Ravenswood (Calvert *et al.* 2005), and recorded from the vicinity of the study area (Herbrecs records - - see Appendix D)
- ▶ *Solanum adenophorum* (endangered under the NCA) – previously recorded from black soils in cleared and remnant patches of gidgee (*Acacia cambagei*) scrub in the vicinity of the study area (Herbrecs records - see Appendix D)
- ▶ *Trioncinia retroflexa* (Belyando cobbler's pegs) (endangered under the NCA) – previously recorded from areas adjacent to the study area (R. Fensham pers. comm. 27 June 2010), and one landowner believes it may be present on his property (in the vicinity of chainage 25, 000)



## Potential Impacts

The major threat to these species from the Project are related to direct removal of populations or parts of populations, permanent removal of suitable habitat area taken up by rail infrastructure, or due to habitat modification, and the introduction of pests or diseases that may result in population declines. In particular, the introduction of parthenium into new areas of grassland adjacent to the project footprint that are subject to heavy grazing pressures has the potential to interrupt breeding cycles for small herbs and rare grasses for many seasons. If this occurs over an entire population (for instance, a patch of Belyando cobbler's pegs isolated from other populations) for enough seasons, the entire population could be permanently extinguished.

## Mitigation Measures

Due to the very large size of the project footprint, it was not possible to survey all areas exhaustively and as a result, populations of these species could be present in areas earmarked for clearing. These species are generally small herbs or grasses, and most are not identifiable (or do not have a presence above ground) during the dry season. Therefore, surveys for these species within the construction area must occur prior to any clearing in a suitable season (late wet season, depending on access issues). Once the location and size of populations is determined, appropriate management strategies relating to clearing, removal or relocation of each species can be developed (most likely into a species-specific management plan, or an overall management plan for populations of conservation significant species). Mitigation measures are expected to include:

- ▶ Avoidance of impacts wherever possible through:
  - Carefully mapping and clearly marking on the ground the locations of populations of species of conservation significance
  - Relocation of infrastructure wherever possible to avoid such populations and individuals
  - Restricting access to ground within the drip line of any tree or shrub belonging to a species of conservation significance that is located next to impact areas, by erecting temporary fencing, and through signage
- ▶ Minimising impacts on populations by:
  - Clearly marking as no-go areas the boundaries of individual populations of small plants, and flagging trees and shrubs
  - Conducting clearing only in accordance with a Species or Population Management Plan (which will be approved by DERM under the clearing permit requirement) and under the supervision of a suitably briefed ecologist (to ensure clearing does not occur except where approved)
  - Stockpiling top soil and vegetative material (which can contain seeds) from within conservation significant populations that are to be cleared, for redistribution in offset areas (where feasible) or in areas of similar habitat and soil type adjacent to the project footprint (with approval of the relevant landowner)
  - Collecting seeds from black ironbox trees and where feasible, other species of conservation significance that may occur within the project footprint prior to removal, for redistribution in adjacent areas, to be added to the seed stock of a suitable conservation group, or to supplement rehabilitation efforts in approved offset areas

- Raising seed stock in nurseries and re-establishing populations, either on site where possible or elsewhere, ideally at a ratio of at least 5:1 (five times the number removed), to allow for loss of saplings
- Transplanting conservation significant species where it is not possible to avoid impacts, for translocation to a suitable site elsewhere (ideally, an offset area, but otherwise areas of suitable adjacent habitat)
- Offsetting in accordance with DERM policies and clearing permit conditions

### 5.5.2 Fauna

Five conservation significant fauna species were recorded from field surveys within the study area. These include the EPBC and NCA listed *Geophaps scripta scripta* (squatter pigeon) *Denisonia maculata* (ornamental snake) and NCA listed *Nettapus coromandelianus* (cotton pygmy-goose), *Chalinolobus picatus* (little pied bat) and *Taphozousroughtoni* (Troughton's sheathtail bat).

**Note:** *Geophaps scripta scripta* (squatter pigeon) and *Denisonia maculata* (ornamental snake) were recorded during the February 2011 survey of two properties (south of Collinville) not assessed during the EIS due to access constraints – refer to Appendix G.

An additional eighteen conservation significant fauna species may occur as suitable habitat may exist within the study area. These include the EPBC and NCA listed *Erythrotriorchis radiatus* (red goshawk), *Egernia rugosa* (yakka skink), *Paradelma orientalis* (brigalow scaly-foot), *Furina dunmalli* (Dunmall's snake), *Rostratula australis* (Australian painted snipe), *Poephila cincta cincta* (black-throated finch (southern)), EPBC listed *Dasyurus hallucatus* (northern quoll) and NCA listed *Ephippiorhynchus asiaticus* (black-necked stork), *Falco hypoleucus* (grey falcon), *Grantiella picta* (painted honeyeater), *Lophoictinia isura* (square-tailed kite), *Melithreptus gularis* (black-chinned honeyeater), *Tadorna radjah* (radjah shelduck), *Acanthophis antarcticus* (common death adder), *Anomalopus brevirostris* (short-necked worm-skink), *Ctenotus capricorni* (capricorn ctenotus) and *Crocodylus porosus* (estuarine crocodile). Twenty six EPBC listed marine and/or migratory bird species have been recorded within the study area.

Conservation significant species are also subject to the impacts described for native fauna species in sections 5.2 and 5.4 of this report. Potential specific impacts relating to conservation significant fauna species recorded from the study area are listed below:

#### ***Geophaps scripta scripta* (squatter pigeon)**

*Geophaps scripta* var. *scripta* is listed as 'vulnerable' under the NCA 1992 and the EPBC Act 1999. This species was observed during survey work. The species spends much of the time on the ground where it nests and forages. *Geophaps scripta scripta* (squatter pigeon) is known to freeze in its position when danger approaches. For this reason individuals may be susceptible to direct mortality. The bird has been seen feeding besides railway lines and roadsides. In Queensland, much of the pigeon's original habitat has been planted to pasture grass for cattle. This has led to a decrease in the abundance of natural food source, however improved pastures are possibly an important source of food especially when at least a few scattered trees are found nearby (Higgins and Davies 1996).

Threats to the squatter pigeon in the study area include:

- ▶ Potential direct mortality of a small number of individuals as this ground-dwelling species is known to remain still on the ground when danger approaches and is therefore susceptible to mortality from vehicle strike for example
- ▶ Reduced movement within remaining habitats bisected by the rail alignment
- ▶ Indirect impacts on this species as a result of habitat displacement from vegetation clearing include:
  - Competition for grasses from introduced herbivores
  - Predation by feral pests (cats and foxes)
  - Loss of preferred riparian habitats through stock grazing and clearing

Given the species' regional abundance and abundance of available habitat within the region, the Project is considered to have a negligible impact on local populations of the species. The incidence of direct mortality will also be reduced by implementing the mitigation measures outlined in section 0.

#### ***Nettapus coromandelianus* (cotton pygmy goose)**

This species was observed during survey work at one location in the dry season (Star of Hope Dam).

Threats to the cotton pygmy goose in the study area include:

- ▶ Potential loss and degradation of permanent water sources, such as farm dams, that provide habitat and feeding resources particularly when water resources are limited during the dry season
- ▶ This impact is considered negligible given the small number of permanent water sources likely to be removed or altered as a result of the Project's location

#### ***Chalinolobus picatus* (little pied bat)**

This species was detected at both anabat sites during survey work. *Chalinolobus picatus* roosts in caves and trees, favouring hollows in large mature eucalyptus trees as well as fallen dead trees (Churchill 2008).

Threats include:

- ▶ Potential direct mortality of a small number of individuals when clearing occurs. The incidence of direct mortality will also be reduced by implementing the mitigation measures outlined in section 0
- ▶ As a result of habitat displacement from vegetation clearing the species may lose some roosting sites. This is only expected to be a minor disturbance as this bat usually roosts alone and moves roost locations daily (Churchill 2008).



### ***Taphozous troughtoni* (Troughton's sheathtail bat)**

This species was detected during survey work. *Taphozous troughtoni* is cave-dwelling and is generally associated with wet and dry sclerophyll forests, open woodlands and grasslands close to rocky areas and caves (Churchill 2008). *Taphozous troughtoni* is currently listed as endangered under the NCA however recent investigations suggest this species maybe more widespread and common in Queensland than previously recognised (Churchill 2008).

Threats include:

- ▶ Impacts are expected to be minimal as the species doesn't roost in vegetation.

### ***Denisonia maculata* (Ornamental snake)**

The Ornamental snake *Denisonia maculata* is known to inhabit seasonally inundated habitats, especially gilgai landscapes within Brigalow, with deep cracking clay soils. The Ornamental snake is a specialist frog predator. The highest recorded levels of activity occur immediately after summer rainfall events, which create optimum conditions for its favoured frog prey. The project footprint traverses a number of areas that support gilgai soils, however the majority of these areas have been cleared of woody cover (*Acacia harpophylla*), fallen timber and leaf litter. These ground features are important in maintaining soil moisture and thermal conditions, all of which are considered important habitat requirements for invertebrates and this in turn on the diversity and abundance of frogs which feed on them and then in turn on the snakes. These features also are considered important refuge for the snake during drier conditions. It is considered that prior to European settlement the region would have been likely to support good quality habitat for the Ornamental snake. However, given the high level of cattle grazing within the study area and the associated disturbances, much of the region only supports marginal and poorer quality habitat for this species.

Threats to the ornamental snake include:

- ▶ Direct mortality as a result of vegetation clearing within Gilgai habitat areas
- ▶ Habitat fragmentation and restricted movement due to the 'barrier effect' of the rail alignment in habitat areas. The use of the culverts by Ornamental snakes is unknown, but other snake species are known to use such structures.

Provided mitigation measures are implemented the Project is not considered to significantly impact on the Ornamental Snake.

### **Mitigation Measures**

Mitigation measures relevant to fauna species of conservation significance that have been recorded or may occur within the study area include:

- ▶ Minimise the width of the transport corridor within ephemeral creek habitats
- ▶ Construct alternate dry season water resources such as dams where appropriate
- ▶ Ensure a fauna spotter is located on site during all vegetation removal to identify, capture and relocate fauna from within areas of vegetation as they are cleared
- ▶ Develop a Management Plan to monitor potential changes in hydrology and water quality



- ▶ Design to include culverts with an area of dry passage within gilgaiied landscapes to allow uninterrupted surface flows and allow small fauna such as frogs and snakes, especially the Ornamental snake dry passage to cross beneath the rail alignment

### Protected Areas

#### Potential Impacts

No vegetation clearing is required within protected areas for this Project. As three protected areas, Mazeppa National Park, Mount Abbot and the Bowen River Wetlands each occur within five kilometres of the proposed study area indirect impacts such as changes to hydrology, water quality and fauna movement away from the study area and into these protected areas are a likely result. Vegetation clearing for the rail alignment construction and increased vehicular movements as a result of construction nearby to these protected areas will open up new areas to disturbances, such as weeds and pest animals, which may also start to invade the nearby protected areas.

Previously described impacts such as changes to floodplain hydrology and sedimentation and run off may have cumulative downstream impacts on the Bowen River and directly impacts on the 14.5 ha of Caley Valley Wetlands which the rail loop intercepts. Potential impacts could include changes in water quality and quantity. In order to minimise impact the construction phase should occur in the dry season and the rail loop should include culverts to allow water movement. Following mitigation, the residual impact of sedimentation and run-off is expected to be negligible.

#### Mitigation Measures

- ▶ Weed and Pest Management Strategy is to be developed and stringently followed particularly for areas adjacent to protected areas
- ▶ Erosion and Sediment Management Plan is to be developed and stringently followed particularly for areas adjacent to protected areas

### 5.6 Summary of Impacts on Matters of National Environmental Significance

Matters of National Environmental Significance (MNES) are protected under the EPBC Act. The EPBC Act relates to projects that involve or impact upon matters of national environmental significance and addresses Australia's commitments to international environmental law and treaties.

MNES relating to terrestrial ecology are discussed in relation to the Project based on the results of the EPBC Protected Matters Search Tool, desktop review of databases and literature and the results of field assessments. These results indicate that the following terrestrial ecology MNES will be impacted by Project:

- ▶ Threatened ecological communities: three were recorded within the study area – Brigalow (*Acacia harpophylla* dominant and co-dominant), Natural Grasslands of the Central Queensland Highlands and northern Fitzroy Basin, and Semi-evergreen vine thicket of the Brigalow Belt (North and South) and Nandewarr Bioregions
- ▶ Threatened flora species: one EPBC listed species was present within the study area, one EPBC listed species is considered likely to be present, and four EPBC listed species may occur
- ▶ Threatened fauna species: 14 EPBC listed species have the potential to occur



- Migratory species: 26 migratory species protected under the EPBC Act were present within the study area

Impacts and mitigation measures are discussed in detail above, however Table 22 provides a summary of MNES present at the site and the residual impacts. These impacts have been assessed against DEWHA's Significant Impact Guidelines.

**Table 22 Summary of impacts on Matters of National Environmental Significance**

| Name/EPBC Status   | Location   | Likelihood of significant impact | Response against criteria  |
|--|--|----------------------------------|--|
| <b>Australian Heritage places</b>                              |  |                                  |  |
| Mazeppa National Park  | South of chainage 155, 000                                   | Not likely                       | The study area is located 3.2 km from this National Park   |
| Mount Abbot  | South and east of chainage 440, 000 & 460,000                | Not likely                       | The study area is located 4 km from Mount Abbot  |
| <b>Threatened Ecological Communities</b>                       |  |                                  |  |
| Brigalow   | See Table 18   | Likely                           | Restricted to clearing of approx 110 ha. Detailed mapping of brigalow communities meeting the EPBC Act TEC description required so as to quantify impacts in detail. Locally, impacts may be significant to some patches.                          |
| Natural Grasslands   | See Table 18   | Likely                           | Restricted to clearing of approx 108 ha. Detailed mapping of natural grassland communities meeting the EPBC Act TEC description required so as to quantify impacts in detail. Locally, impacts may be significant to some patches.                 |
| Semi Evergreen Vine Thicket                                    | See Table 18   | Possible                         | Restricted to clearing of approx 14 ha. Detailed mapping of semi evergreen vine thicket communities meeting the EPBC Act TEC description required so as to quantify impacts in detail. Locally, impacts may be highly significant to some patches. |
| <b>Threatened Flora</b>  |  |                                  |  |
| <i>Eucalyptus raveretiana</i><br>Black ironbox<br>(vulnerable) | Located at chainage 465150, along both sides of Elliot River | Possible                         | This species is rare but can be locally common, as it is along the banks of the Elliot upstream of the project footprint.  |

| Name/EPBC Status  | Location   | Likelihood of significant impact | Response against criteria  |
|---|--|----------------------------------|--|
|   |  |                                  | Removal of a limited number of individuals to construct a river crossing is highly unlikely to constitute a significant impact to the species or the population on the Elliot River.   |
| <i>Dichanthium queenslandicum</i><br>King bluegrass<br>(vulnerable) | Not located during surveys but likely to occur.<br><br>Known to be present between chainage 285, 000 and 325, 000.<br><br>Predicted to occur south of Eaglefield Creek (chainage 225, 000) | Possible                         | This species is rare but can be locally common, although it is included as among 13 indicator species for the Natural Grassland TEC (TSSQ 2008adq).<br><br>Targeted surveys need to be conducted for this species in all native grassland within clearing areas. If present, this species can be transplanted relatively easily.<br><br>However, with appropriate mitigation measures and offsetting, this Project is unlikely to represent a significant impact to this species.          |
| <i>Croton magneticus</i><br>Magnetic Island croton<br>(vulnerable)  | Not located during surveys but may occur given the presence of suitable habitat.<br><br>May be present in areas of Semi evergreen vine thicket – see Table 18 for locations                | Not likely                       | This species is unlikely to be encountered as the project footprint does not pass through high quality habitat for this species in the coastal areas (where the species has been previously located).<br><br>The area of Semi Evergreen Vine Thicket TEC traversed will be low (~17 ha) and targeted surveys should be conducted for this species.<br><br>With appropriate mitigation measures and offsetting, this Project is unlikely to represent a significant impact to this species. |
| <i>Dichathium setosum</i><br>Bluegrass<br>(vulnerable)              | Not located during surveys but may occur given the presence of suitable habitat.<br><br>May occur in similar locations to <i>D. queenslandicum</i> .                                       | Possible                         | Targeted surveys need to be conducted for this species in all native grassland within clearing areas. If present, this species can be transplanted relatively easily.<br><br>However, with appropriate mitigation measures and offsetting, this Project is unlikely to represent a significant impact  |

| Name/EPBC Status  | Location   | Likelihood of significant impact | Response against criteria   |
|---|--|----------------------------------|---|
| to this species.  |  |                                  |   |
| <i>Ozothamnus eriocephalus</i><br>(vulnerable)                | <p>Not located during surveys but may occur given the presence of suitable habitat.</p> <p>May occur at a number of locations in the northern section of the project footprint section within sclerophyll or vine thicket vegetation on granite or sandstones.</p> | Not likely                       | <p>This species is protected in three National Parks in the region, and is known from five separate locations. Due to the broad range of habitats it occupies, all of which are commonly encountered in the project footprint, targeted surveys would be problematic.</p> <p>A Species Management Plan will be prepared that will outline procedures to be followed if this species is encountered during clearing operations (clearing to be done under the supervision of an ecologist who is acquainted with the details of this relatively conspicuous shrub)</p> |
| <b>Threatened Fauna</b>                                       |  |                                  |   |
|   |  |                                  |   |
| <i>Geophaps scripta scripta</i>                               | Observed at the following fauna survey sites AD1, AD5, AD25, AR3, AR24, AR28, AR29 and during opportunistic searches   | Not likely                       | The species is regionally abundant  |
| Squatter pigeon<br>(vulnerable)                               |  |                                  | This species has abundant habitat throughout the Brigalow Belt bioregion. Loss of habitat is negligible given its abundance in the regional landscape   |
|   |  |                                  | Mortality of individuals may occur but is not likely to impact at the population level. Section 5.3.12 and Section 5.4.1 details mitigation measures to minimise direct mortality in both the construction and operational phase of the Project.  |
| <i>Denisonia maculata</i><br>Ornamental snake<br>(vulnerable) | Observed during opportunistic searches near chainage 355,000   | Not likely                       | Mortality of individuals may occur but is not likely to impact at the population level. Section 5.3.12 and Section 5.4.1 details mitigation measures to minimise direct mortality in both the construction and operational phase of the Project.  |



| Name/EPBC Status   | Location   | Likelihood of significant impact | Response against criteria   |
|--|--|----------------------------------|---|
|  |  |                                  | A localised realignment may be advisable depending on the final realignment. At present a section of DERM Essential Habitat (ornamental snake) is situated within the study area.   |
| <i>Egernia rugosa</i><br>Yakka skink<br>(vulnerable)               | Not located during surveys but likely to occur.                                  | Not likely                       | Field surveys did not confirm the presence of any individuals in the study area. Suitable habitat is present in dry sclerophyll forest and open woodlands surrounding the southern half of the study area. Limited impact on preferred habitat.<br><br>Mortality of individuals may occur but is not likely to impact at the population level. Section 5.3.12 and Section 5.4.1 details mitigation measures to minimise direct mortality in both the construction and operational phase of the Project.   |
| <i>Furina dunmalli</i><br>Dunmall's snake<br>(vulnerable)          | Not located during surveys but may occur given the presence of suitable habitat. | Not likely                       | Field surveys did not confirm the presence of any individuals in the study area. Furthermore the species has not been historically recorded in the region surrounding the study area. However <i>Furina dunmalli</i> is known to inhabit remnant brigalow woodland vegetation. Limited impact on preferred habitat.<br><br>Mortality of individuals may occur but is not likely to impact at the population level. Section 5.3.12 and Section 5.4.1 details mitigation measures to minimise direct mortality in both the construction and operational phase of the Project. |
| <i>Paradelma orientalis</i><br>Brigalow scaly-foot<br>(vulnerable) | Not located during surveys but likely to occur.                                  | Not likely                       | Field surveys did not confirm the presence of any individuals in the study area.<br><br>Section 5.3.12 and Section 5.4.1 details mitigation measures to minimise direct mortality in both the construction and operational  |

| Name/EPBC Status  | Location   | Likelihood of significant impact | Response against criteria   |
|---|--|----------------------------------|---|
| phase of the Project.   |  |                                  |   |
| <i>Dasyurus hallucatus</i><br>Northern quoll<br>(endangered)                                | Not located during surveys but may occur given the presence of suitable habitat. | Not likely                       | Targeted field surveys failed to confirm the presence of any individuals in the study area.<br><i>Dasyurus hallucatus</i> prefers habitats associated rocky woodland vegetation found on hillslopes. This habitat is not likely to be impacted.   |
| <i>Erythrotriorchis radiatus</i><br>Red goshawk<br>(vulnerable)                             | Not located during surveys but may occur given the presence of suitable habitat. | Not likely                       | Field surveys did not confirm the presence of any individuals in the study area.<br>This bird is known to nest in trees taller than 20 m that are generally within one km of water. There is expected to be limited clearing in the vicinity of permanent water bodies.   |
| <i>Poephila cincta cincta</i><br>Black-throated finch – southern subspecies<br>(endangered) | Not located during surveys but may occur given the presence of suitable habitat. | Not likely                       | Targeted field surveys failed to confirm the presence of any individuals in the study area.<br>Furthermore the species has not been historically recorded in the region surrounding the study area, although it is known to occur within the vicinity of Bowen. The alignment intersects predominantly cleared areas in the northern sections of the study area.  |
| 26 marine and/or migratory species  | At a number of locations in the Study Area                                       | Not likely                       | The Caley Valley wetland supports a significant community of marine and migratory wetland birds.<br><br>The Project is unlikely to substantially modify, destroy or isolate important habitat. Apart from Caley Valley few permanent water sources will be affected by the Project.<br><br>The Project is unlikely to result in invasive species becoming established in important habitat for migratory species. |

| Name/EPBC Status | Location | Likelihood of significant impact | Response against criteria   |
|------------------|----------|----------------------------------|---|
|                  |          |                                  | Most species are regionally abundant and an ecologically significant proportion of a species population is unlikely to occur within the study area. |

## 5.7 Legislation

### 5.7.1 Environment Protection and Biodiversity Conservation Act

The EPBC Act is the Commonwealth's principle piece of environmental protection legislation. Under Part 3 of the EPBC Act 1999, a person must not take an action that has or is likely to have a significant impact on a MNES unless that person can rely on an exemption, or obtains an approval from the Commonwealth Minister.

The proposed works were declared to be a controlled action requiring assessment by an EIS. The controlling provisions of the EPBC Act that were determined to be relevant to the Project are:

- ▶ Sections 12 and 15A World Heritage Properties
- ▶ Sections 15B and 15C National Heritage Places
- ▶ Sections 18 and 18A Listed Threatened Species and Communities
- ▶ Sections 20 and 20A Listed Migratory Species

### 5.7.2 Nature Conservation Act

The NCA provides for the conservation of nature through protection of all native plants and animals in Queensland. Actions impacting on protected native flora and fauna are regulated under the NCA.

Accordingly, some or all of the following permits may be required for the Project:

- ▶ Protected Animals Movement Permits (section 88 of the NCA)
- ▶ Protected Plants Clearing Permits (section 89 of the NCA): this permit is required for all species listed under the *Nature Conservation (Wildlife) Regulation 2006* including least concern plants. The *Nature Conservation (Protected Plants) Conservation Plan 2000* (Conservation Plan) outlines how clearing permits, licences and exemptions can be issued to take protected plants.

### 5.7.3 Vegetation Management Act

The VMA regulates the conservation and management of vegetation communities and clearing of vegetation. It provides a framework for identification, description and mapping of REs and remnant vegetation by the Queensland Herbarium as 'endangered', 'of concern' or 'least concern'.

This Project will require the removal of approximately 1538 ha of remnant vegetation. In addition, numerous areas of non-remnant vegetation on road reserves and leasehold land will be cleared. Therefore, an operational works permit to clear native vegetation will be required. To obtain this



permit, the Project will be required to address Part S of the *Regional Vegetation Management Code for the Brigalow Belt and New England Tableland Bioregions – version 2* for clearing in the Brigalow Belt and Part S of the *Regional Vegetation Management Code for Western Bioregions – version 2* for clearing in the Desert Uplands (or whatever the most recent version is at the time of lodgement of the clearing application). DERM are responsible for assessing these applications.

#### **5.7.4 Land Protection (Pest and Stock Route Management) Act**

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

Eight declared pest species were recorded in the study area (see Table 13) and mitigation measures relating to their control have been included in this report (see Sections 5.3.15 and 5.4.4).

#### **5.7.5 Fisheries Act**

All marine plants are protected under Queensland law through provisions of the *Fisheries Act 1994*. The destruction, damage or disturbance of marine plants without prior approval from Queensland Department of Employment, Economic Development and Innovation (DEEDI) is prohibited. Under s.8 of the Fisheries Act, marine plants are plants that usually grow on, or adjacent to, tidal land, whether it is living or dead (with the exception of declared pest plants). Marine plant protection applies irrespective of the tenure (e.g. unallocated state land and all state tenured lands, including private freehold and leasehold lands) of the land on which the plant occurs, the time the plant has been growing at the location, or the degree of or purpose of the disturbance.

Under Section 51 of the Fisheries Act a Disturbance of Marine Plants permit will be required for removal of marine plants. This is discussed in Section 4.4.3.

### **5.8 Offsets**

An Offsets Package for the Project will be developed in consultation with DERM, DEEDI and DEWHA giving consideration to relevant state and Commonwealth policies relating to offsets, as outlined below.

#### **5.8.1 Matters of National Environmental Significance**

The DEWHA released a draft policy statement *Use of environmental offsets under the Environment Protection and Biodiversity Conservation Act 1999* (DEWR 2007) in 2007.

Under this policy, environmental offsets for impacts on MNES may be used to maintain or enhance the health, diversity and productivity of the environment as it relates to those MNES on projects where impacts are not excessive and cannot be adequately managed through avoidance or mitigation. Environmental offsets are assessed on a case-by-case basis, and can include financial support for research relevant to the MNES being targeted, or towards the implementation of a recovery plan for a MNES TEC or species being affected by the project. Alternatively, habitat can be provided and legally protected from future development as an offset.



Offsets are likely to be vital for this project to demonstrate that impacts on MNES are adequately managed. It is important to note that under the Queensland policy, areas of retained vegetation (ie land-based offsets) provided as offsets under the EPBC Act cannot also be used to satisfy state requirements. However, this does not apply to indirect offsets (which are not recognised under the Queensland offsets policy).

### 5.8.2 Regional Ecosystems

Under the applicable clearing codes for the Brigalow Belt and Desert Uplands bioregions (see Section 5.7.3), offsetting will be required to meet a number of performance requirements, including those addressing:

- ▶ Clearing in watercourses
- ▶ The disruption of ecological connectivity
- ▶ Clearing in threshold, of concern and endangered REs
- ▶ Clearing in essential habitat

This Project will require the removal of approximately 111 ha of endangered REs, 104 ha of of concern REs, and 109 ha of least concern Res (Threshold or TEC).

The latest version of Queensland's policy in relation to the provision of offsets under the VMA is the *Policy for vegetation management offsets* (DERM 2009a). This differs from the EPBC Act offset policy in three key areas:

- ▶ Offsets under the Queensland policy can be located on the same property as the impact (in fact, this policy views locating the offset close to the impact as highly desirable, in stark contrast to the Commonwealth policy)
- ▶ The Queensland policy does not recognise indirect offsets (that is, offsets that are not in the form of land with similar vegetation to the vegetation being cleared)
- ▶ The Queensland policy allows developers to prepare and register offsets *in advance*

In addition, the Queensland policy is a more advanced document in its second version, and is tightly prescriptive, whereas the Commonwealth policy is an initial draft that is broadly indicative.

Calculation of the offset will be dependant on a number of factors (the use of offsets to meet the watercourse and connectivity performance requirements in particular is complex), including the quality of the vegetation being cleared and of the vegetation being offered as the offset. In addition, the assessment approach taken by DERM toward solutions to performance requirements such as maintaining ecological connectivity will determine the total area required, and this is impossible to predict in advance.

Therefore, it is not possible to make even a rough estimate of likely total offset requirement with any degree of accuracy at this stage. It should be noted that offsets will only be accepted when all reasonable attempts have been made to avoid clearing or minimise impacts, and that if offsets are required, they will need to be protected from future development by means of a legal document such as a covenant or Nature Refuge agreement.



### 5.8.3 Nature Conservation Act

Clearing of protected plants listed as being conservation significant (that is, near threatened, vulnerable, endangered, extinct in the wild etc.) under the NCA requires a permit. In addition, clearing of protected plants listed as least concern (that is, of no or minimal conservation significance) under the NCA will require a permit unless the clearing occurs on land owned by the proponent (the entity doing the clearing). In order to obtain these permits, it is necessary to demonstrate that impacts have been adequately offset.

To facilitate this requirement, the then Environmental Protection Agency (now DERM) issued the consultation draft *Queensland Government Policy for Biodiversity Offsets* (EPA 2008). In general, where the clearing of species of conservation significance is required, proponents must demonstrate that the conservation outcomes for the species being cleared have been *improved* by the action (that is, a *net gain*). Where least concern species are being cleared, proponents must demonstrate that the conservation outcome for the species involved has not declined (that is, no net loss).

Under the draft biodiversity offsets policy, indirect offsets (that is, assistance in implementing a recovery plan, providing fauna crossings over roads or similar actions, but specifically not cash) are only acceptable in certain instances, and then only in combination with direct offsets (that is, directly replacing the vegetation cleared). An important feature of this policy is the principle of 'additionality', which requires that the offset must provide 'additional protection to environmental values at risk, or additional management actions to improve environmental values'. This means that offsets must be above and beyond actions that are already necessary for the developer, and/or must provide additional protection to values that are at risk.

The implications of this principle are that the offset cannot comprise land already being offered as an action or offset under another obligation (e.g. an area of land rehabilitated as an obligation under another Act cannot be offered as an offset). Or, the offset must extend protection to environmental values that are actually under threat – e.g. protection of intact brigalow vegetation. In parallel with the vegetation management offset policy, the offset must be protected from future development by a legal mechanism such as a covenant or Nature Refuge agreement.

There are two major instances in which this project may be required to obtain permits to clear least concern plants:

- ▶ Where clearing is to occur on government-owned leasehold land, road reserves and other government tenures (if the land is not to be transferred to the proponent)
- ▶ In any instance where the proponent may seek to commence clearing land *before* the tenure has been transferred (ie, before they actually own that land)

### 5.8.4 Marine Plants

Offsets will be required under the *Fisheries Act 1994* to compensate for the clearance of marine plants associated with the REs 11.1.2 and 11.1.4. Offsets for marine plant removal can take a variety of forms including financial contribution towards research. Proposed offsets will be provided in an offset plan.



## 6. Risk Assessment

An impact and risk assessment was undertaken to assess the risk of the proposed Project on the terrestrial environment. Environmental risks associated with Project construction and operation were identified and classified into one of four risk categories (High, Medium, Low and Very Low). These classifications allowed priorities to be set for addressing and mitigating environmental risks. The risk assessment process is outlined in detail below.

### Stage 1: Identification of Risk

This included identification of all relevant risks, addresses all known activities and related environmental aspects of the Project.

### Stage 2: Risk Analysis

An analysis of each risk was undertaken to determine the likelihood of occurrence and its consequences. A qualitative description of the likelihood and consequences for each risk enabled a semi-quantitative method to be used to calculate a 'score' for each risk.

Definitions and scales for consequence and likelihood ratings are shown in Table 23 and Table 24 while the risk assessment matrix is described in Table 25.

**Table 23 Consequence Rating**

| Consequence | Rating | Description   |
|-------------|--------|---|
| Nil         | 0      | No impact   |
| Minor       | 1      | Minor temporary environmental damage or disturbance                                   |
| Moderate    | 2      | Minor permanent environmental damage or disturbance                                   |
| Significant | 3      | Reduction in habitat range/breeding success/abundance                                 |
| Major       | 4      | Significant loss of community or habitat potentially leading to the loss of a species |
| Critical    | 5      | Total loss of a species or ecosystem  |

**Table 24 Likelihood Rating**

| Likelihood | Rating | Likelihood Calculator   |
|------------|--------|---|
| Rare       | 1      | The risk may occur only in exceptional circumstances (The risk is not likely to occur in the next 25 years) |
| Unlikely   | 2      | The risk could occur at some time (The risk is likely to occur once in the next 5-25 years)                 |
| Possible   | 3      | The risk might occur at some time (This risk is likely to occur in the next 2-5 years)                      |



| Likelihood     | Rating | Likelihood Calculator   |
|----------------|--------|---|
| Likely         | 4      | The risk will probably occur in most circumstances (The risk is likely to occur in 1-2 years)               |
| Almost Certain | 5      | The risk is expected to occur in most circumstances (The risk is likely to occur within the next 12 months) |

**Table 25 Risk Assessment Matrix**

| Likelihood         | Consequence  |           |                 |              |           |          |
|--------------------|--------------|-----------|-----------------|--------------|-----------|----------|
|                    | Critical (5) | Major (4) | Significant (3) | Moderate (2) | Minor (1) | Nil (0)  |
| Almost Certain (5) | High         | High      | High            | Medium       | Medium    | Very Low |
| Likely (4)         | High         | High      | Medium          | Medium       | Low       | Very Low |
| Possible (3)       | High         | Medium    | Medium          | Low          | Low       | Very Low |
| Unlikely (2)       | Medium       | Medium    | Low             | Low          | Very Low  | Very Low |
| Rare (1)           | Medium       | Low       | Low             | Very Low     | Very Low  | Very Low |

### Stage 3: Calculation of Risk Level

Two levels of risk were used:

The **Primary Risk Level** is a conservative measure of risk, based on the most severe consequences across all the relevant criteria. Primary Risk Level was calculated according to the equation:

$$\text{Primary Risk Level} = \text{Likelihood Rating} \times \text{Maximum Consequence Rating}$$

The **Residual Risk Level** is a measure of the remaining risk, once mitigation and control measures have been implemented. Residual Risk Level was calculated according to the equation:

$$\text{Residual Risk Level} = (\text{Likelihood Rating} \times \text{Maximum Consequence Rating}) - \text{mitigation measures}$$

### Stage 4: Determination of Options for Treatment of Risks

Following the analysis of a risk, options available for risk treatment were investigated and the option or options that provide the greatest cost benefit determined.

Risks were treated in one or a combination of ways:

- ▶ Avoiding a risk by preventing the activity that leads to the risk eventuating
- ▶ Reducing the likelihood of the risk eventuating
- ▶ Reducing the consequences if the risk does eventuate
- ▶ Transfer the risk
- ▶ Retaining the risk.



### **Stage 5: Applying the Process to Expected Impacts**

Table 26 adopts the process described above to provide an assessment of ecological risk for the Project. Six construction impacts were considered to have high risk prior to mitigation (vegetation clearing, direct mortality of wildlife, habitat degradation from light, noise and vibration pollution, dust, introduced species and indirect habitat degradation). Following implementation of mitigation measures vegetation clearing was still a high risk while all other impacts were considered a medium risk.

Four operational impacts were considered to have high risk prior to mitigation (habitat degradation from light, noise and vibration pollution, dust, introduced species and indirect habitat degradation). Following implementation of mitigation measures, all impacts were reduced to a medium risk or lower (Table 26).



**Table 26** Risk assessment for terrestrial ecological values

| Activity   | Expected impact   | Preliminary Risk Level (L,C) score | Mitigation measures   | Residual Risk Level (L, C) score |
|--|---|------------------------------------|---|----------------------------------|
| <b>Construction Phase</b>                        |   |                                    |   |                                  |
| Vegetation Clearing                              | Permanent loss of vegetation.<br>Loss of habitat<br>Approx. 3, 000 ha of native vegetation will be cleared.             | 5, 4<br><br>High                   | ► Minimise project footprint<br>► Realign Project away from important vegetation and habitat.<br>► Ensure only project footprint is cleared.<br>► Offset vegetation clearing. | 5, 3<br><br>High                 |
| Mortality of Terrestrial Fauna                   | Construction activities have the potential to cause direct mortality of common and threatened fauna.                    | 5, 3<br><br>High                   | ► Fauna spotters located on site prior and during clearing.<br>► Translocation plan for fauna.<br>► Erect temporary fencing.<br>► Enforcing on-site speed limits              | 4, 3<br><br>Medium               |
| Habitat Degradation – light, noise and vibration | Light, noise and vibration disturbance has the potential to disrupt breeding, nesting and foraging activities of fauna. | 5, 3<br><br>High                   | ► Limit lighting near sensitive areas.<br>► Employ directional lighting with protective guards where practical.   | 4, 3<br><br>Medium               |
| Dust   | Dust contamination of air and water surface   | 5, 3<br><br>High                   | ► Haul roads must be watered regularly to hold dust down.<br>► Restrict speed limits to reduce dust generation.   | 4, 3<br><br>Medium               |



| <b>Activity</b>                                  | <b>Expected impact</b>  | <b>Preliminary Risk Level (L,C) score</b> | <b>Mitigation measures</b>  | <b>Residual Risk Level (L, C) score</b> |
|--|---|---|---|---|
| Introduced species                               | Disturbance in the study area may increase abundance of weed and pest species. Increased impact of these introduced species on native species and ecosystems. | 5, 4<br>High                              | <ul style="list-style-type: none"> <li>▶ Develop a Weed and Pest Management Plan. This includes vehicle wash down stations.</li> <li>▶ Weed free certification for vehicles entering the site.</li> </ul> | 3, 4<br>Medium                          |
| Fire Hazards                                     | Changes to local fire regimes   | 3, 3<br>Medium                            | <ul style="list-style-type: none"> <li>▶ Implementation of a Fire Management Plan. Measures include; Onsite preventative measures and fire fighting equipment.</li> </ul>                                 | 2, 3<br>Low                             |
| Indirect Habitat Degradation                     | Restriction of fauna movement.<br>Increased edge effects  | 5, 3<br>High                              | <ul style="list-style-type: none"> <li>▶ Install sediment fences where necessary.</li> <li>▶ Culverts to allow fauna movement under the rail line.</li> </ul>   | 3, 3<br>Medium                          |
| <b>Operational Phase</b>                         |   |   |   |   |
| Mortality of Terrestrial Fauna                   | Construction activities have the potential to cause direct mortality of common and threatened fauna.  | 4, 3<br>Medium                            | <ul style="list-style-type: none"> <li>▶ Fencing to reduce animal access to rail line.</li> <li>▶ Culverts to allow fauna movement under the rail line.</li> </ul>  | 3, 3<br>Medium                          |
| Habitat degradation – light, noise and vibration | Light, noise and vibration disturbance from train operation has the potential to disrupt breeding, nesting and foraging activities of fauna.                  | 5, 3<br>High                              | <ul style="list-style-type: none"> <li>▶ Limit permanent operational lighting near sensitive areas (i.e. road crossings).</li> </ul>  | 4, 3<br>Medium                          |
| Dust   | Dust contamination of air and water surface   | 5, 3<br>High                              | <ul style="list-style-type: none"> <li>▶ Adopt QR, Coal Dust Management Plan.</li> <li>▶ Train carriage design</li> </ul>   | 4, 3<br>Medium                          |



| Activity                     | Expected impact   | Preliminary Risk Level (L,C) score | Mitigation measures  | Residual Risk Level (L, C) score |
|------------------------------|---|------------------------------------|--|----------------------------------|
| Introduced species           | Disturbance in the study area may increase abundance of weed and pest species. Increased impact of these introduced species on native species and ecosystems. | 5, 4<br>High                       | ► Develop a Weed and Pest Management Plan. This includes vehicle wash down stations.                   | 3, 4<br>Medium                   |
| Fire Hazards                 | Changes to local fire regimes   | 3, 3<br>Medium                     | ► Implementation of a Fire Management Plan<br>► Implementation of above mentioned Weed Management Plan | 2, 3<br>Low                      |
| Indirect Habitat Degradation | Restriction of fauna movement.<br>Sedimentation and Run-off<br>Changes to Floodplain Hydrology  | 5, 3<br>High                       | ► Culverts to allow fauna movement under the rail line.  | 3, 3<br>Medium                   |



### Risk Assessment Limitations

As with any model, the relevance and applicability of the risk model revolves around a number of basic assumptions and limitations. The application of the risk model has been based on subjective ranges of consequences and probabilities. Limitations of the application of the risk methodology for this study include:

- ▶ The assessment is based on the professional judgement of a limited number of experienced GHD Environmental staff and does not incorporate the collective experience of all parties involved with the Project. The full range of risks and the most appropriate consequence and likelihood rating would be best completed in a workshop involving key stakeholders, however, discussion with key stakeholders ensued prior to the GHD workshop taking into consideration their views and expectations.
- ▶ The assessment has been limited to a selected number of primary risks and the assessment of cumulative risk to the environment from multiple pollution sources or sources of environmental degradation has not been addressed. Cumulative risks are approached for this study in a qualitatively manner only.

Although a semi-quantitative methodology was used to conduct the risk assessment, the resultant risk estimation is purely relative. The risk estimations do not imply an absolute scale of risk that can be applied to any other situation or assessment.



## 7. Conclusion

This Project involves the construction of a railway between the proposed Alpha mine, approximately 50 km north of Alpha in central Queensland, to the railhead at Abbot Point, just north of Bowen, a distance of approximately 495 km. The proposed rail alignment passes through a range of ecological communities located on generally level to undulating landforms, including 68 REs and 1538 ha of mapped remnant vegetation. It is primarily located within the Brigalow Belt bioregion, entering the Desert Uplands at its most southern extent. Four major Central Queensland river systems are crossed – the Bogie River, the Bowen River, the Suttor River and the Belyando River, all of which are located in the greater Burdekin River catchment.

Surveys for this Project were conducted during three weeks in the dry season and three weeks in the wet season. These surveys were subject to a number of constraints including limited access to properties, and difficulties accessing black soil plains in the wet season. Desktop surveys were conducted initially to detect those species known or predicted to occur in the area, with a focus on species listed as being of conservation significance under State or Commonwealth legislation. Vegetation community mapping in the form of Queensland RE mapping was also prepared. Field surveys were then designed to sample the species diversity in the study area.

Flora diversity was investigated at species and community level using rapid survey methodologies at two levels – secondary surveys centred on quadrat sampling, and quaternary surveys centred on meandering transects and targeted threatened species searches. Surveys targeted at sampling fauna diversity were centred on the establishment of trapping lines within a broad range of habitat types and utilising a range of trapping techniques, with rapid habitat surveys, timed bird transect searches, opportunistic observation and scat and traces searches.

Desktop surveys indicated 12 species of flora and 14 species of fauna currently listed under Queensland or Commonwealth legislation that have been located in the vicinity of the study area previously, or that have a likelihood of occurring in the area based on known requirements and the availability of suitable habitat. Overall, seven species of conservation significance were detected during the field surveys - two plants, two birds and two mammals which includes:

- ▶ *Bonamia dietrichiana* (near threatened under the NCA): a twiner or vine present in very low densities in narrow leaved ironbark woodland with a dense understorey at the foot of Mt Roundback, near Abbot Point
- ▶ Black ironbox (*Eucalyptus raveretiana*) (vulnerable under the NCA and EPBC Act): a dominant component of fringing riverine open forest along the banks of the Elliot River in the far north of the project footprint
- ▶ Squatter pigeon (*Geophaps scripta scripta*) (vulnerable under the NCA and EPBC Act) observed regularly along the entire alignment
- ▶ Ornamental snake (*Denisonia maculata*) (vulnerable under the NCA and EPBC Act) observed at one location within the project footprint
- ▶ Cotton pygmy goose (*Nettapus coromandelianus*) (near threatened under the NCA) observed in a wetland near the centre of the alignment



- ▶ Little pied bat (*Chalinolobus picatus*) (near threatened under the NCA): detected at five locations within the project footprint
- ▶ Troughton's sheathtail bat (*Taphozous troughtoni*) (listed as endangered under the NCA): detected at one location within the project footprint

In addition, one flora species, two birds, three mammals and three reptiles of conservation significance are considered likely to occur based on habitats present, and at least 13 flora species, seven species of bird and four species of reptile of conservation significance may occur. A total of 26 migratory bird species were also found within the study area.

At the community level a total of 15 vegetation alliances were identified in the study area. The area of direct impact (a corridor 60 m wide) encompassed 10 endangered REs comprising approximately 111 ha and 19 of concern REs comprising approximately 104 ha, in addition to 39 REs listed as being least concern (totalling 1322 ha). Of these, 18 REs are listed as components of four threatened ecological communities (TECs) protected under the EPBC Act, all of which are endangered and these include:

- ▶ Brigalow (*Acacia harpophylla* dominant and co-dominant) – constituent REs comprise 110 ha of the project footprint
- ▶ Natural Grasslands of Central Queensland and the northern Fitzroy Basin – constituent REs comprise 108 ha of the project footprint
- ▶ Semi-evergreen vine thicket of the Brigalow Belt (North and South) and Nandewaar bioregions – constituent REs comprise 14 ha of the project footprint

A number of potential impacts were identified for the construction and operational phase of the Project, including:

- ▶ Direct loss of vegetation, habitat and resources as a result of vegetation clearing
- ▶ Direct mortality of fauna
- ▶ Disruption to wildlife behaviour due to light, noise and vibration disturbance
- ▶ Effects of dust
- ▶ Introduction and further spread of exotic weed and pest species
- ▶ Alteration to fire regimes
- ▶ Indirect habitat degradation

Recommendations are made for addressing these impacts, including avoidance of ecologically sensitive areas, offsetting to address loss of habitat and vegetation, substituting plain wire for barbed wire (if possible), pre- and post-construction weed audits, the preparation of Weed Management Plans, installation of wash-down bays in areas of heavy *parthenium* infestation, and the design of fauna-friendly culverts at which animal cross-country movements can be facilitated.

With appropriate mitigation measures and offsets, the overall impacts of the Project can be significantly reduced.



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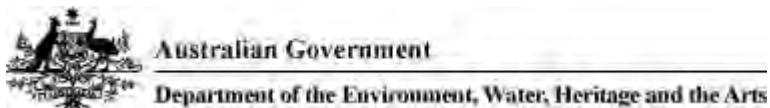
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## Appendix A

# Ecological Desktop Results

- ▶ EPBC Environment Reporting Tool Results
- ▶ Wildlife Online Search Results
- ▶ DEWHA Directory of Important Wetlands - Information Sheet



## Environmental Reporting Tool

You are here: [Environment Home](#) > [ERIN](#) > [ERT](#)

26 November 2009 10:57

## Database Report

This report includes places of national environmental significance that are registered in the Department of the Environment and Water Resources' databases, for the selected area. The information presented here has been provided by a range of groups across Australia, and the accuracy and resolution varies.

**Search Type:** Line

**Buffer:** 5 km

**Coordinates:** -23.1847162,146.5128484, -  
23.1903458,146.5093907, -  
23.1917291,146.5091762, -  
23.1932572,146.5092993, -  
23.2050284,146.5118981, -  
23.2200067,146.518975, -23.170329,146.5249293,  
-23.1180432,146.5941025, -  
23.0696284,146.6389517, -  
22.9225706,146.7412367, -  
22.8420557,146.7411918, -  
22.7838949,146.7596713, -  
22.7187559,146.773842, -  
22.6817019,146.7820098, -  
22.5886105,146.8265975, -  
22.4626218,147.0836079, -  
22.3820239,147.1253401, -  
22.3045777,147.1698036, -  
22.2249616,147.220512, -  
22.1783649,147.2533726, -  
22.1053015,147.3168105, -  
22.0348402,147.3460074, -  
21.9140645,147.4002518, -  
21.8409031,147.426574, -  
21.8081694,147.4832132, -  
21.7930321,147.5048624, -  
21.7689311,147.5530146, -  
21.6761385,147.6082942, -  
21.6079363,147.6496451, -  
21.6060621,147.6506019, -  
21.5344289,147.6725867, -  
21.3108898,147.8403467, -  
21.2639785,147.873863, -21.1977931,147.835767,  
-21.1412987,147.8630564, -  
21.1099805,147.9219464, -  
20.9988781,147.849137, -  
20.9026482,147.8392581, -  
20.7937969,147.7797371, -  
20.7107777,147.7375999, -  
20.5429894,147.6206843, -  
20.4667178,147.5758609, -  
20.4195863,147.5044042, -

20.3328681,147.4593303, -  
 20.2204303,147.5502618, -  
 20.0408668,147.8830459, -  
 20.0225937,147.9061348, -  
 20.0243759,147.9389584, -  
 19.9920382,148.0047912, -19.9726026,148.064536



**Report Contents:** [Summary](#) >> [Details](#) >> [Caveat](#) >> [Acknowledgment](#)

## Biodiversity

|  |      |
|--|------|
| <b><u>Threatened Species:</u></b>                | 20   |
| <b><u>Migratory Species:</u></b>                 | 16   |
| <b><u>Listed Marine Species:</u></b>             | 15   |
| <b><u>Invasive Species:</u></b>                  | 13   |
| <b>Whales and Other Cetaceans:</b>               | None |
| <b><u>Threatened Ecological Communities:</u></b> |      |

## Heritage

|  |      |
|--|------|
| <b><u>World Heritage Properties:</u></b> | None |
| <b><u>Australian Heritage Sites:</u></b> | 2    |

## Wetlands

|   |      |
|---|------|
| <b><u>Ramsar sites:</u></b><br><b>(Internationally important)</b> | None |
| <b><u>Nationally Important Wetlands:</u></b>                      | 2    |



## National Pollutant Inventory

|                                     |      |
|-------------------------------------|------|
| <b><u>Reporting Facilities:</u></b> | 2    |
| <b>Airsheds:</b>                    | None |
| <b>Catchments:</b>                  | None |

## Protected Areas

|  |      |
|--|------|
| <b><u>Reserves and Conservation Areas</u></b> <sup>1</sup> |      |
| <b><u>Regional Forest Agreements:</u></b>                  | None |

This map may contain data which are  
 © Commonwealth of Australia (Geoscience Australia)  
 © PSMA Australia Limited

## Biodiversity

Threatened Species [ [Dataset Information](#) ]      Status      Comments

### Birds

|  |            |  |
|--|------------|--|
| <a href="#"><i>Erythrorhynchus radiatus</i></a><br>Red Goshawk                                     | Vulnerable | Species or species habitat likely to occur within area |
| <a href="#"><i>Geophaps scripta scripta</i></a><br>Squatter Pigeon (southern)                      | Vulnerable | Species or species habitat likely to occur within area |
| <a href="#"><i>Neochmia ruficauda ruficauda</i></a><br>Star Finch (eastern), Star Finch (southern) | Endangered | Species or species habitat likely to occur within area |
| <a href="#"><i>Poephila cincta cincta</i></a><br>Black-throated Finch (southern)                   | Endangered | Species or species habitat likely to occur within area |

|  |            |  |
|--|------------|--|
| <a href="#"><i>Rostratula australis</i></a><br>Australian Painted Snipe            | Vulnerable | Species or species habitat may occur within area       |
| <b>Mammals</b>   |            |  |
| <a href="#"><i>Dasyurus hallucatus</i></a><br>Northern Quoll                       | Endangered | Species or species habitat likely to occur within area |
| <a href="#"><i>Pteropus conspicillatus</i></a><br>Spectacled Flying-fox            | Vulnerable | Species or species habitat may occur within area       |
| <a href="#"><i>Xeromys myoides</i></a><br>Water Mouse, False Water Rat             | Vulnerable | Species or species habitat likely to occur within area |
| <b>Reptiles</b>  |            |  |
| <a href="#"><i>Egernia rugosa</i></a><br>Yakka Skink                               | Vulnerable | Species or species habitat likely to occur within area |
| <a href="#"><i>Furina dummalli</i></a><br>Dunmall's Snake                          | Vulnerable | Species or species habitat may occur within area       |
| <a href="#"><i>Paradelma orientalis</i></a><br>Brigalow Scaly-foot                 | Vulnerable | Species or species habitat likely to occur within area |
| <b>Plants</b>  |            |  |
| <a href="#"><i>Acacia ramiflora</i></a>  | Vulnerable | Species or species habitat may occur within area       |
| <a href="#"><i>Croton magneticus</i></a>   | Vulnerable | Species or species habitat likely to occur within area |
| <a href="#"><i>Cycas ophiolitica</i></a>   | Endangered | Species or species habitat likely to occur within area |
| <a href="#"><i>Dichanthium queenslandicum</i></a><br>King Blue-grass               | Vulnerable | Species or species habitat likely to occur within area |
| <a href="#"><i>Digitaria porrecta</i></a><br>Finger Panic Grass                    | Endangered | Species or species habitat likely to occur within area |
| <a href="#"><i>Eucalyptus raveretiana</i></a><br>Black Ironbox                     | Vulnerable | Species or species habitat likely to occur within area |
| <a href="#"><i>Leucopogon cuspidatus</i></a>                                       | Vulnerable | Species or species habitat likely to occur within area |
| <a href="#"><i>Ozothamnus eriocephalus</i></a>                                     | Vulnerable | Species or species habitat likely to occur within area |
| <a href="#"><i>Taeniophyllum muelleri</i></a><br>Minute Orchid, Ribbon-root Orchid | Vulnerable | Species or species habitat may occur within area       |
| Migratory Species [ <a href="#">Dataset Information</a> ]                          | Status     | Comments   |
| <b>Migratory Terrestrial Species</b>   |            |  |
| <b>Birds</b>   |            |  |
| <a href="#"><i>Haliaeetus leucogaster</i></a><br>White-bellied Sea-Eagle           | Migratory  | Species or species habitat likely to occur within area |
| <a href="#"><i>Hirundapus caudacutus</i></a><br>White-throated Needletail          | Migratory  | Species or species habitat may occur within area       |
| <a href="#"><i>Hirundo rustica</i></a><br>Barn Swallow                             | Migratory  | Species or species habitat may occur within area       |
| <a href="#"><i>Merops ornatus</i></a><br>Rainbow Bee-eater                         | Migratory  | Species or species habitat may occur within area       |

|   |           |  |
|---|-----------|--|
| <a href="#"><i>Monarcha melanopsis</i></a><br>Black-faced Monarch | Migratory | Breeding may occur within area                         |
| <a href="#"><i>Monarcha trivirgatus</i></a><br>Spectacled Monarch | Migratory | Breeding likely to occur within area                   |
| <a href="#"><i>Myiagra cyanoleuca</i></a><br>Satin Flycatcher     | Migratory | Species or species habitat likely to occur within area |

### **Migratory Wetland Species**

#### **Birds**

|   |           |  |
|---|-----------|--|
| <a href="#"><i>Ardea alba</i></a><br>Great Egret, White Egret                               | Migratory | Species or species habitat may occur within area       |
| <a href="#"><i>Ardea ibis</i></a><br>Cattle Egret   | Migratory | Species or species habitat may occur within area       |
| <a href="#"><i>Nettapus coromandelianus albipennis</i></a><br>Australian Cotton Pygmy-goose | Migratory | Species or species habitat may occur within area       |
| <a href="#"><i>Rostratula benghalensis s. lat.</i></a><br>Painted Snipe                     | Migratory | Species or species habitat may occur within area       |
| <a href="#"><i>Tringa stagnatilis</i></a><br>Marsh Sandpiper, Little Greenshank             | Migratory | Species or species habitat likely to occur within area |

#### **Migratory Marine Birds**

|   |           |  |
|---|-----------|--|
| <a href="#"><i>Apus pacificus</i></a><br>Fork-tailed Swift    | Migratory | Species or species habitat may occur within area |
| <a href="#"><i>Ardea alba</i></a><br>Great Egret, White Egret | Migratory | Species or species habitat may occur within area |
| <a href="#"><i>Ardea ibis</i></a><br>Cattle Egret             | Migratory | Species or species habitat may occur within area |

#### **Migratory Marine Species**

#### **Reptiles**

|  |           |  |
|--|-----------|--|
| <a href="#"><i>Crocodylus porosus</i></a><br>Estuarine Crocodile, Salt-water Crocodile | Migratory | Species or species habitat likely to occur within area |
| Listed Marine Species [ <a href="#">Dataset Information</a> ]                          | Status    | Comments   |

#### **Birds**

|   |                              |  |
|---|------------------------------|--|
| <a href="#"><i>Anseranas semipalmata</i></a><br>Magpie Goose              | Listed - overfly marine area | Species or species habitat may occur within area       |
| <a href="#"><i>Apus pacificus</i></a><br>Fork-tailed Swift                | Listed - overfly marine area | Species or species habitat may occur within area       |
| <a href="#"><i>Ardea alba</i></a><br>Great Egret, White Egret             | Listed - overfly marine area | Species or species habitat may occur within area       |
| <a href="#"><i>Ardea ibis</i></a><br>Cattle Egret                         | Listed - overfly marine area | Species or species habitat may occur within area       |
| <a href="#"><i>Haliaeetus leucogaster</i></a><br>White-bellied Sea-Eagle  | Listed                       | Species or species habitat likely to occur within area |
| <a href="#"><i>Hirundapus caudacutus</i></a><br>White-throated Needletail | Listed - overfly marine area | Species or species habitat may occur within area       |
| <a href="#"><i>Hirundo rustica</i></a><br>Barn Swallow                    | Listed - overfly marine area | Species or species habitat may occur within area       |
| <a href="#"><i>Merops ornatus</i></a>                                     | Listed - overfly             | Species or species habitat may                         |

|   |                              |  |
|---|------------------------------|--|
| Rainbow Bee-eater   | marine area                  | occur within area                                      |
| <a href="#"><i>Monarcha melanopsis</i></a>  | Listed - overfly marine area | Breeding may occur within area                         |
| Black-faced Monarch   |                              |  |
| <a href="#"><i>Monarcha trivirgatus</i></a>   | Listed - overfly marine area | Breeding likely to occur within area                   |
| Spectacled Monarch  |                              |  |
| <a href="#"><i>Myiagra cyanoleuca</i></a>   | Listed - overfly marine area | Species or species habitat likely to occur within area |
| Satin Flycatcher  |                              |  |
| <a href="#"><i>Nettapus coromandelianus albipennis</i></a>  | Listed - overfly marine area | Species or species habitat may occur within area       |
| Australian Cotton Pygmy-goose   |                              |  |
| <a href="#"><i>Rostratula benghalensis s. lat.</i></a>  | Listed - overfly marine area | Species or species habitat may occur within area       |
| Painted Snipe   |                              |  |
| <a href="#"><i>Tringa stagnatilis</i></a>   | Listed - overfly marine area | Species or species habitat likely to occur within area |
| Marsh Sandpiper, Little Greenshank  |                              |  |
| <b>Reptiles</b>   |                              |  |
| <a href="#"><i>Crocodylus porosus</i></a>   | Listed                       | Species or species habitat likely to occur within area |
| Estuarine Crocodile, Salt-water Crocodile   |                              |  |
| Invasive Species [ <a href="#">Dataset Information</a> ]  | Status                       | Comments   |
| Selected Invasive Species: Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resources Audit, 2001. |                              |  |
| <b>Frogs</b>  |                              |  |
| <a href="#"><i>Bufo marinus</i></a>   | Feral                        | Species or species habitat likely to occur within area |
| Cane Toad   |                              |  |
| <b>Mammals</b>  |                              |  |
| <a href="#"><i>Capra hircus</i></a>   | Feral                        | Species or species habitat may occur within area       |
| Goat  |                              |  |
| <a href="#"><i>Felis catus</i></a>  | Feral                        | Species or species habitat likely to occur within area |
| Cat, House Cat, Domestic Cat  |                              |  |
| <a href="#"><i>Oryctolagus cuniculus</i></a>  | Feral                        | Species or species habitat likely to occur within area |
| Rabbit, European Rabbit   |                              |  |
| <a href="#"><i>Sus scrofa</i></a>   | Feral                        | Species or species habitat may occur within area       |
| Pig   |                              |  |
| <a href="#"><i>Vulpes vulpes</i></a>  | Feral                        | Species or species habitat may occur within area       |
| Red Fox, Fox  |                              |  |
| <b>Plants</b>   |                              |  |
| <a href="#"><i>Acacia nilotica subsp. <i>indica</i></i></a>   | WoNS                         | Species or species habitat may occur within area       |
| Prickly Acacia  |                              |  |
| <a href="#"><i>Cryptostegia grandiflora</i></a>   | WoNS                         | Species or species habitat likely to occur within area |
| Rubber Vine, Rubbervine, India Rubber Vine, India Rubbervine, Palay Rubbervine, Purple Allamanda  |                              |  |
| <a href="#"><i>Hymenachne amplexicaulis</i></a>   | WoNS                         | Species or species habitat likely to                   |

|   |            |  |
|---|------------|--|
| Hymenachne, Olive Hymenachne, Water Stargrass, West Indian Grass, West Indian Marsh Grass   |            | occur within area                                      |
| <a href="#"><i>Lantana camara</i></a><br>Lantana, Common Lantana, Kamara<br>Lantana, Large-leaf Lantana, Pink Flowered<br>Lantana, Red Flowered Lantana, Red-Flowered Sage, White Sage, Wild Sage | WoNS       | Species or species habitat may occur within area       |
| <a href="#"><i>Parkinsonia aculeata</i></a><br>Parkinsonia, Jerusalem Thorn, Jelly Bean Tree, Horse Bean  | WoNS       | Species or species habitat may occur within area       |
| <a href="#"><i>Parthenium hysterophorus</i></a><br>Parthenium Weed, Bitter Weed, Carrot Grass, False Ragweed  | WoNS       | Species or species habitat likely to occur within area |
| <a href="#"><i>Salvinia molesta</i></a><br>Salvinia, Giant Salvinia, Aquarium Watermoss, Kariba Weed  | WoNS       | Species or species habitat may occur within area       |
| Threatened Ecological Communities<br>[ <a href="#">Dataset Information</a> ]  | Status     | Comments   |
| <a href="#">Brigalow (<i>Acacia harpophylla</i> dominant and co-dominant)</a>   | Endangered | Community known to occur within area                   |
| <a href="#">Natural Grasslands of the Queensland Central Highlands and the northern Fitzroy Basin</a>   | Endangered | Community likely to occur within area                  |
| <a href="#">Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions</a>   | Endangered | Community likely to occur within area                  |
| <a href="#">Weeping Myall Woodlands</a>   | Endangered | Community likely to occur within area                  |

## Heritage

Australian Heritage Sites [ [Dataset Information](#) ]  
Note that not all Indigenous sites may be listed.

## Natural

[Mazeppa National Park QLD](#)

[Mount Abbot QLD](#)

## Wetlands

Nationally Important Wetland Sites [ [Dataset Information](#) ]

[Abbot Point - Caley Valley, QLD](#)

[Bowen River: Birralee - Pelican Creek, QLD](#)

## National Pollutant Inventory

Reporting Facility [ [Dataset Information](#) ]      Top Substance Source

Substance emissions are ranked on a scale of 1-100: 1=lowest; 100=highest. Rankings are shown as: =0-25; =26-50; =51-75; =76-100.

|   |   |   |
|---|---|---|
| <a href="#">Orica Australia ( Newlands Plant - Orica Mining Services, Glenden QLD )</a> | Total Volatile Organic Compounds<br>[ Low ] | Dangerous goods (DG) storage depot for storage of Ammonium Nitrate (AN), Ammonium Nitrate Emulsion (ANE) and diesel to support bulk explosive delivery to |
|---|---|---|

|   |   |             |
|---|---|-------------|
|   |   | mine        |
| <a href="#">QFCO Pty Ltd ( KR Fisher, Delta QLD )</a> | Ammonia<br>(total)<br> [ Low ] | Pig Farming |
| Other   |   |             |

Reserves and Conservation Areas [ [Dataset Information](#) ]

Mazeppa National Park, QLD

## Caveat

The information presented here has been drawn from a range of sources, compiled for a variety of purposes. Details of the coverage of each dataset are included in the metadata [Dataset Information] links above.

## Acknowledgment

This database has been compiled from a range of data sources. The Department acknowledges the following custodians who have contributed valuable data and advice:

- | [New South Wales National Parks and Wildlife Service](#)
- | [Department of Sustainability and Environment, Victoria](#)
- | [Department of Primary Industries, Water and Environment, Tasmania](#)
- | [Department of Environment and Heritage, South Australia Planning SA](#)
- | [Parks and Wildlife Commission of the Northern Territory](#)
- | [Environmental Protection Agency, Queensland](#)
- | [Birds Australia](#)
- | [Australian Bird and Bat Banding Scheme](#)
- | [Australian National Wildlife Collection](#)
- | Natural history museums of Australia
- | [Queensland Herbarium](#)
- | [National Herbarium of NSW](#)
- | [Royal Botanic Gardens and National Herbarium of Victoria](#)
- | [Tasmanian Herbarium](#)
- | [State Herbarium of South Australia](#)
- | [Northern Territory Herbarium](#)
- | [Western Australian Herbarium](#)
- | [Australian National Herbarium, Atherton and Canberra](#)
- | [University of New England](#)
- | Other groups and individuals

[ANUCLIM Version 1.8, Centre for Resource and Environmental Studies, Australian National University](#) was used extensively for the production of draft maps of species distribution. The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Vascular flora species returned from Wildlife Online search (for all 3 areas combined).

| Kingdom | Class    | Family           | Scientific Name  | Common Name         | I | Q | A | Sighting Records | Specimen Records |
|---------|----------|------------------|--|---------------------|---|---|---|------------------|------------------|
| plants  | conifers | Araucariaceae    | <i>Araucaria cunninghamii</i> var. <i>cunninghamii</i> |                     | C |   |   | 1                | 3                |
| plants  | conifers | Cupressaceae     | <i>Callitris columellaris</i>                          |                     | C |   |   | 1                | 1                |
| plants  | conifers | Cupressaceae     | <i>Callitris glauophylla</i>                           | white cypress pine  | C |   |   | 3                | 2                |
| plants  | cycads   | Zamiaceae        | <i>Macrozamia moorei</i>                               |                     | C |   |   | 3                | 1                |
| plants  | ferns    | Adiantaceae      | <i>Adiantum aethiopicum</i>                            |                     | C |   |   | 2                | 1                |
| plants  | ferns    | Adiantaceae      | <i>Adiantum atroviride</i>                             |                     | C |   |   | 1                | 2                |
| plants  | ferns    | Adiantaceae      | <i>Adiantum hispidulum</i>                             |                     | C |   |   | 1                | 1                |
| plants  | ferns    | Adiantaceae      | <i>Adiantum hispidulum</i> var. <i>hispidulum</i>      |                     | C |   |   | 3                | 0                |
| plants  | ferns    | Adiantaceae      | <i>Adiantum hispidulum</i> var. <i>hypoglaucum</i>     |                     | C |   |   | 1                | 1                |
| plants  | ferns    | Adiantaceae      | <i>Adiantum hispidulum</i> var. <i>minus</i>           |                     | C |   |   | 2                | 0                |
| plants  | ferns    | Dryopteridaceae  | <i>Arachniodes aristata</i>                            | prickly shield fern | C |   |   | 2                | 7                |
| plants  | ferns    | Nephrolepidaceae | <i>Arthropteris tenella</i>                            | climbing fern       | C |   |   | 2                | 4                |
| plants  | ferns    | Aspleniaceae     | <i>Asplenium australasicum</i>                         |                     | C |   |   | 2                | 1                |
| plants  | ferns    | Aspleniaceae     | <i>Asplenium paleaceum</i>                             | scaly asplenium     | C |   |   | 1                | 1                |
| plants  | ferns    | Aspleniaceae     | <i>Asplenium polyodon</i>                              | mare's tail fern    | C |   |   | 2                | 3                |
| plants  | ferns    | Blechnaceae      | <i>Blechnum cartilagineum</i>                          | gristle fern        | C |   |   | 1                | 5                |
| plants  | ferns    | Adiantaceae      | <i>Cheilanthes brownii</i>                             |                     | C |   |   | 1                | 1                |
| plants  | ferns    | Adiantaceae      | <i>Cheilanthes brownii</i>                             |                     | C |   |   | 2                | 1                |
| plants  | ferns    | Adiantaceae      | <i>Cheilanthes nitida</i>                              |                     | C |   |   | 1                | 1                |
| plants  | ferns    | Adiantaceae      | <i>Cheilanthes nudiuscula</i>                          |                     | C |   |   | 3                | 0                |
| plants  | ferns    | Adiantaceae      | <i>Cheilanthes sieberi</i>                             |                     | C |   |   | 17               | 3                |
| plants  | ferns    | Adiantaceae      | <i>Cheilanthes sieberi</i> subsp. <i>sieberi</i>       |                     | C |   |   | 3                | 0                |
| plants  | ferns    | Cyatheaceae      | <i>Cyathea cooperi</i>                                 |                     | C |   |   | 1                | 3                |
| plants  | ferns    | Davalliaceae     | <i>Davallia denticulata</i> var. <i>denticulata</i>    |                     | C |   |   | 1                | 2                |
| plants  | ferns    | Davalliaceae     | <i>Davallia pyxidata</i>                               |                     | C |   |   | 3                | 1                |
| plants  | ferns    | Blechnaceae      | <i>Doodia aspera</i>                                   | prickly rasp fern   | C |   |   | 1                | 0                |
| plants  | ferns    | Blechnaceae      | <i>Doodia caudata</i>                                  |                     | C |   |   | 2                | 1                |
| plants  | ferns    | Blechnaceae      | <i>Doodia media</i>                                    |                     | C |   |   | 1                | 1                |
| plants  | ferns    | Polypodiaceae    | <i>Drynaria rigidula</i>                               |                     | C |   |   | 1                | 0                |
| plants  | ferns    | Grammitidaceae   | <i>Grammitis stenophylla</i>                           |                     | C |   |   | 1                | 0                |
| plants  | ferns    | Dryopteridaceae  | <i>Lastreopsis tenera</i>                              |                     | C |   |   | 5                | 1                |
| plants  | ferns    | Thelypteridaceae | <i>Macrothelypteris torresiana</i>                     | pale wood fern      | C |   |   | 1                | 1                |
| plants  | ferns    | Marsileaceae     | <i>Marsilea hirsuta</i>                                | hairy nardoo        | C |   |   | 4                | 2                |

|        |               |                  |   |                      |   |    |   |
|--------|---------------|------------------|---|----------------------|---|----|---|
| plants | ferns         | Marsileaceae     | <i>Marsilea mutica</i>                              | shiny nardoo         | C | 1  | 0 |
| plants | ferns         | Nephrolepidaceae | <i>Nephrolepis hirsutula</i>                        |                      | C | 1  | 1 |
| plants | ferns         | Adiantaceae      | <i>Paraceterach muelleri</i>                        |                      | C | 1  | 2 |
| plants | ferns         | Adiantaceae      | <i>Pellaea nana</i>                                 |                      | C | 1  | 1 |
| plants | ferns         | Polypodiaceae    | <i>Platycerium bifurcatum</i>                       |                      | C | 2  | 1 |
| plants | ferns         | Polypodiaceae    | <i>Platycerium veitchii</i>                         | silver elkhorn       | C | 2  | 1 |
| plants | ferns         | Polypodiaceae    | <i>Pyrrosia confluens</i> var. <i>confluens</i>     |                      | C | 2  | 1 |
| plants | higher dicots | Malvaceae        | <i>Abelmoschus ficulneus</i>                        | native rosella       | C | 2  | 2 |
| plants | higher dicots | Fabaceae         | <i>Abrus precatorius</i> subsp. <i>precatorius</i>  |                      | C | 2  | 1 |
| plants | higher dicots | Malvaceae        | <i>Abutilon auritum</i>                             | Chinese lantern      | C | 1  | 0 |
| plants | higher dicots | Malvaceae        | <i>Abutilon calliphylum</i>                         | velvet lanternflower | C | 1  | 1 |
| plants | higher dicots | Malvaceae        | <i>Abutilon cunninghamii</i>                        |                      | C | 1  | 4 |
| plants | higher dicots | Malvaceae        | <i>Abutilon fraseri</i>                             | dwarf lantern flower | C | 3  | 1 |
| plants | higher dicots | Malvaceae        | <i>Abutilon fraseri</i> subsp. <i>fraseri</i>       |                      | C | 7  | 2 |
| plants | higher dicots | Malvaceae        | <i>Abutilon guineense</i>                           |                      | C | 4  | 4 |
| plants | higher dicots | Malvaceae        | <i>Abutilon hannii</i>                              |                      | C | 1  | 0 |
| plants | higher dicots | Malvaceae        | <i>Abutilon leucopetalum</i>                        |                      | C | 1  | 1 |
| plants | higher dicots | Malvaceae        | <i>Abutilon malvifolium</i>                         | bastard marshmallow  | C | 4  | 2 |
| plants | higher dicots | Malvaceae        | <i>Abutilon micropetalum</i>                        |                      | C | 6  | 2 |
| plants | higher dicots | Malvaceae        | <i>Abutilon nobile</i>                              |                      | C | 2  | 0 |
| plants | higher dicots | Malvaceae        | <i>Abutilon otocarpum</i>                           |                      | C | 1  | 1 |
| plants | higher dicots | Malvaceae        | <i>Abutilon oxycarpum</i>                           |                      | C | 16 | 0 |
| plants | higher dicots | Malvaceae        | <i>Abutilon oxycarpum</i> var. <i>oxycarpum</i>     |                      | C | 2  | 1 |
| plants | higher dicots | Malvaceae        | <i>Abutilon oxycarpum</i> var. <i>subsagittatum</i> |                      | C | 4  | 0 |
| plants | higher dicots | Malvaceae        | <i>Abutilon subviscosum</i>                         |                      | C | 1  | 0 |
| plants | higher dicots | Mimosaceae       | <i>Acacia abbatiana</i>                             |                      | C | 3  | 1 |
| plants | higher dicots | Mimosaceae       | <i>Acacia amblygona</i>                             | fan-leaf wattle      | C | 7  | 6 |
| plants | higher dicots | Mimosaceae       | <i>Acacia angusta</i>                               |                      | C | 1  | 2 |
| plants | higher dicots | Mimosaceae       | <i>Acacia argyraea</i>                              |                      | C | 1  | 7 |
| plants | higher dicots | Mimosaceae       | <i>Acacia argyrodendron</i>                         |                      | C | 11 | 0 |
| plants | higher dicots | Mimosaceae       | <i>Acacia aulacocarpa</i>                           |                      | C | 1  | 0 |
| plants | higher dicots | Mimosaceae       | <i>Acacia bancroftiorum</i>                         |                      | C | 1  | 1 |
| plants | higher dicots | Mimosaceae       | <i>Acacia bidwillii</i>                             |                      | C | 2  | 2 |
| plants | higher dicots | Mimosaceae       | <i>Acacia blakei</i> subsp. <i>blakei</i>           |                      | C | 1  | 3 |
| plants | higher dicots | Mimosaceae       | <i>Acacia burrowii</i>                              |                      | C | 1  | 0 |
| plants | higher dicots | Mimosaceae       | <i>Acacia cambagei</i>                              | gidgee               | C | 27 | 0 |

|        |               |            |                                     |                    |   |    |   |
|--------|---------------|------------|-------------------------------------|--------------------|---|----|---|
| plants | higher dicots | Mimosaceae | Acacia catenulata                   | bendee             | C | 8  | 0 |
| plants | higher dicots | Mimosaceae | Acacia complanata                   | flatstem wattle    | C | 1  | 1 |
| plants | higher dicots | Mimosaceae | Acacia conferta                     |                    | C | 2  | 5 |
| plants | higher dicots | Mimosaceae | Acacia cowleana                     |                    | C | 1  | 5 |
| plants | higher dicots | Mimosaceae | Acacia crassa                       |                    | C | 1  | 0 |
| plants | higher dicots | Mimosaceae | Acacia crassa subsp. crassa         |                    | C | 1  | 4 |
| plants | higher dicots | Mimosaceae | Acacia crassicarpa                  |                    | C | 1  | 1 |
| plants | higher dicots | Mimosaceae | Acacia decora                       | pretty wattle      | C | 2  | 2 |
| plants | higher dicots | Mimosaceae | Acacia dietrichiana                 |                    | C | 3  | 0 |
| plants | higher dicots | Mimosaceae | Acacia excelsa                      |                    | C | 24 | 0 |
| plants | higher dicots | Mimosaceae | Acacia excelsa subsp. excelsa       |                    | C | 3  | 0 |
| plants | higher dicots | Mimosaceae | Acacia farnesiana                   | mimosa bush        | Y | 8  | 1 |
| plants | higher dicots | Mimosaceae | Acacia fasciculifera                | scaly bark         | C | 4  | 4 |
| plants | higher dicots | Mimosaceae | Acacia flavescens                   | toothed wattle     | C | 5  | 3 |
| plants | higher dicots | Mimosaceae | Acacia fodinalis                    |                    | C | 2  | 0 |
| plants | higher dicots | Mimosaceae | Acacia galiooides                   |                    | C | 6  | 1 |
| plants | higher dicots | Mimosaceae | Acacia glaucocarpa                  | hickory wattle     | C | 2  | 2 |
| plants | higher dicots | Mimosaceae | Acacia gonoclada                    |                    | C | 2  | 2 |
| plants | higher dicots | Mimosaceae | Acacia harpophylla                  | brigalow           | C | 46 | 3 |
| plants | higher dicots | Mimosaceae | Acacia hemsleyi                     |                    | C | 2  | 0 |
| plants | higher dicots | Mimosaceae | Acacia holosericea                  |                    | C | 1  | 2 |
| plants | higher dicots | Mimosaceae | Acacia holosericea var. holosericea |                    | C | 1  | 4 |
| plants | higher dicots | Mimosaceae | Acacia humifusa                     |                    | C | 1  | 2 |
| plants | higher dicots | Mimosaceae | Acacia hyaloneura                   |                    | C | 1  | 3 |
| plants | higher dicots | Mimosaceae | Acacia jackesiana                   |                    | R | 3  | 0 |
| plants | higher dicots | Mimosaceae | Acacia jucunda                      |                    | C | 1  | 1 |
| plants | higher dicots | Mimosaceae | Acacia julifera                     |                    | C | 1  | 0 |
| plants | higher dicots | Mimosaceae | Acacia julifera subsp. curvinervia  |                    | C | 2  | 0 |
| plants | higher dicots | Mimosaceae | Acacia julifera subsp. julifera     |                    | C | 8  | 1 |
| plants | higher dicots | Mimosaceae | Acacia laccata                      |                    | C | 5  | 1 |
| plants | higher dicots | Mimosaceae | Acacia lazaridis                    |                    | C | 10 | 1 |
| plants | higher dicots | Mimosaceae | Acacia leichhardtii                 |                    | C | 1  | 0 |
| plants | higher dicots | Mimosaceae | Acacia leiocalyx                    |                    | C | 1  | 5 |
| plants | higher dicots | Mimosaceae | Acacia leiocalyx subsp. leiocalyx   |                    | C | 1  | 2 |
| plants | higher dicots | Mimosaceae | Acacia leptocarpa                   | north coast wattle | C | 2  | 0 |
| plants | higher dicots | Mimosaceae | Acacia leptostachya                 | Townsville wattle  | C | 10 | 1 |

|        |               |               |                                       |                       |   |    |   |
|--------|---------------|---------------|---------------------------------------|-----------------------|---|----|---|
| plants | higher dicots | Mimosaceae    | Acacia longifolia                     | Sydney golden wattle  | C | 1  | 0 |
| plants | higher dicots | Mimosaceae    | Acacia longispicata                   |                       | C | 1  | 3 |
| plants | higher dicots | Mimosaceae    | Acacia maidenii                       | Maiden's wattle       | C | 2  | 1 |
| plants | higher dicots | Mimosaceae    | Acacia melanoxylon                    | blackwood             | C | 2  | 2 |
| plants | higher dicots | Mimosaceae    | Acacia melleodora                     |                       | C | 8  | 2 |
| plants | higher dicots | Mimosaceae    | Acacia multisiliqua                   |                       | C | 12 | 1 |
| plants | higher dicots | Mimosaceae    | Acacia nesophila                      |                       | C | 1  | 2 |
| plants | higher dicots | Mimosaceae    | Acacia nilotica                       |                       | Y | 2  | 1 |
| plants | higher dicots | Mimosaceae    | Acacia nilotica subsp. indica         | prickly acacia        | Y | 7  | 1 |
| plants | higher dicots | Mimosaceae    | Acacia oraria                         |                       | C | 6  | 1 |
| plants | higher dicots | Mimosaceae    | Acacia orthocarpa                     |                       | C | 4  | 1 |
| plants | higher dicots | Mimosaceae    | Acacia oswaldii                       | miljee                | C | 3  | 1 |
| plants | higher dicots | Mimosaceae    | Acacia pendula                        | myall                 | C | 1  | 4 |
| plants | higher dicots | Mimosaceae    | Acacia platycarpa                     |                       | C | 1  | 1 |
| plants | higher dicots | Mimosaceae    | Acacia ramiflora                      |                       | E | 2  | 0 |
| plants | higher dicots | Mimosaceae    | Acacia rhodoxylon                     | ringy rosewood        | C | 6  | 2 |
| plants | higher dicots | Mimosaceae    | Acacia rhodoxylon x A.shirleyi        |                       | C | 1  | 1 |
| plants | higher dicots | Mimosaceae    | Acacia salicina                       | doolan                | C | 20 | 1 |
| plants | higher dicots | Mimosaceae    | Acacia sericophylla                   |                       | C | 11 | 1 |
| plants | higher dicots | Mimosaceae    | Acacia shirleyi                       | lancewood             | C | 8  | 3 |
| plants | higher dicots | Mimosaceae    | Acacia simsii                         |                       | C | 1  | 2 |
| plants | higher dicots | Mimosaceae    | Acacia sparsiflora                    |                       | C | 2  | 3 |
| plants | higher dicots | Mimosaceae    | Acacia spirorbis subsp. solandri      |                       | C | 2  | 0 |
| plants | higher dicots | Mimosaceae    | Acacia stenophylla                    | belalie               | C | 7  | 1 |
| plants | higher dicots | Mimosaceae    | Acacia stipuligera                    |                       | C | 1  | 2 |
| plants | higher dicots | Mimosaceae    | Acacia tenuissima                     |                       | C | 8  | 1 |
| plants | higher dicots | Mimosaceae    | Acacia tephrina                       |                       | C | 7  | 2 |
| plants | higher dicots | Mimosaceae    | Acacia triptera                       |                       | C | 2  | 0 |
| plants | higher dicots | Mimosaceae    | Acacia umbellata                      |                       | C | 4  | 5 |
| plants | higher dicots | Mimosaceae    | Acacia victoriae                      |                       | C | 2  | 1 |
| plants | higher dicots | Euphorbiaceae | Acalypha eremorum                     | soft acalypha         | C | 5  | 3 |
| plants | higher dicots | Asteraceae    | Acanthospermum hispidum               | star burr             | Y | 1  | 8 |
| plants | higher dicots | Amaranthaceae | Achyranthes aspera                    |                       | C | 8  | 4 |
| plants | higher dicots | Asteraceae    | Acmella grandiflora                   |                       | C | 1  | 1 |
| plants | higher dicots | Asteraceae    | Acmella grandiflora var. brachyglossa |                       | C | 1  | 1 |
| plants | higher dicots | Myrtaceae     | Acmena resa                           | red Eungella satinash | C | 2  | 2 |

|        |               |               |   |                      |   |    |   |
|--------|---------------|---------------|---|----------------------|---|----|---|
| plants | higher dicots | Rutaceae      | <i>Acronychia acronychioides</i>                    |                      | C | 1  | 1 |
| plants | higher dicots | Rutaceae      | <i>Acronychia laevis</i>                            | glossy acronychia    | C | 6  | 2 |
| plants | higher dicots | Apiaceae      | <i>Actinotus gibbonsii</i>                          | dwarf flannel flower | C | 2  | 1 |
| plants | higher dicots | Amaranthaceae | <i>Aerva javanica</i>                               |                      | Y | 1  | 4 |
| plants | higher dicots | Fabaceae      | <i>Aeschynomene brevifolia</i>                      |                      | C | 2  | 2 |
| plants | higher dicots | Fabaceae      | <i>Aeschynomene indica</i>                          | budda pea            | C | 3  | 1 |
| plants | higher dicots | Fabaceae      | <i>Aeschynomene micranthos</i>                      |                      | C | 3  | 0 |
| plants | higher dicots | Asteraceae    | <i>Ageratum conyzoides</i> subsp. <i>conyzoides</i> |                      | Y | 6  | 1 |
| plants | higher dicots | Meliaceae     | <i>Aglaia sapindina</i>                             |                      | C | 1  | 1 |
| plants | higher dicots | Rubiaceae     | <i>Aidia racemosa</i>                               |                      | C | 2  | 0 |
| plants | higher dicots | Lamiaceae     | <i>Ajuga australis</i>                              | Australian bugle     | C | 1  | 3 |
| plants | higher dicots | Mimosaceae    | <i>Albizia lebbeck</i>                              | Indian siris         | C | 1  | 2 |
| plants | higher dicots | Mimosaceae    | <i>Albizia procera</i>                              |                      | C | 1  | 0 |
| plants | higher dicots | Sapindaceae   | <i>Alectryon connatus</i>                           | grey birds-eye       | C | 8  | 0 |
| plants | higher dicots | Sapindaceae   | <i>Alectryon diversifolius</i>                      | scrub boonaree       | C | 12 | 0 |
| plants | higher dicots | Sapindaceae   | <i>Alectryon oleifolius</i>                         |                      | C | 2  | 3 |
| plants | higher dicots | Sapindaceae   | <i>Alectryon oleifolius</i> subsp. <i>elongatus</i> |                      | C | 2  | 1 |
| plants | higher dicots | Sapindaceae   | <i>Alectryon reticulatus</i>                        | wild quince          | C | 1  | 0 |
| plants | higher dicots | Apocynaceae   | <i>Allamanda cathartica</i>                         |                      | Y | 1  | 1 |
| plants | higher dicots | Casuarinaceae | <i>Allocasuarina littoralis</i>                     |                      | C | 1  | 1 |
| plants | higher dicots | Casuarinaceae | <i>Allocasuarina luehmannii</i>                     | bull oak             | C | 8  | 0 |
| plants | higher dicots | Rhamnaceae    | <i>Alphitonia excelsa</i>                           | soap tree            | C | 14 | 3 |
| plants | higher dicots | Rhamnaceae    | <i>Alphitonia pomaderroides</i>                     |                      | C | 1  | 1 |
| plants | higher dicots | Apocynaceae   | <i>Alstonia constricta</i>                          | bitterbark           | C | 8  | 1 |
| plants | higher dicots | Amaranthaceae | <i>Alternanthera denticulata</i>                    | lesser joyweed       | C | 3  | 1 |
| plants | higher dicots | Amaranthaceae | <i>Alternanthera ficoidea</i>                       |                      | Y | 7  | 2 |
| plants | higher dicots | Amaranthaceae | <i>Alternanthera micrantha</i>                      |                      | C | 7  | 0 |
| plants | higher dicots | Amaranthaceae | <i>Alternanthera nana</i>                           | hairy joyweed        | C | 2  | 0 |
| plants | higher dicots | Amaranthaceae | <i>Alternanthera nodiflora</i>                      | joyweed              | C | 13 | 1 |
| plants | higher dicots | Amaranthaceae | <i>Alternanthera pungens</i>                        | khaki weed           | Y | 2  | 0 |
| plants | higher dicots | Fabaceae      | <i>Alysicarpus aurantiacus</i>                      |                      | C | 1  | 4 |
| plants | higher dicots | Fabaceae      | <i>Alysicarpus muelleri</i>                         |                      | C | 3  | 0 |
| plants | higher dicots | Fabaceae      | <i>Alysicarpus ovalifolius</i>                      |                      | Y | 5  | 3 |
| plants | higher dicots | Fabaceae      | <i>Alysicarpus vaginalis</i>                        |                      | Y | 2  | 1 |
| plants | higher dicots | Apocynaceae   | <i>Alyxia ruscifolia</i>                            |                      | C | 9  | 0 |
| plants | higher dicots | Apocynaceae   | <i>Alyxia spicata</i>                               |                      | C | 4  | 4 |

|        |               |                |   |                             |   |    |   |
|--------|---------------|----------------|---|-----------------------------|---|----|---|
| plants | higher dicots | Amaranthaceae  | Amaranthaceae                                     |                             | C | 1  | 3 |
| plants | higher dicots | Amaranthaceae  | <i>Amaranthus cochleitepalus</i>                  |                             | C | 1  | 1 |
| plants | higher dicots | Amaranthaceae  | <i>Amaranthus interruptus</i>                     |                             | C | 4  | 2 |
| plants | higher dicots | Amaranthaceae  | <i>Amaranthus mitchellii</i>                      | Boggabri weed               | C | 1  | 0 |
| plants | higher dicots | Amaranthaceae  | <i>Amaranthus spinosus</i>                        | needle burr                 | Y | 2  | 0 |
| plants | higher dicots | Amaranthaceae  | <i>Amaranthus viridis</i>                         | green amaranth              | Y | 4  | 3 |
| plants | higher dicots | Lythraceae     | <i>Ammannia multiflora</i>                        | jerry-jerry                 | C | 2  | 3 |
| plants | higher dicots | Loranthaceae   | <i>Amyema bifurcata</i>                           |                             | C | 1  | 2 |
| plants | higher dicots | Loranthaceae   | <i>Amyema congener</i> subsp. <i>rotundifolia</i> |                             | C | 4  | 0 |
| plants | higher dicots | Loranthaceae   | <i>Amyema conspicua</i> subsp. <i>conspicua</i>   |                             | C | 2  | 3 |
| plants | higher dicots | Loranthaceae   | <i>Amyema lucasii</i>                             |                             | C | 1  | 0 |
| plants | higher dicots | Loranthaceae   | <i>Amyema maidenii</i>                            |                             | C | 1  | 1 |
| plants | higher dicots | Loranthaceae   | <i>Amyema maidenii</i> subsp. <i>angustifolia</i> |                             | C | 1  | 0 |
| plants | higher dicots | Loranthaceae   | <i>Amyema miquelii</i>                            |                             | C | 1  | 0 |
| plants | higher dicots | Loranthaceae   | <i>Amyema quandang</i>                            |                             | C | 7  | 0 |
| plants | higher dicots | Loranthaceae   | <i>Amyema quandang</i> var. <i>bancroftii</i>     | broad-leaved grey mistletoe | C | 6  | 1 |
| plants | higher dicots | Primulaceae    | <i>Anagallis pumila</i>                           |                             | C | 2  | 2 |
| plants | higher dicots | Myrtaceae      | <i>Angophora floribunda</i>                       | rough-barked apple          | C | 1  | 1 |
| plants | higher dicots | Myrtaceae      | <i>Angophora leiocarpa</i>                        | rusty gum                   | C | 2  | 1 |
| plants | higher dicots | Lamiaceae      | <i>Anisomeles malabarica</i>                      |                             | C | 3  | 1 |
| plants | higher dicots | Santalaceae    | <i>Anthobolus leptomerioides</i>                  |                             | C | 2  | 1 |
| plants | higher dicots | Phyllanthaceae | <i>Antidesma erostre</i>                          |                             | C | 1  | 0 |
| plants | higher dicots | Phyllanthaceae | <i>Antidesma parvifolium</i>                      |                             | C | 2  | 0 |
| plants | higher dicots | Polygonaceae   | <i>Antigonon leptopus</i>                         |                             | Y | 2  | 1 |
| plants | higher dicots | Rubiaceae      | <i>Antirhea putaminosa</i>                        |                             | C | 1  | 1 |
| plants | higher dicots | Fabaceae       | <i>Aphyllodium biarticulatum</i>                  |                             | C | 1  | 0 |
| plants | higher dicots | Capparaceae    | <i>Apophyllum anomalum</i>                        | broom bush                  | C | 23 | 0 |
| plants | higher dicots | Apocynaceae    | <i>Araujia sericifera</i>                         | moth plant                  | Y | 1  | 1 |
| plants | higher dicots | Mimosaceae     | <i>Archidendropsis basaltica</i>                  | red lancewood               | C | 10 | 3 |
| plants | higher dicots | Mimosaceae     | <i>Archidendropsis thozetiana</i>                 |                             | C | 3  | 3 |
| plants | higher dicots | Convolvulaceae | <i>Argyreia nervosa</i>                           |                             | Y | 5  | 1 |
| plants | higher dicots | Sapindaceae    | <i>Arytera divaricata</i>                         | coogera                     | C | 1  | 2 |
| plants | higher dicots | Apocynaceae    | <i>Asclepias curassavica</i>                      | red-head cottonbush         | Y | 2  | 1 |
| plants | higher dicots | Araliaceae     | <i>Astrotricha biddulphiana</i>                   |                             | C | 1  | 1 |
| plants | higher dicots | Araliaceae     | <i>Astrotricha pterocarpa</i>                     |                             | C | 1  | 1 |
| plants | higher dicots | Sapindaceae    | <i>Atalaya calcicola</i>                          |                             | R | 7  | 1 |

|        |               |                  |  |                          |   |    |   |
|--------|---------------|------------------|--|--------------------------|---|----|---|
| plants | higher dicots | Sapindaceae      | <i>Atalaya hemiglaucha</i>                         |                          | C | 31 | 0 |
| plants | higher dicots | Sapindaceae      | <i>Atalaya multiflora</i>                          | broad-leaved whitewood   | C | 1  | 0 |
| plants | higher dicots | Sapindaceae      | <i>Atalaya rigida</i>                              |                          | R | 1  | 1 |
| plants | higher dicots | Sapindaceae      | <i>Atalaya salicifolia</i>                         |                          | C | 1  | 1 |
| plants | higher dicots | Sapindaceae      | <i>Atalaya variifolia</i>                          |                          | C | 1  | 2 |
| plants | higher dicots | Chenopodiaceae   | <i>Atriplex lindleyi</i>                           |                          | C | 1  | 0 |
| plants | higher dicots | Chenopodiaceae   | <i>Atriplex lindleyi</i> subsp. <i>lindleyi</i>    |                          | C | 1  | 0 |
| plants | higher dicots | Chenopodiaceae   | <i>Atriplex muelleri</i>                           | lagoon saltbush          | C | 4  | 0 |
| plants | higher dicots | Chenopodiaceae   | <i>Atriplex spongiosa</i>                          |                          | C | 2  | 1 |
| plants | higher dicots | Pittosporaceae   | <i>Auranticarpa rhombifolia</i>                    |                          | C | 1  | 0 |
| plants | higher dicots | Fabaceae         | <i>Austrosteenisia blackii</i>                     | bloodvine                | C | 1  | 1 |
| plants | higher dicots | Fabaceae         | <i>Austrosteenisia blackii</i> var. <i>blackii</i> |                          | C | 1  | 1 |
| plants | higher dicots | Meliaceae        | <i>Azadirachta indica</i>                          |                          | Y | 2  | 2 |
| plants | higher dicots | Scrophulariaceae | <i>Bacopa floribunda</i>                           |                          | C | 1  | 2 |
| plants | higher dicots | Euphorbiaceae    | <i>Baloghia inophylla</i>                          | scrub bloodwood          | C | 2  | 1 |
| plants | higher dicots | Proteaceae       | <i>Banksia integrifolia</i> subsp. <i>compar</i>   |                          | C | 2  | 0 |
| plants | higher dicots | Lamiaceae        | <i>Basilicum polystachyon</i>                      |                          | C | 1  | 1 |
| plants | higher dicots | Elatinaceae      | <i>Bergia pedicellaris</i>                         |                          | C | 1  | 1 |
| plants | higher dicots | Elatinaceae      | <i>Bergia trimera</i>                              |                          | C | 1  | 0 |
| plants | higher dicots | Euphorbiaceae    | <i>Bertya sharpeana</i>                            | Mt. Coolum bertya        | R | 2  | 1 |
| plants | higher dicots | Asteraceae       | <i>Bidens bipinnata</i>                            | bipinnate beggar's ticks | Y | 1  | 2 |
| plants | higher dicots | Asteraceae       | <i>Bidens pilosa</i>                               |                          | Y | 1  | 1 |
| plants | higher dicots | Bixaceae         | <i>Bixa orellana</i>                               | analto                   | Y | 1  | 1 |
| plants | higher dicots | Asteraceae       | <i>Blumea mollis</i>                               |                          | C | 1  | 3 |
| plants | higher dicots | Asteraceae       | <i>Blumea saxatilis</i>                            |                          | C | 5  | 0 |
| plants | higher dicots | Gesneriaceae     | <i>Boea hygroscopica</i>                           |                          | C | 1  | 3 |
| plants | higher dicots | Nyctaginaceae    | <i>Boerhavia burbidgeana</i>                       |                          | C | 1  | 0 |
| plants | higher dicots | Nyctaginaceae    | <i>Boerhavia dominii</i>                           |                          | C | 3  | 4 |
| plants | higher dicots | Nyctaginaceae    | <i>Boerhavia paludosa</i>                          |                          | C | 5  | 1 |
| plants | higher dicots | Nyctaginaceae    | <i>Boerhavia pubescens</i>                         |                          | C | 3  | 2 |
| plants | higher dicots | Convolvulaceae   | <i>Bonamia dietrichiana</i>                        |                          | R | 2  | 0 |
| plants | higher dicots | Convolvulaceae   | <i>Bonamia media</i>                               |                          | C | 1  | 2 |
| plants | higher dicots | Convolvulaceae   | <i>Bonamia media</i> var. <i>media</i>             |                          | C | 4  | 0 |
| plants | higher dicots | Fabaceae         | <i>Bossiaea brownii</i>                            |                          | C | 1  | 1 |
| plants | higher dicots | Fabaceae         | <i>Bossiaea carinalis</i>                          |                          | C | 2  | 0 |
| plants | higher dicots | Nyctaginaceae    | <i>Bougainvillea glabra</i>                        |                          | Y | 1  | 1 |

|        |               |                  |  |                          |   |    |   |
|--------|---------------|------------------|--|--------------------------|---|----|---|
| plants | higher dicots | Sterculiaceae    | <i>Brachychiton acerifolius</i>                        | flame tree               | C | 1  | 4 |
| plants | higher dicots | Sterculiaceae    | <i>Brachychiton australis</i>                          | broad-leaved bottle tree | C | 2  | 1 |
| plants | higher dicots | Sterculiaceae    | <i>Brachychiton populneus</i> subsp. <i>trilobus</i>   |                          | C | 2  | 1 |
| plants | higher dicots | Sterculiaceae    | <i>Brachychiton rupestris</i>                          |                          | C | 1  | 1 |
| plants | higher dicots | Phyllanthaceae   | <i>Breynia cernua</i>                                  |                          | C | 1  | 0 |
| plants | higher dicots | Phyllanthaceae   | <i>Breynia oblongifolia</i>                            |                          | C | 5  | 0 |
| plants | higher dicots | Phyllanthaceae   | <i>Bridelia leichhardtii</i>                           |                          | C | 1  | 0 |
| plants | higher dicots | Rhizophoraceae   | <i>Bruguiera exaristata</i>                            |                          | C | 1  | 0 |
| plants | higher dicots | Goodeniaceae     | <i>Brunonia australis</i>                              | blue pincushion          | C | 1  | 0 |
| plants | higher dicots | Acanthaceae      | <i>Brunoniella acaulis</i>                             |                          | C | 3  | 1 |
| plants | higher dicots | Acanthaceae      | <i>Brunoniella acaulis</i> subsp. <i>acaulis</i>       |                          | C | 1  | 0 |
| plants | higher dicots | Acanthaceae      | <i>Brunoniella australis</i>                           | blue trumpet             | C | 4  | 1 |
| plants | higher dicots | Crassulaceae     | <i>Bryophyllum daigremontianum</i>                     |                          | Y | 1  | 0 |
| plants | higher dicots | Crassulaceae     | <i>Bryophyllum delagoense</i>                          |                          | Y | 1  | 0 |
| plants | higher dicots | Crassulaceae     | <i>Bryophyllum pinnatum</i>                            | resurrection plant       | Y | 1  | 1 |
| plants | higher dicots | Scrophulariaceae | <i>Buchnera gracilis</i>                               |                          | C | 3  | 0 |
| plants | higher dicots | Scrophulariaceae | <i>Buchnera linearis</i>                               |                          | C | 1  | 3 |
| plants | higher dicots | Pittosporaceae   | <i>Bursaria incana</i>                                 |                          | C | 16 | 0 |
| plants | higher dicots | Pittosporaceae   | <i>Bursaria tenuifolia</i>                             |                          | C | 3  | 1 |
| plants | higher dicots | Caesalpiniaceae  | <i>Caesalpinia gilliesii</i>                           | bird-of-paradise flower  | Y | 1  | 1 |
| plants | higher dicots | Fabaceae         | <i>Cajanus acutifolius</i>                             |                          | C | 1  | 0 |
| plants | higher dicots | Fabaceae         | <i>Cajanus confertiflorus</i>                          |                          | C | 2  | 1 |
| plants | higher dicots | Fabaceae         | <i>Cajanus marmoratus</i>                              |                          | C | 3  | 2 |
| plants | higher dicots | Fabaceae         | <i>Cajanus reticulatus</i> var. <i>reticulatus</i>     |                          | C | 1  | 1 |
| plants | higher dicots | Fabaceae         | <i>Cajanus scarabaeoides</i> var. <i>scarabaeoides</i> |                          | C | 4  | 1 |
| plants | higher dicots | Portulacaceae    | <i>Calandrinia pickeringii</i>                         |                          | C | 2  | 2 |
| plants | higher dicots | Portulacaceae    | <i>Calandrinia uniflora</i>                            |                          | C | 1  | 1 |
| plants | higher dicots | Lamiaceae        | <i>Callicarpa candicans</i>                            |                          | C | 1  | 1 |
| plants | higher dicots | Lamiaceae        | <i>Callicarpa pedunculata</i>                          | velvet leaf              | C | 1  | 1 |
| plants | higher dicots | Clusiaceae       | <i>Calophyllum inophyllum</i>                          | beach calophyllum        | C | 1  | 1 |
| plants | higher dicots | Asteraceae       | <i>Calotis cuneata</i>                                 |                          | C | 6  | 2 |
| plants | higher dicots | Asteraceae       | <i>Calotis cuneifolia</i>                              | burr daisy               | C | 3  | 3 |
| plants | higher dicots | Asteraceae       | <i>Calotis dentex</i>                                  | white burr daisy         | C | 2  | 0 |
| plants | higher dicots | Asteraceae       | <i>Calotis lappulacea</i>                              | yellow burr daisy        | C | 1  | 4 |
| plants | higher dicots | Asteraceae       | <i>Calotis squamigera</i>                              |                          | C | 1  | 1 |
| plants | higher dicots | Asteraceae       | <i>Calotis xanthosioidea</i>                           |                          | C | 1  | 1 |

|        |               |                 |  |                          |   |    |   |
|--------|---------------|-----------------|--|--------------------------|---|----|---|
| plants | higher dicots | Asteraceae      | <i>Calyptocarpus vialis</i>                              | creeping cinderella weed | Y | 4  | 0 |
| plants | higher dicots | Myrtaceae       | <i>Calytrix microcoma</i>                                |                          | C | 1  | 1 |
| plants | higher dicots | Myrtaceae       | <i>Calytrix tetragona</i>                                | fringe myrtle            | C | 1  | 1 |
| plants | higher dicots | Asteraceae      | <i>Camptacra barbata</i>                                 |                          | C | 1  | 0 |
| plants | higher dicots | Asteraceae      | <i>Camptacra gracilis</i>                                |                          | C | 2  | 0 |
| plants | higher dicots | Burseraceae     | <i>Canarium australianum</i> var. <i>australianum</i>    |                          | C | 1  | 0 |
| plants | higher dicots | Fabaceae        | <i>Canavalia papuana</i>                                 | wild jack bean           | C | 2  | 1 |
| plants | higher dicots | Capparaceae     | <i>Capparis arborea</i>                                  | brush caper berry        | C | 2  | 1 |
| plants | higher dicots | Capparaceae     | <i>Capparis canescens</i>                                |                          | C | 12 | 1 |
| plants | higher dicots | Capparaceae     | <i>Capparis lasiantha</i>                                | nipan                    | C | 34 | 0 |
| plants | higher dicots | Capparaceae     | <i>Capparis lanthifolia</i>                              |                          | C | 4  | 2 |
| plants | higher dicots | Capparaceae     | <i>Capparis lanthifolia</i> var. <i>bancroftii</i>       |                          | C | 1  | 1 |
| plants | higher dicots | Capparaceae     | <i>Capparis lanthifolia</i> var. <i>loranthifolia</i>    |                          | C | 1  | 1 |
| plants | higher dicots | Capparaceae     | <i>Capparis lucida</i>                                   |                          | C | 2  | 1 |
| plants | higher dicots | Capparaceae     | <i>Capparis mitchellii</i>                               |                          | C | 5  | 2 |
| plants | higher dicots | Capparaceae     | <i>Capparis ornans</i>                                   |                          | C | 5  | 1 |
| plants | higher dicots | Capparaceae     | <i>Capparis sarmentosa</i>                               | scrambling caper         | C | 1  | 0 |
| plants | higher dicots | Capparaceae     | <i>Capparis sepiaria</i>                                 |                          | C | 4  | 1 |
| plants | higher dicots | Capparaceae     | <i>Capparis shanesiana</i>                               |                          | C | 2  | 1 |
| plants | higher dicots | Capparaceae     | <i>Capparis umbonata</i>                                 |                          | C | 5  | 1 |
| plants | higher dicots | Solanaceae      | <i>Capsicum frutescens</i>                               |                          | Y | 4  | 2 |
| plants | higher dicots | Sapindaceae     | <i>Cardiospermum halicacabum</i> var. <i>halicacabum</i> |                          | Y | 1  | 0 |
| plants | higher dicots | Caricaceae      | <i>Carica papaya</i>                                     | pawpaw                   | Y | 1  | 1 |
| plants | higher dicots | Apocynaceae     | <i>Carissa lanceolata</i>                                |                          | C | 26 | 0 |
| plants | higher dicots | Apocynaceae     | <i>Carissa ovata</i>                                     | currantbush              | C | 44 | 1 |
| plants | higher dicots | Apocynaceae     | <i>Cascabela thevetia</i>                                | yellow oleander          | Y | 6  | 0 |
| plants | higher dicots | Caesalpiniaceae | <i>Cassia brewsteri</i>                                  |                          | C | 7  | 1 |
| plants | higher dicots | Caesalpiniaceae | <i>Cassia fistula</i>                                    | Indian laburnum          | Y | 1  | 0 |
| plants | higher dicots | Caesalpiniaceae | <i>Cassia tomentella</i>                                 |                          | C | 1  | 1 |
| plants | higher dicots | Asteraceae      | <i>Cassinia laevis</i>                                   |                          | C | 4  | 0 |
| plants | higher dicots | Asteraceae      | <i>Cassinia quinquefaria</i>                             |                          | C | 2  | 3 |
| plants | higher dicots | Casuarinaceae   | <i>Casuarina cristata</i>                                | belah                    | C | 3  | 0 |
| plants | higher dicots | Casuarinaceae   | <i>Casuarina cunninghamiana</i>                          |                          | C | 2  | 2 |
| plants | higher dicots | Apocynaceae     | <i>Catharanthus roseus</i>                               | pink periwinkle          | Y | 3  | 2 |
| plants | higher dicots | Vitaceae        | <i>Cayratia clematidea</i>                               | slender grape            | C | 1  | 3 |
| plants | higher dicots | Vitaceae        | <i>Cayratia trifolia</i>                                 |                          | C | 4  | 1 |

|        |               |                 |  |                   |   |   |   |   |   |
|--------|---------------|-----------------|--|-------------------|---|---|---|---|---|
| plants | higher dicots | Amaranthaceae   | <i>Celosia argentea</i>                                  |                   |   | Y |   | 1 | 0 |
| plants | higher dicots | Ulmaceae        | <i>Celtis paniculata</i>                                 | native celtis     | C |   | 1 | 1 |   |
| plants | higher dicots | Asteraceae      | <i>Centaurea melitensis</i>                              | Maltese cockspur  | Y |   | 1 | 0 |   |
| plants | higher dicots | Gentianaceae    | <i>Centaurium spicatum</i>                               | spike centaury    | C |   | 1 | 1 |   |
| plants | higher dicots | Apiaceae        | <i>Centella asiatica</i>                                 |                   | C |   | 2 | 0 |   |
| plants | higher dicots | Asteraceae      | <i>Centipeda minima</i>                                  |                   | C |   | 2 | 2 |   |
| plants | higher dicots | Asteraceae      | <i>Centipeda minima</i> subsp. <i>minima</i>             |                   | C |   | 5 | 1 |   |
| plants | higher dicots | Asteraceae      | <i>Centipeda nidiformis</i>                              |                   | C |   | 1 | 0 |   |
| plants | higher dicots | Asteraceae      | <i>Centipeda racemosa</i>                                | snuffweed         | C |   | 1 | 0 |   |
| plants | higher dicots | Fabaceae        | <i>Centrosema molle</i>                                  |                   | Y |   | 1 | 1 |   |
| plants | higher dicots | Apocynaceae     | <i>Cerbera dumicola</i>                                  |                   | R |   | 3 | 0 |   |
| plants | higher dicots | Rhizophoraceae  | <i>Ceriops tagal</i>                                     | yellow mangrove   | C |   | 2 | 1 |   |
| plants | higher dicots | Caesalpiniaceae | <i>Chamaecrista absus</i> var. <i>absus</i>              |                   | C |   | 3 | 0 |   |
| plants | higher dicots | Caesalpiniaceae | <i>Chamaecrista concinna</i>                             |                   | C |   | 1 | 1 |   |
| plants | higher dicots | Caesalpiniaceae | <i>Chamaecrista longipes</i>                             |                   | C |   | 1 | 0 |   |
| plants | higher dicots | Caesalpiniaceae | <i>Chamaecrista mimosoides</i>                           | dwarf cassia      | C |   | 2 | 1 |   |
| plants | higher dicots | Caesalpiniaceae | <i>Chamaecrista nomame</i> var. <i>nomame</i>            |                   | C |   | 1 | 0 |   |
| plants | higher dicots | Euphorbiaceae   | <i>Chamaesyce australis</i>                              |                   | C |   | 1 | 2 |   |
| plants | higher dicots | Euphorbiaceae   | <i>Chamaesyce coghlani</i>                               |                   | C |   | 4 | 1 |   |
| plants | higher dicots | Euphorbiaceae   | <i>Chamaesyce dallachiana</i>                            | mat spurge        | C |   | 3 | 1 |   |
| plants | higher dicots | Euphorbiaceae   | <i>Chamaesyce drummondii</i>                             | caustic-weed      | C |   | 2 | 1 |   |
| plants | higher dicots | Euphorbiaceae   | <i>Chamaesyce hirta</i>                                  | asthma plant      | Y |   | 4 | 1 |   |
| plants | higher dicots | Euphorbiaceae   | <i>Chamaesyce hyssopifolia</i>                           |                   | Y |   | 9 | 2 |   |
| plants | higher dicots | Euphorbiaceae   | <i>Chamaesyce mitchelliana</i>                           |                   | C |   | 1 | 0 |   |
| plants | higher dicots | Euphorbiaceae   | <i>Chamaesyce myrtoides</i>                              |                   | C |   | 1 | 1 |   |
| plants | higher dicots | Chenopodiaceae  | <i>Chenopodium auricomum</i>                             |                   | C |   | 5 | 1 |   |
| plants | higher dicots | Chenopodiaceae  | <i>Chenopodium carinatum</i>                             | green crumbweed   | C |   | 6 | 0 |   |
| plants | higher dicots | Chenopodiaceae  | <i>Chenopodium desertorum</i> subsp. <i>microphyllum</i> |                   | C |   | 1 | 1 |   |
| plants | higher dicots | Chenopodiaceae  | <i>Chenopodium murale</i>                                | green fat-hen     | Y |   | 1 | 1 |   |
| plants | higher dicots | Fabaceae        | <i>Chorizema parviflorum</i>                             | eastern flame pea | C |   | 1 | 4 |   |
| plants | higher dicots | Asteraceae      | <i>Chrysoccephalum apiculatum</i>                        | yellow buttons    | C |   | 4 | 3 |   |
| plants | higher dicots | Asteraceae      | <i>Cirsium vulgare</i>                                   | spear thistle     | Y |   | 1 | 0 |   |
| plants | higher dicots | Vitaceae        | <i>Cissus adnata</i>                                     |                   | C |   | 1 | 0 |   |
| plants | higher dicots | Vitaceae        | <i>Cissus antarctica</i>                                 |                   | C |   | 1 | 0 |   |
| plants | higher dicots | Vitaceae        | <i>Cissus cardiophylla</i>                               |                   | C |   | 2 | 0 |   |
| plants | higher dicots | Vitaceae        | <i>Cissus hypoglauca</i>                                 |                   | C |   | 1 | 2 |   |

|        |               |                  |  |                    |   |    |   |
|--------|---------------|------------------|--|--------------------|---|----|---|
| plants | higher dicots | Vitaceae         | <i>Cissus oblonga</i>  |                    | C | 1  | 1 |
| plants | higher dicots | Vitaceae         | <i>Cissus reniformis</i>                                     |                    | C | 3  | 0 |
| plants | higher dicots | Vitaceae         | <i>Cissus repens</i>   |                    | C | 2  | 0 |
| plants | higher dicots | Cucurbitaceae    | <i>Citrullus lanatus</i> var. <i>lanatus</i>                 | Y                  |   | 1  | 2 |
| plants | higher dicots | Rutaceae         | <i>Citrus glauca</i>   |                    | C | 10 | 4 |
| plants | higher dicots | Euphorbiaceae    | <i>Claoxylon tenerifolium</i> subsp. <i>tenerifolium</i>     |                    | C | 1  | 4 |
| plants | higher dicots | Phyllanthaceae   | <i>Cleistanthus dallachyanus</i>                             |                    | C | 3  | 1 |
| plants | higher dicots | Vitaceae         | <i>Clematicissus opaca</i>                                   |                    | C | 1  | 0 |
| plants | higher dicots | Cleomaceae       | <i>Cleome aculeata</i>                                       | Y                  |   | 2  | 1 |
| plants | higher dicots | Cleomaceae       | <i>Cleome gynandra</i>                                       | Y                  |   | 2  | 1 |
| plants | higher dicots | Cleomaceae       | <i>Cleome tetrandra</i> var. <i>tetrandra</i>                |                    | C | 1  | 0 |
| plants | higher dicots | Cleomaceae       | <i>Cleome viscosa</i>  | tick-weed          | C | 3  | 2 |
| plants | higher dicots | Lamiaceae        | <i>Clerodendrum floribundum</i>                              |                    | C | 4  | 1 |
| plants | higher dicots | Lamiaceae        | <i>Clerodendrum inerme</i>                                   | coastal lolly bush | C | 1  | 1 |
| plants | higher dicots | Lamiaceae        | <i>Clerodendrum tomentosum</i>                               |                    | C | 1  | 3 |
| plants | higher dicots | Fabaceae         | <i>Clitoria ternatea</i>                                     | butterfly pea      | Y | 6  | 1 |
| plants | higher dicots | Rutaceae         | <i>Coatesia paniculata</i>                                   |                    | C | 2  | 0 |
| plants | higher dicots | Cochlospermaceae | <i>Cochlospermum gillivraei</i>                              |                    | C | 4  | 0 |
| plants | higher dicots | Polygalaceae     | <i>Comesperma pallidum</i>                                   |                    | C | 5  | 1 |
| plants | higher dicots | Convolvulaceae   | <i>Convolvulus angustissimus</i> subsp. <i>angustissimus</i> |                    | C | 1  | 0 |
| plants | higher dicots | Convolvulaceae   | <i>Convolvulus arvensis</i>                                  |                    | Y | 1  | 2 |
| plants | higher dicots | Asteraceae       | <i>Conyza aegyptiaca</i>                                     |                    | Y | 1  | 0 |
| plants | higher dicots | Asteraceae       | <i>Conyza bonariensis</i>                                    |                    | Y | 1  | 1 |
| plants | higher dicots | Sparrmanniaceae  | <i>Corchorus aestuans</i>                                    |                    | C | 1  | 3 |
| plants | higher dicots | Sparrmanniaceae  | <i>Corchorus hygrophilus</i>                                 |                    | R | 1  | 2 |
| plants | higher dicots | Sparrmanniaceae  | <i>Corchorus olitorius</i>                                   | jute               | C | 3  | 2 |
| plants | higher dicots | Sparrmanniaceae  | <i>Corchorus sidoides</i> subsp. <i>vermicularis</i>         |                    | C | 1  | 1 |
| plants | higher dicots | Sparrmanniaceae  | <i>Corchorus tomentellus</i>                                 |                    | C | 2  | 3 |
| plants | higher dicots | Sparrmanniaceae  | <i>Corchorus trilocularis</i>                                |                    | C | 3  | 1 |
| plants | higher dicots | Boraginaceae     | <i>Cordia dichotoma</i>                                      |                    | C | 3  | 0 |
| plants | higher dicots | Asteraceae       | <i>Coronidium glutinosum</i>                                 |                    | C | 11 | 0 |
| plants | higher dicots | Asteraceae       | <i>Coronidium lanuginosum</i>                                |                    | C | 4  | 1 |
| plants | higher dicots | Asteraceae       | <i>Coronidium rupicola</i>                                   |                    | C | 3  | 1 |
| plants | higher dicots | Myrtaceae        | <i>Corymbia aureola</i>                                      |                    | C | 9  | 0 |
| plants | higher dicots | Myrtaceae        | <i>Corymbia blakei</i>                                       |                    | C | 3  | 3 |
| plants | higher dicots | Myrtaceae        | <i>Corymbia blakei</i> subsp. <i>blakei</i>                  |                    | C | 1  | 1 |

|        |               |           |   |                           |   |    |   |
|--------|---------------|-----------|---|---------------------------|---|----|---|
| plants | higher dicots | Myrtaceae | <i>Corymbia brachycarpa</i>                                       |                           | C | 1  | 1 |
| plants | higher dicots | Myrtaceae | <i>Corymbia citriodora</i>  | spotted gum               | C | 4  | 2 |
| plants | higher dicots | Myrtaceae | <i>Corymbia clarksoniana</i>                                      |                           | C | 10 | 3 |
| plants | higher dicots | Myrtaceae | <i>Corymbia dallachiana</i>                                       |                           | C | 16 | 2 |
| plants | higher dicots | Myrtaceae | <i>Corymbia dimorpha</i>  |                           | C | 1  | 2 |
| plants | higher dicots | Myrtaceae | <i>Corymbia erythrophloia</i>                                     | variable-barked bloodwood | C | 7  | 2 |
| plants | higher dicots | Myrtaceae | <i>Corymbia intermedia</i>  | pink bloodwood            | C | 1  | 3 |
| plants | higher dicots | Myrtaceae | <i>Corymbia lamprophylla</i>                                      |                           | C | 20 | 0 |
| plants | higher dicots | Myrtaceae | <i>Corymbia leichhardtii</i>                                      | rustyjacket               | C | 1  | 1 |
| plants | higher dicots | Myrtaceae | <i>Corymbia papuana</i>   | ghost gum                 | C | 14 | 0 |
| plants | higher dicots | Myrtaceae | <i>Corymbia plena</i>   |                           | C | 2  | 3 |
| plants | higher dicots | Myrtaceae | <i>Corymbia polycarpa</i>   | long-fruited bloodwood    | C | 2  | 1 |
| plants | higher dicots | Myrtaceae | <i>Corymbia setosa</i>  |                           | C | 5  | 0 |
| plants | higher dicots | Myrtaceae | <i>Corymbia setosa</i> subsp. <i>pedicellaris</i>                 |                           | C | 3  | 3 |
| plants | higher dicots | Myrtaceae | <i>Corymbia terminalis</i>  |                           | C | 1  | 3 |
| plants | higher dicots | Myrtaceae | <i>Corymbia tessellaris</i>                                       | Moreton Bay ash           | C | 8  | 4 |
| plants | higher dicots | Myrtaceae | <i>Corymbia torelliana</i>  | cadaghi                   | C | 1  | 2 |
| plants | higher dicots | Myrtaceae | <i>Corymbia trachyphloia</i>                                      |                           | C | 1  | 0 |
| plants | higher dicots | Myrtaceae | <i>Corymbia trachyphloia</i> subsp. <i>trachyphloia</i>           |                           | C | 1  | 8 |
| plants | higher dicots | Fabaceae  | <i>Crotalaria brevis</i>  |                           | C | 2  | 0 |
| plants | higher dicots | Fabaceae  | <i>Crotalaria calycinia</i>                                       |                           | C | 3  | 1 |
| plants | higher dicots | Fabaceae  | <i>Crotalaria dissitiflora</i>                                    |                           | C | 1  | 0 |
| plants | higher dicots | Fabaceae  | <i>Crotalaria dissitiflora</i> subsp. <i>dissitiflora</i>         |                           | C | 1  | 0 |
| plants | higher dicots | Fabaceae  | <i>Crotalaria goreensis</i>                                       | <i>gambia pea</i>         | Y | 1  | 1 |
| plants | higher dicots | Fabaceae  | <i>Crotalaria incana</i> subsp. <i>incana</i>                     |                           | Y | 1  | 1 |
| plants | higher dicots | Fabaceae  | <i>Crotalaria juncea</i>  | <i>sunhemp</i>            | Y | 6  | 1 |
| plants | higher dicots | Fabaceae  | <i>Crotalaria laburnifolia</i>                                    |                           | Y | 9  | 0 |
| plants | higher dicots | Fabaceae  | <i>Crotalaria medicaginea</i>                                     | trefoil rattlepod         | C | 4  | 0 |
| plants | higher dicots | Fabaceae  | <i>Crotalaria medicaginea</i> var. <i>medicaginea</i>             |                           | C | 1  | 9 |
| plants | higher dicots | Fabaceae  | <i>Crotalaria medicaginea</i> var. <i>neglecta</i>                |                           | C | 3  | 1 |
| plants | higher dicots | Fabaceae  | <i>Crotalaria mitchellii</i> subsp. <i>mitchellii</i>             |                           | C | 6  | 0 |
| plants | higher dicots | Fabaceae  | <i>Crotalaria montana</i>   |                           | C | 1  | 0 |
| plants | higher dicots | Fabaceae  | <i>Crotalaria montana</i> var. <i>angustifolia</i>                |                           | C | 2  | 0 |
| plants | higher dicots | Fabaceae  | <i>Crotalaria novae-hollandiae</i> subsp. <i>novae-hollandiae</i> |                           | C | 2  | 0 |
| plants | higher dicots | Fabaceae  | <i>Crotalaria pallida</i> var. <i>obovata</i>                     |                           | Y | 7  | 3 |
| plants | higher dicots | Fabaceae  | <i>Crotalaria sessiliflora</i> var. <i>anthylloides</i>           |                           | C | 1  | 1 |

|        |               |                 |   |                       |   |   |    |   |
|--------|---------------|-----------------|---|-----------------------|---|---|----|---|
| plants | higher dicots | Fabaceae        | <i>Crotalaria spectabilis</i>                             | showy rattlepod       | Y |   | 1  | 0 |
| plants | higher dicots | Fabaceae        | <i>Crotalaria verrucosa</i>                               |                       | C |   | 3  | 1 |
| plants | higher dicots | Euphorbiaceae   | <i>Croton acronychioides</i>                              | thick-leaved croton   | C |   | 1  | 0 |
| plants | higher dicots | Euphorbiaceae   | <i>Croton arnhemicus</i>                                  |                       | C |   | 11 | 1 |
| plants | higher dicots | Euphorbiaceae   | <i>Croton insularis</i>                                   | Queensland cascarilla | C |   | 2  | 0 |
| plants | higher dicots | Euphorbiaceae   | <i>Croton magneticus</i>                                  |                       | V | V | 8  | 0 |
| plants | higher dicots | Euphorbiaceae   | <i>Croton phebaliooides</i>                               | narrow-leaved croton  | C |   | 4  | 2 |
| plants | higher dicots | Rhamnaceae      | <i>Cryptandra rigida</i>                                  |                       | C |   | 3  | 3 |
| plants | higher dicots | Apocynaceae     | <i>Cryptostegia grandiflora</i>                           | rubber vine           | Y |   | 8  | 0 |
| plants | higher dicots | Cucurbitaceae   | <i>Cucumis anguria</i> var. <i>anguria</i>                | West Indian gherkin   | Y |   | 4  | 1 |
| plants | higher dicots | Cucurbitaceae   | <i>Cucumis maderaspatanus</i>                             |                       | C |   | 1  | 0 |
| plants | higher dicots | Cucurbitaceae   | <i>Cucumis melo</i>                                       |                       | C |   | 1  | 1 |
| plants | higher dicots | Cucurbitaceae   | <i>Cucumis melo</i> subsp. <i>agrestis</i>                |                       | C |   | 7  | 3 |
| plants | higher dicots | Cucurbitaceae   | <i>Cucumis myriocarpus</i> subsp. <i>myriocarpus</i>      | prickly pademelon     | Y |   | 2  | 5 |
| plants | higher dicots | Cucurbitaceae   | <i>Cucurbitaceae</i>                                      |                       | C |   | 1  | 0 |
| plants | higher dicots | Fabaceae        | <i>Cullen australasicum</i>                               |                       | C |   | 1  | 2 |
| plants | higher dicots | Fabaceae        | <i>Cullen cinereum</i>                                    |                       | C |   | 3  | 2 |
| plants | higher dicots | Sapindaceae     | <i>Cupaniopsis anacardioides</i>                          | tuckeroo              | C |   | 5  | 1 |
| plants | higher dicots | Sapindaceae     | <i>Cupaniopsis parvifolia</i>                             | small-leaved tuckeroo | C |   | 2  | 3 |
| plants | higher dicots | Sapindaceae     | <i>Cupaniopsis simulata</i>                               |                       | C |   | 2  | 1 |
| plants | higher dicots | Asteraceae      | <i>Cyanthillium cinereum</i>                              |                       | C |   | 1  | 9 |
| plants | higher dicots | Rubiaceae       | <i>Cyclophyllum coprosmoides</i>                          |                       | C |   | 1  | 2 |
| plants | higher dicots | Rubiaceae       | <i>Cyclophyllum coprosmoides</i> var. <i>coprosmoides</i> |                       | C |   | 5  | 1 |
| plants | higher dicots | Apocynaceae     | <i>Cynanchum bowmanii</i>                                 | bowman's milkvine     | C |   | 1  | 1 |
| plants | higher dicots | Boraginaceae    | <i>Cynoglossum suaveolens</i>                             | sweet hound's tooth   | C |   | 1  | 1 |
| plants | higher dicots | Goodeniaceae    | <i>Dampiera adpressa</i>                                  |                       | C |   | 2  | 0 |
| plants | higher dicots | Goodeniaceae    | <i>Dampiera adpressa</i>                                  |                       | C |   | 1  | 0 |
| plants | higher dicots | Goodeniaceae    | <i>Dampiera ferruginea</i>                                | velvet beauty-bush    | C |   | 4  | 1 |
| plants | higher dicots | Solanaceae      | <i>Datura inoxia</i>                                      |                       | Y |   | 5  | 1 |
| plants | higher dicots | Solanaceae      | <i>Datura leichhardtii</i>                                | native thornapple     | Y |   | 3  | 1 |
| plants | higher dicots | Fabaceae        | <i>Daviesia filipes</i>                                   |                       | C |   | 1  | 3 |
| plants | higher dicots | Fabaceae        | <i>Daviesia squarrosa</i>                                 |                       | C |   | 4  | 0 |
| plants | higher dicots | Fabaceae        | <i>Daviesia ulicifolia</i>                                | native gorse          | C |   | 1  | 1 |
| plants | higher dicots | Amaranthaceae   | <i>Deeringia amaranthoides</i>                            | redberry              | C |   | 6  | 1 |
| plants | higher dicots | Amaranthaceae   | <i>Deeringia arborescens</i>                              | climbing deeringia    | C |   | 1  | 0 |
| plants | higher dicots | Caesalpiniaceae | <i>Delonix regia</i>                                      | poinciana             | Y |   | 1  | 2 |

|        |               |                |   |                            |   |   |   |
|--------|---------------|----------------|---|----------------------------|---|---|---|
| plants | higher dicots | Urticaceae     | Dendrocnide photinophylla                         | shiny-leaved stinging tree | C | 1 | 1 |
| plants | higher dicots | Loranthaceae   | Dendrophthoe glabrescens                          |                            | C | 2 | 1 |
| plants | higher dicots | Loranthaceae   | Dendrophthoe homoplastica                         |                            | C | 4 | 0 |
| plants | higher dicots | Loranthaceae   | Dendrophthoe vitellina                            | long-flowered mistletoe    | C | 2 | 1 |
| plants | higher dicots | Celastraceae   | Denhamia celastroides                             | broad-leaved boxwood       | C | 4 | 0 |
| plants | higher dicots | Celastraceae   | Denhamia oleaster                                 |                            | C | 3 | 5 |
| plants | higher dicots | Celastraceae   | Denhamia pittosporoides                           |                            | C | 1 | 0 |
| plants | higher dicots | Rubiaceae      | Dentella repens                                   | dentella                   | C | 1 | 0 |
| plants | higher dicots | Fabaceae       | Desmodium brachypodium                            | large ticktrefoil          | C | 1 | 2 |
| plants | higher dicots | Fabaceae       | Desmodium campylocaulon                           |                            | C | 1 | 0 |
| plants | higher dicots | Fabaceae       | Desmodium filiforme                               |                            | C | 1 | 0 |
| plants | higher dicots | Fabaceae       | Desmodium gangeticum                              |                            | C | 1 | 3 |
| plants | higher dicots | Fabaceae       | Desmodium macrocarpum                             |                            | R | 1 | 0 |
| plants | higher dicots | Fabaceae       | Desmodium muelleri                                |                            | C | 3 | 0 |
| plants | higher dicots | Fabaceae       | Desmodium pullenii                                |                            | C | 1 | 2 |
| plants | higher dicots | Fabaceae       | Desmodium rhytidophyllum                          |                            | C | 2 | 0 |
| plants | higher dicots | Fabaceae       | Desmodium tortuosum                               | Florida beggar-weed        | Y | 1 | 1 |
| plants | higher dicots | Fabaceae       | Desmodium trichostachyum                          |                            | C | 1 | 1 |
| plants | higher dicots | Fabaceae       | Desmodium varians                                 | slender tick trefoil       | C | 1 | 2 |
| plants | higher dicots | Convolvulaceae | Dichondra repens                                  | kidney weed                | C | 1 | 1 |
| plants | higher dicots | Rutaceae       | Dinosperma erythrococcum                          |                            | C | 2 | 1 |
| plants | higher dicots | Ebenaceae      | Diospyros australis                               | black plum                 | C | 3 | 1 |
| plants | higher dicots | Ebenaceae      | Diospyros fasciculosa                             | grey ebony                 | C | 1 | 2 |
| plants | higher dicots | Ebenaceae      | Diospyros geminata                                | scaly ebony                | C | 7 | 1 |
| plants | higher dicots | Ebenaceae      | Diospyros humilis                                 | small-leaved ebony         | C | 5 | 1 |
| plants | higher dicots | Ebenaceae      | Diospyros pentamera                               | myrtle ebony               | C | 2 | 1 |
| plants | higher dicots | Cucurbitaceae  | Diplocyclos palmatus                              |                            | C | 2 | 1 |
| plants | higher dicots | Cucurbitaceae  | Diplocyclos palmatus subsp. palmatus              |                            | C | 4 | 1 |
| plants | higher dicots | Acanthaceae    | Dipteracanthus australasicus                      |                            | C | 3 | 1 |
| plants | higher dicots | Acanthaceae    | Dipteracanthus australasicus subsp. australasicus |                            | C | 6 | 0 |
| plants | higher dicots | Acanthaceae    | Dipteracanthus australasicus subsp. corynothecus  |                            | C | 4 | 1 |
| plants | higher dicots | Chenopodiaceae | Dissocarpus biflorus                              |                            | C | 1 | 1 |
| plants | higher dicots | Chenopodiaceae | Dissocarpus biflorus var. cephalocarpus           |                            | C | 3 | 4 |
| plants | higher dicots | Sapindaceae    | Distichostemon dodecandrus                        |                            | C | 6 | 0 |
| plants | higher dicots | Sapindaceae    | Dodonaea filifolia                                |                            | C | 1 | 1 |
| plants | higher dicots | Sapindaceae    | Dodonaea lanceolata                               |                            | C | 3 | 1 |

|        |               |                |  |                  |   |    |   |
|--------|---------------|----------------|--|------------------|---|----|---|
| plants | higher dicots | Sapindaceae    | Dodonaea lanceolata var. lanceolata      | C                | 5 | 1  |   |
| plants | higher dicots | Sapindaceae    | Dodonaea lanceolata var. subsessilifolia | C                | 2 | 4  |   |
| plants | higher dicots | Sapindaceae    | Dodonaea petiolaris                      | C                | 1 | 0  |   |
| plants | higher dicots | Sapindaceae    | Dodonaea stenophylla                     | C                | 4 | 1  |   |
| plants | higher dicots | Sapindaceae    | Dodonaea triangularis                    | C                | 3 | 1  |   |
| plants | higher dicots | Sapindaceae    | Dodonaea viscosa                         | C                | 2 | 3  |   |
| plants | higher dicots | Sapindaceae    | Dodonaea viscosa subsp. burmanniana      | C                | 4 | 1  |   |
| plants | higher dicots | Sapindaceae    | Dodonaea viscosa subsp. mucronata        | C                | 1 | 2  |   |
| plants | higher dicots | Sapindaceae    | Dodonaea viscosa subsp. spatulata        | C                | 2 | 1  |   |
| plants | higher dicots | Bignoniaceae   | Dolichandrone heterophylla               | C                | 2 | 1  |   |
| plants | higher dicots | Droseraceae    | Drosera angustifolia                     | C                | 1 | 1  |   |
| plants | higher dicots | Droseraceae    | Drosera indica                           | C                | 2 | 1  |   |
| plants | higher dicots | Droseraceae    | Drosera peltata                          | pale sundew      | C | 1  | 2 |
| plants | higher dicots | Droseraceae    | Drosera peltata                          | pale sundew      | C | 1  | 0 |
| plants | higher dicots | Putranjivaceae | Drypetes deplanchei                      | grey boxwood     | C | 11 | 2 |
| plants | higher dicots | Chenopodiaceae | Dysphania glomulifera subsp. glomulifera |                  | C | 1  | 1 |
| plants | higher dicots | Chenopodiaceae | Dysphania kalpari                        |                  | C | 2  | 1 |
| plants | higher dicots | Chenopodiaceae | Dysphania rhadinostachya subsp. inflata  |                  | C | 2  | 1 |
| plants | higher dicots | Asteraceae     | Eclipta prostrata                        | white eclipta    | C | 2  | 1 |
| plants | higher dicots | Boraginaceae   | Ehretia grahamii                         |                  | C | 9  | 4 |
| plants | higher dicots | Boraginaceae   | Ehretia grahamii x E.membranifolia       |                  | C | 1  | 1 |
| plants | higher dicots | Boraginaceae   | Ehretia grahamii x E.saligna             |                  | C | 1  | 1 |
| plants | higher dicots | Boraginaceae   | Ehretia membranifolia                    | weeping koda     | C | 9  | 1 |
| plants | higher dicots | Boraginaceae   | Ehretia saligna                          |                  | C | 1  | 0 |
| plants | higher dicots | Chenopodiaceae | Einadia hastata                          |                  | C | 2  | 0 |
| plants | higher dicots | Chenopodiaceae | Einadia nutans                           |                  | C | 1  | 4 |
| plants | higher dicots | Chenopodiaceae | Einadia nutans subsp. eremaea            |                  | C | 2  | 1 |
| plants | higher dicots | Chenopodiaceae | Einadia nutans subsp. linifolia          |                  | C | 4  | 1 |
| plants | higher dicots | Chenopodiaceae | Einadia nutans subsp. nutans             |                  | C | 2  | 0 |
| plants | higher dicots | Chenopodiaceae | Einadia trigonos                         |                  | C | 1  | 0 |
| plants | higher dicots | Chenopodiaceae | Einadia trigonos subsp. stellulata       |                  | C | 1  | 0 |
| plants | higher dicots | Elaeocarpaceae | Elaeocarpus eumundi                      | Eumundi quandong | C | 1  | 2 |
| plants | higher dicots | Elaeocarpaceae | Elaeocarpus obovatus                     | blueberry ash    | C | 1  | 2 |
| plants | higher dicots | Celastraceae   | Elaeodendron australe var. integrifolium |                  | C | 4  | 2 |
| plants | higher dicots | Celastraceae   | Elaeodendron melanocarpum                |                  | C | 5  | 3 |
| plants | higher dicots | Sapindaceae    | Elattostachys xylocarpa                  | white tamarind   | C | 3  | 0 |

|        |               |                 |  |                            |   |    |   |
|--------|---------------|-----------------|--|----------------------------|---|----|---|
| plants | higher dicots | Asteraceae      | <i>Emilia sonchifolia</i>                              |                            | Y | 3  | 0 |
| plants | higher dicots | Asteraceae      | <i>Emilia sonchifolia</i> var. <i>javanica</i>         |                            | Y | 2  | 1 |
| plants | higher dicots | Asteraceae      | <i>Emilia sonchifolia</i> var. <i>sonchifolia</i>      |                            | Y | 2  | 1 |
| plants | higher dicots | Chenopodiaceae  | <i>Enchytraea tomentosa</i>                            |                            | C | 9  | 1 |
| plants | higher dicots | Chenopodiaceae  | <i>Enchytraea tomentosa</i> var. <i>glabra</i>         |                            | C | 1  | 1 |
| plants | higher dicots | Chenopodiaceae  | <i>Enchytraea tomentosa</i> var. <i>tomentosa</i>      |                            | C | 2  | 1 |
| plants | higher dicots | Asteraceae      | <i>Epaltes australis</i>                               | spreading nutheads         | C | 2  | 2 |
| plants | higher dicots | Myoporaceae     | <i>Eremophila bignoniiflora</i>                        | eurah                      | C | 9  | 1 |
| plants | higher dicots | Myoporaceae     | <i>Eremophila debilis</i>                              | winter apple               | C | 3  | 0 |
| plants | higher dicots | Myoporaceae     | <i>Eremophila deserti</i>                              |                            | C | 13 | 1 |
| plants | higher dicots | Myoporaceae     | <i>Eremophila longifolia</i>                           | berrigan                   | C | 1  | 1 |
| plants | higher dicots | Myoporaceae     | <i>Eremophila maculata</i> subsp. <i>maculata</i>      |                            | C | 3  | 0 |
| plants | higher dicots | Myoporaceae     | <i>Eremophila mitchellii</i>                           |                            | C | 43 | 0 |
| plants | higher dicots | Myoporaceae     | <i>Eremophila polyclada</i>                            | flowering lignum           | C | 4  | 1 |
| plants | higher dicots | Fabaceae        | <i>Erythrina vespertilio</i>                           |                            | C | 1  | 2 |
| plants | higher dicots | Fabaceae        | <i>Erythrina vespertilio</i> subsp. <i>vespertilio</i> |                            | C | 1  | 0 |
| plants | higher dicots | Erythroxylaceae | <i>Erythroxylum australe</i>                           | cocaine tree               | C | 33 | 1 |
| plants | higher dicots | Erythroxylaceae | <i>Erythroxylum ellipticum</i>                         |                            | C | 1  | 1 |
| plants | higher dicots | Myrtaceae       | <i>Eucalyptus acmenoides</i>                           |                            | C | 4  | 1 |
| plants | higher dicots | Myrtaceae       | <i>Eucalyptus brownii</i>                              | Reid River box             | C | 6  | 2 |
| plants | higher dicots | Myrtaceae       | <i>Eucalyptus brownii</i> - <i>E.populnea</i>          |                            | C | 1  | 1 |
| plants | higher dicots | Myrtaceae       | <i>Eucalyptus brownii</i> x <i>E.persistens</i>        |                            | C | 1  | 1 |
| plants | higher dicots | Myrtaceae       | <i>Eucalyptus camaldulensis</i>                        |                            | C | 17 | 0 |
| plants | higher dicots | Myrtaceae       | <i>Eucalyptus camaldulensis</i>                        |                            | C | 7  | 1 |
| plants | higher dicots | Myrtaceae       | <i>Eucalyptus camaganeana</i>                          | Dawson gum                 | C | 11 | 1 |
| plants | higher dicots | Myrtaceae       | <i>Eucalyptus cloeziana</i>                            | Gympie messmate            | C | 1  | 0 |
| plants | higher dicots | Myrtaceae       | <i>Eucalyptus coolabah</i>                             | coolabah                   | C | 9  | 0 |
| plants | higher dicots | Myrtaceae       | <i>Eucalyptus crebra</i>                               | narrow-leaved red ironbark | C | 17 | 3 |
| plants | higher dicots | Myrtaceae       | <i>Eucalyptus crebra</i> x <i>E.shirleyi</i>           |                            | C | 1  | 1 |
| plants | higher dicots | Myrtaceae       | <i>Eucalyptus drepanophylla</i>                        |                            | C | 1  | 1 |
| plants | higher dicots | Myrtaceae       | <i>Eucalyptus exserta</i>                              | Queensland peppermint      | C | 2  | 1 |
| plants | higher dicots | Myrtaceae       | <i>Eucalyptus fibrosa</i>                              |                            | C | 1  | 1 |
| plants | higher dicots | Myrtaceae       | <i>Eucalyptus howittiana</i>                           | Howitt's box               | R | 2  | 1 |
| plants | higher dicots | Myrtaceae       | <i>Eucalyptus melanophloia</i>                         |                            | C | 31 | 3 |
| plants | higher dicots | Myrtaceae       | <i>Eucalyptus melanophloia</i> x <i>E.orgadophila</i>  |                            | C | 1  | 0 |
| plants | higher dicots | Myrtaceae       | <i>Eucalyptus melliodora</i>                           | yellow box                 | C | 1  | 3 |

|        |               |                |   |                              |   |    |   |
|--------|---------------|----------------|---|------------------------------|---|----|---|
| plants | higher dicots | Myrtaceae      | <i>Eucalyptus microtheca</i>                              | coolibah                     | C | 4  | 1 |
| plants | higher dicots | Myrtaceae      | <i>Eucalyptus moluccana</i>                               | gum-topped box               | C | 1  | 4 |
| plants | higher dicots | Myrtaceae      | <i>Eucalyptus orgadophila</i>                             | mountain coolibah            | C | 6  | 0 |
| plants | higher dicots | Myrtaceae      | <i>Eucalyptus persistens</i>                              |                              | C | 20 | 0 |
| plants | higher dicots | Myrtaceae      | <i>Eucalyptus platyphylla</i>                             | poplar gum                   | C | 5  | 2 |
| plants | higher dicots | Myrtaceae      | <i>Eucalyptus platyphylla</i> x <i>E.tereticornis</i>     |                              | C | 1  | 1 |
| plants | higher dicots | Myrtaceae      | <i>Eucalyptus populnea</i>                                | poplar box                   | C | 32 | 2 |
| plants | higher dicots | Myrtaceae      | <i>Eucalyptus populnea</i>                                | poplar box                   | C | 5  | 1 |
| plants | higher dicots | Myrtaceae      | <i>Eucalyptus raveretiana</i>                             | black ironbox                | V | 4  | 5 |
| plants | higher dicots | Myrtaceae      | <i>Eucalyptus shirleyi</i>                                |                              | C | 7  | 1 |
| plants | higher dicots | Myrtaceae      | <i>Eucalyptus similis</i>                                 | Queensland yellowjacket      | C | 1  | 0 |
| plants | higher dicots | Myrtaceae      | <i>Eucalyptus tenuipes</i>                                | narrow-leaved white mahogany | C | 1  | 1 |
| plants | higher dicots | Myrtaceae      | <i>Eucalyptus tereticornis</i> subsp. <i>tereticornis</i> |                              | C | 3  | 3 |
| plants | higher dicots | Myrtaceae      | <i>Eucalyptus thozetiana</i>                              |                              | C | 10 | 0 |
| plants | higher dicots | Myrtaceae      | <i>Eucalyptus whitei</i>                                  | White's ironbark             | C | 2  | 4 |
| plants | higher dicots | Myrtaceae      | <i>Eucalyptus xanthoclada</i>                             | yellow-branched ironbark     | C | 1  | 2 |
| plants | higher dicots | Asteraceae     | <i>Euchiton sphaericus</i>                                |                              | C | 1  | 0 |
| plants | higher dicots | Myrtaceae      | <i>Eugenia reinwardtiana</i>                              | beach cherry                 | C | 3  | 2 |
| plants | higher dicots | Euphorbiaceae  | <i>Euphorbia cyathophora</i>                              | dwarf poinsettia             | Y | 1  | 2 |
| plants | higher dicots | Euphorbiaceae  | <i>Euphorbia heterophylla</i>                             |                              | Y | 3  | 2 |
| plants | higher dicots | Euphorbiaceae  | <i>Euphorbia stevenii</i>                                 | bottle tree spurge           | C | 1  | 0 |
| plants | higher dicots | Euphorbiaceae  | <i>Euphorbia tannensis</i>                                |                              | C | 1  | 0 |
| plants | higher dicots | Euphorbiaceae  | <i>Euphorbia tannensis</i> subsp. <i>eremophila</i>       |                              | C | 2  | 0 |
| plants | higher dicots | Anacardiaceae  | <i>Euroschinus falcatus</i> var. <i>angustifolius</i>     |                              | C | 3  | 2 |
| plants | higher dicots | Anacardiaceae  | <i>Euroschinus falcatus</i> var. <i>falcatus</i>          |                              | C | 1  | 1 |
| plants | higher dicots | Rubiaceae      | <i>Everistia vacciniifolia</i>                            |                              | C | 2  | 1 |
| plants | higher dicots | Rubiaceae      | <i>Everistia vacciniifolia</i> forma <i>crassa</i>        |                              | C | 1  | 2 |
| plants | higher dicots | Rubiaceae      | <i>Everistia vacciniifolia</i> var. <i>nervosa</i>        |                              | C | 1  | 0 |
| plants | higher dicots | Convolvulaceae | <i>Evolvulus alsinoides</i>                               |                              | C | 29 | 4 |
| plants | higher dicots | Convolvulaceae | <i>Evolvulus alsinoides</i> var. <i>decumbens</i>         |                              | C | 1  | 1 |
| plants | higher dicots | Convolvulaceae | <i>Evolvulus alsinoides</i> var. <i>vilosicalyx</i>       |                              | C | 1  | 0 |
| plants | higher dicots | Santalaceae    | <i>Exocarpos cupressiformis</i>                           | native cherry                | C | 2  | 0 |
| plants | higher dicots | Santalaceae    | <i>Exocarpos latifolius</i>                               |                              | C | 5  | 0 |
| plants | higher dicots | Santalaceae    | <i>Exocarpos sparteus</i>                                 | slender cherry               | C | 1  | 2 |
| plants | higher dicots | Polygonaceae   | <i>Fallopia convolvulus</i>                               | black bindweed               | Y | 1  | 1 |
| plants | higher dicots | Moraceae       | <i>Ficus coronata</i>                                     | creek sandpaper fig          | C | 2  | 1 |

|        |               |                  |  |                       |   |    |   |
|--------|---------------|------------------|--|-----------------------|---|----|---|
| plants | higher dicots | Moraceae         | Ficus destruens                              | C                     | 1 | 2  |   |
| plants | higher dicots | Moraceae         | Ficus microcarpa var. hillii                 | C                     | 3 | 1  |   |
| plants | higher dicots | Moraceae         | Ficus obliqua                                | C                     | 1 | 1  |   |
| plants | higher dicots | Moraceae         | Ficus opposita                               | C                     | 2 | 0  |   |
| plants | higher dicots | Moraceae         | Ficus rubiginosa forma rubiginosa            | C                     | 9 | 8  |   |
| plants | higher dicots | Moraceae         | Ficus superba var. henneana                  | C                     | 1 | 1  |   |
| plants | higher dicots | Moraceae         | Ficus virens var. sublanceolata              | C                     | 1 | 0  |   |
| plants | higher dicots | Asteraceae       | Flaveria australasica                        | speedy weed           | C | 1  | 2 |
| plants | higher dicots | Fabaceae         | Flemingia parviflora                         | flemingia             | C | 1  | 1 |
| plants | higher dicots | Rutaceae         | Flindersia australis                         | crow's ash            | C | 3  | 2 |
| plants | higher dicots | Rutaceae         | Flindersia dissosperma                       |                       | C | 15 | 2 |
| plants | higher dicots | Phyllanthaceae   | Flueggea leucopyrus                          |                       | C | 9  | 4 |
| plants | higher dicots | Phyllanthaceae   | Flueggea virosa subsp. melanthesoides        |                       | C | 5  | 8 |
| plants | higher dicots | Fabaceae         | Galactia tenuiflora                          |                       | C | 5  | 1 |
| plants | higher dicots | Fabaceae         | Galactia tenuiflora forma sericea            |                       | C | 1  | 1 |
| plants | higher dicots | Fabaceae         | Galactia tenuiflora var. lucida              |                       | C | 1  | 0 |
| plants | higher dicots | Rubiaceae        | Galium propinquum                            |                       | C | 1  | 0 |
| plants | higher dicots | Rubiaceae        | Galium spathulatum                           |                       | C | 1  | 1 |
| plants | higher dicots | Sapindaceae      | Ganophyllum falcatum                         |                       | C | 1  | 0 |
| plants | higher dicots | Clusiaceae       | Garcinia xanthochymus                        |                       | Y | 1  | 0 |
| plants | higher dicots | Fabaceae         | Gastrolobium grandiflorum                    |                       | C | 2  | 2 |
| plants | higher dicots | Rutaceae         | Geijera parviflora                           | wilga                 | C | 23 | 1 |
| plants | higher dicots | Rutaceae         | Geijera salicifolia                          | brush wilga           | C | 9  | 0 |
| plants | higher dicots | Molluginaceae    | Glinus lotoides                              | hairy carpet weed     | C | 9  | 1 |
| plants | higher dicots | Molluginaceae    | Glinus oppositifolius                        |                       | C | 2  | 0 |
| plants | higher dicots | Phyllanthaceae   | Glochidion ferdinandi                        |                       | C | 2  | 1 |
| plants | higher dicots | Asteraceae       | Glossocardia bidens                          | native cobbler's pegs | C | 2  | 3 |
| plants | higher dicots | Asteraceae       | Glossocardia refracta                        |                       | C | 3  | 2 |
| plants | higher dicots | Lamiaceae        | Glossocarya hemiderma                        |                       | C | 3  | 2 |
| plants | higher dicots | Scrophulariaceae | Glossostigma diandrum                        |                       | C | 1  | 1 |
| plants | higher dicots | Fabaceae         | Glycine falcata                              |                       | C | 3  | 1 |
| plants | higher dicots | Fabaceae         | Glycine latifolia                            |                       | C | 2  | 0 |
| plants | higher dicots | Fabaceae         | Glycine pescadrensis                         |                       | C | 1  | 1 |
| plants | higher dicots | Fabaceae         | Glycine sp. (Laglan Station L.S.Smith 10302) |                       | C | 1  | 5 |
| plants | higher dicots | Fabaceae         | Glycine tabacina                             | glycine pea           | C | 1  | 3 |
| plants | higher dicots | Fabaceae         | Glycine tomentella                           | woolly glycine        | C | 1  | 4 |

|        |               |                 |  |                     |   |   |    |   |
|--------|---------------|-----------------|--|---------------------|---|---|----|---|
| plants | higher dicots | Rutaceae        | <i>Glycosmis trifoliata</i>                          |                     |   | C | 1  | 0 |
| plants | higher dicots | Apocynaceae     | <i>Gomphocarpus physocarpus</i>                      | balloon cottonbush  | Y |   | 1  | 0 |
| plants | higher dicots | Amaranthaceae   | <i>Gomphrena celosioides</i>                         | gomphrena weed      | Y |   | 10 | 2 |
| plants | higher dicots | Amaranthaceae   | <i>Gomphrena humilis</i>                             |                     |   | C | 4  | 0 |
| plants | higher dicots | Amaranthaceae   | <i>Gomphrena lanata</i>                              |                     |   | C | 2  | 1 |
| plants | higher dicots | Haloragaceae    | <i>Gonocarpus acanthocarpus</i>                      |                     |   | C | 1  | 1 |
| plants | higher dicots | Haloragaceae    | <i>Gonocarpus chinensis</i> subsp. <i>verrucosus</i> |                     |   | C | 1  | 1 |
| plants | higher dicots | Goodeniaceae    | <i>Goodenia armitiana</i>                            |                     |   | C | 1  | 1 |
| plants | higher dicots | Goodeniaceae    | <i>Goodenia byrnesii</i>                             |                     |   | C | 1  | 1 |
| plants | higher dicots | Goodeniaceae    | <i>Goodenia fascicularis</i>                         |                     |   | C | 2  | 1 |
| plants | higher dicots | Goodeniaceae    | <i>Goodenia glabra</i>                               |                     |   | C | 1  | 1 |
| plants | higher dicots | Goodeniaceae    | <i>Goodenia grandiflora</i>                          |                     |   | C | 4  | 0 |
| plants | higher dicots | Goodeniaceae    | <i>Goodenia hirsuta</i>                              |                     |   | C | 1  | 1 |
| plants | higher dicots | Goodeniaceae    | <i>Goodenia lunata</i>                               |                     |   | C | 1  | 1 |
| plants | higher dicots | Goodeniaceae    | <i>Goodenia pilosa</i>                               |                     |   | C | 2  | 1 |
| plants | higher dicots | Goodeniaceae    | <i>Goodenia strangfordii</i>                         |                     |   | C | 2  | 0 |
| plants | higher dicots | Goodeniaceae    | <i>Goodenia viridula</i>                             |                     |   | C | 2  | 1 |
| plants | higher dicots | Myrtaceae       | <i>Gossia bidwillii</i>                              |                     |   | C | 10 | 0 |
| plants | higher dicots | Myrtaceae       | <i>Gossia punctata</i>                               |                     |   | C | 1  | 0 |
| plants | higher dicots | Malvaceae       | <i>Gossypium australe</i>                            |                     |   | C | 1  | 0 |
| plants | higher dicots | Malvaceae       | <i>Gossypium sturtianum</i>                          |                     |   | R | 1  | 1 |
| plants | higher dicots | Proteaceae      | <i>Grevillea decora</i>                              |                     |   | C | 1  | 0 |
| plants | higher dicots | Proteaceae      | <i>Grevillea decora</i> subsp. <i>decora</i>         |                     |   | C | 5  | 0 |
| plants | higher dicots | Proteaceae      | <i>Grevillea glauca</i>                              | bushy's clothes peg |   | C | 3  | 1 |
| plants | higher dicots | Proteaceae      | <i>Grevillea helmsiae</i>                            |                     |   | C | 6  | 1 |
| plants | higher dicots | Proteaceae      | <i>Grevillea hilliana</i>                            |                     |   | C | 3  | 2 |
| plants | higher dicots | Proteaceae      | <i>Grevillea longistyla</i>                          |                     |   | C | 3  | 4 |
| plants | higher dicots | Proteaceae      | <i>Grevillea parallela</i>                           |                     |   | C | 15 | 0 |
| plants | higher dicots | Proteaceae      | <i>Grevillea pteridifolia</i>                        | golden parrot tree  |   | C | 6  | 0 |
| plants | higher dicots | Proteaceae      | <i>Grevillea sessilis</i>                            |                     |   | C | 2  | 6 |
| plants | higher dicots | Proteaceae      | <i>Grevillea striata</i>                             | beefwood            |   | C | 7  | 0 |
| plants | higher dicots | Sparrmanniaceae | <i>Grewia asiatica</i>                               |                     | Y |   | 11 | 1 |
| plants | higher dicots | Sparrmanniaceae | <i>Grewia latifolia</i>                              | dysentery plant     |   | C | 16 | 2 |
| plants | higher dicots | Sparrmanniaceae | <i>Grewia papuana</i>                                |                     |   | C | 1  | 4 |
| plants | higher dicots | Sparrmanniaceae | <i>Grewia retusifolia</i>                            |                     |   | C | 2  | 0 |
| plants | higher dicots | Sparrmanniaceae | <i>Grewia scabrella</i>                              |                     |   | C | 8  | 1 |

|        |               |               |  |                   |   |    |   |
|--------|---------------|---------------|--|-------------------|---|----|---|
| plants | higher dicots | Apocynaceae   | <i>Gymnanthera oblonga</i>                           |                   | C | 3  | 1 |
| plants | higher dicots | Asteraceae    | <i>Gynura drymophila</i>                             |                   | C | 1  | 1 |
| plants | higher dicots | Asteraceae    | <i>Gynura drymophila</i> var. <i>drymophila</i>      |                   | C | 5  | 5 |
| plants | higher dicots | Proteaceae    | <i>Hakea chordophylla</i>                            |                   | C | 2  | 0 |
| plants | higher dicots | Proteaceae    | <i>Hakea lorea</i> subsp. <i>lorea</i>               |                   | C | 1  | 5 |
| plants | higher dicots | Haloragaceae  | <i>Haloragis aspera</i>                              | raspweed          | C | 1  | 2 |
| plants | higher dicots | Haloragaceae  | <i>Haloragis heterophylla</i>                        | rough raspweed    | C | 1  | 2 |
| plants | higher dicots | Byttneriaceae | <i>Hannafordia shanesii</i>                          |                   | C | 2  | 0 |
| plants | higher dicots | Fabaceae      | <i>Hardenbergia perbrevidens</i>                     |                   | C | 2  | 3 |
| plants | higher dicots | Fabaceae      | <i>Hardenbergia violacea</i>                         |                   | C | 2  | 0 |
| plants | higher dicots | Sapindaceae   | <i>Harpullia pendula</i>                             |                   | C | 1  | 3 |
| plants | higher dicots | Cactaceae     | <i>Harrisia martini</i>                              |                   | Y | 28 | 0 |
| plants | higher dicots | Proteaceae    | <i>Helicia glabriflora</i>                           | pale oak          | C | 2  | 3 |
| plants | higher dicots | Boraginaceae  | <i>Heliotropium amplexicaule</i>                     | blue heliotrope   | Y | 1  | 2 |
| plants | higher dicots | Boraginaceae  | <i>Heliotropium brachygynne</i>                      |                   | C | 1  | 1 |
| plants | higher dicots | Boraginaceae  | <i>Heliotropium consimile</i>                        |                   | C | 2  | 1 |
| plants | higher dicots | Boraginaceae  | <i>Heliotropium cunninghamii</i>                     |                   | C | 1  | 2 |
| plants | higher dicots | Boraginaceae  | <i>Heliotropium curassavicum</i>                     | smooth heliotrope | Y | 1  | 2 |
| plants | higher dicots | Boraginaceae  | <i>Heliotropium geocharis</i>                        |                   | C | 1  | 3 |
| plants | higher dicots | Boraginaceae  | <i>Heliotropium indicum</i>                          |                   | Y | 3  | 3 |
| plants | higher dicots | Boraginaceae  | <i>Heliotropium muelleri</i>                         |                   | C | 1  | 0 |
| plants | higher dicots | Boraginaceae  | <i>Heliotropium ovalifolium</i>                      |                   | C | 2  | 1 |
| plants | higher dicots | Boraginaceae  | <i>Heliotropium pauciflorum</i>                      |                   | C | 2  | 2 |
| plants | higher dicots | Boraginaceae  | <i>Heliotropium peninsulare</i>                      |                   | C | 2  | 2 |
| plants | higher dicots | Boraginaceae  | <i>Heliotropium tenuifolium</i>                      |                   | C | 2  | 8 |
| plants | higher dicots | Malvaceae     | <i>Herissantia crispa</i>                            |                   | C | 2  | 0 |
| plants | higher dicots | Dilleniaceae  | <i>Hibbertia acicularis</i>                          |                   | C | 2  | 1 |
| plants | higher dicots | Dilleniaceae  | <i>Hibbertia cistoidea</i>                           |                   | C | 3  | 0 |
| plants | higher dicots | Dilleniaceae  | <i>Hibbertia stricta</i>                             |                   | C | 1  | 0 |
| plants | higher dicots | Dilleniaceae  | <i>Hibbertia stricta</i> var. <i>fruticosa</i>       |                   | C | 1  | 0 |
| plants | higher dicots | Malvaceae     | <i>Hibiscus brachysiphonius</i>                      |                   | C | 3  | 1 |
| plants | higher dicots | Malvaceae     | <i>Hibiscus burtonii</i>                             |                   | C | 2  | 1 |
| plants | higher dicots | Malvaceae     | <i>Hibiscus divaricatus</i>                          |                   | C | 6  | 1 |
| plants | higher dicots | Malvaceae     | <i>Hibiscus heterophyllus</i>                        |                   | C | 3  | 3 |
| plants | higher dicots | Malvaceae     | <i>Hibiscus heterophyllus</i> x <i>H.meraukensis</i> |                   | C | 1  | 4 |
| plants | higher dicots | Malvaceae     | <i>Hibiscus krichauffianus</i>                       |                   | C | 1  | 2 |

|        |               |               |  |                   |   |   |   |
|--------|---------------|---------------|--|-------------------|---|---|---|
| plants | higher dicots | Malvaceae     | <i>Hibiscus meraukensis</i>                        | Merauke hibiscus  | C | 5 | 1 |
| plants | higher dicots | Malvaceae     | <i>Hibiscus normanii</i>                           |                   | C | 2 | 2 |
| plants | higher dicots | Malvaceae     | <i>Hibiscus sturtii</i>                            |                   | C | 1 | 1 |
| plants | higher dicots | Malvaceae     | <i>Hibiscus sturtii</i> var. <i>campylochlamys</i> |                   | C | 1 | 1 |
| plants | higher dicots | Malvaceae     | <i>Hibiscus sturtii</i> var. <i>grandiflorus</i>   |                   | C | 1 | 1 |
| plants | higher dicots | Malvaceae     | <i>Hibiscus sturtii</i> var. <i>sturtii</i>        |                   | C | 5 | 2 |
| plants | higher dicots | Malvaceae     | <i>Hibiscus trionum</i> var. <i>trionum</i>        |                   | Y | 1 | 0 |
| plants | higher dicots | Malvaceae     | <i>Hibiscus trionum</i> var. <i>vesicarius</i>     |                   | C | 2 | 0 |
| plants | higher dicots | Malvaceae     | <i>Hibiscus vitifolius</i>                         |                   | C | 3 | 1 |
| plants | higher dicots | Euphorbiaceae | <i>Homalanthus stillingiifolius</i>                |                   | C | 1 | 0 |
| plants | higher dicots | Fabaceae      | <i>Hovea densivellosa</i>                          |                   | C | 1 | 0 |
| plants | higher dicots | Fabaceae      | <i>Hovea lanceolata</i>                            |                   | C | 6 | 1 |
| plants | higher dicots | Fabaceae      | <i>Hovea longipes</i>                              | brush hovea       | C | 3 | 0 |
| plants | higher dicots | Fabaceae      | <i>Hovea parvicalyx</i>                            |                   | C | 3 | 8 |
| plants | higher dicots | Fabaceae      | <i>Hovea tholiformis</i>                           |                   | C | 1 | 2 |
| plants | higher dicots | Apocynaceae   | <i>Hoya australis</i> subsp. <i>australis</i>      |                   | C | 5 | 1 |
| plants | higher dicots | Violaceae     | <i>Hybanthus enneaspermus</i>                      |                   | C | 1 | 0 |
| plants | higher dicots | Violaceae     | <i>Hybanthus monopetalus</i>                       |                   | C | 1 | 1 |
| plants | higher dicots | Violaceae     | <i>Hybanthus stellaroides</i>                      |                   | C | 1 | 6 |
| plants | higher dicots | Araliaceae    | <i>Hydrocotyle geraniifolia</i>                    | forest pennywort  | C | 2 | 0 |
| plants | higher dicots | Clusiaceae    | <i>Hypericum gramineum</i>                         |                   | C | 1 | 0 |
| plants | higher dicots | Acanthaceae   | <i>Hypoestes floribunda</i>                        |                   | C | 4 | 3 |
| plants | higher dicots | Lamiaceae     | <i>Hyptis suaveolens</i>                           | hyptis            | Y | 3 | 3 |
| plants | higher dicots | Fabaceae      | <i>Indigostrum parviflorum</i>                     |                   | C | 2 | 1 |
| plants | higher dicots | Fabaceae      | <i>Indigofera australis</i>                        |                   | C | 1 | 0 |
| plants | higher dicots | Fabaceae      | <i>Indigofera brevidens</i>                        |                   | C | 1 | 0 |
| plants | higher dicots | Fabaceae      | <i>Indigofera brevidens</i> var. <i>brevidens</i>  |                   | C | 3 | 2 |
| plants | higher dicots | Fabaceae      | <i>Indigofera colutea</i>                          | sticky indigo     | C | 2 | 0 |
| plants | higher dicots | Fabaceae      | <i>Indigofera ewartiana</i>                        |                   | C | 1 | 1 |
| plants | higher dicots | Fabaceae      | <i>Indigofera haplophylla</i>                      |                   | C | 1 | 0 |
| plants | higher dicots | Fabaceae      | <i>Indigofera hirsuta</i>                          | hairy indigo      | C | 7 | 2 |
| plants | higher dicots | Fabaceae      | <i>Indigofera leucotricha</i>                      |                   | C | 2 | 2 |
| plants | higher dicots | Fabaceae      | <i>Indigofera linifolia</i>                        |                   | C | 2 | 1 |
| plants | higher dicots | Fabaceae      | <i>Indigofera linnaei</i>                          | Birdsville indigo | C | 4 | 0 |
| plants | higher dicots | Fabaceae      | <i>Indigofera pratensis</i>                        |                   | C | 1 | 0 |
| plants | higher dicots | Fabaceae      | <i>Indigofera trifoliata</i>                       |                   | C | 1 | 1 |

|        |               |                 |   |                        |   |   |   |
|--------|---------------|-----------------|---|------------------------|---|---|---|
| plants | higher dicots | Fabaceae        | <i>Indigofera tryonii</i>                                 |                        | C | 1 | 0 |
| plants | higher dicots | Convolvulaceae  | <i>Ipomoea abrupta</i>                                    |                        | C | 2 | 2 |
| plants | higher dicots | Convolvulaceae  | <i>Ipomoea aquatica</i>                                   |                        | C | 2 | 1 |
| plants | higher dicots | Convolvulaceae  | <i>Ipomoea argillicola</i>                                |                        | C | 1 | 1 |
| plants | higher dicots | Convolvulaceae  | <i>Ipomoea brassii</i>                                    |                        | C | 1 | 0 |
| plants | higher dicots | Convolvulaceae  | <i>Ipomoea brownii</i>                                    |                        | C | 3 | 2 |
| plants | higher dicots | Convolvulaceae  | <i>Ipomoea calobra</i>                                    |                        | C | 2 | 1 |
| plants | higher dicots | Convolvulaceae  | <i>Ipomoea coptica</i>                                    |                        | C | 1 | 1 |
| plants | higher dicots | Convolvulaceae  | <i>Ipomoea diamantinensis</i>                             | desert cowvine         | C | 1 | 0 |
| plants | higher dicots | Convolvulaceae  | <i>Ipomoea gracilis</i>                                   |                        | C | 5 | 0 |
| plants | higher dicots | Convolvulaceae  | <i>Ipomoea lonchophylla</i>                               |                        | C | 1 | 1 |
| plants | higher dicots | Convolvulaceae  | <i>Ipomoea pes-caprae</i> subsp. <i>brasiliensis</i>      | goatsfoot              | C | 3 | 0 |
| plants | higher dicots | Convolvulaceae  | <i>Ipomoea plebeia</i>                                    | bellvine               | C | 8 | 9 |
| plants | higher dicots | Convolvulaceae  | <i>Ipomoea polymorpha</i>                                 |                        | C | 7 | 0 |
| plants | higher dicots | Convolvulaceae  | <i>Ipomoea triloba</i>                                    |                        | Y | 3 | 1 |
| plants | higher dicots | Fabaceae        | <i>Jacksonia ramosissima</i>                              |                        | C | 3 | 1 |
| plants | higher dicots | Fabaceae        | <i>Jacksonia rhadinoclonia</i>                            | Miles dogwood          | C | 1 | 3 |
| plants | higher dicots | Convolvulaceae  | <i>Jacquemontia paniculata</i>                            |                        | C | 6 | 2 |
| plants | higher dicots | Convolvulaceae  | <i>Jacquemontia paniculata</i> var. <i>tomentosa</i>      |                        | C | 2 | 2 |
| plants | higher dicots | Sapindaceae     | <i>Jagera pseudorhus</i> var. <i>pseudorhus</i>           |                        | C | 1 | 1 |
| plants | higher dicots | Oleaceae        | <i>Jasminum didymum</i>                                   |                        | C | 7 | 0 |
| plants | higher dicots | Oleaceae        | <i>Jasminum didymum</i> subsp. <i>didymum</i>             |                        | C | 2 | 1 |
| plants | higher dicots | Oleaceae        | <i>Jasminum didymum</i> subsp. <i>lineare</i>             |                        | C | 2 | 1 |
| plants | higher dicots | Oleaceae        | <i>Jasminum didymum</i> subsp. <i>racemosum</i>           |                        | C | 5 | 1 |
| plants | higher dicots | Oleaceae        | <i>Jasminum elongatum</i>                                 |                        | C | 1 | 2 |
| plants | higher dicots | Oleaceae        | <i>Jasminum simplicifolium</i> subsp. <i>australiense</i> |                        | C | 1 | 1 |
| plants | higher dicots | Euphorbiaceae   | <i>Jatropha curcas</i>                                    | physic nut             | Y | 1 | 2 |
| plants | higher dicots | Euphorbiaceae   | <i>Jatropha gossypiifolia</i>                             |                        | Y | 5 | 1 |
| plants | higher dicots | Pedaliaceae     | <i>Josephinia eugeniae</i>                                | <i>josephinia burr</i> | C | 1 | 0 |
| plants | higher dicots | Byttneriaceae   | <i>Keraudrenia collina</i>                                |                        | C | 5 | 2 |
| plants | higher dicots | Byttneriaceae   | <i>Keraudrenia hookeriana</i>                             |                        | C | 2 | 3 |
| plants | higher dicots | Byttneriaceae   | <i>Keraudrenia nephrosperma</i>                           |                        | C | 1 | 3 |
| plants | higher dicots | Rubiaceae       | <i>Knoxia sumatrensis</i>                                 |                        | C | 1 | 3 |
| plants | higher dicots | Caesalpiniaceae | <i>Labichea nitida</i>                                    |                        | C | 7 | 1 |
| plants | higher dicots | Caesalpiniaceae | <i>Labichea rupestris</i>                                 |                        | C | 1 | 3 |
| plants | higher dicots | Asteraceae      | <i>Lactuca saligna</i>                                    | wild lettuce           | Y | 1 | 0 |

|        |               |                  |   |                       |   |    |   |
|--------|---------------|------------------|---|-----------------------|---|----|---|
| plants | higher dicots | Bombacaceae      | <i>Lagunaria queenslandica</i>                          |                       | C | 2  | 2 |
| plants | higher dicots | Verbenaceae      | <i>Lantana camara</i>                                   | Y                     |   | 10 | 1 |
| plants | higher dicots | Rubiaceae        | <i>Larsenaikia jardinei</i>                             |                       | C | 8  | 0 |
| plants | higher dicots | Rubiaceae        | <i>Larsenaikia ochreata</i>                             |                       | C | 1  | 1 |
| plants | higher dicots | Rubiaceae        | <i>Larsenaikia ochreata</i>                             |                       | C | 9  | 1 |
| plants | higher dicots | Asteraceae       | <i>Leiocarpa brevicompta</i>                            |                       | C | 1  | 1 |
| plants | higher dicots | Brassicaceae     | <i>Lepidium africanum</i>                               | common peppercress    | Y | 1  | 1 |
| plants | higher dicots | Brassicaceae     | <i>Lepidium bonariense</i>                              | Argentine peppercress | Y | 1  | 2 |
| plants | higher dicots | Brassicaceae     | <i>Lepidium didymum</i>                                 |                       | Y | 1  | 3 |
| plants | higher dicots | Fabaceae         | <i>Leptosema chapmanii</i>                              |                       | R | 1  | 1 |
| plants | higher dicots | Fabaceae         | <i>Leptosema oxylobioides</i>                           |                       | C | 2  | 4 |
| plants | higher dicots | Myrtaceae        | <i>Leptospermum amboinense</i>                          |                       | C | 1  | 2 |
| plants | higher dicots | Myrtaceae        | <i>Leptospermum anfractum</i>                           |                       | C | 2  | 1 |
| plants | higher dicots | Myrtaceae        | <i>Leptospermum lamellatum</i>                          |                       | C | 6  | 1 |
| plants | higher dicots | Myrtaceae        | <i>Leptospermum neglectum</i>                           |                       | C | 3  | 3 |
| plants | higher dicots | Mimosaceae       | <i>Leucaena leucocephala</i> subsp. <i>glabrata</i>     |                       | Y | 1  | 1 |
| plants | higher dicots | Mimosaceae       | <i>Leucaena leucocephala</i> subsp. <i>leucocephala</i> |                       | Y | 3  | 1 |
| plants | higher dicots | Lamiaceae        | <i>Leucas cephalotes</i>                                |                       | Y | 1  | 3 |
| plants | higher dicots | Lamiaceae        | <i>Leucas lavandulifolia</i>                            |                       | Y | 7  | 1 |
| plants | higher dicots | Ericaceae        | <i>Leucopogon cuspidatus</i>                            |                       | C | 3  | 1 |
| plants | higher dicots | Oleaceae         | <i>Ligustrum australianum</i>                           |                       | C | 2  | 1 |
| plants | higher dicots | Scrophulariaceae | <i>Limnophila fragrans</i>                              |                       | C | 1  | 0 |
| plants | higher dicots | Scrophulariaceae | <i>Limosella australis</i>                              | mudwort               | C | 1  | 1 |
| plants | higher dicots | Scrophulariaceae | <i>Lindernia crustacea</i>                              |                       | C | 2  | 0 |
| plants | higher dicots | Campanulaceae    | <i>Lobelia membranacea</i>                              |                       | C | 2  | 3 |
| plants | higher dicots | Campanulaceae    | <i>Lobelia quadrangularis</i>                           |                       | C | 1  | 2 |
| plants | higher dicots | Loganiaceae      | <i>Logania albiflora</i>                                |                       | C | 1  | 1 |
| plants | higher dicots | Myrtaceae        | <i>Lophostemon confertus</i>                            | brush box             | C | 1  | 1 |
| plants | higher dicots | Myrtaceae        | <i>Lophostemon grandiflorus</i>                         |                       | C | 1  | 1 |
| plants | higher dicots | Myrtaceae        | <i>Lophostemon grandiflorus</i> subsp. <i>riparius</i>  |                       | C | 4  | 1 |
| plants | higher dicots | Myrtaceae        | <i>Lophostemon suaveolens</i>                           | swamp box             | C | 2  | 2 |
| plants | higher dicots | Fabaceae         | <i>Lotus australis</i>                                  | Australian trefoil    | C | 1  | 0 |
| plants | higher dicots | Onagraceae       | <i>Ludwigia octovalvis</i>                              | willow primrose       | C | 1  | 2 |
| plants | higher dicots | Onagraceae       | <i>Ludwigia perennis</i>                                |                       | C | 1  | 1 |
| plants | higher dicots | Solanaceae       | <i>Lycianthes shanesii</i>                              |                       | C | 1  | 0 |
| plants | higher dicots | Loranthaceae     | <i>Lysiana subfalcata</i>                               |                       | C | 4  | 2 |

|        |               |                  |   |                            |   |    |   |
|--------|---------------|------------------|---|----------------------------|---|----|---|
| plants | higher dicots | Myrtaceae        | <i>Lysicarpus angustifolius</i>                                 | budgeroo                   | C | 2  | 2 |
| plants | higher dicots | Caesalpiniaceae  | <i>Lysiphyllum binatum</i>                                      |                            | C | 1  | 2 |
| plants | higher dicots | Caesalpiniaceae  | <i>Lysiphyllum carronii</i>                                     | ebony tree                 | C | 24 | 7 |
| plants | higher dicots | Caesalpiniaceae  | <i>Lysiphyllum hookeri</i>                                      | Queensland ebony           | C | 20 | 0 |
| plants | higher dicots | Fabaceae         | <i>Macroptilium atropurpureum</i>                               | siratro                    | Y | 4  | 0 |
| plants | higher dicots | Fabaceae         | <i>Macroptilium lathyroides</i> var. <i>semierectum</i>         |                            | Y | 2  | 1 |
| plants | higher dicots | Fabaceae         | <i>Macrotyloma uniflorum</i> var. <i>stenocarpum</i>            |                            | Y | 2  | 1 |
| plants | higher dicots | Chenopodiaceae   | <i>Maireana aphylla</i>   | cotton bush                | C | 1  | 1 |
| plants | higher dicots | Chenopodiaceae   | <i>Maireana coronata</i>  |                            | C | 1  | 0 |
| plants | higher dicots | Chenopodiaceae   | <i>Maireana microphylla</i>                                     |                            | C | 3  | 6 |
| plants | higher dicots | Chenopodiaceae   | <i>Maireana villosa</i>   |                            | C | 6  | 1 |
| plants | higher dicots | Euphorbiaceae    | <i>Mallotus nesophilus</i>                                      |                            | C | 2  | 3 |
| plants | higher dicots | Euphorbiaceae    | <i>Mallotus philippensis</i>                                    | red kamala                 | C | 2  | 4 |
| plants | higher dicots | Malvaceae        | <i>Malva parviflora</i>   | small-flowered mallow      | Y | 1  | 1 |
| plants | higher dicots | Malvaceae        | <i>Malvastrum americanum</i>                                    |                            | Y | 4  | 0 |
| plants | higher dicots | Malvaceae        | <i>Malvastrum americanum</i> var. <i>americanum</i>             |                            | Y | 7  | 1 |
| plants | higher dicots | Malvaceae        | <i>Malvastrum coromandelianum</i>                               | prickly malvastrum         | Y | 1  | 0 |
| plants | higher dicots | Malvaceae        | <i>Malvastrum coromandelianum</i> subsp. <i>coromandelianum</i> |                            | Y | 2  | 1 |
| plants | higher dicots | Apocynaceae      | <i>Marsdenia micradenia</i>                                     | gymnema                    | C | 4  | 0 |
| plants | higher dicots | Apocynaceae      | <i>Marsdenia microlepis</i>                                     |                            | C | 4  | 4 |
| plants | higher dicots | Apocynaceae      | <i>Marsdenia pleiadenia</i>                                     |                            | C | 1  | 2 |
| plants | higher dicots | Apocynaceae      | <i>Marsdenia pumila</i>   |                            | V | 1  | 1 |
| plants | higher dicots | Apocynaceae      | <i>Marsdenia rostrata</i>                                       |                            | C | 2  | 5 |
| plants | higher dicots | Apocynaceae      | <i>Marsdenia viridiflora</i>                                    |                            | C | 2  | 1 |
| plants | higher dicots | Apocynaceae      | <i>Marsdenia viridiflora</i> subsp. <i>tropica</i>              |                            | C | 1  | 3 |
| plants | higher dicots | Apocynaceae      | <i>Marsdenia viridiflora</i> subsp. <i>viridiflora</i>          |                            | C | 7  | 0 |
| plants | higher dicots | Martyniaceae     | <i>Martynia annua</i>   | small-fruited devil's claw | Y | 5  | 1 |
| plants | higher dicots | Celastraceae     | <i>Maytenus cunninghamii</i>                                    | yellow berry bush          | C | 11 | 1 |
| plants | higher dicots | Celastraceae     | <i>Maytenus disperma</i>  | orange boxwood             | C | 5  | 2 |
| plants | higher dicots | Scrophulariaceae | <i>Mecardonia procumbens</i>                                    |                            | Y | 5  | 2 |
| plants | higher dicots | Myrtaceae        | <i>Melaleuca bracteata</i>                                      |                            | C | 1  | 1 |
| plants | higher dicots | Myrtaceae        | <i>Melaleuca fluviatilis</i>                                    |                            | C | 1  | 1 |
| plants | higher dicots | Myrtaceae        | <i>Melaleuca leucadendra</i>                                    | broad-leaved tea-tree      | C | 2  | 1 |
| plants | higher dicots | Myrtaceae        | <i>Melaleuca linariifolia</i>                                   | snow-in summer             | C | 6  | 1 |
| plants | higher dicots | Myrtaceae        | <i>Melaleuca nervosa</i>  |                            | C | 14 | 0 |
| plants | higher dicots | Myrtaceae        | <i>Melaleuca nervosa</i> subsp. <i>nervosa</i>                  |                            | C | 1  | 1 |

|        |               |                  |  |                        |   |    |   |
|--------|---------------|------------------|--|------------------------|---|----|---|
| plants | higher dicots | Myrtaceae        | Melaleuca nodosa                       |                        | C | 2  | 1 |
| plants | higher dicots | Myrtaceae        | Melaleuca pallescens                   |                        | C | 4  | 1 |
| plants | higher dicots | Myrtaceae        | Melaleuca tamariscina                  |                        | C | 6  | 2 |
| plants | higher dicots | Myrtaceae        | Melaleuca trichostachya                |                        | C | 3  | 1 |
| plants | higher dicots | Myrtaceae        | Melaleuca uncinata                     |                        | C | 2  | 1 |
| plants | higher dicots | Myrtaceae        | Melaleuca viminalis                    |                        | C | 2  | 1 |
| plants | higher dicots | Myrtaceae        | Melaleuca viridiflora                  |                        | C | 7  | 2 |
| plants | higher dicots | Myrtaceae        | Melaleuca viridiflora var. viridiflora |                        | C | 3  | 2 |
| plants | higher dicots | Pentapetaceae    | Melhania oblongifolia                  |                        | C | 21 | 1 |
| plants | higher dicots | Pentapetaceae    | Melhania ovata                         |                        | C | 1  | 2 |
| plants | higher dicots | Meliaceae        | Melia azedarach                        | white cedar            | C | 1  | 1 |
| plants | higher dicots | Ericaceae        | Melichrus urceolatus                   | honey gorse            | C | 2  | 0 |
| plants | higher dicots | Byttneriaceae    | Melochia corchorifolia                 |                        | C | 1  | 1 |
| plants | higher dicots | Byttneriaceae    | Melochia pyramidata                    |                        | Y | 4  | 1 |
| plants | higher dicots | Memecylaceae     | Memecylon pauciflorum var. pauciflorum |                        | C | 3  | 3 |
| plants | higher dicots | Convolvulaceae   | Merremia dissecta                      |                        | Y | 1  | 1 |
| plants | higher dicots | Convolvulaceae   | Merremia hederacea                     |                        | C | 1  | 1 |
| plants | higher dicots | Convolvulaceae   | Merremia peltata                       | Cook's glory           | C | 1  | 2 |
| plants | higher dicots | Convolvulaceae   | Merremia quinata                       |                        | C | 1  | 1 |
| plants | higher dicots | Convolvulaceae   | Merremia quinquefolia                  |                        | Y | 2  | 6 |
| plants | higher dicots | Rutaceae         | Micromelum minutum                     | clusterberry           | C | 2  | 2 |
| plants | higher dicots | Myrtaceae        | Micromyrtus capricornia                |                        | C | 4  | 1 |
| plants | higher dicots | Myrtaceae        | Micromyrtus gracilis                   |                        | C | 5  | 0 |
| plants | higher dicots | Euphorbiaceae    | Microstachys chamaelea                 |                        | C | 1  | 0 |
| plants | higher dicots | Scrophulariaceae | Mimulus repens                         | creeping monkey flower | C | 1  | 2 |
| plants | higher dicots | Scrophulariaceae | Mimulus repens                         | creeping monkey flower | C | 1  | 0 |
| plants | higher dicots | Sapotaceae       | Mimusops elengi                        |                        | C | 5  | 0 |
| plants | higher dicots | Asteraceae       | Minuria integrifolia                   | smooth minuria         | C | 1  | 1 |
| plants | higher dicots | Fabaceae         | Mirbelia aotoides                      |                        | C | 1  | 5 |
| plants | higher dicots | Fabaceae         | Mirbelia pungens                       |                        | C | 1  | 2 |
| plants | higher dicots | Sapindaceae      | Mischocarpus                           |                        | C | 2  | 2 |
| plants | higher dicots | Sapindaceae      | Mischocarpus anodontus                 | veiny pearfruit        | C | 2  | 1 |
| plants | higher dicots | Sapindaceae      | Mischocarpus macrocarpus               |                        | C | 1  | 1 |
| plants | higher dicots | Sapindaceae      | Mischocarpus stipitatus                |                        | C | 2  | 0 |
| plants | higher dicots | Rubiaceae        | Mitracarpus hirtus                     |                        | Y | 1  | 1 |
| plants | higher dicots | Loganiaceae      | Mitrasacme brachystemonea              |                        | C | 2  | 3 |

|        |               |                |  |                         |   |    |   |
|--------|---------------|----------------|--|-------------------------|---|----|---|
| plants | higher dicots | Loganiaceae    | Mitrasacme loricifolia                     |                         | C | 1  | 1 |
| plants | higher dicots | Loganiaceae    | Mitrasacme prolifera                       |                         | C | 1  | 5 |
| plants | higher dicots | Molluginaceae  | Mollugo cerviana                           |                         | C | 2  | 1 |
| plants | higher dicots | Molluginaceae  | Mollugo verticillata                       |                         | Y | 4  | 0 |
| plants | higher dicots | Cucurbitaceae  | Momordica charantia                        | balsam pear             | Y | 2  | 0 |
| plants | higher dicots | Rubiaceae      | Morinda canthoides                         |                         | C | 4  | 2 |
| plants | higher dicots | Rubiaceae      | Morinda jasminoides                        | morinda                 | C | 2  | 0 |
| plants | higher dicots | Rubiaceae      | Morinda reticulata                         |                         | C | 2  | 3 |
| plants | higher dicots | Polygonaceae   | Muehlenbeckia florulenta                   | lignum                  | C | 7  | 1 |
| plants | higher dicots | Polygonaceae   | Muehlenbeckia rhyticarya                   |                         | C | 1  | 0 |
| plants | higher dicots | Rutaceae       | Murraya ovatifoliolata                     |                         | C | 3  | 2 |
| plants | higher dicots | Rutaceae       | Murraya paniculata cv. Exotica             |                         | Y | 3  | 0 |
| plants | higher dicots | Myoporaceae    | Myoporum acuminatum                        | coastal boabialla       | C | 1  | 1 |
| plants | higher dicots | Myoporaceae    | Myoporum montanum                          | boabialla               | C | 14 | 3 |
| plants | higher dicots | Haloragaceae   | Myriophyllum aquaticum                     | Brazilian water milfoil | Y | 1  | 2 |
| plants | higher dicots | Haloragaceae   | Myriophyllum verrucosum                    | water milfoil           | C | 2  | 1 |
| plants | higher dicots | Myrsinaceae    | Myrsine porosa                             |                         | C | 2  | 1 |
| plants | higher dicots | Myrsinaceae    | Myrsine variabilis                         |                         | C | 1  | 6 |
| plants | higher dicots | Cucurbitaceae  | Neoachmandra cunninghamii                  |                         | C | 1  | 1 |
| plants | higher dicots | Chenopodiaceae | Neobassia proceriflora                     | soda bush               | C | 1  | 1 |
| plants | higher dicots | Mimosaceae     | Neptunia dimorphantha                      |                         | C | 2  | 3 |
| plants | higher dicots | Mimosaceae     | Neptunia gracilis forma gracilis           |                         | C | 13 | 0 |
| plants | higher dicots | Mimosaceae     | Neptunia major                             |                         | C | 2  | 1 |
| plants | higher dicots | Mimosaceae     | Neptunia monosperma                        |                         | C | 2  | 1 |
| plants | higher dicots | Solanaceae     | Nicotiana forsteri                         |                         | C | 1  | 1 |
| plants | higher dicots | Solanaceae     | Nicotiana glauca                           | tree tobacco            | Y | 2  | 2 |
| plants | higher dicots | Solanaceae     | Nicotiana megalosiphon subsp. megalosiphon |                         | C | 4  | 2 |
| plants | higher dicots | Sapotaceae     | Niemeyera antiloga                         | brown pearwood          | C | 6  | 1 |
| plants | higher dicots | Oleaceae       | Notelaea microcarpa                        |                         | C | 1  | 1 |
| plants | higher dicots | Oleaceae       | Notelaea microcarpa var. microcarpa        |                         | C | 2  | 3 |
| plants | higher dicots | Menyanthaceae  | Nymphoides crenata                         | wavy marshwort          | C | 1  | 1 |
| plants | higher dicots | Amaranthaceae  | Nyssanthes diffusa                         | barbed-wire weed        | C | 1  | 1 |
| plants | higher dicots | Amaranthaceae  | Nyssanthes erecta                          |                         | C | 1  | 1 |
| plants | higher dicots | Lamiaceae      | Ocimum americanum var. americanum          |                         | Y | 5  | 3 |
| plants | higher dicots | Lamiaceae      | Ocimum basilicum                           |                         | Y | 2  | 1 |
| plants | higher dicots | Lamiaceae      | Ocimum tenuiflorum                         |                         | C | 4  | 3 |

|        |               |                 |  |                      |   |    |   |
|--------|---------------|-----------------|--|----------------------|---|----|---|
| plants | higher dicots | Rubiaceae       | <i>Oldenlandia coerulescens</i>                                |                      | C | 2  | 6 |
| plants | higher dicots | Rubiaceae       | <i>Oldenlandia corymbosa</i> var. <i>corymbosa</i>             | Y                    |   | 2  | 2 |
| plants | higher dicots | Rubiaceae       | <i>Oldenlandia galioides</i>                                   |                      | C | 2  | 0 |
| plants | higher dicots | Rubiaceae       | <i>Oldenlandia mitrasacmoides</i>                              |                      | C | 1  | 3 |
| plants | higher dicots | Rubiaceae       | <i>Oldenlandia mitrasacmoides</i> subsp. <i>mitrasacmoides</i> |                      | C | 2  | 2 |
| plants | higher dicots | Rubiaceae       | <i>Oldenlandia mitrasacmoides</i> subsp. <i>trachymenoides</i> |                      | C | 4  | 2 |
| plants | higher dicots | Oleaceae        | <i>Olea paniculata</i>   |                      | C | 2  | 2 |
| plants | higher dicots | Asteraceae      | <i>Olearia canescens</i>                                       |                      | C | 1  | 0 |
| plants | higher dicots | Asteraceae      | <i>Olearia subspicata</i>                                      |                      | C | 1  | 3 |
| plants | higher dicots | Asteraceae      | <i>Olearia xerophila</i>                                       |                      | C | 3  | 1 |
| plants | higher dicots | Rubiaceae       | <i>Opercularia diphylla</i>                                    |                      | C | 1  | 1 |
| plants | higher dicots | Convolvulaceae  | <i>Operculina aequisepala</i>                                  |                      | C | 2  | 0 |
| plants | higher dicots | Cactaceae       | <i>Opuntia stricta</i>   | Y                    |   | 1  | 0 |
| plants | higher dicots | Cactaceae       | <i>Opuntia tomentosa</i>                                       | Y                    |   | 11 | 0 |
| plants | higher dicots | Myrtaceae       | <i>Osbornia octodonta</i>                                      | velvety tree pear    |   |    |   |
| plants | higher dicots | Meliaceae       | <i>Owenia acidula</i>  | myrtle mangrove      | C | 1  | 2 |
| plants | higher dicots | Oxalidaceae     | <i>Oxalis chnoodes</i>   | emu apple            | C | 10 | 0 |
| plants | higher dicots | Oxalidaceae     | <i>Oxalis corniculata</i>                                      |                      | C | 1  | 0 |
| plants | higher dicots | Oxalidaceae     | <i>Oxalis perennans</i>  |                      | C | 1  | 1 |
| plants | higher dicots | Oxalidaceae     | <i>Oxalis radicosa</i>   |                      | C | 3  | 4 |
| plants | higher dicots | Oxalidaceae     | <i>Oxalis thompsoniae</i>                                      |                      | C | 1  | 2 |
| plants | higher dicots | Asteraceae      | <i>Ozothamnus eriocephalus</i>                                 |                      | V | 2  | 1 |
| plants | higher dicots | Bignoniaceae    | <i>Pandorea jasminoides</i>                                    |                      | C | 1  | 1 |
| plants | higher dicots | Bignoniaceae    | <i>Pandorea pandorana</i>                                      | wonga vine           | C | 2  | 7 |
| plants | higher dicots | Mimosaceae      | <i>Paraserianthes toona</i>                                    | Mackay cedar         | C | 2  | 1 |
| plants | higher dicots | Caesalpiniaceae | <i>Parkinsonia aculeata</i>                                    | Jerusalem thorn      | Y | 2  | 2 |
| plants | higher dicots | Apocynaceae     | <i>Parsonia eucalyptophylla</i>                                | gargaloo             | C | 3  | 7 |
| plants | higher dicots | Apocynaceae     | <i>Parsonia lanceolata</i>                                     | northern silkpod     | C | 8  | 1 |
| plants | higher dicots | Apocynaceae     | <i>Parsonia plaesiophylla</i>                                  |                      | C | 5  | 6 |
| plants | higher dicots | Apocynaceae     | <i>Parsonia straminea</i>                                      | monkey rope          | C | 2  | 4 |
| plants | higher dicots | Apocynaceae     | <i>Parsonia velutina</i>                                       | hairy silkpod        | C | 1  | 0 |
| plants | higher dicots | Asteraceae      | <i>Parthenium hysterophorus</i>                                | parthenium weed      | Y | 1  | 1 |
| plants | higher dicots | Passifloraceae  | <i>Passiflora aurantia</i>                                     |                      | C | 1  | 0 |
| plants | higher dicots | Passifloraceae  | <i>Passiflora aurantia</i> var. <i>aurantia</i>                |                      | C | 1  | 2 |
| plants | higher dicots | Passifloraceae  | <i>Passiflora foetida</i>                                      |                      | Y | 6  | 0 |
| plants | higher dicots | Passifloraceae  | <i>Passiflora suberosa</i>                                     | corky passion flower | Y | 3  | 4 |

|        |               |                  |  |                  |   |    |   |
|--------|---------------|------------------|--|------------------|---|----|---|
| plants | higher dicots | Rubiaceae        | Pavetta australiensis                                  |                  | C | 1  | 1 |
| plants | higher dicots | Rubiaceae        | Pavetta australiensis var. australiensis               |                  | C | 4  | 0 |
| plants | higher dicots | Rubiaceae        | Pavetta australiensis var. australiensis - P.granitica |                  | C | 1  | 0 |
| plants | higher dicots | Rubiaceae        | Pavetta granitica                                      |                  | C | 1  | 1 |
| plants | higher dicots | Caesalpiniaceae  | Peltophorum pterocarpum                                | yellow poinciana | Y | 1  | 1 |
| plants | higher dicots | Scrophulariaceae | Peplidium foecundum                                    |                  | C | 2  | 3 |
| plants | higher dicots | Scrophulariaceae | Peplidium maritimum                                    |                  | C | 1  | 2 |
| plants | higher dicots | Asteraceae       | Peripleura arida                                       |                  | C | 1  | 1 |
| plants | higher dicots | Asteraceae       | Peripleura bicolor                                     |                  | C | 2  | 2 |
| plants | higher dicots | Asteraceae       | Peripleura hispidula var. hispidula                    |                  | C | 1  | 2 |
| plants | higher dicots | Asteraceae       | Peripleura hispidula var. setosa                       |                  | C | 4  | 3 |
| plants | higher dicots | Asteraceae       | Peripleura obovata                                     |                  | C | 2  | 2 |
| plants | higher dicots | Asteraceae       | Peripleura scabra                                      |                  | R | 3  | 1 |
| plants | higher dicots | Polygonaceae     | Persicaria attenuata                                   |                  | C | 1  | 1 |
| plants | higher dicots | Polygonaceae     | Persicaria lapathifolia                                | pale knotweed    | C | 2  | 2 |
| plants | higher dicots | Polygonaceae     | Persicaria orientalis                                  | princes feathers | C | 1  | 0 |
| plants | higher dicots | Proteaceae       | Persoonia amaliae                                      |                  | R | 9  | 1 |
| plants | higher dicots | Proteaceae       | Persoonia falcata                                      |                  | C | 6  | 0 |
| plants | higher dicots | Picrodendraceae  | Petalostigma banksii                                   |                  | C | 2  | 1 |
| plants | higher dicots | Picrodendraceae  | Petalostigma pubescens                                 | quinine tree     | C | 12 | 2 |
| plants | higher dicots | Caesalpiniaceae  | Petalostylis labicheoides                              |                  | C | 2  | 0 |
| plants | higher dicots | Rutaceae         | Phebalium glandulosum subsp. glandulosum               |                  | C | 4  | 1 |
| plants | higher dicots | Rutaceae         | Phebalium nottii                                       | pink phebalium   | C | 1  | 0 |
| plants | higher dicots | Verbenaceae      | Phyla nodiflora  | carpetweed       | C | 1  | 0 |
| plants | higher dicots | Phyllanthaceae   | Phyllanthus carpentariae                               |                  | C | 1  | 0 |
| plants | higher dicots | Phyllanthaceae   | Phyllanthus collinus                                   |                  | C | 5  | 1 |
| plants | higher dicots | Phyllanthaceae   | Phyllanthus fuernrohrii                                |                  | C | 4  | 0 |
| plants | higher dicots | Phyllanthaceae   | Phyllanthus gunnii                                     |                  | C | 1  | 1 |
| plants | higher dicots | Phyllanthaceae   | Phyllanthus lacerosus                                  |                  | C | 1  | 1 |
| plants | higher dicots | Phyllanthaceae   | Phyllanthus maderaspatensis                            |                  | C | 6  | 1 |
| plants | higher dicots | Phyllanthaceae   | Phyllanthus maderaspatensis var. maderaspatensis       |                  | C | 2  | 4 |
| plants | higher dicots | Phyllanthaceae   | Phyllanthus novae-hollandiae                           |                  | C | 3  | 0 |
| plants | higher dicots | Phyllanthaceae   | Phyllanthus similis                                    |                  | C | 1  | 1 |
| plants | higher dicots | Phyllanthaceae   | Phyllanthus tenellus                                   |                  | Y | 1  | 1 |
| plants | higher dicots | Phyllanthaceae   | Phyllanthus virgatus                                   |                  | C | 5  | 1 |
| plants | higher dicots | Solanaceae       | Physalis angulata                                      |                  | Y | 3  | 1 |

|        |               |                 |  |                           |   |    |   |
|--------|---------------|-----------------|--|---------------------------|---|----|---|
| plants | higher dicots | Solanaceae      | <i>Physalis lanceifolia</i>                            |                           | Y | 2  | 2 |
| plants | higher dicots | Solanaceae      | <i>Physalis pubescens</i>                              |                           | Y | 1  | 1 |
| plants | higher dicots | Thymelaeaceae   | <i>Pimelea haematostachya</i>                          |                           | C | 7  | 1 |
| plants | higher dicots | Thymelaeaceae   | <i>Pimelea linifolia</i>                               |                           | C | 1  | 1 |
| plants | higher dicots | Thymelaeaceae   | <i>Pimelea microcephala</i>                            |                           | C | 1  | 1 |
| plants | higher dicots | Thymelaeaceae   | <i>Pimelea microcephala</i> subsp. <i>microcephala</i> |                           | C | 1  | 1 |
| plants | higher dicots | Urticaceae      | <i>Pipturus argenteus</i>                              | white nettle              | C | 1  | 0 |
| plants | higher dicots | Nyctaginaceae   | <i>Pisonia aculeata</i>                                | thorny Pisonia            | C | 3  | 0 |
| plants | higher dicots | Pittosporaceae  | <i>Pittosporum angustifolium</i>                       |                           | C | 1  | 1 |
| plants | higher dicots | Pittosporaceae  | <i>Pittosporum spinescens</i>                          |                           | C | 2  | 0 |
| plants | higher dicots | Pittosporaceae  | <i>Pittosporum undulatum</i>                           | sweet pittosporum         | C | 1  | 4 |
| plants | higher dicots | Pittosporaceae  | <i>Pittosporum venulosum</i>                           |                           | C | 1  | 2 |
| plants | higher dicots | Sapotaceae      | <i>Planchonella cotinifolia</i>                        |                           | C | 1  | 1 |
| plants | higher dicots | Sapotaceae      | <i>Planchonella myrsinifolia</i>                       |                           | C | 1  | 3 |
| plants | higher dicots | Sapotaceae      | <i>Planchonella pohlmaniana</i>                        |                           | C | 8  | 4 |
| plants | higher dicots | Sapotaceae      | <i>Planchonella pubescens</i>                          |                           | C | 1  | 1 |
| plants | higher dicots | Lecythidaceae   | <i>Planchonia careya</i>                               | cockatoo apple            | C | 8  | 1 |
| plants | higher dicots | Apiaceae        | <i>Platysace valida</i>                                |                           | C | 2  | 0 |
| plants | higher dicots | Lamiaceae       | <i>Plectranthus congestus</i>                          |                           | C | 1  | 1 |
| plants | higher dicots | Lamiaceae       | <i>Plectranthus cyanophyllus</i>                       |                           | C | 2  | 7 |
| plants | higher dicots | Lamiaceae       | <i>Plectranthus diversus</i>                           |                           | C | 5  | 0 |
| plants | higher dicots | Lamiaceae       | <i>Plectranthus graveolens</i>                         | flea bush                 | C | 3  | 1 |
| plants | higher dicots | Lamiaceae       | <i>Plectranthus parviflorus</i>                        |                           | C | 3  | 0 |
| plants | higher dicots | Anacardiaceae   | <i>Pleiogynium timorense</i>                           | Burdekin plum             | C | 12 | 3 |
| plants | higher dicots | Asteraceae      | <i>Pluchea baccharoides</i>                            | narrow-leaved plains bush | C | 2  | 0 |
| plants | higher dicots | Asteraceae      | <i>Pluchea dentex</i>                                  | bowl daisy                | C | 3  | 1 |
| plants | higher dicots | Asteraceae      | <i>Pluchea dioscoridis</i>                             |                           | C | 2  | 1 |
| plants | higher dicots | Asteraceae      | <i>Pluchea dunlopii</i>                                |                           | C | 1  | 0 |
| plants | higher dicots | Asteraceae      | <i>Pluchea rubelliflora</i>                            |                           | C | 1  | 0 |
| plants | higher dicots | Plumbaginaceae  | <i>Plumbago zeylanica</i>                              | native plumbago           | C | 2  | 1 |
| plants | higher dicots | Asteraceae      | <i>Podolepis longipedata</i>                           | tall copper-wire daisy    | C | 1  | 0 |
| plants | higher dicots | Rubiaceae       | <i>Pogonolobus reticulatus</i>                         |                           | C | 10 | 4 |
| plants | higher dicots | Rhamnaceae      | <i>Polianthion minutiflorum</i>                        |                           | V | 1  | 1 |
| plants | higher dicots | Caryophyllaceae | <i>Polycarphaea breviflora</i>                         |                           | C | 1  | 3 |
| plants | higher dicots | Caryophyllaceae | <i>Polycarphaea corymbosa</i>                          |                           | C | 1  | 0 |
| plants | higher dicots | Caryophyllaceae | <i>Polycarphaea corymbosa</i> var. <i>corymbosa</i>    |                           | C | 2  | 2 |

|        |               |                 |   |                  |   |    |   |
|--------|---------------|-----------------|---|------------------|---|----|---|
| plants | higher dicots | Caryophyllaceae | <i>Polycarpea corymbosa</i> var. <i>minor</i>           |                  | C | 1  | 0 |
| plants | higher dicots | Caryophyllaceae | <i>Polycarpea multicaulis</i>                           |                  | C | 2  | 3 |
| plants | higher dicots | Caryophyllaceae | <i>Polycarpea spirostylis</i>                           |                  | C | 4  | 1 |
| plants | higher dicots | Caryophyllaceae | <i>Polycarpea spirostylis</i> subsp. <i>densiflora</i>  |                  | C | 1  | 1 |
| plants | higher dicots | Caryophyllaceae | <i>Polycarpea spirostylis</i> subsp. <i>spirostylis</i> |                  | C | 1  | 0 |
| plants | higher dicots | Polygalaceae    | <i>Polygala linariifolia</i>                            |                  | C | 3  | 2 |
| plants | higher dicots | Polygalaceae    | <i>Polygala rhinanthoides</i>                           |                  | C | 2  | 1 |
| plants | higher dicots | Polygonaceae    | <i>Polygonum plebeium</i>                               | small knotweed   | C | 1  | 2 |
| plants | higher dicots | Convolvulaceae  | <i>Polymeria ambigua</i>                                |                  | C | 2  | 1 |
| plants | higher dicots | Convolvulaceae  | <i>Polymeria longifolia</i>                             |                  | C | 2  | 3 |
| plants | higher dicots | Convolvulaceae  | <i>Polymeria marginata</i>                              |                  | C | 4  | 1 |
| plants | higher dicots | Convolvulaceae  | <i>Polymeria pusilla</i>                                |                  | C | 1  | 0 |
| plants | higher dicots | Araliaceae      | <i>Polyscias australiana</i>                            | ivory basswood   | C | 1  | 1 |
| plants | higher dicots | Araliaceae      | <i>Polyscias elegans</i>                                | celery wood      | C | 1  | 1 |
| plants | higher dicots | Rhamnaceae      | <i>Pomaderris argyrophylla</i>                          |                  | C | 1  | 2 |
| plants | higher dicots | Rubiaceae       | <i>Pomax umbellata</i>                                  |                  | C | 1  | 4 |
| plants | higher dicots | Phyllanthaceae  | <i>Poranthera microphylla</i>                           | small poranthera | C | 1  | 1 |
| plants | higher dicots | Portulacaceae   | <i>Portulaca australis</i>                              |                  | C | 1  | 1 |
| plants | higher dicots | Portulacaceae   | <i>Portulaca bicolor</i>                                |                  | C | 3  | 1 |
| plants | higher dicots | Portulacaceae   | <i>Portulaca filifolia</i>                              |                  | C | 1  | 1 |
| plants | higher dicots | Portulacaceae   | <i>Portulaca oleracea</i>                               | pigweed          | Y | 8  | 1 |
| plants | higher dicots | Portulacaceae   | <i>Portulaca pilosa</i>                                 |                  | Y | 2  | 3 |
| plants | higher dicots | Portulacaceae   | <i>Portulaca pilosa</i> subsp. <i>pilosa</i>            |                  | Y | 2  | 1 |
| plants | higher dicots | Sapotaceae      | <i>Pouteria queenslandica</i>                           |                  | C | 4  | 1 |
| plants | higher dicots | Campanulaceae   | <i>Pratia concolor</i>                                  | poison pratia    | C | 1  | 1 |
| plants | higher dicots | Asteraceae      | <i>Praxelis clematidea</i>                              |                  | Y | 1  | 0 |
| plants | higher dicots | Lamiaceae       | <i>Premna dallachiana</i>                               |                  | C | 1  | 2 |
| plants | higher dicots | Lamiaceae       | <i>Prostanthera leichhardtii</i>                        |                  | C | 1  | 1 |
| plants | higher dicots | Picrodendraceae | <i>Pseudanthus ligulatus</i> subsp. <i>ligulatus</i>    |                  | C | 2  | 2 |
| plants | higher dicots | Acanthaceae     | <i>Pseuderanthemum tenellum</i>                         |                  | C | 1  | 2 |
| plants | higher dicots | Acanthaceae     | <i>Pseuderanthemum variabile</i>                        | pastel flower    | C | 24 | 1 |
| plants | higher dicots | Asteraceae      | <i>Pseudognaphalium luteoalbum</i>                      | Jersey cudweed   | C | 2  | 1 |
| plants | higher dicots | Rubiaceae       | <i>Psychotria daphnooides</i>                           |                  | C | 2  | 1 |
| plants | higher dicots | Rubiaceae       | <i>Psychotria fitzalanii</i>                            |                  | C | 1  | 1 |
| plants | higher dicots | Rubiaceae       | <i>Psychotria lonicerooides</i>                         | hairy psychotria | C | 2  | 2 |
| plants | higher dicots | Rubiaceae       | <i>Psydrax attenuata</i>                                |                  | C | 2  | 4 |

|        |               |                |  |                    |   |    |   |
|--------|---------------|----------------|--|--------------------|---|----|---|
| plants | higher dicots | Rubiaceae      | <i>Psydrax forsteri</i>                        |                    | C | 3  | 0 |
| plants | higher dicots | Rubiaceae      | <i>Psydrax johnsonii</i>                       |                    | C | 11 | 0 |
| plants | higher dicots | Rubiaceae      | <i>Psydrax lamprophylla</i>                    |                    | C | 2  | 2 |
| plants | higher dicots | Rubiaceae      | <i>Psydrax odorata</i>                         |                    | C | 5  | 1 |
| plants | higher dicots | Rubiaceae      | <i>Psydrax odorata forma australiana</i>       |                    | C | 2  | 1 |
| plants | higher dicots | Rubiaceae      | <i>Psydrax odorata forma buxifolia</i>         |                    | C | 3  | 1 |
| plants | higher dicots | Rubiaceae      | <i>Psydrax odorata forma subnitida</i>         |                    | C | 1  | 0 |
| plants | higher dicots | Rubiaceae      | <i>Psydrax odorata subsp. australiana</i>      |                    | C | 7  | 2 |
| plants | higher dicots | Rubiaceae      | <i>Psydrax oleifolia</i>                       |                    | C | 6  | 0 |
| plants | higher dicots | Rubiaceae      | <i>Psydrax saligna forma saligna</i>           |                    | C | 3  | 5 |
| plants | higher dicots | Asteraceae     | <i>Pterocaulon redolens</i>                    |                    | C | 5  | 2 |
| plants | higher dicots | Asteraceae     | <i>Pterocaulon serrulatum</i>                  |                    | C | 7  | 1 |
| plants | higher dicots | Asteraceae     | <i>Pterocaulon serrulatum var. serrulatum</i>  |                    | C | 1  | 1 |
| plants | higher dicots | Asteraceae     | <i>Pterocaulon sphacelatum</i>                 | applebush          | C | 3  | 1 |
| plants | higher dicots | Amaranthaceae  | <i>Ptilotus fusiformis</i>                     |                    | C | 2  | 0 |
| plants | higher dicots | Amaranthaceae  | <i>Ptilotus macrocephalus</i>                  | green pussytails   | C | 2  | 2 |
| plants | higher dicots | Amaranthaceae  | <i>Ptilotus nobilis</i>                        |                    | C | 1  | 0 |
| plants | higher dicots | Amaranthaceae  | <i>Ptilotus nobilis subsp. semilanatus</i>     |                    | C | 5  | 1 |
| plants | higher dicots | Amaranthaceae  | <i>Ptilotus obovatus</i>                       |                    | C | 1  | 1 |
| plants | higher dicots | Amaranthaceae  | <i>Ptilotus polystachyus</i>                   |                    | C | 4  | 1 |
| plants | higher dicots | Fabaceae       | <i>Pultenaea spinosa</i>                       |                    | C | 1  | 2 |
| plants | higher dicots | Combretaceae   | <i>Quisqualis indica</i>                       |                    | Y | 1  | 2 |
| plants | higher dicots | Chenopodiaceae | <i>Rhagodia spinescens</i>                     | thorny saltbush    | C | 6  | 1 |
| plants | higher dicots | Myrtaceae      | <i>Rhodamnia costata</i>                       |                    | C | 2  | 3 |
| plants | higher dicots | Asteraceae     | <i>Rhodanthe microglossa</i>                   | clustered sunray   | C | 2  | 5 |
| plants | higher dicots | Fabaceae       | <i>Rhynchosia acuminatissima</i>               |                    | C | 1  | 0 |
| plants | higher dicots | Fabaceae       | <i>Rhynchosia minima</i>                       |                    | C | 2  | 1 |
| plants | higher dicots | Fabaceae       | <i>Rhynchosia minima</i> var. <i>australis</i> |                    | C | 1  | 1 |
| plants | higher dicots | Fabaceae       | <i>Rhynchosia minima</i> var. <i>minima</i>    |                    | C | 1  | 1 |
| plants | higher dicots | Rubiaceae      | <i>Richardia brasiliensis</i>                  | white eye          | Y | 4  | 1 |
| plants | higher dicots | Euphorbiaceae  | <i>Ricinocarpos ledifolius</i>                 | scrub wedding bush | C | 11 | 0 |
| plants | higher dicots | Euphorbiaceae  | <i>Ricinus communis</i>                        | castor oil bush    | Y | 1  | 1 |
| plants | higher dicots | Zygophyllaceae | <i>Roepera apiculata</i>                       |                    | C | 1  | 4 |
| plants | higher dicots | Brassicaceae   | <i>Rorippa dietrichiana</i>                    |                    | C | 1  | 2 |
| plants | higher dicots | Brassicaceae   | <i>Rorippa gigantea</i>                        |                    | C | 1  | 1 |
| plants | higher dicots | Acanthaceae    | <i>Rostellularia adscendens</i>                |                    | C | 14 | 0 |

|        |               |                |  |                    |   |    |   |
|--------|---------------|----------------|--|--------------------|---|----|---|
| plants | higher dicots | Acanthaceae    | Rostellularia adscendens subsp. adscendens |                    | C | 5  | 2 |
| plants | higher dicots | Acanthaceae    | Rostellularia adscendens var. adscendens   |                    | C | 1  | 3 |
| plants | higher dicots | Acanthaceae    | Rostellularia adscendens var. clementii    |                    | C | 2  | 2 |
| plants | higher dicots | Acanthaceae    | Rostellularia adscendens var. hispida      |                    | C | 2  | 1 |
| plants | higher dicots | Lythraceae     | Rotala occultiflora                        |                    | C | 1  | 0 |
| plants | higher dicots | Acanthaceae    | Ruellia tuberosa                           | Y                  |   | 10 | 0 |
| plants | higher dicots | Acanthaceae    | Ruellia tweediana                          | Y                  |   | 2  | 1 |
| plants | higher dicots | Asteraceae     | Rutidosis leucantha                        |                    | C | 1  | 2 |
| plants | higher dicots | Chenopodiaceae | Salsola kali                               |                    | C | 19 | 1 |
| plants | higher dicots | Chenopodiaceae | Salsola tragus                             | Y                  |   | 4  | 2 |
| plants | higher dicots | Myrtaceae      | Sannantha collina                          |                    | C | 1  | 1 |
| plants | higher dicots | Santalaceae    | Santalum lanceolatum                       |                    | C | 9  | 1 |
| plants | higher dicots | Rutaceae       | Sarcomelicope simplicifolia                |                    | C | 1  | 1 |
| plants | higher dicots | Apocynaceae    | Sarcostemma viminale subsp. australe       |                    | C | 2  | 1 |
| plants | higher dicots | Apocynaceae    | Sarcostemma viminale subsp. brunonianum    |                    | C | 8  | 1 |
| plants | higher dicots | Phyllanthaceae | Sauvagesia albiflorus                      | snowbush           | C | 3  | 1 |
| plants | higher dicots | Phyllanthaceae | Sauvagesia rigens                          |                    | C | 4  | 1 |
| plants | higher dicots | Phyllanthaceae | Sauvagesia trachyspermus                   |                    | C | 1  | 1 |
| plants | higher dicots | Goodeniaceae   | Scaevola spinescens                        | prickly fan flower | C | 1  | 0 |
| plants | higher dicots | Araliaceae     | Schefflera actinophylla                    | umbrella tree      | C | 2  | 1 |
| plants | higher dicots | Araliaceae     | Schefflera arboricola                      |                    | Y | 1  | 1 |
| plants | higher dicots | Gentianaceae   | Schenkia australis                         |                    | C | 2  | 1 |
| plants | higher dicots | Anacardiaceae  | Schinus terebinthifolius                   |                    | Y | 5  | 1 |
| plants | higher dicots | Chenopodiaceae | Sclerolaena anisacanthoides                | yellow burr        | C | 4  | 2 |
| plants | higher dicots | Chenopodiaceae | Sclerolaena bicornis                       |                    | C | 3  | 0 |
| plants | higher dicots | Chenopodiaceae | Sclerolaena bicornis var. horrida          |                    | C | 2  | 0 |
| plants | higher dicots | Chenopodiaceae | Sclerolaena birchii                        | galvanised burr    | C | 5  | 0 |
| plants | higher dicots | Chenopodiaceae | Sclerolaena calcarata                      | red burr           | C | 1  | 3 |
| plants | higher dicots | Chenopodiaceae | Sclerolaena convexula                      |                    | C | 1  | 2 |
| plants | higher dicots | Chenopodiaceae | Sclerolaena cuneata                        | tangled copperburr | C | 1  | 1 |
| plants | higher dicots | Chenopodiaceae | Sclerolaena diacantha                      | grey copper burr   | C | 1  | 2 |
| plants | higher dicots | Chenopodiaceae | Sclerolaena glabra                         |                    | C | 2  | 2 |
| plants | higher dicots | Chenopodiaceae | Sclerolaena muricata                       |                    | C | 2  | 0 |
| plants | higher dicots | Chenopodiaceae | Sclerolaena muricata var. muricata         |                    | C | 2  | 1 |
| plants | higher dicots | Chenopodiaceae | Sclerolaena ramulosa                       |                    | C | 1  | 2 |
| plants | higher dicots | Chenopodiaceae | Sclerolaena tetracuspis                    | brigalow burr      | C | 1  | 1 |

|        |               |                  |  |                  |   |   |   |
|--------|---------------|------------------|--|------------------|---|---|---|
| plants | higher dicots | Chenopodiaceae   | <i>Sclerolaena tricuspis</i>                         | giant red burr   | C | 4 | 1 |
| plants | higher dicots | Flacourtiaceae   | <i>Scolopia braunii</i>                              | flintwood        | C | 3 | 2 |
| plants | higher dicots | Scrophulariaceae | <i>Scoparia dulcis</i>                               | Scoparia         | Y | 1 | 1 |
| plants | higher dicots | Apocynaceae      | <i>Secamone elliptica</i>                            |                  | C | 3 | 2 |
| plants | higher dicots | Asteraceae       | <i>Senecio brigalowensis</i>                         |                  | C | 1 | 1 |
| plants | higher dicots | Asteraceae       | <i>Senecio depressicola</i>                          |                  | C | 1 | 2 |
| plants | higher dicots | Asteraceae       | <i>Senecio quadridentatus</i>                        | cotton fireweed  | C | 1 | 4 |
| plants | higher dicots | Caesalpiniaceae  | <i>Senna aciphylla</i>                               | Australian senna | C | 1 | 0 |
| plants | higher dicots | Caesalpiniaceae  | <i>Senna alata</i>                                   |                  | Y | 2 | 1 |
| plants | higher dicots | Caesalpiniaceae  | <i>Senna artemisioides</i>                           |                  | C | 4 | 1 |
| plants | higher dicots | Caesalpiniaceae  | <i>Senna artemisioides</i> subsp. <i>coriacea</i>    |                  | C | 2 | 2 |
| plants | higher dicots | Caesalpiniaceae  | <i>Senna artemisioides</i> subsp. <i>filifolia</i>   |                  | C | 2 | 2 |
| plants | higher dicots | Caesalpiniaceae  | <i>Senna artemisioides</i> subsp. <i>oligophylla</i> |                  | C | 1 | 1 |
| plants | higher dicots | Caesalpiniaceae  | <i>Senna artemisioides</i> subsp. <i>zygophylla</i>  |                  | C | 1 | 1 |
| plants | higher dicots | Caesalpiniaceae  | <i>Senna barclayana</i>                              |                  | C | 2 | 0 |
| plants | higher dicots | Caesalpiniaceae  | <i>Senna circinnata</i>                              |                  | C | 1 | 0 |
| plants | higher dicots | Caesalpiniaceae  | <i>Senna circinnata</i>                              |                  | C | 5 | 1 |
| plants | higher dicots | Caesalpiniaceae  | <i>Senna coronilloides</i>                           |                  | C | 4 | 1 |
| plants | higher dicots | Caesalpiniaceae  | <i>Senna costata</i>                                 |                  | C | 1 | 1 |
| plants | higher dicots | Caesalpiniaceae  | <i>Senna gaudichaudii</i>                            |                  | C | 4 | 6 |
| plants | higher dicots | Caesalpiniaceae  | <i>Senna magnifolia</i>                              |                  | C | 1 | 2 |
| plants | higher dicots | Caesalpiniaceae  | <i>Senna obtusifolia</i>                             |                  | Y | 1 | 1 |
| plants | higher dicots | Caesalpiniaceae  | <i>Senna occidentalis</i>                            | coffee senna     | Y | 3 | 0 |
| plants | higher dicots | Caesalpiniaceae  | <i>Senna pendula</i> var. <i>glabrata</i>            | Easter cassia    | Y | 1 | 1 |
| plants | higher dicots | Caesalpiniaceae  | <i>Senna planitiicola</i>                            |                  | C | 1 | 1 |
| plants | higher dicots | Byttneriaceae    | <i>Seringia corollata</i>                            |                  | C | 5 | 4 |
| plants | higher dicots | Sapotaceae       | <i>Sersalisia sericea</i>                            |                  | C | 6 | 1 |
| plants | higher dicots | Fabaceae         | <i>Sesbania brachycarpa</i>                          |                  | C | 1 | 1 |
| plants | higher dicots | Fabaceae         | <i>Sesbania campylocarpa</i>                         |                  | C | 2 | 0 |
| plants | higher dicots | Fabaceae         | <i>Sesbania cannabina</i> var. <i>cannabina</i>      |                  | C | 3 | 2 |
| plants | higher dicots | Cucurbitaceae    | <i>Sicyos australis</i>                              | star cucumber    | C | 1 | 1 |
| plants | higher dicots | Malvaceae        | <i>Sida acuta</i>                                    | spinyhead sida   | Y | 4 | 2 |
| plants | higher dicots | Malvaceae        | <i>Sida aprica</i>                                   |                  | C | 2 | 1 |
| plants | higher dicots | Malvaceae        | <i>Sida aprica</i> var. <i>solanacea</i>             |                  | C | 1 | 0 |
| plants | higher dicots | Malvaceae        | <i>Sida atherophora</i>                              |                  | C | 8 | 2 |
| plants | higher dicots | Malvaceae        | <i>Sida brachypoda</i>                               |                  | C | 2 | 1 |

|        |               |                |   |                        |   |    |   |
|--------|---------------|----------------|---|------------------------|---|----|---|
| plants | higher dicots | Malvaceae      | <i>Sida cordifolia</i>                            |                        | Y | 9  | 2 |
| plants | higher dicots | Malvaceae      | <i>Sida everistiana</i>                           |                        | C | 4  | 2 |
| plants | higher dicots | Malvaceae      | <i>Sida fibulifera</i>                            |                        | C | 1  | 2 |
| plants | higher dicots | Malvaceae      | <i>Sida filiformis</i>                            |                        | C | 7  | 1 |
| plants | higher dicots | Malvaceae      | <i>Sida hackettiana</i>                           |                        | C | 2  | 2 |
| plants | higher dicots | Malvaceae      | <i>Sida magnifica</i>                             |                        | C | 2  | 1 |
| plants | higher dicots | Malvaceae      | <i>Sida pleiantha</i>                             |                        | C | 2  | 1 |
| plants | higher dicots | Malvaceae      | <i>Sida rhombifolia</i>                           |                        | Y | 1  | 0 |
| plants | higher dicots | Malvaceae      | <i>Sida rohlenae</i>                              |                        | C | 6  | 1 |
| plants | higher dicots | Malvaceae      | <i>Sida rohlenae</i> subsp. <i>rohlenae</i>       |                        | C | 1  | 2 |
| plants | higher dicots | Malvaceae      | <i>Sida spinosa</i>                               | spiny sida             | Y | 5  | 4 |
| plants | higher dicots | Malvaceae      | <i>Sida trichopoda</i>                            |                        | C | 18 | 1 |
| plants | higher dicots | Malvaceae      | <i>Sida virgata</i>                               |                        | C | 1  | 1 |
| plants | higher dicots | Brassicaceae   | <i>Sisymbrium officinale</i>                      | hedge mustard          | Y | 1  | 1 |
| plants | higher dicots | Elaeocarpaceae | <i>Sloanea langii</i>                             |                        | C | 1  | 0 |
| plants | higher dicots | Elaeocarpaceae | <i>Sloanea macbrydei</i>                          |                        | C | 3  | 3 |
| plants | higher dicots | Solanaceae     | <i>Solanum adenophorum</i>                        |                        | E | 2  | 2 |
| plants | higher dicots | Solanaceae     | <i>Solanum cleistogamum</i>                       |                        | C | 1  | 1 |
| plants | higher dicots | Solanaceae     | <i>Solanum ellipticum</i>                         | potato bush            | C | 2  | 1 |
| plants | higher dicots | Solanaceae     | <i>Solanum erianthum</i>                          | potato tree            | Y | 1  | 3 |
| plants | higher dicots | Solanaceae     | <i>Solanum esuriale</i>                           | quena                  | C | 1  | 2 |
| plants | higher dicots | Solanaceae     | <i>Solanum ferociissimum</i>                      |                        | C | 1  | 1 |
| plants | higher dicots | Solanaceae     | <i>Solanum furfuraceum</i>                        |                        | C | 1  | 1 |
| plants | higher dicots | Solanaceae     | <i>Solanum galbinum</i>                           |                        | C | 2  | 3 |
| plants | higher dicots | Solanaceae     | <i>Solanum nigrum</i> subsp. <i>nigrum</i>        |                        | Y | 3  | 6 |
| plants | higher dicots | Solanaceae     | <i>Solanum nodiflorum</i>                         |                        | Y | 1  | 1 |
| plants | higher dicots | Solanaceae     | <i>Solanum opacum</i>                             | green berry nightshade | C | 1  | 1 |
| plants | higher dicots | Solanaceae     | <i>Solanum parvifolium</i>                        |                        | C | 2  | 1 |
| plants | higher dicots | Solanaceae     | <i>Solanum parvifolium</i> subsp. <i>tropicum</i> |                        | C | 1  | 0 |
| plants | higher dicots | Solanaceae     | <i>Solanum seaforthianum</i>                      | Brazilian nightshade   | Y | 3  | 1 |
| plants | higher dicots | Solanaceae     | <i>Solanum sporadotrichum</i>                     |                        | R | 2  | 1 |
| plants | higher dicots | Solanaceae     | <i>Solanum torvum</i>                             | devil's fig            | Y | 3  | 1 |
| plants | higher dicots | Asteraceae     | <i>Sonchus oleraceus</i>                          | common sowthistle      | Y | 2  | 0 |
| plants | higher dicots | Lamiaceae      | <i>Spartothamnella juncea</i>                     | native broom           | C | 1  | 0 |
| plants | higher dicots | Lamiaceae      | <i>Spartothamnella puberula</i>                   |                        | C | 2  | 0 |
| plants | higher dicots | Rubiaceae      | <i>Spermacoce baileyan</i>                        |                        | C | 1  | 0 |

|        |               |                  |   |                    |   |    |   |
|--------|---------------|------------------|---|--------------------|---|----|---|
| plants | higher dicots | Rubiaceae        | Spermacoce brachystema                  |                    | C | 12 | 1 |
| plants | higher dicots | Rubiaceae        | Spermacoce multicaulis                  |                    | C | 3  | 8 |
| plants | higher dicots | Asteraceae       | Sphaeranthus africanus                  |                    | C | 1  | 0 |
| plants | higher dicots | Asteraceae       | Sphaeranthus indicus                    |                    | C | 1  | 2 |
| plants | higher dicots | Verbenaceae      | Stachytarpheta jamaicensis              | Jamaica snakeweed  | Y | 7  | 1 |
| plants | higher dicots | Stackhousiaceae  | Stackhousia intermedia                  |                    | C | 1  | 2 |
| plants | higher dicots | Scrophulariaceae | Stemodia florulenta                     |                    | C | 1  | 0 |
| plants | higher dicots | Scrophulariaceae | Stemodia glabella                       |                    | C | 1  | 1 |
| plants | higher dicots | Scrophulariaceae | Stemodia pubescens                      |                    | C | 1  | 2 |
| plants | higher dicots | Sterculiaceae    | Sterculia quadrifida                    | peanut tree        | C | 3  | 5 |
| plants | higher dicots | Moraceae         | Streblus brunonianus                    | whalebone tree     | C | 2  | 3 |
| plants | higher dicots | Asteraceae       | Streptoglossa adscendens                | desert daisy       | C | 13 | 1 |
| plants | higher dicots | Scrophulariaceae | Striga parviflora                       |                    | C | 2  | 5 |
| plants | higher dicots | Loganiaceae      | Strychnos psilosperma                   | strychnine tree    | C | 3  | 4 |
| plants | higher dicots | Stylidiaceae     | Stylium eglandulosum                    |                    | C | 4  | 1 |
| plants | higher dicots | Stylidiaceae     | Stylium eriorhizum                      |                    | C | 1  | 2 |
| plants | higher dicots | Fabaceae         | Stylosanthes guianensis                 |                    | Y | 3  | 1 |
| plants | higher dicots | Fabaceae         | Stylosanthes guianensis var. intermedia |                    | Y | 1  | 1 |
| plants | higher dicots | Fabaceae         | Stylosanthes hamata                     |                    | Y | 3  | 1 |
| plants | higher dicots | Fabaceae         | Stylosanthes humilis                    | Townsville stylo   | Y | 2  | 1 |
| plants | higher dicots | Fabaceae         | Stylosanthes scabra                     |                    | Y | 2  | 1 |
| plants | higher dicots | Fabaceae         | Swainsona affinis                       |                    | C | 2  | 1 |
| plants | higher dicots | Fabaceae         | Swainsona campylantha                   |                    | C | 1  | 0 |
| plants | higher dicots | Fabaceae         | Swainsona galegifolia                   | smooth Darling pea | C | 4  | 4 |
| plants | higher dicots | Symplocaceae     | Symplocos stawellii var. stawellii      |                    | C | 1  | 0 |
| plants | higher dicots | Rubiaceae        | Synaptantha tillaeacea var. tillaeacea  |                    | C | 2  | 0 |
| plants | higher dicots | Asteraceae       | Synedrella nodiflora                    |                    | Y | 1  | 2 |
| plants | higher dicots | Myrtaceae        | Syzygium australe                       | scrub cherry       | C | 2  | 1 |
| plants | higher dicots | Myrtaceae        | Syzygium cryptophlebium                 |                    | C | 1  | 1 |
| plants | higher dicots | Myrtaceae        | Syzygium cumini                         |                    | Y | 1  | 2 |
| plants | higher dicots | Myrtaceae        | Syzygium endophloium                    |                    | C | 1  | 1 |
| plants | higher dicots | Myrtaceae        | Syzygium oleosum                        | blue cherry        | C | 2  | 1 |
| plants | higher dicots | Apocynaceae      | Tabernaemontana orientalis              |                    | C | 1  | 3 |
| plants | higher dicots | Apocynaceae      | Tabernaemontana pandacaqui              | banana bush        | C | 1  | 2 |
| plants | higher dicots | Caesalpiniaceae  | Tamarindus indica                       |                    | Y | 5  | 1 |
| plants | higher dicots | Tamaricaceae     | Tamarix aphylla                         | athel tree         | Y | 2  | 2 |

|        |               |                |  |                     |   |    |   |
|--------|---------------|----------------|--|---------------------|---|----|---|
| plants | higher dicots | Myrsinaceae    | Tapeinosperma pseudojambosa  | tapeinosperma       | C | 3  | 1 |
| plants | higher dicots | Bignoniaceae   | Tecoma stans   | tecoma              | Y | 1  | 3 |
| plants | higher dicots | Bignoniaceae   | Tecoma stans var. stans  |                     | Y | 1  | 1 |
| plants | higher dicots | Chenopodiaceae | Tecticornia pergranulata subsp. divaricata                         |                     | C | 1  | 0 |
| plants | higher dicots | Fabaceae       | Tephrosia astragaloides var. (Belyando Crossing E.J.Thompson+ 139) |                     | C | 7  | 0 |
| plants | higher dicots | Fabaceae       | Tephrosia barbatala  |                     | C | 1  | 1 |
| plants | higher dicots | Fabaceae       | Tephrosia brachyodon   |                     | C | 1  | 0 |
| plants | higher dicots | Fabaceae       | Tephrosia brachyodon var. brachyodon                               |                     | C | 1  | 1 |
| plants | higher dicots | Fabaceae       | Tephrosia brachyodon var. longifolia                               |                     | C | 2  | 0 |
| plants | higher dicots | Fabaceae       | Tephrosia celestangii  |                     | C | 1  | 2 |
| plants | higher dicots | Fabaceae       | Tephrosia filipes forma vestita                                    |                     | C | 1  | 0 |
| plants | higher dicots | Fabaceae       | Tephrosia filipes subsp. filipes                                   |                     | C | 3  | 1 |
| plants | higher dicots | Fabaceae       | Tephrosia filipes var. (Mt Blackjack A.R.Bean+ 7332)               |                     | C | 4  | 4 |
| plants | higher dicots | Fabaceae       | Tephrosia juncea   |                     | C | 1  | 2 |
| plants | higher dicots | Fabaceae       | Tephrosia leptoclada   |                     | C | 1  | 1 |
| plants | higher dicots | Fabaceae       | Tephrosia macrostachya   |                     | C | 1  | 1 |
| plants | higher dicots | Fabaceae       | Tephrosia purpurea var. sericea                                    |                     | C | 4  | 1 |
| plants | higher dicots | Fabaceae       | Tephrosia rufula   |                     | C | 1  | 2 |
| plants | higher dicots | Combretaceae   | Terminalia aridicola   |                     | C | 1  | 1 |
| plants | higher dicots | Combretaceae   | Terminalia aridicola subsp. aridicola                              |                     | C | 1  | 9 |
| plants | higher dicots | Combretaceae   | Terminalia aridicola subsp. chillagoensis                          |                     | C | 1  | 2 |
| plants | higher dicots | Combretaceae   | Terminalia melanocarpa   |                     | C | 1  | 1 |
| plants | higher dicots | Combretaceae   | Terminalia muelleri  |                     | C | 4  | 2 |
| plants | higher dicots | Combretaceae   | Terminalia oblongata   |                     | C | 13 | 0 |
| plants | higher dicots | Combretaceae   | Terminalia oblongata subsp. oblongata                              |                     | C | 4  | 0 |
| plants | higher dicots | Combretaceae   | Terminalia porphyrocarpa   |                     | C | 4  | 0 |
| plants | higher dicots | Aizoaceae      | Tetragonia tetragonoides   | New Zealand spinach | C | 2  | 2 |
| plants | higher dicots | Vitaceae       | Tetrastigma nitens   | shining grape       | C | 1  | 8 |
| plants | higher dicots | Lamiaceae      | Teucrium integrifolium   |                     | C | 1  | 1 |
| plants | higher dicots | Thymelaeaceae  | Thecanthes cornucopiae   |                     | C | 1  | 0 |
| plants | higher dicots | Myrtaceae      | Thryptomene parviflora   |                     | C | 1  | 2 |
| plants | higher dicots | Araliaceae     | Trachymene montana   |                     | C | 1  | 0 |
| plants | higher dicots | Euphorbiaceae  | Tragia novae-hollandiae  | stinging-vine       | C | 1  | 1 |
| plants | higher dicots | Ulmaceae       | Trema tomentosa  |                     | C | 2  | 7 |
| plants | higher dicots | Ulmaceae       | Trema tomentosa var. aspera  |                     | C | 1  | 0 |
| plants | higher dicots | Aizoaceae      | Trianthema portulacastrum  | black pigweed       | Y | 1  | 3 |

|        |               |                  |  |                      |   |    |   |
|--------|---------------|------------------|--|----------------------|---|----|---|
| plants | higher dicots | Aizoaceae        | <i>Trianthema triquetra</i>                          | red spinach          | C | 19 | 0 |
| plants | higher dicots | Zygophyllaceae   | <i>Tribulopis angustifolia</i>                       |                      | C | 1  | 0 |
| plants | higher dicots | Zygophyllaceae   | <i>Tribulopis pentandra</i>                          |                      | C | 1  | 1 |
| plants | higher dicots | Zygophyllaceae   | <i>Tribulus cistoides</i>                            | bulls head vine      | C | 2  | 1 |
| plants | higher dicots | Zygophyllaceae   | <i>Tribulus eichlerianus</i>                         | bull head            | C | 1  | 1 |
| plants | higher dicots | Zygophyllaceae   | <i>Tribulus micrococcus</i>                          | yellow vine          | C | 4  | 2 |
| plants | higher dicots | Zygophyllaceae   | <i>Tribulus terrestris</i>                           | caltrop              | C | 7  | 0 |
| plants | higher dicots | Boraginaceae     | <i>Trichodesma zeylanicum</i>                        |                      | C | 1  | 0 |
| plants | higher dicots | Boraginaceae     | <i>Trichodesma zeylanicum</i> var. <i>zeylanicum</i> |                      | C | 5  | 5 |
| plants | higher dicots | Asteraceae       | <i>Tridax procumbens</i>                             | tridax daisy         | Y | 4  | 1 |
| plants | higher dicots | Rubiaceae        | <i>Triflorensia ixoroides</i>                        |                      | C | 2  | 4 |
| plants | higher dicots | Myrtaceae        | <i>Triplarina calophylla</i>                         |                      | C | 2  | 0 |
| plants | higher dicots | Sparrmanniaceae  | <i>Triumfetta pentandra</i>                          |                      | Y | 2  | 2 |
| plants | higher dicots | Sparrmanniaceae  | <i>Triumfetta pentandra</i>                          |                      | Y | 1  | 4 |
| plants | higher dicots | Sparrmanniaceae  | <i>Triumfetta rhomboidea</i>                         | chinese burr         | Y | 6  | 1 |
| plants | higher dicots | Moraceae         | <i>Trophis scandens</i> subsp. <i>scandens</i>       |                      | C | 2  | 1 |
| plants | higher dicots | Meliaceae        | <i>Turraea pubescens</i>                             | native honeysuckle   | C | 1  | 1 |
| plants | higher dicots | Apocynaceae      | <i>Tylophora erecta</i>                              |                      | C | 3  | 0 |
| plants | higher dicots | Fabaceae         | <i>Uraria lagopodioides</i>                          |                      | C | 1  | 0 |
| plants | higher dicots | Fabaceae         | <i>Uraria picta</i>                                  |                      | C | 1  | 1 |
| plants | higher dicots | Malvaceae        | <i>Urena lobata</i>                                  | urena weed           | Y | 1  | 2 |
| plants | higher dicots | Lentibulariaceae | <i>Utricularia aurea</i>                             | golden bladderwort   | C | 1  | 7 |
| plants | higher dicots | Lentibulariaceae | <i>Utricularia caerulea</i>                          | blue bladderwort     | C | 1  | 0 |
| plants | higher dicots | Lentibulariaceae | <i>Utricularia gibba</i>                             | floating bladderwort | C | 1  | 1 |
| plants | higher dicots | Lentibulariaceae | <i>Utricularia limosa</i>                            |                      | C | 1  | 1 |
| plants | higher dicots | Goodeniaceae     | <i>Velleia paradoxa</i>                              | spur velleia         | C | 1  | 1 |
| plants | higher dicots | Rhamnaceae       | <i>Ventilago ecorollata</i>                          |                      | C | 1  | 1 |
| plants | higher dicots | Rhamnaceae       | <i>Ventilago viminalis</i>                           | supplejack           | C | 11 | 2 |
| plants | higher dicots | Verbenaceae      | <i>Verbena litoralis</i> var. <i>litoralis</i>       |                      | Y | 1  | 1 |
| plants | higher dicots | Verbenaceae      | <i>Verbena macrostachya</i>                          |                      | C | 1  | 2 |
| plants | higher dicots | Asteraceae       | <i>Verbesina encelioides</i>                         | crownbeard           | Y | 1  | 2 |
| plants | higher dicots | Fabaceae         | <i>Vigna hosei</i>                                   |                      | Y | 1  | 1 |
| plants | higher dicots | Fabaceae         | <i>Vigna lanceolata</i>                              |                      | C | 1  | 1 |
| plants | higher dicots | Fabaceae         | <i>Vigna lanceolata</i> var. <i>lanceolata</i>       |                      | C | 6  | 1 |
| plants | higher dicots | Fabaceae         | <i>Vigna radiata</i> var. <i>sublobata</i>           |                      | C | 2  | 0 |
| plants | higher dicots | Fabaceae         | <i>Vigna vexillata</i> var. <i>angustifolia</i>      |                      | C | 1  | 1 |

|        |               |                |   |                          |   |   |   |
|--------|---------------|----------------|---|--------------------------|---|---|---|
| plants | higher dicots | Fabaceae       | <i>Vigna vexillata</i> var. <i>youngiana</i>                      | C                        | 1 | 0 |   |
| plants | higher dicots | Lamiaceae      | <i>Vitex trifolia</i> var. <i>subtrisepta</i>                     | C                        | 1 | 0 |   |
| plants | higher dicots | Lamiaceae      | <i>Vitex trifolia</i> var. <i>trifolia</i>                        | C                        | 1 | 1 |   |
| plants | higher dicots | Asteraceae     | <i>Vittadinia dissecta</i> var. <i>dissecta</i>                   | C                        | 1 | 2 |   |
| plants | higher dicots | Asteraceae     | <i>Vittadinia pustulata</i>                                       | C                        | 2 | 1 |   |
| plants | higher dicots | Asteraceae     | <i>Vittadinia sulcata</i>   | native daisy             | C | 1 | 1 |
| plants | higher dicots | Campanulaceae  | <i>Wahlenbergia caryophylloides</i>                               | C                        | 1 | 1 |   |
| plants | higher dicots | Campanulaceae  | <i>Wahlenbergia gracilis</i>                                      | sprawling bluebell       | C | 1 | 2 |
| plants | higher dicots | Campanulaceae  | <i>Wahlenbergia tumidifructa</i>                                  | C                        | 1 | 2 |   |
| plants | higher dicots | Byttneriaceae  | <i>Waltheria indica</i>   | C                        | 6 | 1 |   |
| plants | higher dicots | Asteraceae     | <i>Wedelia spilanthoides</i>                                      | C                        | 1 | 1 |   |
| plants | higher dicots | Thymelaeaceae  | <i>Wikstroemia indica</i>   | tie bush                 | C | 1 | 2 |
| plants | higher dicots | Apocynaceae    | <i>Wrightia saligna</i>   | C                        | 2 | 2 |   |
| plants | higher dicots | Apocynaceae    | <i>Wrightia versicolor</i>  | C                        | 3 | 4 |   |
| plants | higher dicots | Asteraceae     | <i>Xanthium occidentale</i>                                       | Y                        | 1 | 2 |   |
| plants | higher dicots | Convolvulaceae | <i>Xenostegia tridentata</i>                                      | C                        | 1 | 3 |   |
| plants | higher dicots | Asteraceae     | <i>Xerochrysum bracteatum</i>                                     | golden everlasting daisy | C | 1 | 1 |
| plants | higher dicots | Asteraceae     | <i>Xerochrysum bracteatum</i> subsp. (Mount Elliot A.R.Bean 3593) | C                        | 1 | 1 |   |
| plants | higher dicots | Olacaceae      | <i>Ximenia americana</i>  | C                        | 1 | 0 |   |
| plants | higher dicots | Meliaceae      | <i>Xylocarpus moluccensis</i>                                     | C                        | 1 | 0 |   |
| plants | higher dicots | Aizoaceae      | <i>Zaleya galericulata</i>  | C                        | 2 | 1 |   |
| plants | higher dicots | Aizoaceae      | <i>Zaleya galericulata</i> subsp. <i>galericulata</i>             | C                        | 2 | 3 |   |
| plants | higher dicots | Rutaceae       | <i>Zanthoxylum brachyacanthum</i>                                 | C                        | 1 | 4 |   |
| plants | higher dicots | Rutaceae       | <i>Zieria aspalathoides</i> subsp. <i>aspalathoides</i>           | C                        | 1 | 0 |   |
| plants | higher dicots | Rutaceae       | <i>Zieria smithii</i>   | C                        | 2 | 2 |   |
| plants | higher dicots | Asteraceae     | <i>Zinnia peruviana</i>   | wild zinnia              | Y | 1 | 2 |
| plants | higher dicots | Rhamnaceae     | <i>Ziziphus mauritiana</i>  | Indian jujube            | Y | 8 | 1 |
| plants | higher dicots | Fabaceae       | <i>Zornia areolata</i>  | C                        | 2 | 0 |   |
| plants | higher dicots | Fabaceae       | <i>Zornia dyctiocarpa</i> var. <i>filifolia</i>                   | C                        | 1 | 0 |   |
| plants | higher dicots | Fabaceae       | <i>Zornia floribunda</i>  | C                        | 1 | 1 |   |
| plants | higher dicots | Fabaceae       | <i>Zornia muelleriana</i>   | C                        | 1 | 0 |   |
| plants | higher dicots | Fabaceae       | <i>Zornia muelleriana</i> subsp. <i>muelleriana</i>               | C                        | 4 | 1 |   |
| plants | higher dicots | Fabaceae       | <i>Zornia muriculata</i>  | C                        | 1 | 2 |   |
| plants | higher dicots | Fabaceae       | <i>Zornia muriculata</i> subsp. <i>angustata</i>                  | C                        | 1 | 1 |   |
| plants | higher dicots | Fabaceae       | <i>Zornia prostrata</i>   | C                        | 1 | 1 |   |
| plants | higher dicots | Fabaceae       | <i>Zornia prostrata</i> var. <i>prostrata</i>                     | C                        | 1 | 4 |   |

|        |               |                  |  |                     |   |   |   |
|--------|---------------|------------------|--|---------------------|---|---|---|
| plants | higher dicots | Fabaceae         | Zornia ramosa                              |                     | C | 1 | 2 |
| plants | lower dicots  | Annonaceae       | Annona squamosa                            | Y                   |   | 1 | 1 |
| plants | lower dicots  | Papaveraceae     | Argemone ochroleuca subsp. ochroleuca      | mexican poppy       | Y | 8 | 1 |
| plants | lower dicots  | Aristolochiaceae | Aristolochia elegans                       | calico-flower       | Y | 1 | 1 |
| plants | lower dicots  | Avicenniaceae    | Avicennia marina subsp. eucalyptifolia     |                     | C | 1 | 1 |
| plants | lower dicots  | Lauraceae        | Beilschmiedia collina                      |                     | C | 1 | 0 |
| plants | lower dicots  | Lauraceae        | Cassytha filiformis                        | dodder laurel       | C | 1 | 1 |
| plants | lower dicots  | Lauraceae        | Cassytha glabella forma glabella           |                     | C | 1 | 0 |
| plants | lower dicots  | Lauraceae        | Cassytha pubescens                         | downy devil's twine | C | 2 | 1 |
| plants | lower dicots  | Ceratophyllaceae | Ceratophyllum demersum                     | hornwort            | C | 1 | 0 |
| plants | lower dicots  | Lauraceae        | Cinnamomum oliveri                         | Oliver's sassafras  | C | 1 | 1 |
| plants | lower dicots  | Ranunculaceae    | Clematis glycinoides                       |                     | C | 2 | 0 |
| plants | lower dicots  | Lauraceae        | Cryptocarya bidwillii                      | yellow laurel       | C | 1 | 0 |
| plants | lower dicots  | Lauraceae        | Cryptocarya macdonaldii                    | McDonald's laurel   | C | 2 | 0 |
| plants | lower dicots  | Lauraceae        | Cryptocarya triplinervis                   |                     | C | 1 | 4 |
| plants | lower dicots  | Lauraceae        | Cryptocarya triplinervis var. triplinervis |                     | C | 1 | 3 |
| plants | lower dicots  | Lauraceae        | Endiandra muelleri                         |                     | C | 2 | 1 |
| plants | lower dicots  | Lauraceae        | Endiandra muelleri subsp. bracteata        |                     | C | 1 | 4 |
| plants | lower dicots  | Annonaceae       | Fitzalanias heteropetala                   |                     | C | 3 | 1 |
| plants | lower dicots  | Hernandiaceae    | Gyrocarpus americanus                      |                     | C | 4 | 1 |
| plants | lower dicots  | Hernandiaceae    | Gyrocarpus americanus subsp. americanus    |                     | C | 3 | 5 |
| plants | lower dicots  | Lauraceae        | Litsea glutinosa                           |                     | C | 1 | 4 |
| plants | lower dicots  | Lauraceae        | Litsea leefeana                            |                     | C | 1 | 1 |
| plants | lower dicots  | Annonaceae       | Melodorum crassipetalum                    |                     | C | 3 | 0 |
| plants | lower dicots  | Annonaceae       | Melodorum leichhardtii                     |                     | C | 3 | 2 |
| plants | lower dicots  | Annonaceae       | Miliusa brahei                             |                     | C | 1 | 1 |
| plants | lower dicots  | Lauraceae        | Neolitsea brassii                          |                     | C | 3 | 1 |
| plants | lower dicots  | Lauraceae        | Neolitsea dealbata                         | white bolly gum     | C | 1 | 0 |
| plants | lower dicots  | Nymphaeaceae     | Nymphaea gigantea                          |                     | C | 2 | 2 |
| plants | lower dicots  | Menispermaceae   | Pachygone ovata                            |                     | C | 2 | 7 |
| plants | lower dicots  | Piperaceae       | Peperomia blanda var. floribunda           |                     | C | 2 | 0 |
| plants | lower dicots  | Piperaceae       | Peperomia tetraphylla                      |                     | C | 1 | 2 |
| plants | lower dicots  | Piperaceae       | Piper hederaceum                           |                     | C | 1 | 1 |
| plants | lower dicots  | Menispermaceae   | Pleogyne australis                         | wiry grape          | C | 4 | 5 |
| plants | lower dicots  | Annonaceae       | Polyalthia nitidissima                     | polyalthia          | C | 5 | 1 |
| plants | lower dicots  | Menispermaceae   | Stephania japonica                         |                     | C | 1 | 2 |

|        |              |                 |   |                      |   |    |   |
|--------|--------------|-----------------|---|----------------------|---|----|---|
| plants | lower dicots | Menispermaceae  | <i>Stephania japonica</i> var. <i>discolor</i>          |                      | C | 1  | 0 |
| plants | lower dicots | Menispermaceae  | <i>Stephania japonica</i> var. <i>timoriensis</i>       |                      | C | 1  | 2 |
| plants | lower dicots | Winteraceae     | <i>Tasmannia insipida</i>                               | brush pepperbush     | C | 2  | 0 |
| plants | lower dicots | Menispermaceae  | <i>Tinospora smilacina</i>                              | snakevine            | C | 5  | 2 |
| plants | lower dicots | Monimiaceae     | <i>Wilkiea macrophylla</i>                              | large-leaved wilkiea | C | 3  | 1 |
| plants | monocots     | Cyperaceae      | <i>Abildgaardia ovata</i>                               |                      | C | 4  | 0 |
| plants | monocots     | Cyperaceae      | <i>Abildgaardia vaginata</i>                            |                      | C | 2  | 1 |
| plants | monocots     | Poaceae         | <i>Acrachne racemosa</i>                                |                      | C | 1  | 3 |
| plants | monocots     | Poaceae         | <i>Alloteropsis cimicina</i>                            |                      | C | 6  | 1 |
| plants | monocots     | Poaceae         | <i>Alloteropsis semialata</i>                           | cockatoo grass       | C | 2  | 0 |
| plants | monocots     | Zingiberaceae   | <i>Alpinia caerulea</i>                                 | wild ginger          | C | 1  | 2 |
| plants | monocots     | Poaceae         | <i>Ancistrachne uncinulata</i>                          | hooky grass          | C | 2  | 3 |
| plants | monocots     | Aponogetonaceae | <i>Aponogeton queenslandicus</i>                        |                      | R | 1  | 1 |
| plants | monocots     | Arecaceae       | <i>Archontophoenix cunninghamiana</i>                   | piccabeen palm       | C | 1  | 0 |
| plants | monocots     | Poaceae         | <i>Aristida acuta</i>                                   |                      | C | 1  | 1 |
| plants | monocots     | Poaceae         | <i>Aristida biglandulosa</i>                            |                      | C | 2  | 0 |
| plants | monocots     | Poaceae         | <i>Aristida calycina</i>                                |                      | C | 4  | 1 |
| plants | monocots     | Poaceae         | <i>Aristida calycina</i> var. <i>calycina</i>           |                      | C | 7  | 2 |
| plants | monocots     | Poaceae         | <i>Aristida calycina</i> var. <i>praealta</i>           |                      | C | 1  | 1 |
| plants | monocots     | Poaceae         | <i>Aristida caput-medusae</i>                           |                      | C | 5  | 0 |
| plants | monocots     | Poaceae         | <i>Aristida gracilipes</i>                              |                      | C | 1  | 1 |
| plants | monocots     | Poaceae         | <i>Aristida granitica</i>                               |                      | E | 2  | 1 |
| plants | monocots     | Poaceae         | <i>Aristida holathera</i>                               |                      | C | 3  | 0 |
| plants | monocots     | Poaceae         | <i>Aristida holathera</i> var. <i>holathera</i>         |                      | C | 7  | 1 |
| plants | monocots     | Poaceae         | <i>Aristida hygrometrica</i>                            |                      | C | 3  | 1 |
| plants | monocots     | Poaceae         | <i>Aristida inaequiglumis</i>                           |                      | C | 3  | 7 |
| plants | monocots     | Poaceae         | <i>Aristida ingrata</i>                                 |                      | C | 4  | 3 |
| plants | monocots     | Poaceae         | <i>Aristida jerichoensis</i>                            |                      | C | 10 | 1 |
| plants | monocots     | Poaceae         | <i>Aristida jerichoensis</i> var. <i>jerichoensis</i>   |                      | C | 2  | 1 |
| plants | monocots     | Poaceae         | <i>Aristida jerichoensis</i> var. <i>subspinulifera</i> |                      | C | 5  | 0 |
| plants | monocots     | Poaceae         | <i>Aristida latifolia</i>                               | feathertop wiregrass | C | 8  | 3 |
| plants | monocots     | Poaceae         | <i>Aristida leptopoda</i>                               | white speargrass     | C | 6  | 1 |
| plants | monocots     | Poaceae         | <i>Aristida muricata</i>                                |                      | C | 1  | 3 |
| plants | monocots     | Poaceae         | <i>Aristida personata</i>                               |                      | C | 5  | 3 |
| plants | monocots     | Poaceae         | <i>Aristida pruinosa</i>                                |                      | C | 2  | 1 |
| plants | monocots     | Poaceae         | <i>Aristida queenslandica</i>                           |                      | C | 1  | 2 |

|        |          |               |   |                       |   |    |   |
|--------|----------|---------------|---|-----------------------|---|----|---|
| plants | monocots | Poaceae       | Aristida queenslandica var. dissimilis    | C                     | 1 | 1  |   |
| plants | monocots | Poaceae       | Aristida queenslandica var. queenslandica | C                     | 2 | 3  |   |
| plants | monocots | Poaceae       | Aristida ramosa                           | purple wiregrass      | C | 1  | 1 |
| plants | monocots | Poaceae       | Aristida sciurooides                      |                       | C | 1  | 1 |
| plants | monocots | Poaceae       | Aristida spuria                           |                       | C | 2  | 1 |
| plants | monocots | Poaceae       | Aristida superpendens                     |                       | C | 1  | 1 |
| plants | monocots | Poaceae       | Aristida warburgii                        |                       | C | 1  | 0 |
| plants | monocots | Poaceae       | Arthragrostis deschampsiodes              |                       | C | 1  | 0 |
| plants | monocots | Poaceae       | Arundinella                               |                       | C | 1  | 0 |
| plants | monocots | Poaceae       | Arundinella nepalensis                    | reedgrass             | C | 2  | 1 |
| plants | monocots | Poaceae       | Arundo donax                              |                       | Y | 1  | 3 |
| plants | monocots | Asparagaceae  | Asparagus aethiopicus cv. Sprenger        |                       | Y | 1  | 2 |
| plants | monocots | Asparagaceae  | Asparagus racemosus                       | native asparagus      | C | 1  | 4 |
| plants | monocots | Poaceae       | Astrebla elymoides                        | hoop mitchell grass   | C | 9  | 2 |
| plants | monocots | Poaceae       | Astrebla lappacea                         | curly mitchell grass  | C | 4  | 2 |
| plants | monocots | Poaceae       | Astrebla pectinata                        | barley mitchell grass | C | 1  | 2 |
| plants | monocots | Poaceae       | Astrebla squarrosa                        | bull mitchell grass   | C | 12 | 0 |
| plants | monocots | Poaceae       | Austrostipa verticillata                  | slender bamboo grass  | C | 1  | 2 |
| plants | monocots | Poaceae       | Bothriochloa bladhii                      |                       | C | 2  | 1 |
| plants | monocots | Poaceae       | Bothriochloa bladhii subsp. bladhii       |                       | C | 3  | 0 |
| plants | monocots | Poaceae       | Bothriochloa bladhii subsp. glabra        |                       | Y | 1  | 1 |
| plants | monocots | Poaceae       | Bothriochloa decipiens                    |                       | C | 5  | 1 |
| plants | monocots | Poaceae       | Bothriochloa decipiens var. cloncurrensis |                       | C | 1  | 2 |
| plants | monocots | Poaceae       | Bothriochloa decipiens var. decipiens     |                       | C | 1  | 0 |
| plants | monocots | Poaceae       | Bothriochloa erianthoides                 | satin top grass       | C | 2  | 1 |
| plants | monocots | Poaceae       | Bothriochloa ewartiana                    | desert bluegrass      | C | 14 | 2 |
| plants | monocots | Poaceae       | Bothriochloa pertusa                      |                       | Y | 3  | 1 |
| plants | monocots | Poaceae       | Brachyachne ciliaris                      | hairy native couch    | C | 1  | 1 |
| plants | monocots | Poaceae       | Brachyachne convergens                    | common native couch   | C | 1  | 1 |
| plants | monocots | Poaceae       | Brachyachne tenella                       |                       | C | 1  | 1 |
| plants | monocots | Asphodelaceae | Bulbine bulbosa                           | golden lily           | C | 3  | 1 |
| plants | monocots | Orchidaceae   | Bulbophyllum macphersonii                 |                       | C | 2  | 7 |
| plants | monocots | Orchidaceae   | Bulbophyllum newportii                    |                       | C | 1  | 1 |
| plants | monocots | Orchidaceae   | Bulbophyllum schillerianum                | red rope orchid       | C | 2  | 0 |
| plants | monocots | Cyperaceae    | Bulbostylis barbata                       |                       | C | 5  | 1 |
| plants | monocots | Cyperaceae    | Bulbostylis pyriformis                    |                       | C | 1  | 2 |

|        |          |                  |  |                                |   |    |   |
|--------|----------|------------------|--|--------------------------------|---|----|---|
| plants | monocots | Johnsoniaceae    | <i>Caesia chlorantha</i>                         |                                | C | 1  | 1 |
| plants | monocots | Johnsoniaceae    | <i>Caesia parviflora</i> var. <i>parviflora</i>  |                                | C | 1  | 1 |
| plants | monocots | Johnsoniaceae    | <i>Caesia parviflora</i> var. <i>vittata</i>     |                                | C | 2  | 1 |
| plants | monocots | Orchidaceae      | <i>Caladenia carnea</i>                          |                                | C | 1  | 4 |
| plants | monocots | Alismataceae     | <i>Caldesia oligococca</i>                       |                                | C | 1  | 0 |
| plants | monocots | Amaryllidaceae   | <i>Calostemma luteum</i>                         |                                | C | 4  | 1 |
| plants | monocots | Poaceae          | <i>Calyptochloa gracillima</i>                   |                                | C | 4  | 1 |
| plants | monocots | Poaceae          | <i>Capillipedium parviflorum</i>                 | scented top                    | C | 1  | 4 |
| plants | monocots | Cyperaceae       | <i>Carex brunnea</i>                             |                                | C | 1  | 1 |
| plants | monocots | Poaceae          | <i>Cenchrus echinatus</i>                        | <i>Mossman River grass</i>     | Y | 1  | 0 |
| plants | monocots | Centrolepidaceae | <i>Centrolepis exserta</i>                       |                                | C | 1  | 1 |
| plants | monocots | Poaceae          | <i>Chloris divaricata</i> var. <i>divaricata</i> | <i>slender chloris</i>         | C | 3  | 1 |
| plants | monocots | Poaceae          | <i>Chloris gayana</i>                            | <i>rhodes grass</i>            | Y | 2  | 1 |
| plants | monocots | Poaceae          | <i>Chloris inflata</i>                           | <i>purpletop chloris</i>       | Y | 8  | 3 |
| plants | monocots | Poaceae          | <i>Chloris lobata</i>                            |                                | C | 1  | 0 |
| plants | monocots | Poaceae          | <i>Chloris pectinata</i>                         | <i>comb chloris</i>            | C | 1  | 4 |
| plants | monocots | Poaceae          | <i>Chloris truncata</i>                          |                                | C | 1  | 4 |
| plants | monocots | Poaceae          | <i>Chloris ventricosa</i>                        | <i>tall chloris</i>            | C | 2  | 0 |
| plants | monocots | Poaceae          | <i>Chloris virgata</i>                           | <i>feathertop rhodes grass</i> | Y | 1  | 1 |
| plants | monocots | Poaceae          | <i>Chrysopogon fallax</i>                        |                                | C | 29 | 1 |
| plants | monocots | Poaceae          | <i>Chrysopogon filipes</i>                       |                                | C | 1  | 1 |
| plants | monocots | Poaceae          | <i>Chrysopogon oliganthus</i>                    |                                | C | 1  | 1 |
| plants | monocots | Poaceae          | <i>Cleistochloa sclerachne</i>                   |                                | C | 1  | 1 |
| plants | monocots | Poaceae          | <i>Cleistochloa subjuncea</i>                    |                                | C | 2  | 0 |
| plants | monocots | Commelinaceae    | <i>Commelina benghalensis</i>                    |                                | Y | 1  | 0 |
| plants | monocots | Commelinaceae    | <i>Commelina diffusa</i>                         | <i>wandering jew</i>           | C | 2  | 1 |
| plants | monocots | Commelinaceae    | <i>Commelina ensifolia</i>                       | <i>scurvy grass</i>            | C | 10 | 1 |
| plants | monocots | Commelinaceae    | <i>Commelina ensifolia</i>                       | <i>scurvy grass</i>            | C | 8  | 0 |
| plants | monocots | Commelinaceae    | <i>Commelina lanceolata</i>                      |                                | C | 1  | 1 |
| plants | monocots | Amaryllidaceae   | <i>Crinum angustifolium</i>                      | <i>field lily</i>              | C | 1  | 2 |
| plants | monocots | Amaryllidaceae   | <i>Crinum flaccidum</i>                          | <i>Murray lily</i>             | C | 2  | 0 |
| plants | monocots | Commelinaceae    | <i>Cyanotis axillaris</i>                        |                                | C | 2  | 1 |
| plants | monocots | Orchidaceae      | <i>Cymbidium canaliculatum</i>                   |                                | C | 7  | 1 |
| plants | monocots | Poaceae          | <i>Cymbopogon ambiguus</i>                       | <i>lemon grass</i>             | C | 1  | 1 |
| plants | monocots | Poaceae          | <i>Cymbopogon bombycinus</i>                     | <i>silky oilgrass</i>          | C | 16 | 1 |
| plants | monocots | Poaceae          | <i>Cymbopogon obtectus</i>                       |                                | C | 1  | 0 |

|        |          |            |  |                   |   |   |   |
|--------|----------|------------|--|-------------------|---|---|---|
| plants | monocots | Poaceae    | <i>Cymbopogon queenslandicus</i>                 |                   | C | 1 | 2 |
| plants | monocots | Poaceae    | <i>Cymbopogon refractus</i>                      | barbed-wire grass | C | 9 | 0 |
| plants | monocots | Poaceae    | <i>Cynodon dactylon</i>                          |                   | Y | 4 | 1 |
| plants | monocots | Poaceae    | <i>Cynodon dactylon</i> var. <i>dactylon</i>     |                   | Y | 5 | 1 |
| plants | monocots | Poaceae    | <i>Cynodon nemfuensis</i> var. <i>nemfuensis</i> |                   | Y | 1 | 0 |
| plants | monocots | Cyperaceae | <i>Cyperus alopecuroides</i>                     |                   | C | 2 | 2 |
| plants | monocots | Cyperaceae | <i>Cyperus alterniflorus</i>                     |                   | C | 1 | 1 |
| plants | monocots | Cyperaceae | <i>Cyperus aquatilis</i>                         |                   | C | 1 | 4 |
| plants | monocots | Cyperaceae | <i>Cyperus betchei</i> subsp. <i>betchei</i>     |                   | C | 2 | 0 |
| plants | monocots | Cyperaceae | <i>Cyperus bifax</i>                             | western nutgrass  | C | 2 | 1 |
| plants | monocots | Cyperaceae | <i>Cyperus bulbosus</i>                          |                   | C | 1 | 5 |
| plants | monocots | Cyperaceae | <i>Cyperus castaneus</i>                         |                   | C | 1 | 2 |
| plants | monocots | Cyperaceae | <i>Cyperus compressus</i>                        |                   | Y | 2 | 1 |
| plants | monocots | Cyperaceae | <i>Cyperus concinnus</i>                         |                   | C | 2 | 1 |
| plants | monocots | Cyperaceae | <i>Cyperus conicus</i>                           |                   | C | 3 | 1 |
| plants | monocots | Cyperaceae | <i>Cyperus cuspidatus</i>                        |                   | C | 1 | 0 |
| plants | monocots | Cyperaceae | <i>Cyperus cyperoides</i>                        |                   | C | 1 | 2 |
| plants | monocots | Cyperaceae | <i>Cyperus dactyloides</i>                       |                   | C | 1 | 2 |
| plants | monocots | Cyperaceae | <i>Cyperus difformis</i>                         | rice sedge        | C | 1 | 5 |
| plants | monocots | Cyperaceae | <i>Cyperus distans</i>                           |                   | C | 1 | 1 |
| plants | monocots | Cyperaceae | <i>Cyperus enervis</i>                           |                   | C | 1 | 2 |
| plants | monocots | Cyperaceae | <i>Cyperus exaltatus</i>                         | tall flatsedge    | C | 2 | 3 |
| plants | monocots | Cyperaceae | <i>Cyperus flavidus</i>                          |                   | C | 1 | 1 |
| plants | monocots | Cyperaceae | <i>Cyperus fulvus</i>                            |                   | C | 2 | 1 |
| plants | monocots | Cyperaceae | <i>Cyperus gilesii</i>                           |                   | C | 5 | 2 |
| plants | monocots | Cyperaceae | <i>Cyperus gracilis</i>                          |                   | C | 1 | 0 |
| plants | monocots | Cyperaceae | <i>Cyperus gymnocaulos</i>                       | spiny flatsedge   | C | 1 | 3 |
| plants | monocots | Cyperaceae | <i>Cyperus haspan</i>                            |                   | C | 1 | 0 |
| plants | monocots | Cyperaceae | <i>Cyperus haspan</i> subsp. <i>haspan</i>       |                   | C | 1 | 1 |
| plants | monocots | Cyperaceae | <i>Cyperus involucratus</i>                      |                   | Y | 3 | 2 |
| plants | monocots | Cyperaceae | <i>Cyperus iria</i>                              |                   | C | 5 | 0 |
| plants | monocots | Cyperaceae | <i>Cyperus isabellinus</i>                       |                   | C | 1 | 1 |
| plants | monocots | Cyperaceae | <i>Cyperus javanicus</i>                         |                   | C | 1 | 3 |
| plants | monocots | Cyperaceae | <i>Cyperus leiocaulon</i>                        |                   | C | 1 | 2 |
| plants | monocots | Cyperaceae | <i>Cyperus perangustus</i>                       |                   | C | 3 | 1 |
| plants | monocots | Cyperaceae | <i>Cyperus platystylis</i>                       |                   | C | 1 | 1 |

|        |          |                   |  |                      |   |    |   |
|--------|----------|-------------------|--|----------------------|---|----|---|
| plants | monocots | Cyperaceae        | <i>Cyperus polystachyos</i>                            |                      | C | 2  | 1 |
| plants | monocots | Cyperaceae        | <i>Cyperus polystachyos</i> var. <i>laxiflorus</i>     |                      | C | 1  | 1 |
| plants | monocots | Cyperaceae        | <i>Cyperus pulchellus</i>                              |                      | C | 1  | 1 |
| plants | monocots | Cyperaceae        | <i>Cyperus rigidellus</i>                              |                      | C | 1  | 1 |
| plants | monocots | Cyperaceae        | <i>Cyperus rotundus</i>                                | nutgrass             | Y | 5  | 1 |
| plants | monocots | Cyperaceae        | <i>Cyperus scaber</i>                                  |                      | C | 1  | 1 |
| plants | monocots | Cyperaceae        | <i>Cyperus sesquiflorus</i>                            |                      | Y | 1  | 0 |
| plants | monocots | Cyperaceae        | <i>Cyperus squarrosus</i>                              | bearded flatsedge    | C | 3  | 1 |
| plants | monocots | Cyperaceae        | <i>Cyperus triceps</i>                                 |                      | C | 1  | 1 |
| plants | monocots | Cyperaceae        | <i>Cyperus victoriensis</i>                            |                      | C | 4  | 4 |
| plants | monocots | Cyperaceae        | <i>Cyperus zollingeri</i>                              |                      | C | 2  | 2 |
| plants | monocots | Poaceae           | <i>Dactyloctenium aegyptium</i>                        | coast button grass   | Y | 3  | 1 |
| plants | monocots | Poaceae           | <i>Dactyloctenium radulans</i>                         | button grass         | C | 18 | 1 |
| plants | monocots | Orchidaceae       | <i>Dendrobium discolor</i>                             |                      | C | 1  | 1 |
| plants | monocots | Orchidaceae       | <i>Dendrobium gracilicaule</i>                         | slender orchid       | C | 1  | 1 |
| plants | monocots | Orchidaceae       | <i>Dendrobium tetragonum</i>                           | tree spider orchid   | C | 1  | 1 |
| plants | monocots | Hemerocallidaceae | <i>Dianella brevipedunculata</i>                       |                      | C | 2  | 1 |
| plants | monocots | Hemerocallidaceae | <i>Dianella caerulea</i>                               |                      | C | 3  | 1 |
| plants | monocots | Hemerocallidaceae | <i>Dianella caerulea</i> var. <i>assera</i>            |                      | C | 1  | 1 |
| plants | monocots | Hemerocallidaceae | <i>Dianella caerulea</i> var. <i>vannata</i>           |                      | C | 2  | 1 |
| plants | monocots | Hemerocallidaceae | <i>Dianella fruticans</i>                              |                      | R | 3  | 1 |
| plants | monocots | Hemerocallidaceae | <i>Dianella longifolia</i>                             |                      | C | 2  | 1 |
| plants | monocots | Hemerocallidaceae | <i>Dianella longifolia</i> var. <i>longifolia</i>      |                      | C | 1  | 1 |
| plants | monocots | Hemerocallidaceae | <i>Dianella longifolia</i> var. <i>stupata</i>         |                      | C | 1  | 0 |
| plants | monocots | Hemerocallidaceae | <i>Dianella nervosa</i>                                |                      | C | 1  | 1 |
| plants | monocots | Hemerocallidaceae | <i>Dianella rara</i>                                   |                      | C | 2  | 1 |
| plants | monocots | Hemerocallidaceae | <i>Dianella revoluta</i>                               |                      | C | 6  | 1 |
| plants | monocots | Poaceae           | <i>Dichanthium annulatum</i>                           | sheda grass          | Y | 4  | 3 |
| plants | monocots | Poaceae           | <i>Dichanthium aristatum</i>                           | angleton grass       | Y | 4  | 1 |
| plants | monocots | Poaceae           | <i>Dichanthium fecundum</i>                            | curly bluegrass      | C | 1  | 1 |
| plants | monocots | Poaceae           | <i>Dichanthium queenslandicum</i>                      |                      | V | V  | 1 |
| plants | monocots | Poaceae           | <i>Dichanthium sericeum</i>                            |                      | C | 3  | 1 |
| plants | monocots | Poaceae           | <i>Dichanthium sericeum</i> subsp. <i>polystachyum</i> |                      | C | 1  | 0 |
| plants | monocots | Poaceae           | <i>Dichanthium sericeum</i> subsp. <i>sericeum</i>     |                      | C | 2  | 1 |
| plants | monocots | Poaceae           | <i>Dichanthium setosum</i>                             |                      | R | V  | 1 |
| plants | monocots | Poaceae           | <i>Digitaria ammophila</i>                             | silky umbrella grass | C | 1  | 2 |

|        |          |               |                                   |                        |   |    |   |
|--------|----------|---------------|-----------------------------------|------------------------|---|----|---|
| plants | monocots | Poaceae       | Digitaria bicornis                |                        | C | 3  | 2 |
| plants | monocots | Poaceae       | Digitaria breviglumis             |                        | C | 2  | 1 |
| plants | monocots | Poaceae       | Digitaria brownii                 |                        | C | 2  | 1 |
| plants | monocots | Poaceae       | Digitaria ciliaris                | summer grass           | Y | 3  | 1 |
| plants | monocots | Poaceae       | Digitaria coenicola               |                        | C | 1  | 2 |
| plants | monocots | Poaceae       | Digitaria ctenantha               |                        | C | 1  | 1 |
| plants | monocots | Poaceae       | Digitaria diffusa                 |                        | C | 2  | 1 |
| plants | monocots | Poaceae       | Digitaria fumida                  |                        | C | 3  | 0 |
| plants | monocots | Poaceae       | Digitaria hystrichoides           | umbrella grass         | C | 1  | 2 |
| plants | monocots | Poaceae       | Digitaria longiflora              |                        | C | 3  | 0 |
| plants | monocots | Poaceae       | Digitaria milanjiana              |                        | Y | 1  | 0 |
| plants | monocots | Poaceae       | Digitaria minima                  |                        | C | 1  | 0 |
| plants | monocots | Poaceae       | Digitaria orbata                  |                        | C | 4  | 1 |
| plants | monocots | Poaceae       | Digitaria parviflora              |                        | C | 1  | 0 |
| plants | monocots | Poaceae       | Digitaria ramularis               |                        | C | 1  | 2 |
| plants | monocots | Dioscoreaceae | Dioscorea transversa              | native yam             | C | 2  | 2 |
| plants | monocots | Orchidaceae   | Dockrillia bowmanii               | scrub pencil orchid    | C | 2  | 2 |
| plants | monocots | Poaceae       | Echinochloa colona                | awnless barnyard grass | Y | 4  | 1 |
| plants | monocots | Poaceae       | Echinochloa crus-galli            | barnyard grass         | Y | 4  | 2 |
| plants | monocots | Poaceae       | Echinochloa polystachya cv. Amity |                        | Y | 1  | 1 |
| plants | monocots | Poaceae       | Echinochloa turneriana            | channel millet         | C | 1  | 7 |
| plants | monocots | Poaceae       | Ectrosia agrostoides              |                        | C | 2  | 1 |
| plants | monocots | Poaceae       | Ectrosia leporina                 |                        | C | 4  | 2 |
| plants | monocots | Cyperaceae    | Eleocharis acuta                  |                        | C | 1  | 2 |
| plants | monocots | Cyperaceae    | Eleocharis atropurpurea           |                        | C | 1  | 3 |
| plants | monocots | Cyperaceae    | Eleocharis equisetina             |                        | C | 1  | 1 |
| plants | monocots | Cyperaceae    | Eleocharis geniculata             |                        | C | 1  | 1 |
| plants | monocots | Cyperaceae    | Eleocharis pallens                | pale spikerush         | C | 7  | 3 |
| plants | monocots | Poaceae       | Eleusine indica                   | crowsfoot grass        | Y | 2  | 1 |
| plants | monocots | Poaceae       | Elionurus citreus                 | lemon-scented grass    | C | 3  | 1 |
| plants | monocots | Poaceae       | Elytrophorus spicatus             |                        | C | 6  | 1 |
| plants | monocots | Poaceae       | Enneapogon caerulescens           |                        | C | 1  | 1 |
| plants | monocots | Poaceae       | Enneapogon gracilis               | slender nineawn        | C | 3  | 3 |
| plants | monocots | Poaceae       | Enneapogon intermedius            |                        | C | 1  | 9 |
| plants | monocots | Poaceae       | Enneapogon lindleyanus            |                        | C | 13 | 2 |
| plants | monocots | Poaceae       | Enneapogon nigricans              | niggerheads            | C | 2  | 8 |

|        |          |         |                                    |                      |   |    |   |
|--------|----------|---------|------------------------------------|----------------------|---|----|---|
| plants | monocots | Poaceae | <i>Enneapogon polyphyllus</i>      | leafy nineawn        | C | 3  | 1 |
| plants | monocots | Poaceae | <i>Enneapogon purpurascens</i>     |                      | C | 2  | 4 |
| plants | monocots | Poaceae | <i>Enneapogon robustissimus</i>    |                      | C | 1  | 2 |
| plants | monocots | Poaceae | <i>Enneapogon truncatus</i>        |                      | C | 1  | 2 |
| plants | monocots | Poaceae | <i>Enneapogon virens</i>           |                      | C | 1  | 1 |
| plants | monocots | Poaceae | <i>Enteropogon acicularis</i>      | curly windmill grass | C | 2  | 1 |
| plants | monocots | Poaceae | <i>Enteropogon minutus</i>         |                      | C | 1  | 1 |
| plants | monocots | Poaceae | <i>Enteropogon ramosus</i>         |                      | C | 3  | 0 |
| plants | monocots | Poaceae | <i>Enteropogon unispiceus</i>      |                      | C | 1  | 7 |
| plants | monocots | Poaceae | <i>Entolasia stricta</i>           | wiry panic           | C | 3  | 0 |
| plants | monocots | Poaceae | <i>Eragrostis alveiformis</i>      |                      | C | 1  | 1 |
| plants | monocots | Poaceae | <i>Eragrostis brownii</i>          | Brown's lovegrass    | C | 1  | 6 |
| plants | monocots | Poaceae | <i>Eragrostis cilianensis</i>      |                      | Y | 2  | 1 |
| plants | monocots | Poaceae | <i>Eragrostis confertiflora</i>    |                      | C | 1  | 6 |
| plants | monocots | Poaceae | <i>Eragrostis cumingii</i>         |                      | C | 1  | 2 |
| plants | monocots | Poaceae | <i>Eragrostis elongata</i>         |                      | C | 4  | 3 |
| plants | monocots | Poaceae | <i>Eragrostis lacunaria</i>        | purple lovegrass     | C | 17 | 2 |
| plants | monocots | Poaceae | <i>Eragrostis lanicaulis</i>       |                      | C | 3  | 2 |
| plants | monocots | Poaceae | <i>Eragrostis leptocarpa</i>       | drooping lovegrass   | C | 1  | 4 |
| plants | monocots | Poaceae | <i>Eragrostis leptostachya</i>     |                      | C | 8  | 1 |
| plants | monocots | Poaceae | <i>Eragrostis longipedicellata</i> |                      | C | 1  | 2 |
| plants | monocots | Poaceae | <i>Eragrostis megalosperma</i>     |                      | C | 1  | 1 |
| plants | monocots | Poaceae | <i>Eragrostis mexicana</i>         | Mexican lovegrass    | Y | 2  | 8 |
| plants | monocots | Poaceae | <i>Eragrostis microcarpa</i>       |                      | C | 3  | 5 |
| plants | monocots | Poaceae | <i>Eragrostis parviflora</i>       | weeping lovegrass    | C | 6  | 1 |
| plants | monocots | Poaceae | <i>Eragrostis pergracilis</i>      |                      | C | 1  | 1 |
| plants | monocots | Poaceae | <i>Eragrostis pilosa</i>           | soft lovegrass       | Y | 1  | 2 |
| plants | monocots | Poaceae | <i>Eragrostis pubescens</i>        |                      | C | 2  | 1 |
| plants | monocots | Poaceae | <i>Eragrostis setifolia</i>        |                      | C | 1  | 2 |
| plants | monocots | Poaceae | <i>Eragrostis sororia</i>          |                      | C | 2  | 1 |
| plants | monocots | Poaceae | <i>Eragrostis spartinaeoides</i>   |                      | C | 6  | 1 |
| plants | monocots | Poaceae | <i>Eragrostis speciosa</i>         |                      | C | 1  | 1 |
| plants | monocots | Poaceae | <i>Eragrostis tenellula</i>        | delicate lovegrass   | C | 7  | 0 |
| plants | monocots | Poaceae | <i>Eragrostis tenuifolia</i>       | elastic grass        | Y | 2  | 1 |
| plants | monocots | Poaceae | <i>Eremochloa bimaculata</i>       | poverty grass        | C | 2  | 1 |
| plants | monocots | Poaceae | <i>Eriachne ciliata</i>            |                      | C | 2  | 1 |

|        |          |                   |   |                         |    |   |
|--------|----------|-------------------|---|-------------------------|----|---|
| plants | monocots | Poaceae           | <i>Eriachne mucronata</i>                                 | C                       | 23 | 1 |
| plants | monocots | Poaceae           | <i>Eriachne mucronata forma</i> (Burnham R.W.Purdie 1370) | C                       | 1  | 1 |
| plants | monocots | Poaceae           | <i>Eriachne obtusa</i>                                    | C                       | 2  | 1 |
| plants | monocots | Poaceae           | <i>Eriachne pallescens</i>                                | C                       | 5  | 4 |
| plants | monocots | Poaceae           | <i>Eriachne pallescens</i> var. <i>pallescens</i>         | C                       | 3  | 4 |
| plants | monocots | Poaceae           | <i>Eriachne rara</i>                                      | C                       | 5  | 1 |
| plants | monocots | Poaceae           | <i>Eriachne stipacea</i>                                  | C                       | 1  | 1 |
| plants | monocots | Eriocaulaceae     | <i>Eriocaulon nanum</i>                                   | C                       | 1  | 6 |
| plants | monocots | Poaceae           | <i>Eriochloa crebra</i>                                   | spring grass<br>C       | 4  | 1 |
| plants | monocots | Poaceae           | <i>Eriochloa meyeriana</i>                                | Y                       | 3  | 3 |
| plants | monocots | Poaceae           | <i>Eriochloa procera</i>                                  | slender cupgrass<br>C   | 3  | 1 |
| plants | monocots | Poaceae           | <i>Eriochloa pseudoacrotricha</i>                         | C                       | 12 | 1 |
| plants | monocots | Poaceae           | <i>Eulalia aurea</i>                                      | silky browntop<br>C     | 3  | 1 |
| plants | monocots | Laxmanniaceae     | <i>Eustrephus latifolius</i>                              | wombat berry<br>C       | 2  | 1 |
| plants | monocots | Cyperaceae        | <i>Fimbristylis aestivalis</i>                            | C                       | 2  | 4 |
| plants | monocots | Cyperaceae        | <i>Fimbristylis bisumbellata</i>                          | C                       | 6  | 1 |
| plants | monocots | Cyperaceae        | <i>Fimbristylis depauperata</i>                           | C                       | 2  | 0 |
| plants | monocots | Cyperaceae        | <i>Fimbristylis dichotoma</i>                             | common fringe-rush<br>C | 10 | 0 |
| plants | monocots | Cyperaceae        | <i>Fimbristylis fimbriystoides</i>                        | C                       | 1  | 6 |
| plants | monocots | Cyperaceae        | <i>Fimbristylis macrantha</i>                             | C                       | 1  | 1 |
| plants | monocots | Cyperaceae        | <i>Fimbristylis microcarya</i>                            | C                       | 1  | 0 |
| plants | monocots | Cyperaceae        | <i>Fimbristylis nuda</i>                                  | C                       | 1  | 1 |
| plants | monocots | Cyperaceae        | <i>Fimbristylis polytrichoides</i>                        | C                       | 1  | 2 |
| plants | monocots | Cyperaceae        | <i>Fimbristylis sieberiana</i>                            | C                       | 2  | 2 |
| plants | monocots | Cyperaceae        | <i>Fimbristylis tristachya</i>                            | C                       | 1  | 6 |
| plants | monocots | Cyperaceae        | <i>Fuirena ciliaris</i>                                   | C                       | 1  | 1 |
| plants | monocots | Cyperaceae        | <i>Gahnia aspera</i>                                      | C                       | 4  | 0 |
| plants | monocots | Cyperaceae        | <i>Gahnia sieberiana</i>                                  | sword grass<br>C        | 1  | 1 |
| plants | monocots | Hemerocallidaceae | <i>Geitonoplesium cymosum</i>                             | scrambling lily<br>C    | 7  | 1 |
| plants | monocots | Hydrocharitaceae  | <i>Halophila decipiens</i>                                | C                       | 1  | 1 |
| plants | monocots | Hydrocharitaceae  | <i>Halophila ovalis</i> subsp. <i>ovalis</i>              | C                       | 2  | 1 |
| plants | monocots | Hydrocharitaceae  | <i>Halophila spinulosa</i>                                | C                       | 2  | 6 |
| plants | monocots | Poaceae           | <i>Heteropogon contortus</i>                              | black speargrass<br>C   | 26 | 9 |
| plants | monocots | Poaceae           | <i>Heteropogon triticeus</i>                              | giant speargrass<br>C   | 6  | 7 |
| plants | monocots | Poaceae           | <i>Hymenachne amplexicaulis</i> cv. Olive                 | Y                       | 2  | 1 |
| plants | monocots | Poaceae           | <i>Hyparrhenia rufa</i>                                   | Y                       | 1  | 6 |

|        |          |               |   |                      |   |   |   |
|--------|----------|---------------|---|----------------------|---|---|---|
| plants | monocots | Poaceae       | <i>Hyparrhenia rufa</i> subsp. <i>rufa</i>          |                      | Y | 2 | 4 |
| plants | monocots | Hypoxidaceae  | <i>Hypoxis arilla</i> cea                           |                      | C | 1 | 1 |
| plants | monocots | Poaceae       | <i>Imperata cylindrica</i>                          | blady grass          | C | 1 | 0 |
| plants | monocots | Colchicaceae  | <i>Iphigenia indica</i>                             |                      | C | 1 | 5 |
| plants | monocots | Poaceae       | <i>Iseilema fragile</i>                             |                      | C | 1 | 1 |
| plants | monocots | Poaceae       | <i>Iseilema macratherum</i>                         |                      | C | 3 | 1 |
| plants | monocots | Poaceae       | <i>Iseilema membranaceum</i>                        | small flinders grass | C | 2 | 3 |
| plants | monocots | Poaceae       | <i>Iseilema vaginiflorum</i>                        | red flinders grass   | C | 8 | 0 |
| plants | monocots | Juncaceae     | <i>Juncus polyanthemus</i>                          |                      | C | 2 | 0 |
| plants | monocots | Laxmanniaceae | <i>Laxmannia gracilis</i>                           | slender wire lily    | C | 1 | 2 |
| plants | monocots | Cyperaceae    | <i>Lepidosperma laterale</i>                        |                      | C | 1 | 5 |
| plants | monocots | Cyperaceae    | <i>Lepidosperma laterale</i> var. <i>laterale</i>   |                      | C | 2 | 2 |
| plants | monocots | Poaceae       | <i>Leptochloa decipiens</i>                         |                      | C | 2 | 1 |
| plants | monocots | Poaceae       | <i>Leptochloa decipiens</i> subsp. <i>asthenes</i>  |                      | C | 4 | 1 |
| plants | monocots | Poaceae       | <i>Leptochloa digitata</i>                          |                      | C | 8 | 3 |
| plants | monocots | Poaceae       | <i>Leptochloa divaricatissima</i>                   |                      | C | 1 | 4 |
| plants | monocots | Poaceae       | <i>Leptochloa fusca</i>                             | brown beetle grass   | C | 1 | 2 |
| plants | monocots | Poaceae       | <i>Leptochloa fusca</i> subsp. <i>fusca</i>         |                      | C | 1 | 1 |
| plants | monocots | Poaceae       | <i>Leptochloa fusca</i> subsp. <i>uninervia</i>     |                      | Y | 2 | 2 |
| plants | monocots | Poaceae       | <i>Leptochloa ligulata</i>                          |                      | C | 2 | 3 |
| plants | monocots | Poaceae       | <i>Leptochloa neesii</i>                            |                      | C | 3 | 1 |
| plants | monocots | Orchidaceae   | <i>Liparis nugentiae</i>                            |                      | C | 2 | 2 |
| plants | monocots | Arecaceae     | <i>Livistona australis</i>                          | cabbage tree palm    | C | 2 | 0 |
| plants | monocots | Arecaceae     | <i>Livistona lanuginosa</i>                         |                      | V | 2 | 2 |
| plants | monocots | Laxmanniaceae | <i>Lomandra confertifolia</i>                       |                      | C | 2 | 2 |
| plants | monocots | Laxmanniaceae | <i>Lomandra confertifolia</i> subsp. <i>pallida</i> |                      | C | 4 | 1 |
| plants | monocots | Laxmanniaceae | <i>Lomandra filiformis</i>                          |                      | C | 4 | 2 |
| plants | monocots | Laxmanniaceae | <i>Lomandra filiformis</i> subsp. <i>filiformis</i> |                      | C | 1 | 1 |
| plants | monocots | Laxmanniaceae | <i>Lomandra longifolia</i>                          |                      | C | 2 | 0 |
| plants | monocots | Laxmanniaceae | <i>Lomandra multiflora</i> subsp. <i>multiflora</i> |                      | C | 3 | 3 |
| plants | monocots | Poaceae       | <i>Megathyrsus maximus</i>                          |                      | Y | 1 | 1 |
| plants | monocots | Poaceae       | <i>Megathyrsus maximus</i> var. <i>coloratus</i>    |                      | Y | 1 | 3 |
| plants | monocots | Poaceae       | <i>Megathyrsus maximus</i> var. <i>maximus</i>      |                      | Y | 4 | 1 |
| plants | monocots | Poaceae       | <i>Megathyrsus maximus</i> var. <i>pubiglumis</i>   |                      | Y | 3 | 1 |
| plants | monocots | Poaceae       | <i>Melinis minutiflora</i>                          | molasses grass       | Y | 1 | 1 |
| plants | monocots | Poaceae       | <i>Melinis repens</i>                               | red natal grass      | Y | 8 | 0 |

|        |          |                  |  |                      |   |    |    |
|--------|----------|------------------|--|----------------------|---|----|----|
| plants | monocots | Poaceae          | <i>Micraira subulifolia</i>                              |                      | C | 1  | 11 |
| plants | monocots | Poaceae          | <i>Mnesithea rottboellioides</i>                         |                      | C | 2  | 2  |
| plants | monocots | Pontederiaceae   | <i>Monochoria cyanea</i>                                 |                      | C | 3  | 0  |
| plants | monocots | Commelinaceae    | <i>Murdannia cryptantha</i>                              |                      | C | 1  | 1  |
| plants | monocots | Commelinaceae    | <i>Murdannia gigantea</i>                                |                      | C | 1  | 3  |
| plants | monocots | Commelinaceae    | <i>Murdannia graminea</i>                                | murdannia            | C | 1  | 0  |
| plants | monocots | Orchidaceae      | <i>Oberonia palmicola</i>                                |                      | C | 1  | 2  |
| plants | monocots | Poaceae          | <i>Ophiuros exaltatus</i>                                |                      | C | 2  | 1  |
| plants | monocots | Poaceae          | <i>Oplismenus aemulus</i>                                | creeping shade grass | C | 3  | 2  |
| plants | monocots | Poaceae          | <i>Oplismenus imbecillis</i>                             |                      | C | 1  | 3  |
| plants | monocots | Poaceae          | <i>Oryza australiensis</i>                               |                      | C | 1  | 3  |
| plants | monocots | Hydrocharitaceae | <i>Ottelia alismoides</i>                                |                      | C | 1  | 1  |
| plants | monocots | Hydrocharitaceae | <i>Ottelia ovalifolia</i>                                | swamp lily           | C | 1  | 5  |
| plants | monocots | Poaceae          | <i>Ottochloa nodosa</i>                                  |                      | C | 1  | 1  |
| plants | monocots | Poaceae          | <i>Oxychloris scariosa</i>                               | winged chloris       | C | 3  | 9  |
| plants | monocots | Pandanaceae      | <i>Pandanus cookii</i>                                   |                      | C | 2  | 1  |
| plants | monocots | Poaceae          | <i>Panicum coloratum</i>                                 |                      | Y | 1  | 1  |
| plants | monocots | Poaceae          | <i>Panicum decompositum</i>                              |                      | C | 1  | 1  |
| plants | monocots | Poaceae          | <i>Panicum decompositum</i> var. <i>decompositum</i>     |                      | C | 4  | 2  |
| plants | monocots | Poaceae          | <i>Panicum effusum</i>                                   |                      | C | 16 | 1  |
| plants | monocots | Poaceae          | <i>Panicum laevinode</i>                                 | pepper grass         | C | 3  | 3  |
| plants | monocots | Poaceae          | <i>Panicum larcomianum</i>                               |                      | C | 2  | 1  |
| plants | monocots | Poaceae          | <i>Panicum mitchellii</i>                                |                      | C | 3  | 7  |
| plants | monocots | Poaceae          | <i>Panicum queenslandicum</i>                            |                      | C | 6  | 4  |
| plants | monocots | Poaceae          | <i>Panicum queenslandicum</i> var. <i>queenslandicum</i> |                      | C | 1  | 2  |
| plants | monocots | Poaceae          | <i>Panicum seminudum</i> var. <i>cairnsianum</i>         |                      | C | 2  | 2  |
| plants | monocots | Poaceae          | <i>Panicum seminudum</i> var. <i>seminudum</i>           |                      | C | 1  | 0  |
| plants | monocots | Poaceae          | <i>Panicum simile</i>                                    |                      | C | 1  | 0  |
| plants | monocots | Poaceae          | <i>Panicum trichoides</i>                                |                      | C | 3  | 1  |
| plants | monocots | Poaceae          | <i>Paspalidium albovillosum</i>                          |                      | C | 1  | 0  |
| plants | monocots | Poaceae          | <i>Paspalidium caespitosum</i>                           | brigalow grass       | C | 5  | 2  |
| plants | monocots | Poaceae          | <i>Paspalidium constrictum</i>                           |                      | C | 10 | 5  |
| plants | monocots | Poaceae          | <i>Paspalidium criniforme</i>                            |                      | C | 3  | 5  |
| plants | monocots | Poaceae          | <i>Paspalidium disjunctum</i>                            |                      | C | 1  | 0  |
| plants | monocots | Poaceae          | <i>Paspalidium distans</i>                               | shotgrass            | C | 7  | 1  |
| plants | monocots | Poaceae          | <i>Paspalidium gausum</i>                                |                      | C | 1  | 3  |

|        |          |                  |  |                       |   |    |   |
|--------|----------|------------------|--|-----------------------|---|----|---|
| plants | monocots | Poaceae          | <i>Paspalidium globoideum</i>                        | sago grass            | C | 3  | 2 |
| plants | monocots | Poaceae          | <i>Paspalidium gracile</i>                           | slender panic         | C | 2  | 0 |
| plants | monocots | Poaceae          | <i>Paspalidium jubiflorum</i>                        | warrego grass         | C | 1  | 0 |
| plants | monocots | Poaceae          | <i>Paspalidium rarum</i>                             |                       | C | 6  | 2 |
| plants | monocots | Poaceae          | <i>Paspalidium scabrifolium</i>                      |                       | R | 1  | 1 |
| plants | monocots | Poaceae          | <i>Paspalum dilatatum</i>                            | paspalum              | Y | 1  | 2 |
| plants | monocots | Poaceae          | <i>Paspalum plicatulum</i>                           | plicatulum            | Y | 1  | 1 |
| plants | monocots | Poaceae          | <i>Paspalum scrobiculatum</i>                        | ditch millet          | C | 2  | 4 |
| plants | monocots | Poaceae          | <i>Paspalum vaginatum</i>                            | saltwater couch       | C | 1  | 2 |
| plants | monocots | Poaceae          | <i>Pennisetum ciliare</i>                            |                       | Y | 18 | 3 |
| plants | monocots | Poaceae          | <i>Pennisetum setigerum</i>                          |                       | Y | 3  | 1 |
| plants | monocots | Poaceae          | <i>Perotis rara</i>                                  | comet grass           | C | 2  | 2 |
| plants | monocots | Arecaceae        | <i>Phoenix dactylifera</i>                           |                       | Y | 1  | 5 |
| plants | monocots | Poaceae          | <i>Phragmites australis</i>                          | common reed           | C | 1  | 1 |
| plants | monocots | Poaceae          | <i>Poa labillardierei</i> var. <i>labillardierei</i> | tussock grass         | C | 1  | 2 |
| plants | monocots | Potamogetonaceae | <i>Potamogeton crispus</i>                           | curly pondweed        | C | 1  | 0 |
| plants | monocots | Potamogetonaceae | <i>Potamogeton tricarinatus</i>                      | floating pondweed     | C | 4  | 0 |
| plants | monocots | Poaceae          | <i>Pseudoraphis spinescens</i>                       | spiny mudgrass        | C | 1  | 0 |
| plants | monocots | Orchidaceae      | <i>Pterostylis nutans</i>                            |                       | C | 1  | 1 |
| plants | monocots | Cyperaceae       | <i>Rhynchospora pterochaeta</i>                      |                       | C | 2  | 0 |
| plants | monocots | Ripogonaceae     | <i>Ripogonum album</i>                               | white supplejack      | C | 2  | 0 |
| plants | monocots | Poaceae          | <i>Saccharum officinarum</i>                         | sugarcane             | Y | 1  | 1 |
| plants | monocots | Poaceae          | <i>Sacciolepis indica</i>                            | Indian cupscale grass | C | 1  | 0 |
| plants | monocots | Poaceae          | <i>Sarga angustum</i>                                |                       | C | 1  | 5 |
| plants | monocots | Poaceae          | <i>Sarga leiocladum</i>                              |                       | C | 1  | 3 |
| plants | monocots | Poaceae          | <i>Sarga plumosum</i>                                |                       | C | 1  | 1 |
| plants | monocots | Poaceae          | <i>Schizachyrium fragile</i>                         | firegrass             | C | 5  | 0 |
| plants | monocots | Poaceae          | <i>Schizachyrium pseudoulalia</i>                    |                       | C | 2  | 3 |
| plants | monocots | Cyperaceae       | <i>Schoenoplectus dissachanthus</i>                  |                       | C | 4  | 1 |
| plants | monocots | Cyperaceae       | <i>Schoenoplectus erectus</i>                        |                       | Y | 1  | 1 |
| plants | monocots | Cyperaceae       | <i>Schoenoplectus lateriflorus</i>                   |                       | C | 2  | 3 |
| plants | monocots | Cyperaceae       | <i>Schoenus yarrabensis</i>                          |                       | C | 1  | 2 |
| plants | monocots | Cyperaceae       | <i>Scleria brownii</i>                               |                       | C | 1  | 1 |
| plants | monocots | Cyperaceae       | <i>Scleria mackaviensis</i>                          |                       | C | 2  | 0 |
| plants | monocots | Cyperaceae       | <i>Scleria rugosa</i>                                |                       | C | 1  | 0 |
| plants | monocots | Cyperaceae       | <i>Scleria sphacelata</i>                            |                       | C | 5  | 2 |

|        |          |             |  |                        |   |    |   |
|--------|----------|-------------|--|------------------------|---|----|---|
| plants | monocots | Poaceae     | <i>Sehima nervosum</i>                           |                        | C | 1  | 1 |
| plants | monocots | Poaceae     | <i>Setaria apiculata</i>                         |                        | C | 2  | 1 |
| plants | monocots | Poaceae     | <i>Setaria australiensis</i>                     | scrub pigeon grass     | C | 1  | 3 |
| plants | monocots | Poaceae     | <i>Setaria dielsii</i>                           |                        | C | 2  | 0 |
| plants | monocots | Poaceae     | <i>Setaria oplismenoides</i>                     |                        | C | 2  | 0 |
| plants | monocots | Poaceae     | <i>Setaria pumila</i> subsp. <i>pallidefusca</i> |                        | Y | 1  | 2 |
| plants | monocots | Poaceae     | <i>Setaria sphacelata</i>                        |                        | Y | 1  | 1 |
| plants | monocots | Poaceae     | <i>Setaria surgens</i>                           |                        | C | 7  | 4 |
| plants | monocots | Smilacaceae | <i>Smilax australis</i>                          | barbed-wire vine       | C | 5  | 1 |
| plants | monocots | Poaceae     | <i>Sorghum bicolor</i>                           | forage sorghum         | Y | 2  | 5 |
| plants | monocots | Poaceae     | <i>Sorghum halepense</i>                         | Johnson grass          | Y | 2  | 1 |
| plants | monocots | Poaceae     | <i>Sorghum nitidum</i> forma <i>aristatum</i>    |                        | C | 1  | 1 |
| plants | monocots | Poaceae     | <i>Sorghum x alnum</i>                           |                        | Y | 2  | 2 |
| plants | monocots | Poaceae     | <i>Sporobolus actinocladus</i>                   | katoora grass          | C | 4  | 1 |
| plants | monocots | Poaceae     | <i>Sporobolus australasicus</i>                  |                        | C | 3  | 3 |
| plants | monocots | Poaceae     | <i>Sporobolus australasicus</i>                  |                        | C | 5  | 1 |
| plants | monocots | Poaceae     | <i>Sporobolus caroli</i>                         | fairy grass            | C | 6  | 1 |
| plants | monocots | Poaceae     | <i>Sporobolus contiguus</i>                      |                        | C | 4  | 1 |
| plants | monocots | Poaceae     | <i>Sporobolus coromandelianus</i>                |                        | Y | 6  | 4 |
| plants | monocots | Poaceae     | <i>Sporobolus creber</i>                         |                        | C | 1  | 7 |
| plants | monocots | Poaceae     | <i>Sporobolus disjunctus</i>                     |                        | C | 2  | 0 |
| plants | monocots | Poaceae     | <i>Sporobolus fertilis</i>                       | giant Parramatta grass | Y | 1  | 3 |
| plants | monocots | Poaceae     | <i>Sporobolus jacquemontii</i>                   |                        | Y | 4  | 1 |
| plants | monocots | Poaceae     | <i>Sporobolus mitchellii</i>                     | rat's tail couch       | C | 2  | 0 |
| plants | monocots | Poaceae     | <i>Sporobolus scabridus</i>                      |                        | C | 18 | 3 |
| plants | monocots | Poaceae     | <i>Sporobolus virginicus</i>                     | sand couch             | C | 1  | 1 |
| plants | monocots | Arecaceae   | <i>Syagrus romanzoffiana</i>                     | Queen palm             | Y | 1  | 3 |
| plants | monocots | Orchidaceae | <i>Taeniophyllum muelleri</i>                    |                        | C | V  | 3 |
| plants | monocots | Cyperaceae  | <i>Tetraria capillaris</i>                       |                        | C | 1  | 2 |
| plants | monocots | Poaceae     | <i>Thaumastochloa major</i>                      |                        | C | 1  | 1 |
| plants | monocots | Poaceae     | <i>Thaumastochloa pubescens</i>                  |                        | C | 1  | 2 |
| plants | monocots | Poaceae     | <i>Thellungiella advena</i>                      | coolibah grass         | C | 1  | 2 |
| plants | monocots | Poaceae     | <i>Themeda arguens</i>                           |                        | C | 1  | 5 |
| plants | monocots | Poaceae     | <i>Themeda avenacea</i>                          |                        | C | 1  | 1 |
| plants | monocots | Poaceae     | <i>Themeda quadrivalvis</i>                      | grader grass           | Y | 2  | 4 |
| plants | monocots | Poaceae     | <i>Themeda triandra</i>                          | kangaroo grass         | C | 30 | 4 |

|        |          |                  |   |                     |   |    |   |
|--------|----------|------------------|---|---------------------|---|----|---|
| plants | monocots | Poaceae          | <i>Thyridolepis xerophila</i>                         |                     | C | 4  | 0 |
| plants | monocots | Laxmanniaceae    | <i>Thysanotus tuberosus</i>                           |                     | C | 2  | 0 |
| plants | monocots | Laxmanniaceae    | <i>Thysanotus tuberosus</i> subsp. <i>tuberosus</i>   |                     | C | 1  | 2 |
| plants | monocots | Poaceae          | <i>Tragus australianus</i>                            | small burr grass    | C | 2  | 2 |
| plants | monocots | Johnsoniaceae    | <i>Tricoryne elatior</i>                              | yellow autumn lily  | C | 2  | 1 |
| plants | monocots | Juncaginaceae    | <i>Triglochin procerum</i>                            |                     | C | 1  | 1 |
| plants | monocots | Poaceae          | <i>Triodia bitextura</i>                              |                     | C | 1  | 1 |
| plants | monocots | Poaceae          | <i>Triodia longiceps</i>                              | giant grey spinifex | C | 1  | 1 |
| plants | monocots | Poaceae          | <i>Triodia microstachya</i>                           |                     | C | 2  | 4 |
| plants | monocots | Poaceae          | <i>Triodia mitchellii</i>                             | buck spinifex       | C | 8  | 2 |
| plants | monocots | Poaceae          | <i>Triodia pungens</i>                                |                     | C | 20 | 1 |
| plants | monocots | Poaceae          | <i>Triodia stenostachya</i>                           |                     | C | 1  | 1 |
| plants | monocots | Poaceae          | <i>Tripogon loliiformis</i>                           | five minute grass   | C | 5  | 2 |
| plants | monocots | Poaceae          | <i>Triraphis mollis</i>                               | purple plumegrass   | C | 1  | 1 |
| plants | monocots | Hydatellaceae    | <i>Trithuria lanterna</i>                             |                     | C | 1  | 4 |
| plants | monocots | Poaceae          | <i>Urochloa foliosa</i>                               |                     | C | 2  | 2 |
| plants | monocots | Poaceae          | <i>Urochloa gilesii</i>                               |                     | C | 5  | 1 |
| plants | monocots | Poaceae          | <i>Urochloa holosericea</i> subsp. <i>holosericea</i> |                     | C | 1  | 6 |
| plants | monocots | Poaceae          | <i>Urochloa mosambicensis</i>                         | sabi grass          | Y | 1  | 1 |
| plants | monocots | Poaceae          | <i>Urochloa mutica</i>                                |                     | Y | 4  | 0 |
| plants | monocots | Poaceae          | <i>Urochloa panicoides</i> var. <i>panicoides</i>     |                     | Y | 1  | 4 |
| plants | monocots | Poaceae          | <i>Urochloa piligera</i>                              |                     | C | 5  | 1 |
| plants | monocots | Poaceae          | <i>Urochloa pubigera</i>                              |                     | C | 3  | 2 |
| plants | monocots | Poaceae          | <i>Urochloa reptans</i>                               |                     | C | 4  | 1 |
| plants | monocots | Poaceae          | <i>Urochloa subquadripara</i>                         |                     | Y | 2  | 1 |
| plants | monocots | Poaceae          | <i>Urochloa whiteana</i>                              |                     | C | 1  | 1 |
| plants | monocots | Poaceae          | <i>Walwhalleya subxerophila</i>                       |                     | C | 2  | 0 |
| plants | monocots | Xanthorrhoeaceae | <i>Xanthorrhoea johnsonii</i>                         |                     | C | 14 | 1 |
| plants | monocots | Xyridaceae       | <i>Xyris oligantha</i>                                |                     | C | 1  | 7 |

Fauna species returned in Wildlife Online search (for 3 search areas combined).

| Kingdom Class | Family     | Scientific Name | Common Name                  | I                        | Q | A | Sighting | Specimen | Marine/Migratory |
|---------------|------------|-----------------|------------------------------|--------------------------|---|---|----------|----------|------------------|
|               |            |                 |                              |                          |   |   | Recs     | Records  |                  |
| animals       | amphibians | Myobatrachidae  | Crinia deserticola           |                          | C |   | 15       | 9        |                  |
| animals       | amphibians | Hylidae         | Cyclorana alboguttata        |                          | C |   | 9        | 5        |                  |
| animals       | amphibians | Hylidae         | Cyclorana brevipes           |                          | C |   | 9        | 0        |                  |
| animals       | amphibians | Hylidae         | Cyclorana cultripes          |                          | C |   | 5        | 0        |                  |
| animals       | amphibians | Hylidae         | Cyclorana novaehollandiae    |                          | C |   | 4        | 0        |                  |
| animals       | amphibians | Hylidae         | Cyclorana platycephala       |                          | C |   | 1        | 0        |                  |
| animals       | amphibians | Limnodynastidae | Limnodynastes peronii        |                          | C |   | 2        | 2        |                  |
| animals       | amphibians | Limnodynastidae | Limnodynastes salmini        |                          | C |   | 1        | 1        |                  |
| animals       | amphibians | Limnodynastidae | Limnodynastes tasmaniensis   |                          | C |   | 16       | 0        |                  |
| animals       | amphibians | Limnodynastidae | Limnodynastes terraereginae  |                          | C |   | 9        | 0        |                  |
| animals       | amphibians | Hylidae         | Litoria bicolor              |                          | C |   | 2        | 1        |                  |
| animals       | amphibians | Hylidae         | Litoria caerulea             |                          | C |   | 11       | 0        |                  |
| animals       | amphibians | Hylidae         | Litoria fallax               |                          | C |   | 8        | 1        |                  |
| animals       | amphibians | Hylidae         | Litoria inermis              |                          | C |   | 20       | 7        |                  |
| animals       | amphibians | Hylidae         | Litoria latopalmata          |                          | C |   | 1        | 0        |                  |
| animals       | amphibians | Hylidae         | Litoria nasuta               |                          | C |   | 1        | 1        |                  |
| animals       | amphibians | Hylidae         | Litoria revelata             |                          | R |   | 1        | 1        |                  |
| animals       | amphibians | Hylidae         | Litoria rothii               |                          | C |   | 17       | 5        |                  |
| animals       | amphibians | Hylidae         | Litoria rubella              |                          | C |   | 7        | 0        |                  |
| animals       | amphibians | Limnodynastidae | Neobatrachus sudelli         |                          | C |   | 1        | 0        |                  |
| animals       | amphibians | Limnodynastidae | Notaden bennettii            |                          | C |   | 14       | 0        |                  |
| animals       | amphibians | Limnodynastidae | Platylectrum ornatum         |                          | C |   | 18       | 0        |                  |
| animals       | amphibians | Bufoidea        | Rhinella marina              |                          | C |   | 11       | 0        |                  |
| animals       | amphibians | Myobatrachidae  | Uperoleia littlejohni        | Einasleigh gungan        | C |   | 1        | 1        |                  |
| animals       | birds      | Meliphagidae    | Acanthagenys rufogularis     | spiny-cheeked honeyeater | C |   | 26       | 0        |                  |
| animals       | birds      | Acanthizidae    | Acanthiza apicalis           | inland thornbill         | C |   | 13       | 0        |                  |
| animals       | birds      | Acanthizidae    | Acanthiza chrysorrhoa        | yellow-rumped thornbill  | C |   | 40       | 2        |                  |
| animals       | birds      | Acanthizidae    | Acanthiza nana               | yellow thornbill         | C |   | 3        | 0        |                  |
| animals       | birds      | Acanthizidae    | Acanthiza pusilla            | brown thornbill          | C |   | 1        | 0        |                  |
| animals       | birds      | Acanthizidae    | Acanthiza reguloides         | buff-rumped thornbill    | C |   | 5        | 4        |                  |
| animals       | birds      | Meliphagidae    | Acanthorhynchus tenuirostris | eastern spinebill        | C |   | 1        | 0        |                  |
| animals       | birds      | Accipitridae    | Accipiter cirrocephalus      | collared sparrowhawk     | C |   | 2        | 0        |                  |

|         |       |                |                                  |                            |   |     |  |
|---------|-------|----------------|----------------------------------|----------------------------|---|-----|--|
| animals | birds | Accipitridae   | <i>Accipiter cirrocephalus</i>   | collared sparrowhawk       | C | 18  | 0                                      |
| animals | birds | Accipitridae   | <i>Accipiter fasciatus</i>       | brown goshawk              | C | 8   | 0 Ma                                   |
| animals | birds | Acrocephalidae | <i>Acrocephalus australis</i>    | Australian reed-warbler    | C | 1   | 0                                      |
| animals | birds | Scolopacidae   | <i>Actitis hypoleucus</i>        | common sandpiper           | C | 10  | 0 Ma, Mi (Bonn, CAMBA, JAMBA, ROKAMBA) |
| animals | birds | Aegothelidae   | <i>Aegotheles cristatus</i>      | Australian owlet-nightjar  | C | 24  | 0                                      |
| animals | birds | Megapodiidae   | <i>Alectura lathami</i>          | Australian brush-turkey    | C | 2   | 0                                      |
| animals | birds | Psittacidae    | <i>Alisterus scapularis</i>      | Australian king-parrot     | C | 3   | 0                                      |
| animals | birds | Rallidae       | <i>Amauornis cinerea</i>         | white-browed crake         | C | 1   | 0                                      |
| animals | birds | Rallidae       | <i>Amauornis moluccana</i>       | pale-vented bush-hen       | C | 2   | 0 Ma                                   |
| animals | birds | Anatidae       | <i>Anas castanea</i>             | chestnut teal              | C | 5   | 0                                      |
| animals | birds | Anatidae       | <i>Anas gracilis</i>             | grey teal                  | C | 14  | 0                                      |
| animals | birds | Anatidae       | <i>Anas platyrhynchos</i>        | northern mallard           | Y | 17  | 0                                      |
| animals | birds | Anatidae       | <i>Anas rhynchos</i>             | Australasian shoveler      | C | 5   | 0                                      |
| animals | birds | Anatidae       | <i>Anas superciliosa</i>         | Pacific black duck         | C | 14  | 0                                      |
| animals | birds | Anhingidae     | <i>Anhinga novaehollandiae</i>   | Australasian darter        | C | 7   | 0                                      |
| animals | birds | Laridae        | <i>Anous minutus</i>             | black noddy                | C | 2   | 2 Ma                                   |
| animals | birds | Anseranatidae  | <i>Anseranas semipalmata</i>     | magpie goose               | C | 154 | 0 Ma                                   |
| animals | birds | Motacillidae   | <i>Anthus novaeseelandiae</i>    | Australasian pipit         | C | 3   | 0 Ma                                   |
| animals | birds | Psittacidae    | <i>Aprosmictus erythropterus</i> | red-winged parrot          | C | 60  | 0                                      |
| animals | birds | Apodidae       | <i>Apus pacificus</i>            | fork-tailed swift          | C | 9   | 0 Ma, Mi (CAMBA, JAMBA, ROKAMBA)       |
| animals | birds | Accipitridae   | <i>Aquila audax</i>              | wedge-tailed eagle         | C | 11  | 0                                      |
| animals | birds | Ardeidae       | <i>Ardea ibis</i>                | cattle egret               | C | 2   | 0 Ma, Mi (CAMBA, JAMBA)                |
| animals | birds | Ardeidae       | <i>Ardea intermedia</i>          | intermediate egret         | C | 1   | 0 Ma                                   |
| animals | birds | Ardeidae       | <i>Ardea modesta</i>             | eastern great egret        | C | 6   | 0 Ma, Mi (CAMBA, JAMBA)                |
| animals | birds | Ardeidae       | <i>Ardea pacifica</i>            | white-necked heron         | C | 4   | 0                                      |
| animals | birds | Otididae       | <i>Ardeotis australis</i>        | Australian bustard         | C | 24  | 0                                      |
| animals | birds | Scolopacidae   | <i>Arenaria interpres</i>        | ruddy turnstone            | C | 12  | 0 Ma, Mi (Bonn, CAMBA, JAMBA, ROKAMBA) |
| animals | birds | Artamidae      | <i>Artamus cinereus</i>          | black-faced woodswallow    | C | 23  | 0                                      |
| animals | birds | Artamidae      | <i>Artamus cyanopterus</i>       | dusky woodswallow          | C | 2   | 0                                      |
| animals | birds | Artamidae      | <i>Artamus leucorynchus</i>      | white-breasted woodswallow | C | 3   | 0                                      |
| animals | birds | Artamidae      | <i>Artamus minor</i>             | little woodswallow         | C | 13  | 0                                      |
| animals | birds | Artamidae      | <i>Artamus personatus</i>        | masked woodswallow         | C | 2   | 0                                      |
| animals | birds | Artamidae      | <i>Artamus superciliosus</i>     | white-browed woodswallow   | C | 8   | 0                                      |
| animals | birds | Accipitridae   | <i>Aviceda subcristata</i>       | Pacific baza               | C | 1   | 0                                      |
| animals | birds | Anatidae       | <i>Aythya australis</i>          | hardhead                   | C | 8   | 0                                      |
| animals | birds | Burhinidae     | <i>Burhinus grallarius</i>       | bush stone-curlew          | C | 6   | 1                                      |

|         |       |               |  |                              |     |     |  |
|---------|-------|---------------|--|------------------------------|-----|-----|--|
| animals | birds | Ardeidae      | <i>Butorides striata</i>   | striated heron               | C   | 31  | 0                                      |
| animals | birds | Cacatuidae    | <i>Cacatua galerita</i>  | sulphur-crested cockatoo     | C   | 12  | 0                                      |
| animals | birds | Cacatuidae    | <i>Cacatua sanguinea</i>   | little corella               | C   | 2   | 0                                      |
| animals | birds | Cacatuidae    | <i>Cacatua tenuirostris</i>  | long-billed corella          | Y C | 3   | 0                                      |
| animals | birds | Cuculidae     | <i>Cacomantis flabelliformis</i>   | fan-tailed cuckoo            | C   | 2   | 0 Ma                                   |
| animals | birds | Cuculidae     | <i>Cacomantis pallidus</i>   | pallid cuckoo                | C   | 15  | 0 Ma                                   |
| animals | birds | Cuculidae     | <i>Cacomantis variolosus</i>   | brush cuckoo                 | C   | 1   | 0                                      |
| animals | birds | Scolopacidae  | <i>Calidris acuminata</i>  | sharp-tailed sandpiper       | C   | 145 | 4 Ma, Mi (Bonn, CAMBA, JAMBA, ROKAMBA) |
| animals | birds | Scolopacidae  | <i>Calidris alba</i>   | sanderling                   | C   | 2   | 0 Ma, Mi (Bonn, CAMBA, JAMBA, ROKAMBA) |
| animals | birds | Scolopacidae  | <i>Calidris canutus</i>  | red knot                     | C   | 1   | 0 Ma, Mi (Bonn, CAMBA, JAMBA, ROKAMBA) |
| animals | birds | Scolopacidae  | <i>Calidris ferruginea</i>   | curlew sandpiper             | C   | 39  | 0 Ma, Mi (Bonn, CAMBA, JAMBA, ROKAMBA) |
| animals | birds | Scolopacidae  | <i>Calidris melanotos</i>  | pectoral sandpiper           | C   | 2   | 0 Ma, Mi (Bonn, JAMBA, ROKAMBA)        |
| animals | birds | Scolopacidae  | <i>Calidris ruficollis</i>   | red-necked stint             | C   | 49  | 0 Ma, Mi (Bonn, CAMBA, JAMBA, ROKAMBA) |
| animals | birds | Scolopacidae  | <i>Calidris tenuirostris</i>   | great knot                   | C   | 6   | 0 Ma, Mi (Bonn, CAMBA, JAMBA, ROKAMBA) |
| animals | birds | Cacatuidae    | <i>Calyptorhynchus banksii</i>   | red-tailed black-cockatoo    | C   | 245 | 0                                      |
| animals | birds | Cacatuidae    | <i>Calyptorhynchus funereus</i>  | yellow-tailed black-cockatoo | C   | 6   | 0                                      |
| animals | birds | Cacatuidae    | <i>Calyptorhynchus lathami</i>   | glossy black-cockatoo        | V   | 1   | 0                                      |
| animals | birds | Caprimulgidae | <i>Caprimulgus macrurus</i>  | large-tailed nightjar        | C   | 6   | 0                                      |
| animals | birds | Casuariidae   | <i>Casuarius casuarius johnsonii</i> (sout southern cassowary (southern population | E                            | 1   | 0   |  |
| animals | birds | Cuculidae     | <i>Centropus phasianinus</i>   | pheasant coucal              | C   | 8   | 0                                      |
| animals | birds | Alcedinidae   | <i>Ceyx azureus</i>  | azure kingfisher             | C   | 3   | 1                                      |
| animals | birds | Cuculidae     | <i>Chalcites basalis</i>   | Horsfield's bronze-cuckoo    | C   | 10  | 0 Ma                                   |
| animals | birds | Cuculidae     | <i>Chalcites lucidus</i>   | shining bronze-cuckoo        | C   | 1   | 0 Ma                                   |
| animals | birds | Cuculidae     | <i>Chalcites minutillus minutillus</i>   | little bronze-cuckoo         | C   | 7   | 0                                      |
| animals | birds | Cuculidae     | <i>Chalcites minutillus russatus</i>   | Gould's bronze-cuckoo        | C   | 3   | 1                                      |
| animals | birds | Cuculidae     | <i>Chalcites osculans</i>  | black-eared cuckoo           | C   | 1   | 0 Ma                                   |
| animals | birds | Charadriidae  | <i>Charadrius leschenaultii</i>  | greater sand plover          | C   | 12  | 0 Ma, Mi (Bonn, CAMBA, JAMBA, ROKAMBA) |
| animals | birds | Charadriidae  | <i>Charadrius mongolus</i>   | lesser sand plover           | C   | 6   | 0 Ma, Mi (Bonn, CAMBA, JAMBA, ROKAMBA) |
| animals | birds | Charadriidae  | <i>Charadrius ruficapillus</i>   | red-capped plover            | C   | 136 | 0 Ma                                   |
| animals | birds | Anatidae      | <i>Chenonetta jubata</i>   | Australian wood duck         | C   | 7   | 0                                      |
| animals | birds | Hirundinidae  | <i>Cheramoeca leucosterna</i>  | white-backed swallow         | C   | 1   | 0                                      |
| animals | birds | Laridae       | <i>Chlidonias hybrida</i>  | whiskered tern               | C   | 17  | 0 Ma                                   |
| animals | birds | Laridae       | <i>Chroicocephalus novaehollandiae</i>   | silver gull                  | C   | 305 | 0 Ma                                   |
| animals | birds | Acanthizidae  | <i>Chthonicola sagittata</i>   | speckled warbler             | C   | 7   | 0                                      |
| animals | birds | Megaluridae   | <i>Cincloramphus cruralis</i>  | brown songlark               | C   | 1   | 0                                      |
| animals | birds | Megaluridae   | <i>Cincloramphus mathewsi</i>  | rufous songlark              | C   | 41  | 0                                      |

|         |       |                 |                                   |                             |   |     |      |
|---------|-------|-----------------|-----------------------------------|-----------------------------|---|-----|------|
| animals | birds | Psophodidae     | <i>Cinclosoma punctatum</i>       | spotted quail-thrush        | C | 1   | 0    |
| animals | birds | Accipitridae    | <i>Circus approximans</i>         | swamp harrier               | C | 9   | 0 Ma |
| animals | birds | Accipitridae    | <i>Circus assimilis</i>           | spotted harrier             | C | 1   | 0    |
| animals | birds | Cisticolidae    | <i>Cisticola exilis</i>           | golden-headed cisticola     | C | 9   | 0    |
| animals | birds | Cisticolidae    | <i>Cisticola juncidis laveryi</i> | zitting cisticola           | C | 1   | 0    |
| animals | birds | Climacteridae   | <i>Climacteris affinis</i>        | white-browed treecreeper    | C | 1   | 0    |
| animals | birds | Climacteridae   | <i>Climacteris picumnus</i>       | brown treecreeper           | C | 47  | 0    |
| animals | birds | Pachycephalidae | <i>Colluricincla harmonica</i>    | grey shrike-thrush          | C | 31  | 0    |
| animals | birds | Pachycephalidae | <i>Colluricincla megarhyncha</i>  | little shrike-thrush        | C | 52  | 0    |
| animals | birds | Columbidae      | <i>Columba livia</i>              | rock dove                   | Y | 10  | 0    |
| animals | birds | Meliphagidae    | <i>Conopophila rufogularis</i>    | rufous-throated honeyeater  | C | 1   | 0    |
| animals | birds | Campephagidae   | <i>Coracina lineata</i>           | barred cuckoo-shrike        | C | 1   | 1    |
| animals | birds | Campephagidae   | <i>Coracina maxima</i>            | ground cuckoo-shrike        | C | 3   | 0    |
| animals | birds | Campephagidae   | <i>Coracina novaehollandiae</i>   | black-faced cuckoo-shrike   | C | 62  | 0 Ma |
| animals | birds | Campephagidae   | <i>Coracina papuensis</i>         | white-bellied cuckoo-shrike | C | 3   | 0 Ma |
| animals | birds | Campephagidae   | <i>Coracina tenuirostris</i>      | cicadabird                  | C | 3   | 0 Ma |
| animals | birds | Corcoracidae    | <i>Corcorax melanorhamphos</i>    | white-winged chough         | C | 1   | 0    |
| animals | birds | Corvidae        | <i>Corvus bennetti</i>            | little crow                 | C | 9   | 0    |
| animals | birds | Corvidae        | <i>Corvus coronoides</i>          | Australian raven            | C | 18  | 0    |
| animals | birds | Corvidae        | <i>Corvus orru</i>                | Torresian crow              | C | 112 | 0    |
| animals | birds | Phasianidae     | <i>Coturnix pectoralis</i>        | stubble quail               | C | 5   | 0 Ma |
| animals | birds | Phasianidae     | <i>Coturnix ypsilophora</i>       | brown quail                 | C | 8   | 0    |
| animals | birds | Artamidae       | <i>Cracticus nigrogularis</i>     | pied butcherbird            | C | 106 | 1    |
| animals | birds | Artamidae       | <i>Cracticus quoyi</i>            | black butcherbird           | C | 2   | 0    |
| animals | birds | Artamidae       | <i>Cracticus tibicen</i>          | Australian magpie           | C | 39  | 0    |
| animals | birds | Artamidae       | <i>Cracticus torquatus</i>        | grey butcherbird            | C | 55  | 0    |
| animals | birds | Cuculidae       | <i>Cuculus optatus</i>            | oriental cuckoo             | C | 5   | 0    |
| animals | birds | Anatidae        | <i>Cygnus atratus</i>             | black swan                  | C | 3   | 0    |
| animals | birds | Halcyonidae     | <i>Dacelo leachii</i>             | blue-winged kookaburra      | C | 25  | 0    |
| animals | birds | Halcyonidae     | <i>Dacelo novaeguineae</i>        | laughing kookaburra         | C | 14  | 0    |
| animals | birds | Neosittidae     | <i>Daphoenositta chrysoptera</i>  | varied sittella             | C | 16  | 0    |
| animals | birds | Anatidae        | <i>Dendrocygna arcuata</i>        | wandering whistling-duck    | C | 121 | 1 Ma |
| animals | birds | Anatidae        | <i>Dendrocygna eytoni</i>         | plumed whistling-duck       | C | 4   | 0    |
| animals | birds | Nectariniidae   | <i>Dicaeum hirundinaceum</i>      | mistletoebird               | C | 16  | 0    |
| animals | birds | Dicruridae      | <i>Dicrurus bracteatus</i>        | spangled drongo             | C | 378 | 0 Ma |
| animals | birds | Casuariidae     | <i>Dromaius novaehollandiae</i>   | emu                         | C | 18  | 0    |

|         |       |                |                                   |                                       |     |     |  |
|---------|-------|----------------|-----------------------------------|---------------------------------------|-----|-----|--|
| animals | birds | Columbidae     | <i>Ducula bicolor</i>             | pied imperial-pigeon                  | C   | 5   | 0 Ma                                   |
| animals | birds | Ardeidae       | <i>Egretta garzetta</i>           | little egret                          | C   | 114 | 0 Ma                                   |
| animals | birds | Ardeidae       | <i>Egretta novaehollandiae</i>    | white-faced heron                     | C   | 6   | 0                                      |
| animals | birds | Ardeidae       | <i>Egretta picata</i>             | pied heron                            | C   | 3   | 0                                      |
| animals | birds | Ardeidae       | <i>Egretta sacra</i>              | eastern reef egret                    | C   | 17  | 0 Ma, Mi (CAMBA)                       |
| animals | birds | Accipitridae   | <i>Elanus axillaris</i>           | black-shouldered kite                 | C   | 2   | 0                                      |
| animals | birds | Charadriidae   | <i>Elseyornis melanops</i>        | black-fronted dotterel                | C   | 9   | 0                                      |
| animals | birds | Meliphagidae   | <i>Entomyzon cyanotis</i>         | blue-faced honeyeater                 | C   | 15  | 0                                      |
| animals | birds | Cacatuidae     | <i>Eolophus roseicapillus</i>     | galah                                 | C   | 71  | 0                                      |
| animals | birds | Ciconiidae     | <i>Ephippiorhynchus asiaticus</i> | black-necked stork                    | R   | 42  | 0                                      |
| animals | birds | Meliphagidae   | <i>Epithianura tricolor</i>       | crimson chat                          | C   | 1   | 0                                      |
| animals | birds | Charadriidae   | <i>Erythrogonyx cinctus</i>       | red-kneed dotterel                    | C   | 12  | 0                                      |
| animals | birds | Accipitridae   | <i>Erythrotriorchis radiatus</i>  | red goshawk                           | E V | 2   | 0                                      |
| animals | birds | Burhinidae     | <i>Esacus magnirostris</i>        | beach stone-curlew                    | V   | 22  | 0 Ma                                   |
| animals | birds | Cuculidae      | <i>Eudynamys orientalis</i>       | eastern koel                          | C   | 1   | 0                                      |
| animals | birds | Eurostopodidae | <i>Eurostopodus argus</i>         | spotted nightjar                      | C   | 6   | 0 Ma                                   |
| animals | birds | Eurostopodidae | <i>Eurostopodus mystacalis</i>    | white-throated nightjar               | C   | 1   | 0 Ma                                   |
| animals | birds | Coraciidae     | <i>Eurystomus orientalis</i>      | dollarbird                            | C   | 21  | 0 Ma                                   |
| animals | birds | Phasianidae    | <i>Excalfactoria chinensis</i>    | king quail                            | C   | 1   | 0                                      |
| animals | birds | Falconidae     | <i>Falco berigora</i>             | brown falcon                          | C   | 18  | 0                                      |
| animals | birds | Falconidae     | <i>Falco cenchroides</i>          | nankeen kestrel                       | C   | 41  | 0 Ma                                   |
| animals | birds | Falconidae     | <i>Falco hypoleucus</i>           | grey falcon                           | R   | 1   | 0                                      |
| animals | birds | Falconidae     | <i>Falco longipennis</i>          | Australian hobby                      | C   | 2   | 0                                      |
| animals | birds | Falconidae     | <i>Falco peregrinus</i>           | peregrine falcon                      | C   | 1   | 0                                      |
| animals | birds | Falconidae     | <i>Falco subniger</i>             | black falcon                          | C   | 1   | 0                                      |
| animals | birds | Fregatidae     | <i>Fregata ariel</i>              | lesser frigatebird                    | C   | 1   | 0 Ma, Mi (CAMBA, JAMBA, ROKAMBA)       |
| animals | birds | Rallidae       | <i>Fulica atra</i>                | Eurasian coot                         | C   | 3   | 0                                      |
| animals | birds | Scolopacidae   | <i>Gallinago hardwickii</i>       | Latham's snipe                        | C   | 1   | 0 Ma, Mi (Bonn, CAMBA, JAMBA, ROKAMBA) |
| animals | birds | Rallidae       | <i>Gallinula tenebrosa</i>        | dusky moorhen                         | C   | 1   | 0                                      |
| animals | birds | Rallidae       | <i>Gallirallus philippensis</i>   | buff-banded rail                      | C   | 1   | 0                                      |
| animals | birds | Laridae        | <i>Gelochelidon nilotica</i>      | gull-billed tern                      | C   | 67  | 0 Ma                                   |
| animals | birds | Columbidae     | <i>Geopelia cuneata</i>           | diamond dove                          | C   | 2   | 0                                      |
| animals | birds | Columbidae     | <i>Geopelia humeralis</i>         | bar-shouldered dove                   | C   | 12  | 0                                      |
| animals | birds | Columbidae     | <i>Geopelia striata</i>           | peaceful dove                         | C   | 10  | 0                                      |
| animals | birds | Columbidae     | <i>Geophaps scripta scripta</i>   | squatter pigeon (southern subspecies) | V V | 11  | 0                                      |
| animals | birds | Acanthizidae   | <i>Gerygone albogularis</i>       | white-throated gerygone               | C   | 9   | 0                                      |

|         |       |                  |                                    |                               |   |     |  |
|---------|-------|------------------|------------------------------------|-------------------------------|---|-----|--|
| animals | birds | Acanthizidae     | <i>Gerygone fusca</i>              | western gerygone              | C | 10  | 0                                      |
| animals | birds | Acanthizidae     | <i>Gerygone levigaster</i>         | mangrove gerygone             | C | 84  | 0                                      |
| animals | birds | Acanthizidae     | <i>Gerygone magnirostris</i>       | large-billed gerygone         | C | 2   | 1                                      |
| animals | birds | Acanthizidae     | <i>Gerygone mouki</i>              | brown gerygone                | C | 2   | 0                                      |
| animals | birds | Acanthizidae     | <i>Gerygone palpebrosa</i>         | fairy gerygone                | C | 4   | 0                                      |
| animals | birds | Monarchidae      | <i>Grallina cyanoleuca</i>         | magpie-lark                   | C | 25  | 0                                      |
| animals | birds | Meliphagidae     | <i>Grantiella picta</i>            | painted honeyeater            | R | 1   | 0                                      |
| animals | birds | Gruidae          | <i>Grus rubicunda</i>              | brolga                        | C | 39  | 0                                      |
| animals | birds | Haematopodidae   | <i>Haematopus fuliginosus</i>      | sooty oystercatcher           | R | 36  | 0                                      |
| animals | birds | Haematopodidae   | <i>Haematopus longirostris</i>     | Australian pied oystercatcher | C | 76  | 2                                      |
| animals | birds | Accipitridae     | <i>Haliaeetus leucogaster</i>      | white-bellied sea-eagle       | C | 118 | 0 Ma, Mi (CAMBA)                       |
| animals | birds | Accipitridae     | <i>Haliastur indus</i>             | brahminy kite                 | C | 166 | 1 Ma                                   |
| animals | birds | Accipitridae     | <i>Haliastur sphenurus</i>         | whistling kite                | C | 11  | 0 Ma                                   |
| animals | birds | Accipitridae     | <i>Hamirostra melanosternon</i>    | black-breasted buzzard        | C | 5   | 0                                      |
| animals | birds | Accipitridae     | <i>Hieraetus morphnoides</i>       | little eagle                  | C | 6   | 0                                      |
| animals | birds | Recurvirostridae | <i>Himantopus himantopus</i>       | black-winged stilt            | C | 1   | 0 Ma                                   |
| animals | birds | Apodidae         | <i>Hirundapus caudacutus</i>       | white-throated needletail     | C | 1   | 0 Ma, Mi (CAMBA, JAMBA, ROKAMBA)       |
| animals | birds | Hirundinidae     | <i>Hirundo neoxena</i>             | welcome swallow               | C | 391 | 0                                      |
| animals | birds | Laridae          | <i>Hydroprogne caspia</i>          | Caspian tern                  | C | 77  | 0 Ma, Mi (CAMBA, JAMBA)                |
| animals | birds | Jacanidae        | <i>Irediparra gallinacea</i>       | comb-crested jacana           | C | 5   | 0                                      |
| animals | birds | Campephagidae    | <i>Lalage leucomela</i>            | varied triller                | C | 192 | 0                                      |
| animals | birds | Campephagidae    | <i>Lalage sueurii</i>              | white-winged triller          | C | 19  | 0                                      |
| animals | birds | Columbidae       | <i>Leucosarcia picata</i>          | wonga pigeon                  | C | 2   | 0                                      |
| animals | birds | Meliphagidae     | <i>Lichenostomus chrysops</i>      | yellow-faced honeyeater       | C | 1   | 0                                      |
| animals | birds | Meliphagidae     | <i>Lichenostomus fasciogularis</i> | mangrove honeyeater           | C | 49  | 0                                      |
| animals | birds | Meliphagidae     | <i>Lichenostomus flavus</i>        | yellow honeyeater             | C | 514 | 0                                      |
| animals | birds | Meliphagidae     | <i>Lichenostomus frenatus</i>      | bridled honeyeater            | C | 1   | 0                                      |
| animals | birds | Meliphagidae     | <i>Lichenostomus fuscus</i>        | fuscous honeyeater            | C | 1   | 0                                      |
| animals | birds | Meliphagidae     | <i>Lichenostomus leucotis</i>      | white-eared honeyeater        | C | 5   | 0                                      |
| animals | birds | Meliphagidae     | <i>Lichenostomus penicillatus</i>  | white-plumed honeyeater       | C | 7   | 0                                      |
| animals | birds | Meliphagidae     | <i>Lichenostomus plumulus</i>      | grey-fronted honeyeater       | C | 6   | 0                                      |
| animals | birds | Meliphagidae     | <i>Lichenostomus unicolor</i>      | white-gaped honeyeater        | C | 1   | 0                                      |
| animals | birds | Meliphagidae     | <i>Lichenostomus virescens</i>     | singing honeyeater            | C | 57  | 0                                      |
| animals | birds | Meliphagidae     | <i>Lichmera indistincta</i>        | brown honeyeater              | C | 30  | 0                                      |
| animals | birds | Scolopacidae     | <i>Limosa lapponica</i>            | bar-tailed godwit             | C | 31  | 0 Ma, Mi (Bonn, CAMBA, JAMBA, ROKAMBA) |
| animals | birds | Scolopacidae     | <i>Limosa limosa</i>               | black-tailed godwit           | C | 10  | 0 Ma, Mi (Bonn, CAMBA, JAMBA, ROKAMBA) |

|         |       |                   |                                    |                            |   |     |                  |
|---------|-------|-------------------|------------------------------------|----------------------------|---|-----|------------------|
| animals | birds | Estrildidae       | <i>Lonchura castaneothorax</i>     | chestnut-breasted mannikin | C | 38  | 0                |
| animals | birds | Estrildidae       | <i>Lonchura punctulata</i>         | nutmeg mannikin            | Y | 36  | 0                |
| animals | birds | Accipitridae      | <i>Lophoictinia isura</i>          | square-tailed kite         | R | 1   | 0                |
| animals | birds | Columbidae        | <i>Lopholaimus antarcticus</i>     | topknot pigeon             | C | 1   | 0                |
| animals | birds | Columbidae        | <i>Macropygia amboinensis</i>      | brown cuckoo-dove          | C | 1   | 0                |
| animals | birds | Anatidae          | <i>Malacorhynchus membranaceus</i> | pink-eared duck            | C | 3   | 0                |
| animals | birds | Maluridae         | <i>Malurus lamberti</i>            | variegated fairy-wren      | C | 41  | 0                |
| animals | birds | Maluridae         | <i>Malurus leucopterus</i>         | white-winged fairy-wren    | C | 1   | 0                |
| animals | birds | Maluridae         | <i>Malurus melanocephalus</i>      | red-backed fairy-wren      | C | 23  | 0                |
| animals | birds | Meliphagidae      | <i>Manorina flavigula</i>          | yellow-throated miner      | C | 97  | 0                |
| animals | birds | Meliphagidae      | <i>Manorina melanocephala</i>      | noisy miner                | C | 3   | 0                |
| animals | birds | Megaluridae       | <i>Megalurus gramineus</i>         | little grassbird           | C | 2   | 0                |
| animals | birds | Megaluridae       | <i>Megalurus timoriensis</i>       | tawny grassbird            | C | 14  | 0                |
| animals | birds | Megapodiidae      | <i>Megapodius reinwardt</i>        | orange-footed scrubfowl    | C | 3   | 0                |
| animals | birds | Petroicidae       | <i>Melanodryas cucullata</i>       | hooded robin               | C | 16  | 0                |
| animals | birds | Meliphagidae      | <i>Meliphaga lewinii</i>           | Lewin's honeyeater         | C | 17  | 0                |
| animals | birds | Meliphagidae      | <i>Meliphaga notata</i>            | yellow-spotted honeyeater  | C | 1   | 0                |
| animals | birds | Meliphagidae      | <i>Melithreptus albogularis</i>    | white-throated honeyeater  | C | 16  | 0                |
| animals | birds | Meliphagidae      | <i>Melithreptus brevirostris</i>   | brown-headed honeyeater    | C | 1   | 0                |
| animals | birds | Meliphagidae      | <i>Melithreptus gularis</i>        | black-chinned honeyeater   | R | 3   | 0                |
| animals | birds | Meliphagidae      | <i>Melithreptus lunatus</i>        | white-naped honeyeater     | C | 1   | 0                |
| animals | birds | Psittacidae       | <i>Melopsittacus undulatus</i>     | budgerigar                 | C | 6   | 0                |
| animals | birds | Meropidae         | <i>Merops ornatus</i>              | rainbow bee-eater          | C | 37  | 0 Ma, Mi (JAMBA) |
| animals | birds | Phalacrocoracidae | <i>Microcarbo melanoleucos</i>     | little pied cormorant      | C | 4   | 0                |
| animals | birds | Petroicidae       | <i>Microeca fascinans</i>          | jacky winter               | C | 52  | 1                |
| animals | birds | Petroicidae       | <i>Microeca flavigaster</i>        | lemon-bellied flycatcher   | C | 19  | 0                |
| animals | birds | Accipitridae      | <i>Milvus migrans</i>              | black kite                 | C | 22  | 0                |
| animals | birds | Alaudidae         | <i>Mirafrla javanica</i>           | Horsfield's bushlark       | C | 5   | 0                |
| animals | birds | Monarchidae       | <i>Monarcha melanopsis</i>         | black-faced monarch        | C | 6   | 0 Ma, Mi (Bonn)  |
| animals | birds | Monarchidae       | <i>Myiagra cyanoleuca</i>          | satin flycatcher           | C | 2   | 0 Ma, Mi (Bonn)  |
| animals | birds | Monarchidae       | <i>Myiagra inquieta</i>            | restless flycatcher        | C | 15  | 0                |
| animals | birds | Monarchidae       | <i>Myiagra rubecula</i>            | leaden flycatcher          | C | 13  | 0                |
| animals | birds | Meliphagidae      | <i>Myzomela obscura</i>            | dusky honeyeater           | C | 41  | 0                |
| animals | birds | Meliphagidae      | <i>Myzomela sanguinolenta</i>      | scarlet honeyeater         | C | 8   | 0                |
| animals | birds | Nectariniidae     | <i>Nectarinia jugularis</i>        | olive-backed sunbird       | C | 371 | 0                |
| animals | birds | Estrildidae       | <i>Neochmia modesta</i>            | plum-headed finch          | C | 1   | 0                |

|         |       |                   |                                   |                         |   |     |  |
|---------|-------|-------------------|-----------------------------------|-------------------------|---|-----|--|
| animals | birds | Estrildidae       | <i>Neochmia ruficauda</i>         | star finch              | C | 2   | 0                                      |
| animals | birds | Estrildidae       | <i>Neochmia temporalis</i>        | red-browed finch        | C | 1   | 0                                      |
| animals | birds | Anatidae          | <i>Nettapus coromandelianus</i>   | cotton pygmy-goose      | R | 1   | 0 Ma                                   |
| animals | birds | Anatidae          | <i>Nettapus pulchellus</i>        | green pygmy-goose       | C | 2   | 0 Ma                                   |
| animals | birds | Strigidae         | <i>Ninox boobook</i>              | southern boobook        | C | 18  | 0 Ma                                   |
| animals | birds | Strigidae         | <i>Ninox connivens</i>            | barking owl             | C | 1   | 0                                      |
| animals | birds | Scolopacidae      | <i>Numenius madagascariensis</i>  | eastern curlew          | R | 95  | 0 Ma, Mi (Bonn, CAMBA, JAMBA, ROKAMBA) |
| animals | birds | Scolopacidae      | <i>Numenius minutus</i>           | little curlew           | C | 7   | 0 Ma, Mi (Bonn, CAMBA, JAMBA, ROKAMBA) |
| animals | birds | Scolopacidae      | <i>Numenius phaeopus</i>          | whimbrel                | C | 75  | 0 Ma, Mi (Bonn, CAMBA, JAMBA, ROKAMBA) |
| animals | birds | Ardeidae          | <i>Nycticorax caledonicus</i>     | Nankeen night-heron     | C | 1   | 0 Ma                                   |
| animals | birds | Cacatuidae        | <i>Nymphicus hollandicus</i>      | cockatiel               | C | 41  | 0                                      |
| animals | birds | Columbidae        | <i>Ocyphaps lophotes</i>          | crested pigeon          | C | 27  | 0                                      |
| animals | birds | Laridae           | <i>Onychoprion anaethetus</i>     | bridled tern            | C | 1   | 0 Ma, Mi (CAMBA, JAMBA)                |
| animals | birds | Pachycephalidae   | <i>Oreoica gutturalis</i>         | crested bellbird        | C | 37  | 0                                      |
| animals | birds | Oriolidae         | <i>Oriolus sagittatus</i>         | olive-backed oriole     | C | 3   | 0                                      |
| animals | birds | Pachycephalidae   | <i>Pachycephala pectoralis</i>    | golden whistler         | C | 1   | 0                                      |
| animals | birds | Pachycephalidae   | <i>Pachycephala rufiventris</i>   | rufous whistler         | C | 72  | 0                                      |
| animals | birds | Accipitridae      | <i>Pandion cristatus</i>          | eastern osprey          | C | 96  | 0 Ma, Mi (Bonn)                        |
| animals | birds | Pardalotidae      | <i>Pardalotus punctatus</i>       | spotted pardalote       | C | 2   | 0                                      |
| animals | birds | Pardalotidae      | <i>Pardalotus rubricatus</i>      | red-browed pardalote    | C | 2   | 0                                      |
| animals | birds | Pardalotidae      | <i>Pardalotus striatus</i>        | striated pardalote      | C | 85  | 0                                      |
| animals | birds | Passeridae        | <i>Passer domesticus</i>          | house sparrow           | Y | 54  | 0                                      |
| animals | birds | Phasianidae       | <i>Pavo cristatus</i>             | Indian peafowl          | Y | 2   | 0                                      |
| animals | birds | Pelecanidae       | <i>Pelecanus conspicillatus</i>   | Australian pelican      | C | 2   | 0 Ma                                   |
| animals | birds | Hirundinidae      | <i>Petrochelidon ariel</i>        | fairy martin            | C | 4   | 0                                      |
| animals | birds | Hirundinidae      | <i>Petrochelidon nigricans</i>    | tree martin             | C | 9   | 0 Ma                                   |
| animals | birds | Petroicidae       | <i>Petroica goodenovii</i>        | red-capped robin        | C | 4   | 0                                      |
| animals | birds | Phalacrocoracidae | <i>Phalacrocorax carbo</i>        | great cormorant         | C | 23  | 0                                      |
| animals | birds | Phalacrocoracidae | <i>Phalacrocorax sulcirostris</i> | little black cormorant  | C | 10  | 0                                      |
| animals | birds | Phalacrocoracidae | <i>Phalacrocorax varius</i>       | pied cormorant          | C | 2   | 0                                      |
| animals | birds | Columbidae        | <i>Phaps chalcoptera</i>          | common bronzewing       | C | 16  | 0                                      |
| animals | birds | Columbidae        | <i>Phaps elegans</i>              | brush bronzewing        | C | 1   | 0                                      |
| animals | birds | Meliphagidae      | <i>Philemon buceroides</i>        | helmeted friarbird      | C | 379 | 0                                      |
| animals | birds | Meliphagidae      | <i>Philemon citreogularis</i>     | little friarbird        | C | 37  | 0                                      |
| animals | birds | Meliphagidae      | <i>Philemon corniculatus</i>      | noisy friarbird         | C | 43  | 0                                      |
| animals | birds | Threskiornithidae | <i>Platalea flavipes</i>          | yellow-billed spoonbill | C | 1   | 0                                      |

|         |       |                   |                                       |                                     |    |    |  |
|---------|-------|-------------------|---------------------------------------|-------------------------------------|----|----|--|
| animals | birds | Threskiornithidae | <i>Platalea regia</i>                 | royal spoonbill                     | C  | 5  | 0                                      |
| animals | birds | Psittacidae       | <i>Platycercus adscitus</i>           | pale-headed rosella                 | C  | 46 | 0                                      |
| animals | birds | Psittacidae       | <i>Platycercus adscitus palliceps</i> | pale-headed rosella (southern form) | C  | 1  | 0                                      |
| animals | birds | Meliphagidae      | <i>Plectrohyncha lanceolata</i>       | striped honeyeater                  | C  | 37 | 0                                      |
| animals | birds | Threskiornithidae | <i>Plegadis falcinellus</i>           | glossy ibis                         | C  | 21 | 0 Ma, Mi (Bonn, CAMBA)                 |
| animals | birds | Charadriidae      | <i>Pluvialis fulva</i>                | Pacific golden plover               | C  | 11 | 0 Ma, Mi (Bonn, CAMBA, JAMBA, ROKAMBA) |
| animals | birds | Charadriidae      | <i>Pluvialis squatarola</i>           | grey plover                         | C  | 3  | 0 Ma, Mi (Bonn, CAMBA, JAMBA, ROKAMBA) |
| animals | birds | Podargidae        | <i>Podargus strigoides</i>            | tawny frogmouth                     | C  | 6  | 0                                      |
| animals | birds | Podicipedidae     | <i>Podiceps cristatus</i>             | great crested grebe                 | C  | 2  | 0                                      |
| animals | birds | Podicipedidae     | <i>Poliocephalus poliocephalus</i>    | hoary-headed grebe                  | C  | 2  | 0                                      |
| animals | birds | Pomatostomidae    | <i>Pomatostomus temporalis</i>        | grey-crowned babbler                | C  | 62 | 0                                      |
| animals | birds | Rallidae          | <i>Porphyrio porphyrio</i>            | purple swamphen                     | C  | 1  | 0                                      |
| animals | birds | Psittacidae       | <i>Psephotus pulcherrimus</i>         | paradise parrot                     | PE | EX | 1 0 Mi (JAMBA)                         |
| animals | birds | Columbidae        | <i>Ptilinopus regina</i>              | rose-crowned fruit-dove             | C  | 2  | 0                                      |
| animals | birds | Columbidae        | <i>Ptilinopus superbus</i>            | superb fruit-dove                   | C  | 1  | 0 Ma                                   |
| animals | birds | Ptilonorhynchidae | <i>Ptilonorhynchus maculatus</i>      | spotted bowerbird                   | C  | 24 | 0                                      |
| animals | birds | Ptilonorhynchidae | <i>Ptilonorhynchus nuchalis</i>       | great bowerbird                     | C  | 2  | 0                                      |
| animals | birds | Meliphagidae      | <i>Ramsayornis fasciatus</i>          | bar-breasted honeyeater             | C  | 13 | 0                                      |
| animals | birds | Recurvirostridae  | <i>Recurvirostra novaehollandiae</i>  | red-necked avocet                   | C  | 66 | 0 Ma                                   |
| animals | birds | Rhipiduridae      | <i>Rhipidura albiscapa</i>            | grey fantail                        | C  | 25 | 0                                      |
| animals | birds | Rhipiduridae      | <i>Rhipidura leucophrys</i>           | willie wagtail                      | C  | 68 | 0                                      |
| animals | birds | Rhipiduridae      | <i>Rhipidura rufifrons</i>            | rufous fantail                      | C  | 4  | 0 Ma, Mi (Bonn)                        |
| animals | birds | Cuculidae         | <i>Scythrops novaehollandiae</i>      | channel-billed cuckoo               | C  | 20 | 0 Ma                                   |
| animals | birds | Acanthizidae      | <i>Sericornis frontalis</i>           | white-browed scrubwren              | C  | 3  | 0                                      |
| animals | birds | Acanthizidae      | <i>Smicromis brevirostris</i>         | weebill                             | C  | 76 | 0                                      |
| animals | birds | Oriolidae         | <i>Sphecotheres vieilloti</i>         | Australasian figbird                | C  | 4  | 0                                      |
| animals | birds | Stercorariidae    | <i>Stercorarius pomarinus</i>         | pomarine jaeger                     | C  | 1  | 1 Ma, Mi (CAMBA, JAMBA)                |
| animals | birds | Laridae           | <i>Sterna hirundo</i>                 | common tern                         | C  | 5  | 0 Ma, Mi (CAMBA, JAMBA, ROKAMBA)       |
| animals | birds | Laridae           | <i>Sterna sumatrana</i>               | black-naped tern                    | C  | 11 | 0 Ma, Mi (CAMBA, JAMBA)                |
| animals | birds | Laridae           | <i>Sternula albifrons</i>             | little tern                         | E  | 18 | 2 Ma, Mi (Bonn, CAMBA, JAMBA, ROKAMBA) |
| animals | birds | Anatidae          | <i>Stictonetta naevosa</i>            | freckled duck                       | R  | 3  | 0                                      |
| animals | birds | Glareolidae       | <i>Stiltia isabella</i>               | Australian pratincole               | C  | 1  | 0 Ma                                   |
| animals | birds | Artamidae         | <i>Strepera graculina</i>             | pied currawong                      | C  | 11 | 0                                      |
| animals | birds | Columbidae        | <i>Streptopelia chinensis</i>         | spotted dove                        | Y  | 31 | 0                                      |
| animals | birds | Corcoracidae      | <i>Struthidea cinerea</i>             | apostlebird                         | C  | 19 | 0                                      |
| animals | birds | Sturnidae         | <i>Sturnus tristis</i>                | common myna                         | Y  | 1  | 0                                      |

|         |           |                   |                                       |                                      |   |     |  |
|---------|-----------|-------------------|---------------------------------------|--------------------------------------|---|-----|--|
| animals | birds     | Sturnidae         | <i>Sturnus vulgaris</i>               | common starling                      | Y | 2   | 0                                      |
| animals | birds     | Meliphagidae      | <i>Sugomel niger</i>                  | black honeyeater                     | C | 1   | 0                                      |
| animals | birds     | Sulidae           | <i>Sula leucogaster</i>               | brown booby                          | C | 6   | 0 Ma, Mi (CAMBA, JAMBA, ROKAMBA)       |
| animals | birds     | Monarchidae       | <i>Sympoiaarchus trivirgatus</i>      | spectacled monarch                   | C | 3   | 0                                      |
| animals | birds     | Podicipedidae     | <i>Tachybaptus novaehollandiae</i>    | Australasian grebe                   | C | 3   | 0                                      |
| animals | birds     | Anatidae          | <i>Tadorna radjah</i>                 | radjah shelduck                      | R | 17  | 0 Ma                                   |
| animals | birds     | Estrildidae       | <i>Taeniopygia bichenovii</i>         | double-barred finch                  | C | 31  | 0                                      |
| animals | birds     | Estrildidae       | <i>Taeniopygia guttata</i>            | zebra finch                          | C | 19  | 0                                      |
| animals | birds     | Halcyonidae       | <i>Tanysiptera sylvia</i>             | buff-breasted paradise-kingfisher    | C | 1   | 0 Ma                                   |
| animals | birds     | Laridae           | <i>Thalasseus bengalensis</i>         | lesser crested tern                  | C | 3   | 0 Ma, Mi (CAMBA)                       |
| animals | birds     | Laridae           | <i>Thalasseus bergii</i>              | crested tern                         | C | 27  | 0 Ma                                   |
| animals | birds     | Threskiornithidae | <i>Threskiornis molucca</i>           | Australian white ibis                | C | 335 | 0 Ma                                   |
| animals | birds     | Threskiornithidae | <i>Threskiornis spinicollis</i>       | straw-necked ibis                    | C | 10  | 0 Ma                                   |
| animals | birds     | Halcyonidae       | <i>Todiramphus chloris</i>            | collared kingfisher                  | C | 7   | 0                                      |
| animals | birds     | Halcyonidae       | <i>Todiramphus macleayii</i>          | forest kingfisher                    | C | 4   | 0 Ma                                   |
| animals | birds     | Halcyonidae       | <i>Todiramphus pyrrhopygius</i>       | red-backed kingfisher                | C | 8   | 0                                      |
| animals | birds     | Halcyonidae       | <i>Todiramphus sanctus</i>            | sacred kingfisher                    | C | 12  | 0 Ma                                   |
| animals | birds     | Rallidae          | <i>Tribonyx ventralis</i>             | black-tailed native-hen              | C | 3   | 0                                      |
| animals | birds     | Psittacidae       | <i>Trichoglossus chlorolepidotus</i>  | scaly-breasted lorikeet              | C | 10  | 0                                      |
| animals | birds     | Psittacidae       | <i>Trichoglossus haematocephalus</i>  | rainbow lorikeet                     | C | 13  | 0                                      |
| animals | birds     | Scolopacidae      | <i>Tringa brevipes</i>                | grey-tailed tattler                  | C | 21  | 0 Ma, Mi (Bonn, CAMBA, JAMBA, ROKAMBA) |
| animals | birds     | Scolopacidae      | <i>Tringa incana</i>                  | wandering tattler                    | C | 2   | 0 Ma, Mi (Bonn, CAMBA, JAMBA)          |
| animals | birds     | Scolopacidae      | <i>Tringa nebularia</i>               | common greenshank                    | C | 61  | 0 Ma, Mi (Bonn, CAMBA, JAMBA, ROKAMBA) |
| animals | birds     | Scolopacidae      | <i>Tringa stagnatilis</i>             | marsh sandpiper                      | C | 96  | 0 Ma, Mi (Bonn, CAMBA, JAMBA, ROKAMBA) |
| animals | birds     | Turnicidae        | <i>Turnix pyrrhotorax</i>             | red-chested button-quail             | C | 3   | 0                                      |
| animals | birds     | Turnicidae        | <i>Turnix velox</i>                   | little button-quail                  | C | 2   | 0                                      |
| animals | birds     | Tytonidae         | <i>Tyto javanica</i>                  | eastern barn owl                     | C | 6   | 0                                      |
| animals | birds     | Tytonidae         | <i>Tyto longimembris</i>              | eastern grass owl                    | C | 1   | 0                                      |
| animals | birds     | Charadriidae      | <i>Vanellus miles</i>                 | masked lapwing                       | C | 6   | 0                                      |
| animals | birds     | Charadriidae      | <i>Vanellus miles miles</i>           | masked lapwing (northern subspecies) | C | 2   | 0                                      |
| animals | birds     | Charadriidae      | <i>Vanellus miles novaehollandiae</i> | masked lapwing (southern subspecies) | C | 1   | 0                                      |
| animals | birds     | Charadriidae      | <i>Vanellus tricolor</i>              | banded lapwing                       | C | 7   | 0                                      |
| animals | birds     | Scolopacidae      | <i>Xenus cinereus</i>                 | terek sandpiper                      | C | 2   | 0 Ma, Mi (Bonn, CAMBA, JAMBA, ROKAMBA) |
| animals | birds     | Timaliidae        | <i>Zosterops lateralis</i>            | silvereye                            | C | 1   | 0 Ma                                   |
| animals | bony fish | Terapontidae      | <i>Amniataba percoides</i>            | barred grunter                       |   | 2   | 0                                      |
| animals | bony fish | Anguillidae       | <i>Anguilla reinhardtii</i>           | longfin eel                          |   | 1   | 0                                      |

|         |           |                  |   |                             |   |    |    |   |
|---------|-----------|------------------|---|-----------------------------|---|----|----|---|
| animals | bony fish | Ariidae          | <i>Arius graeffei</i>                   | blue catfish                |   | 1  | 0  |   |
| animals | bony fish | Hemiramphidae    | <i>Arrhamphus sclerolepis</i>           | snubnose garfish            |   | 1  | 0  |   |
| animals | bony fish | Gobiidae         | <i>Glossogobius giuris</i>              | tank goby                   |   | 2  | 0  |   |
| animals | bony fish | Terapontidae     | <i>Hephaestus fuliginosus</i>           | sooty grunter               |   | 1  | 0  |   |
| animals | bony fish | Eleotridae       | <i>Hypseleotris compressa</i>           | empire gudgeon              |   | 2  | 0  |   |
| animals | bony fish | Eleotridae       | <i>Hypseleotris galii</i>               | firetail gudgeon            |   | 1  | 0  |   |
| animals | bony fish | Centropomidae    | <i>Lates calcarifer</i>                 | barramundi                  |   | 1  | 0  |   |
| animals | bony fish | Terapontidae     | <i>Leiopotherapon unicolor</i>          | spangled perch              |   | 1  | 1  |   |
| animals | bony fish | Melanotaeniidae  | <i>Melanotaenia splendida splendida</i> | eastern rainbowfish         |   | 1  | 0  |   |
| animals | bony fish | Clupeidae        | <i>Nematalosa erebi</i>                 | bony bream                  |   | 1  | 0  |   |
| animals | bony fish | Plotosidae       | <i>Neosilurus ater</i>                  | black catfish               |   | 1  | 1  |   |
| animals | bony fish | Plotosidae       | <i>Neosilurus hyrtlii</i>               | Hyrtl's catfish             |   | 6  | 5  |   |
| animals | bony fish | Plotosidae       | <i>Porochilus rendahli</i>              | Rendahl's catfish           |   | 1  | 0  |   |
| animals | bony fish | Terapontidae     | <i>Scortum hillii</i>                   | leathery grunter            |   | 1  | 0  |   |
| animals | bony fish | Belonidae        | <i>Strongylura krefftii</i>             | freshwater longtom          |   | 1  | 0  |   |
| animals | mammals   | Potoroidae       | <i>Aepyprymnus rufescens</i>            | rufous bettong              | C | 12 | 0  |   |
| animals | mammals   | Dasyuridae       | <i>Antechinus flavipes</i>              | yellow-footed antechinus    | C | 1  | 0  |   |
| animals | mammals   | Bovidae          | <i>Bos taurus</i>                       | European cattle             | Y | 50 | 0  |   |
| animals | mammals   | Canidae          | <i>Canis familiaris</i>                 | dog                         | Y | 4  | 0  |   |
| animals | mammals   | Canidae          | <i>Canis lupus dingo</i>                | dingo                       |   | 11 | 0  |   |
| animals | mammals   | Molossidae       | <i>Chaerephon jobensis</i>              | northern freetail bat       | C | 2  | 0  |   |
| animals | mammals   | Vespertilionidae | <i>Chalinolobus gouldii</i>             | Gould's wattled bat         | C | 1  | 0  |   |
| animals | mammals   | Vespertilionidae | <i>Chalinolobus nigrogriseus</i>        | hoary wattled bat           | C | 4  | 2  |   |
| animals | mammals   | Vespertilionidae | <i>Chalinolobus picatus</i>             | little pied bat             | R | 1  | 1  |   |
| animals | mammals   | Dasyuridae       | <i>Dasyurus hallucatus</i>              | northern quoll              | C | E  | 1  | 0 |
| animals | mammals   | Dugongidae       | <i>Dugong dugon</i>                     | dugong                      | V | 1  | 0  |   |
| animals | mammals   | Equidae          | <i>Equus caballus</i>                   | horse                       | Y |    | 1  | 0 |
| animals | mammals   | Felidae          | <i>Felis catus</i>                      | cat                         | Y |    | 6  | 0 |
| animals | mammals   | Muridae          | <i>Hydromys chrysogaster</i>            | water rat                   | C |    | 1  | 0 |
| animals | mammals   | Macropodidae     | <i>Lagorchestes conspicillatus</i>      | spectacled hare-wallaby     | C |    | 8  | 0 |
| animals | mammals   | Vombatidae       | <i>Lasiorhinus krefftii</i>             | northern hairy-nosed wombat | E | E  | 23 | 0 |
| animals | mammals   | Muridae          | <i>Leggadina forresti</i>               | Forrest's mouse             | C |    | 2  | 1 |
| animals | mammals   | Leporidae        | <i>Lepus capensis</i>                   | brown hare                  | Y |    | 2  | 0 |
| animals | mammals   | Macropodidae     | <i>Macropus agilis</i>                  | agile wallaby               | C |    | 22 | 0 |
| animals | mammals   | Macropodidae     | <i>Macropus dorsalis</i>                | black-striped wallaby       | C |    | 2  | 0 |
| animals | mammals   | Macropodidae     | <i>Macropus giganteus</i>               | eastern grey kangaroo       | C |    | 97 | 0 |

|         |         |                   |  |                               |   |    |    |
|---------|---------|-------------------|--|-------------------------------|---|----|----|
| animals | mammals | Macropodidae      | <i>Macropus parryi</i>                     | whiptail wallaby              | C | 3  | 0  |
| animals | mammals | Macropodidae      | <i>Macropus robustus</i>                   | common wallaroo               | C | 11 | 0  |
| animals | mammals | Macropodidae      | <i>Macropus rufogriseus</i>                | red-necked wallaby            | C | 1  | 0  |
| animals | mammals | Macropodidae      | <i>Macropus rufus</i>                      | red kangaroo                  | C | 51 | 0  |
| animals | mammals | Muridae           | <i>Melomys burtoni</i>                     | grassland melomys             | C | 2  | 0  |
| animals | mammals | Vespertilionidae  | <i>Miniopterus schreibersii oceanensis</i> | eastern bent-wing bat         | C | 1  | 0  |
| animals | mammals | Molossidae        | <i>Mormopterus beccarii</i>                | Beccari's freetail bat        | C | 9  | 1  |
| animals | mammals | Molossidae        | <i>Mormopterus planiceps</i>               | southern freetail bat         | C | 1  | 0  |
| animals | mammals | Muridae           | <i>Mus musculus</i>                        | house mouse                   | Y | 18 | 0  |
| animals | mammals | Vespertilionidae  | <i>Nyctophilus bifax</i>                   | northern long-eared bat       | C | 2  | 0  |
| animals | mammals | Vespertilionidae  | <i>Nyctophilus geoffroyi</i>               | lesser long-eared bat         | C | 5  | 5  |
| animals | mammals | Ornithorhynchidae | <i>Ornithorhynchus anatinus</i>            | platypus                      | C | 1  | 0  |
| animals | mammals | Leporidae         | <i>Oryctolagus cuniculus</i>               | rabbit                        | Y | 56 | 0  |
| animals | mammals | Pseudocheiridae   | <i>Petauroides volans</i>                  | greater glider                | C | 2  | 0  |
| animals | mammals | Petauridae        | <i>Petaurus breviceps</i>                  | sugar glider                  | C | 3  | 0  |
| animals | mammals | Macropodidae      | <i>Petrogale assimilis</i>                 | allied rock-wallaby           | C | 12 | 9  |
| animals | mammals | Macropodidae      | <i>Petrogale herberti</i>                  | Herbert's rock-wallaby        | C | 14 | 7  |
| animals | mammals | Macropodidae      | <i>Petrogale inornata</i>                  | unadorned rock-wallaby        | C | 22 | 16 |
| animals | mammals | Phascolarctidae   | <i>Phascolarctos cinereus</i>              | koala                         | C | 7  | 0  |
| animals | mammals | Dasyuridae        | <i>Planigale ingrami</i>                   | long-tailed planigale         | C | 14 | 0  |
| animals | mammals | Dasyuridae        | <i>Planigale maculata</i>                  | common planigale              | C | 4  | 1  |
| animals | mammals | Dasyuridae        | <i>Planigale tenuirostris</i>              | narrow-nosed planigale        | C | 2  | 2  |
| animals | mammals | Muridae           | <i>Pseudomys delicatulus</i>               | delicate mouse                | C | 49 | 0  |
| animals | mammals | Muridae           | <i>Pseudomys desertor</i>                  | desert mouse                  | C | 3  | 0  |
| animals | mammals | Muridae           | <i>Pseudomys gracilicaudatus</i>           | eastern chestnut mouse        | C | 1  | 1  |
| animals | mammals | Muridae           | <i>Pseudomys patrius</i>                   | eastern pebble-mound mouse    | C | 4  | 0  |
| animals | mammals | Pteropodidae      | <i>Pteropus alecto</i>                     | black flying-fox              | C | 2  | 1  |
| animals | mammals | Pteropodidae      | <i>Pteropus scapulatus</i>                 | little red flying-fox         | C | 3  | 0  |
| animals | mammals | Muridae           | <i>Rattus sordidus</i>                     | canefield rat                 | C | 2  | 0  |
| animals | mammals | Muridae           | <i>Rattus tunneyi</i>                      | pale field-rat                | C | 13 | 0  |
| animals | mammals | Rhinolophidae     | <i>Rhinolophus megaphyllus</i>             | eastern horseshoe-bat         | C | 2  | 0  |
| animals | mammals | Emballonuridae    | <i>Saccoaimus flaviventris</i>             | yellow-bellied sheathtail bat | C | 1  | 0  |
| animals | mammals | Vespertilionidae  | <i>Scotorepens balstoni</i>                | inland broad-nosed bat        | C | 1  | 0  |
| animals | mammals | Vespertilionidae  | <i>Scotorepens greyii</i>                  | little broad-nosed bat        | C | 2  | 2  |
| animals | mammals | Vespertilionidae  | <i>Scotorepens sanborni</i>                | northern broad-nosed bat      | C | 1  | 1  |
| animals | mammals | Dasyuridae        | <i>Sminthopsis macroura</i>                | stripe-faced dunnart          | C | 6  | 0  |

|         |          |                  |   |                             |   |    |                   |
|---------|----------|------------------|---|-----------------------------|---|----|-------------------|
| animals | mammals  | Suidae           | <i>Sus scrofa</i>                                 | pig                         | Y | 9  | 0                 |
| animals | mammals  | Tachyglossidae   | <i>Tachyglossus aculeatus</i>                     | short-beaked echidna        | C | 22 | 0                 |
| animals | mammals  | Molossidae       | <i>Tadarida australis</i>                         | white-striped freetail bat  | C | 2  | 0                 |
| animals | mammals  | Phalangeridae    | <i>Trichosurus vulpecula</i>                      | common brushtail possum     | C | 4  | 0                 |
| animals | mammals  | Vespertilionidae | <i>Vespadelus vulturnus</i>                       | little forest bat           | C | 3  | 0                 |
| animals | mammals  | Macropodidae     | <i>Wallabia bicolor</i>                           | swamp wallaby               | C | 4  | 0                 |
| animals | reptiles | Elapidae         | <i>Acanthophis antarcticus</i>                    | common death adder          | R | 3  | 0                 |
| animals | reptiles | Agamidae         | <i>Amphibolurus burnsi</i>                        |                             | C | 2  | 0                 |
| animals | reptiles | Agamidae         | <i>Amphibolurus gilberti</i>                      | Gilbert's dragon            | C | 1  | 0                 |
| animals | reptiles | Agamidae         | <i>Amphibolurus nobbi</i>                         |                             | C | 5  | 2                 |
| animals | reptiles | Scincidae        | <i>Anomalopus brevicollis</i>                     |                             | R | 1  | 0                 |
| animals | reptiles | Boidae           | <i>Antaresia maculosa</i>                         |                             | C | 4  | 0                 |
| animals | reptiles | Boidae           | <i>Aspidites melanocephalus</i>                   | black-headed python         | C | 2  | 0                 |
| animals | reptiles | Colubridae       | <i>Boiga irregularis</i>                          | brown tree snake            | C | 1  | 0                 |
| animals | reptiles | Scincidae        | <i>Carlia foliorum</i>                            |                             | C | 4  | 0                 |
| animals | reptiles | Scincidae        | <i>Carlia jarnoldae</i>                           |                             | C | 4  | 0                 |
| animals | reptiles | Scincidae        | <i>Carlia munda</i>                               |                             | C | 12 | 1                 |
| animals | reptiles | Scincidae        | <i>Carlia mundivensis</i>                         |                             | C | 1  | 0                 |
| animals | reptiles | Scincidae        | <i>Carlia pectoralis</i>                          |                             | C | 5  | 0                 |
| animals | reptiles | Scincidae        | <i>Carlia schmeltzii</i>                          |                             | C | 1  | 0                 |
| animals | reptiles | Chelidae         | <i>Chelodina canni</i>                            | Cann's longneck turtle      | C | 2  | 0                 |
| animals | reptiles | Chelidae         | <i>Chelodina longicollis</i>                      | eastern snake-necked turtle | C | 2  | 0                 |
| animals | reptiles | Cheloniidae      | <i>Chelonia mydas</i>                             | green turtle                | V | V  | 2 0 Ma, Mi (Bonn) |
| animals | reptiles | Agamidae         | <i>Chlamydosaurus kingii</i>                      | frilled lizard              | C | 2  | 0                 |
| animals | reptiles | Crocodylidae     | <i>Crocodylus porosus</i>                         | estuarine crocodile         | V | 1  | 0 Ma, Mi (Bonn)   |
| animals | reptiles | Scincidae        | <i>Cryptoblepharus metallicus</i>                 | metallic snake-eyed skink   | C | 2  | 1                 |
| animals | reptiles | Scincidae        | <i>Cryptoblepharus pannosus</i>                   | ragged snake-eyed skink     | C | 52 | 2                 |
| animals | reptiles | Scincidae        | <i>Cryptoblepharus plagioccephalus sensu lato</i> |                             | C | 10 | 0                 |
| animals | reptiles | Scincidae        | <i>Cryptoblepharus virgatus sensu lato</i>        |                             | C | 12 | 0                 |
| animals | reptiles | Agamidae         | <i>Ctenophorus nuchalis</i>                       | central netted dragon       | C | 6  | 0                 |
| animals | reptiles | Scincidae        | <i>Ctenotus allotropis</i>                        |                             | C | 5  | 0                 |
| animals | reptiles | Scincidae        | <i>Ctenotus capricorni</i>                        |                             | R | 1  | 0                 |
| animals | reptiles | Scincidae        | <i>Ctenotus hebetior</i>                          |                             | C | 1  | 0                 |
| animals | reptiles | Scincidae        | <i>Ctenotus leonhardii</i>                        |                             | C | 3  | 0                 |
| animals | reptiles | Scincidae        | <i>Ctenotus pantherinus</i>                       |                             | C | 7  | 1                 |
| animals | reptiles | Scincidae        | <i>Ctenotus robustus</i>                          |                             | C | 55 | 0                 |

|         |          |             |                                     |                            |   |    |   |   |
|---------|----------|-------------|-------------------------------------|----------------------------|---|----|---|---|
| animals | reptiles | Scincidae   | <i>Ctenotus strauchii</i>           |                            | C | 15 | 0 |   |
| animals | reptiles | Scincidae   | <i>Ctenotus taeniolatus</i>         | copper-tailed skink        | C | 11 | 0 |   |
| animals | reptiles | Pygopodidae | <i>Delma tincta</i>                 |                            | C | 3  | 1 |   |
| animals | reptiles | Elapidae    | <i>Demansia psammophis</i>          | yellow-faced whip snake    | C | 7  | 0 |   |
| animals | reptiles | Elapidae    | <i>Demansia torquata</i>            | collared whip snake        | C | 1  | 0 |   |
| animals | reptiles | Elapidae    | <i>Demansia vestigiata</i>          | black whip snake           | C | 5  | 0 |   |
| animals | reptiles | Colubridae  | <i>Dendrelaphis punctulata</i>      | common tree snake          | C | 1  | 0 |   |
| animals | reptiles | Elapidae    | <i>Denisonia maculata</i>           | ornamental snake           | V | V  | 3 | 0 |
| animals | reptiles | Gekkonidae  | <i>Diplodactylus conspicillatus</i> | fat-tailed diplodactylus   | C | 12 | 0 |   |
| animals | reptiles | Gekkonidae  | <i>Diplodactylus vittatus</i>       | wood gecko                 | C | 3  | 0 |   |
| animals | reptiles | Agamidae    | <i>Diporiphora australis</i>        |                            | C | 7  | 0 |   |
| animals | reptiles | Scincidae   | <i>Egernia rugosa</i>               | yakka skink                | V | V  | 1 | 0 |
| animals | reptiles | Scincidae   | <i>Egernia striolata</i>            | tree skink                 | C | 1  | 0 |   |
| animals | reptiles | Chelidae    | <i>Elseya irwini</i>                | Irwin's turtle             | C | 2  | 0 |   |
| animals | reptiles | Chelidae    | <i>Emydura macquarii krefftii</i>   | Krefft's river turtle      | C | 1  | 0 |   |
| animals | reptiles | Scincidae   | <i>Eremiascincus fasciolatus</i>    | narrow-banded sand swimmer | C | 2  | 0 |   |
| animals | reptiles | Scincidae   | <i>Eremiascincus richardsonii</i>   | broad-banded sand swimmer  | C | 1  | 0 |   |
| animals | reptiles | Elapidae    | <i>Furina diadema</i>               | red-naped snake            | C | 5  | 0 |   |
| animals | reptiles | Elapidae    | <i>Furina ornata</i>                | orange-naped snake         | C | 2  | 0 |   |
| animals | reptiles | Gekkonidae  | <i>Gehyra catenata</i>              |                            | C | 51 | 0 |   |
| animals | reptiles | Gekkonidae  | <i>Gehyra dubia</i>                 |                            | C | 8  | 0 |   |
| animals | reptiles | Gekkonidae  | <i>Gehyra variegata</i>             | tree dtella                | C | 4  | 0 |   |
| animals | reptiles | Scincidae   | <i>Glaphyromorphus punctulatus</i>  |                            | C | 3  | 2 |   |
| animals | reptiles | Gekkonidae  | <i>Hemidactylus frenatus</i>        | house gecko                | Y |    | 1 | 0 |
| animals | reptiles | Gekkonidae  | <i>Heteronotia binoei</i>           | Bynoe's gecko              | C | 63 | 0 |   |
| animals | reptiles | Elapidae    | <i>Hoplocephalus bitorquatus</i>    | pale-headed snake          | C | 4  | 0 |   |
| animals | reptiles | Scincidae   | <i>Lerista fragilis</i>             |                            | C | 22 | 0 |   |
| animals | reptiles | Scincidae   | <i>Lerista punctatovittata</i>      |                            | C | 17 | 2 |   |
| animals | reptiles | Scincidae   | <i>Lerista timida</i>               |                            | C | 1  | 0 |   |
| animals | reptiles | Pygopodidae | <i>Lialis burtonis</i>              | Burton's legless lizard    | C | 4  | 0 |   |
| animals | reptiles | Gekkonidae  | <i>Lucasium steindachneri</i>       | Steindachner's gecko       | C | 11 | 0 |   |
| animals | reptiles | Scincidae   | <i>Menetia greyii</i>               |                            | C | 22 | 0 |   |
| animals | reptiles | Scincidae   | <i>Menetia timlowi</i>              |                            | C | 3  | 1 |   |
| animals | reptiles | Boidae      | <i>Morelia spilota</i>              | carpet python              | C | 2  | 0 |   |
| animals | reptiles | Scincidae   | <i>Morethia boulengeri</i>          |                            | C | 35 | 0 |   |
| animals | reptiles | Scincidae   | <i>Morethia taeniopleura</i>        | fire-tailed skink          | C | 6  | 1 |   |

|         |          |             |                                       |                             |     |    |   |
|---------|----------|-------------|---------------------------------------|-----------------------------|-----|----|---|
| animals | reptiles | Gekkonidae  | <i>Nephrurus asper</i>                | spiny knob-tailed gecko     | C   | 6  | 0 |
| animals | reptiles | Gekkonidae  | <i>Oedura castelnau</i>               | northern velvet gecko       | C   | 1  | 0 |
| animals | reptiles | Gekkonidae  | <i>Oedura marmorata</i>               | marbled velvet gecko        | C   | 2  | 0 |
| animals | reptiles | Gekkonidae  | <i>Oedura monilis</i>                 |                             | C   | 7  | 0 |
| animals | reptiles | Gekkonidae  | <i>Oedura rhombifer</i>               | zig-zag gecko               | C   | 3  | 0 |
| animals | reptiles | Elapidae    | <i>Oxyuranus scutellatus</i>          | coastal taipan              | C   | 1  | 0 |
| animals | reptiles | Pygopodidae | <i>Paradelma orientalis</i>           | brigalow scaly-foot         | V V | 5  | 0 |
| animals | reptiles | Agamidae    | <i>Pogona barbata</i>                 | bearded dragon              | C   | 18 | 0 |
| animals | reptiles | Scincidae   | <i>Proablepharus tenuis</i>           |                             | C   | 3  | 1 |
| animals | reptiles | Elapidae    | <i>Pseudechis australis</i>           | king brown snake            | C   | 1  | 0 |
| animals | reptiles | Elapidae    | <i>Pseudonaja guttata</i>             | speckled brown snake        | C   | 1  | 1 |
| animals | reptiles | Elapidae    | <i>Pseudonaja nuchalis</i>            | western brown snake         | C   | 1  | 0 |
| animals | reptiles | Elapidae    | <i>Pseudonaja textilis</i>            | eastern brown snake         | C   | 1  | 0 |
| animals | reptiles | Pygopodidae | <i>Pygopus nigriceps</i>              | hooded scaly-foot           | C   | 2  | 0 |
| animals | reptiles | Pygopodidae | <i>Pygopus schraderi</i>              |                             | C   | 11 | 0 |
| animals | reptiles | Typhlopidae | <i>Ramphotyphlops grypus</i>          |                             | C   | 1  | 0 |
| animals | reptiles | Typhlopidae | <i>Ramphotyphlops ligatus</i>         |                             | C   | 4  | 0 |
| animals | reptiles | Typhlopidae | <i>Ramphotyphlops unguirostris</i>    |                             | C   | 1  | 0 |
| animals | reptiles | Elapidae    | <i>Rhinoplocephalus boschmai</i>      | Carpentaria whip snake      | C   | 1  | 0 |
| animals | reptiles | Elapidae    | <i>Rhinoplocephalus nigrostriatus</i> | black-striped snake         | C   | 3  | 0 |
| animals | reptiles | Gekkonidae  | <i>Rhynchoedura ornata</i>            | beaked gecko                | C   | 2  | 0 |
| animals | reptiles | Elapidae    | <i>Simoselaps australis</i>           | coral snake                 | C   | 6  | 0 |
| animals | reptiles | Gekkonidae  | <i>Strophurus williamsi</i>           | soft-spined gecko           | C   | 10 | 0 |
| animals | reptiles | Elapidae    | <i>Suta suta</i>                      | myall snake                 | C   | 3  | 0 |
| animals | reptiles | Scincidae   | <i>Tiliqua scincoides</i>             | eastern blue-tongued lizard | C   | 2  | 0 |
| animals | reptiles | Colubridae  | <i>Tropidonophis mairii</i>           | freshwater snake            | C   | 11 | 0 |
| animals | reptiles | Agamidae    | <i>Tympanocryptis lineata</i>         | lined earless dragon        | C   | 3  | 2 |
| animals | reptiles | Varanidae   | <i>Varanus gouldii</i>                | sand monitor                | C   | 1  | 0 |
| animals | reptiles | Varanidae   | <i>Varanus mertensi</i>               | Mertens' water monitor      | C   | 2  | 1 |
| animals | reptiles | Varanidae   | <i>Varanus panoptes</i>               | yellow-spotted monitor      | C   | 1  | 0 |
| animals | reptiles | Varanidae   | <i>Varanus storri</i>                 | Storr's monitor             | C   | 1  | 0 |
| animals | reptiles | Varanidae   | <i>Varanus tristis</i>                | black-tailed monitor        | C   | 19 | 0 |
| animals | reptiles | Elapidae    | <i>Vermicella annulata</i>            | bandy-bandy                 | C   | 2  | 0 |



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### Wetlands

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## Directory of Important Wetlands in Australia - Information sheet

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### Abbot Point - Caley Valley - QLD001

|   |  |
|---|--|
| <b>Level of importance:</b>                       | National - Directory   |
| <b>Location:</b>                                  | The site extends about 18 kilometres from Mt Curlewis in the west to Euri Creek in the east and about 6 kilometres from Bald Hill in the north to Caley Valley homestead in the south. Its centre is at 19 degrees 55' 22" S, 148 degrees 02' 25" E and is about 21 kilometres north northwest of Bowen. |
| <b>Biogeographic region:</b>                      | Brigalow Belt North.   |
| <b>Shire:</b>                                     | Bowen.   |
| <b>Area:</b>                                      | 5150 ha.   |
| <b>Elevation:</b>                                 | Less than 20m AHD. Most of the area is less than 5m AHD.   |
| <b>Other listed wetlands in same aggregation:</b> | None.  |
| <b>Wetland type:</b>                              | A1, A5, A6, C1, A9, A10, A11, A8   |
| <b>Criteria for inclusion:</b>                    | 1, 2, 3, 5,  |

#### Site description:

The site comprises a complex continuous wetland aggregation (Blackman et al. 1992) of subtidal and intertidal marine and estuarine wetlands, with a large fresh and brackish water wetland within an artificial impoundment. The catchment for the area is a portion of the Salisbury Plain and the slopes of Mount Roundback and Mount Little immediately to the south. Spring, Table Top, Main and Mount Stuart creeks drain into Curlewis Bay to the northeast, while Six Mile, Goodbye and Saltwater creeks drain into the impounded area.

#### Physical features:

The site is located on a low-lying prograded coastal plain west of the Don River delta. Landform pattern: plain (beach ridge on eastern and western sides, the area around the lake has some of the features of an alluvial plain and some of those of a lacustrine plain) and tidal flat. Landform elements: closed depressions (lake, swamp, lagoon); open depressions (drainage depression, stream channel, stream bed, swamp, swale, tidal channel, estuary); flats (backplain, floodout, tidal flat, intertidal flat, supratidal flat); simple slope (beach, duneslope) and embankment. Adjacent uplands are gently sloping plains, foredunes, beach ridges and hills.

Geology/soils: Quaternary sediments dominate the site. In the south-east they are dominated by alluvial deposits, in the centre there are lacustrine, in the south-west the sediments are mainly estuarine and the dune barriers are

Quaternary coastal deposits. High points around the site are comprised of early Carboniferous basic volcanics or late Carboniferous acid Igneous intrusions associated with Connor's Arch. The soils of the sand dunes are quartzipsammements. The saline soils of the mangroves and intertidal flats are undescribed. The soils of the lake and its associated swamp are unknown. Climate: The site falls within the 990-1397mm isohyets, with rain falling mostly in December- April.

**Hydrological features:**

Hydrological features: As with other extensive coastal wetlands between Mackay and Townsville the hydrological development of this site began with the delivery of fluviatile sediments (in this case by Euri Creek and the Don River) to a recently inundated (by a post ice age sea level rise) coastline with islands very close to the shore. Bald Hill, Mount Luce and Mt Curlewis appear to have been islands that have been tied to the mainland by these sediments. Outcrops of beach rock on the southeastern flank of Mt Luce indicate a former (Holocene) island coastline and suggest a slightly higher sea level than at present. Similar evidence of a higher Holocene sea level exists elsewhere between Mackay and Townsville (e.g. south of Cape Upstart). It appears that Saltwater Creek, which is the eastern extremity of the site represents a former channel of Euri Creek, which once entered the sea south south-east of Mt Luce. Lower Euri Creek may represent a former course of the Don, in which case it may once have entered the sea further west than it does now. It appears that the Don, which has formed a substantial modern delta, was a major source of the sediments that tie the islands. As the sediments accumulated barriers developed between the islands and extending south southeast from Bald Hill, where the present coal loading facility is located. This resulted in an almost landlocked bay and restricted the passage of Euri Creek and possibly the Don. The bay was filled in by accumulating sediments which form the foundation of the present wetlands. It is probable that the waters of the Euri and possibly the Don found outlets to the sea between Mt Luce and Mt Curlewis. Eventually the outlets shifted back east of Mt Luce to their present positions. Saltwater Creek maintains the site's connection to Euri Creek and to a lesser extent the Don. During the wet season when water levels in the Euri and Don are high, water flows north-westwards along Saltwater Creek and into the site. As water levels fall during the dry, water flows from the site and into Euri Creek.

Fresh water is also provided by local runoff from the Salisbury Plain and the slopes of Mount Roundback and Mount Little. Spring, Table Top, Main and Mount Stuart creeks drain into Curlewis Bay to the north-east, while Six Mile, Goodbye and Saltwater creeks drain into the central area and disappear in the swamps surrounding the lake. There is also a reversible movement of waters on the western side of the site. During the wet season there tends to be a movement of fresh and brackish waters westwards from the site and into Curlewis Bay.

During the dry tidal water movement dominates and saline waters enter the site from Curlewis Bay, mean tidal range is 3.6m. This pattern has been modified by the construction of a causeway between Caley Valley Homestead and the flanks of Mt Luce. This causeway has been piped in a couple of places (Mt Stuart Creek flows under the northern end) but it does restrict the movement of water between the site and Curlewis Bay. The result of this is that water remains longer on the higher flats around the lake, and salt water is less able to enter the eastern side of the site, reducing salinity there.

Water quality: Measurements were made at several points around the lake between 0900 and 1730 on 9 September 1999. Conductivity ranged from 2 ?S/cm with a salinity of 0.9 (in Saltwater Creek) to 53 ?S/cm with a salinity of 35 (in the tidal channel of Mt Stuart Creek on the western side of the site. pH ranged from 7.8 (on the flat south east of Mt Luce) to 8.9 (on the eastern side of the northern end of the causeway). Dissolved oxygen ranged from 50 percent (4.5 mg/L) on the flat south-east of Mt Luce (taken at 0930) to 267 percent (20.4 mg/L) south of the Lake (taken at 1630).

**Ecological features:**

The site comprises a complex continuous wetland aggregation of subtidal and intertidal marine and estuarine wetlands. Some of the estuarine wetland, is marginally so and some is impounded. Marine wetland is mainly intertidal and limited to the western side of the site (inshore Curlewis Bay). Classes present are: unconsolidated bottom, unconsolidated shore, aquatic bed, stream bed, emergent, scrub-shrub and forested, subtidal unconsolidated bottom and aquatic bed, intertidal unconsolidated shore and aquatic bed.

**Significance:**

The site provides an outstanding example of wetlands on a tropical prograding coast. Permanent water, a wide range of wetland habitats, very rich food resources and sheltered roosting and breeding sites cause the site to be

exceptionally important for waterbirds. The importance of the site is such that it meets criteria for identifying wetlands of international importance adopted by the Ramsar Convention (e.g. 1a, 1c, 2a, 2c).

**Notable flora:**

Mangroves occur mainly on the western side of the site - associated with three tidal channels flowing into Curlewis Bay. Dense grey mangrove (*Avicennia marina*), spotted mangrove (*Rhizophora stylosa*) and yellow mangrove (*Ceriops tagal*) line channel banks. Away from the channels trees tend to be lower and sparser and dominated by yellow mangrove (*Ceriops tagal*). There are expanses of unvegetated tidal flat between the channels. These flats commonly have an algal crust, which may get disrupted periodically (e.g. by king tides or storm surges) and provide an important source of nutrients. The landward margins of tidal flats support halophytic scrub-shrub wetland in which the following species have been recorded *Halosarcia halocnemoides*, *H. indica*, *H. pergranulata*, *Suadea arbusculoides*, *Teticornia australasica*, *Sarcocornia quinqueflora* and sand couch (*Sporobolus virginicus*).

There are also areas of sand couch (*Sporobolus virginicus*) grassland. During very wet periods parts of these flats may become temporarily inundated with brackish water and support emergent or aquatic beds. Stands of *Schoenoplectus littoralis* grow in the extensive swamp surrounding the lake. The stands are not continuous but tend to form sinuous bands two to five metres across with broader areas of open water or aquatic bed between them. This pattern appears to be particularly valuable for water birds as it provides them with a 'best of both worlds' situation. The *Schoenoplectus* bands provide shelter for roosting and breeding while the open areas are feeding sites. The banding facilitates rapid access of one from another. There are also small areas of *Eleocharis dulcis* (particularly around the western end of Saltwater Creek) which tends to grow in shallower, less brackish water than the *Schoenoplectus*. Beds of emergent grasses such as spiny mudgrass (*Pseudoraphis spinescens*) and *Cynodon dactylon* and smaller sedges such as *Cyperus zollingeri* and *Cyperus scaber* may also be present, particularly on the landward edge of the site. Algae most commonly dominate aquatic beds.

Water is generally turbid and this appears to be caused mainly by planktonic algae. High levels of planktonic algae are also suggested in the massive increase in dissolved oxygen that can occur during the day. Other species present include *Nymphaea gigantea*, *Nymphoides indica*, *Persicaria subsessilis*, *Marsilea drummondii*, *Ottelia alismoides* and *Pseudoraphis spinescens*. About 70 species have been recorded in beach scrub communities. Seagrass communities occur in the shallow marine waters.

**Notable fauna:**

The lake and its surrounding swamp is an important breeding and dry season concentration area for a wide range of waterfowl. The site is particularly important for black swans (*Cygnus atratus*) and is one of their most northerly breeding sites. Black-necked stork (*Ephippiorhynchus asiaticus*) (Sr, EPBC migratory species) is commonly present on site and cotton pygmy-goose (*Nettapus coromandelianus*) (Sr, EPBC migratory species) is occasionally present. Waders use the intertidal habitat, occasionally gathering in very large numbers (this is particularly so of black-winged stilt (*Himantopus himantopus*)). White-bellied sea-eagle (*Haliaeetus leucogaster*) and marsh sandpiper (*Tringa stagnatilis*), are covered by the migratory provisions of the EPBC Act: The following species have been recorded in the Wildnet online database as occurring on the site: swamp harrier (*Circus approximans*), brahminy kite (*Haliastur indus*), osprey (*Pandion haliaetus*), grey teal (*Anas gracilis*), Pacific black duck (*Anas superciliosa*), wandering whistling duck (*Dendrocygna arcuata*), plumed whistling-duck (*Dendrocygna eytoni*), darter (*Anhinga melanogaster*), magpie goose (*Anseranas semipalmata*), great egret (*Ardea alba*), cattle egret (*Ardea ibis*), intermediate egret (*Ardea intermedia*), pied heron (*Ardea picata*), little egret (*Egretta garzetta*), white-faced heron (*Egretta novaehollandiae*), masked lapwing (*Vanellus miles*), brolga (*Grus rubicunda*), blue-ingested kookaburra (*Dacelo leachii*), laughing kookaburra (*Dacelo novaeguineae*), forest kingfisher (*Todiramphus macleayii*), sacred kingfisher (*Todiramphus sanctus*), whiskered tern (*Chlidonias hybridus*), silver gull (*Larus novaehollandiae*), gull-billed tern (*Sterna nilotica*), Richard's pipit (*Anthus novaeseelandiae*), Australian pelican (*Pelecanus conspicillatus*), little pied cormorant (*Phalacrocorax melanoleucus*), little black cormorant (*Phalacrocorax sulcirostris*), pied cormorant (*Phalacrocorax varius*), Australasian grebe (*Tachybaptus novaehollandiae*), dusky moorhen (*Gallinula tenebrosa*), purple swamphen (*Porphyrio porphyrio*), black-winged stilt (*Himantopus himantopus*), sharp-tailed sandpiper (*Calidris acuminata*), wood sandpiper (*Tringa glareola*), marsh sandpiper (*Tringa stagnatilis*), masked booby (*Sula dactylatra*), yellow-billed spoonbill (*Platalea flavipes*), royal spoonbill (*Platalea regia*), Australian white ibis (*Threskiornis molucca*), and straw-necked ibis (*Threskiornis spinicollis*).

Other sources indicate that the following species are also sometimes present on the site: freckled duck (*Stictonetta*

naevosa) (Sr), pink-eared duck (*Malacorhynchus membranaceus*), chestnut teal (*Anas castanea*), Australasian shoveller (*Anas rhynchotis*), wood duck (*Chettonetta jubata*), hardhead (*Aythya australis*), and green pygmy-goose (*Nettapus pulchellus*). The ornate burrowing frog (*Limnodynastes ornatus*) has been recorded on site.

**Other Fauna:**

It is highly probable that the site supports a population of water mouse (*Xeromys myoides*) (Nv, Sv). It is probable that estuarine crocodiles (*Crocodylus porosus*) (Sv) occasionally use tidal channels on the western side of the site.

**Social and Cultural values:**

The lake was formerly an important water fowl hunting area for the local community.

**Land tenure:**

On site: Mostly freehold, some leasehold, State land and resources reserve. The marine section on the western side of the site falls within the Port of Abbot Point. Surrounding areas: Leasehold, freehold and State land.

**Current land use:**

On site: Extensive grazing and buffer for Abbot Point Coal Loading facility. The facility is an international port, entry to it and exit from it needs to be carefully monitored. Having the area surrounded by uninhabited wetland facilitates this. Surrounding areas: Extensive cattle grazing. A large coal loading facility and associated infrastructure are located immediately to the north of the site.

**Disturbance or threat:**

Current: Managed grazing is compatible with the management of the wetland habitat, however inappropriate grazing has had a severe impact on the beach scrub communities on the southern part of the area. These have now been isolated by an access road and rail line to the Abbot Point coal loading facility and grazing no longer occurs there. Feral pigs are present in the area and are having some impact on wetland margins. The banks of Saltwater Creek on the eastern side of the site are badly infested with *Acacia nilotica*, *Acacia farnesiana* and *Parkinsonia aculeata*. *Lantana camara*, *Solanum seaforthianum*, *Cryptostegia grandiflora*, *Ziziphus mauritiana*, *Bothriochloa pertusa*, *Cenchrus ciliaris*, *Cenchrus echinatum* and *Stachytarpheta jamaicensis* have been recorded on more rarely inundated parts of the site.

Potential: The coal loading facility adjacent to the site is an international port that presents a special potential for invading exotic species. This port is one of the largest in Australia and is visited by over 60 bulk carriers per year; each of these discharge about 30,000 tonnes of ballast water per visit. They come from 14 countries, the majority from Japan. A study of the ballast water in 23 bulk carriers found 57 taxa of marine organisms. Twenty marine organisms (18 animals and 2 plants) are known to have been introduced into Queensland waters. Only one of these is known to have arrived in ballast waters. Marine species introduced in ballast water have had significant environmental impact on marine environments in the southern states and overseas. It is estimated that most of the ballast water discharge in Queensland waters occurs at Hay Point, Abbot Point and Weipa. The port facility at Abbot Point does not yet appear to be implicated in the introduction of any marine organisms.

Other potential problems associated with the facility are erosion initiated by activities there, wind or water borne coal dust and leachate from coal dumps. Erosion associated with the facility does not appear to be a problem on the site. Coal dust and leachate have the potential to alter water chemistry and in extreme, localised cases poison or smother organisms. There is no evidence that these things are happening on site. There is potential for noise associated with the facility to disrupt wildlife, particularly breeding swans, but there is no evidence that this is occurring. There are mineral sands on and around the site that are potential sources of titanium; there are currently no plans to use them.

**Conservation measures taken:**

Abbott Bay Resources Reserve. Community Nature Conservation in consultation with station management and Environmental Protection Agency staff. Mount Isa Mines is developing an environmental management plan designed to protect the wetlands under their care at Abbot Point. The State Coastal Management Plan - Queensland Coastal Policy (August 2001) provides policy that prevents, minimises or mitigates further loss or degradation and impacts on coastal wetlands.

**Management authority and jurisdiction:**

Landholders. The majority of the site is controlled by Bulkcoal Pty Ltd, a wholly-owned subsidiary of MIM Holdings

Limited. The Port of Abbot Point is owned by Ports Corporation of Queensland and managed by Bulkcoal Pty Ltd.

**References:**

Australian Nature Conservation Agency. (1993); Australian Nature Conservation Agency. (1996); Blackman, J.G. et al. (2002); Blackman, J.G. et al.(1992); Coles, R.G. et al. (1989); Environment Australia. (2001); Environmental Protection Agency. (1999); Frith, H.J. (1967); Gregory, C.M. (1969); Hilliard, R.W. et al. (1997); Lavery, H.J. (1971); Marsh, H. & Saalfeld, W.K. (1990), Queensland Department of Primary Industries (1993); Stanton, J.P. (1975). [See Queensland Reference List](#)

**Compiler & date:**

Spain, A.V.and Blackman, J.G., 1992. Revised Blackman, J.G. and Craven, S.A. 1995. Revised Perry, T.W. 2001.  
Edited Miller G.J. and Worland, J.L. 2004.

**Drainage:**

*AWRC Division:* NORTH-EAST COAST

*AWRC Region:* WHITSUNDAY

*AWRC Basin:* DON RIVER

*Catchment:* Don River

*Sub-catchment:*

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### Bowen River: Birralee - Pelican Creek Aggregation - QLD198

|   |  |
|---|--|
| <b>Level of importance:</b>                       | National - Directory   |
| <b>Location:</b>                                  | A 15 kilometre section of the Bowen River with a central point at 20 degrees 35' 25" S, 147 degrees 36' 39" E. Approximately 27 kilometres west of Collinsville. |
| <b>Biogeographic region:</b>                      | Brigalow Belt North  |
| <b>Shire:</b>                                     | Bowen  |
| <b>Area:</b>                                      | 1 342 ha.  |
| <b>Elevation:</b>                                 | 80-100m AHD  |
| <b>Other listed wetlands in same aggregation:</b> | None.  |
| <b>Wetland type:</b>                              | B2, B6, B5, B4   |
| <b>Criteria for inclusion:</b>                    | 1, 2, 3, 5,  |

#### Site description:

Large permanent clear water hole in the central part of the site, rapids, sand, rock or rubble bars, terraces and small waterholes at the upstream and downstream ends. Most of this section of the river has cut into volcanic rocks and has a bedrock bed, which has been partially covered by sheets and banks of sand, gravel and pebbles. There are large areas of bare rock particularly in the upstream section of the site where there is a broad (c 80m on the NE side of the river) and uneven bedrock terrace into which the river has cut a channel about 40m wide and 5m deep. On the NE side 10-15 metres of alluvium forms a precipitous bank. No prominent banks of alluvium are present on the SW side, which is densely tree covered and descends only a few metres below the flood plain. Landform: Channel incised into an alluvial plain. Landform elements: bank, bar, bench, channel bench cliff, alcove, cliff-foot slope, levee, stream bed, stream channel, terrace flat. Geology/soils: Basic and acid volcanics and associated sediments (Lizzie Creek Volcanics). Kandosols -loamy to clayey sand. Climate: The site lies between the 600 and 650mm rainfall isohyets (DNR Engineering Services 1999).

#### Physical features:

Permanently flooded intermittent riverine rocky shore, permanently flooded intermittent riverine rocky bottom, semi-permanently flooded intermittent riverine rocky shore, semi-permanently flooded intermittent riverine unconsolidated shore, permanently flooded intermittent riverine rooted vascular aquatic bed, seasonally flooded intermittent riverine sandy streambed, seasonally flooded intermittent riverine bedrock streambed, seasonally flooded intermittent riverine

cobble-gravel streambed, semipermanently flooded intermittent riverine sandy streambed, semi-permanently flooded intermittent riverine bedrock streambed, semi-permanently flooded intermittent riverine cobble-gravel streambed, seasonally flooded palustrine evergreen forest, seasonally flooded palustrine emergent wetland.

**Hydrological features:**

The largest waterhole on the site is about 3.4 kilometres in length. At its widest point it is about 150 metres, the average width would be somewhere between 90 and 100 metres. Its area is about 43 hectares. The maximum depth is unknown. The bedrock bed is quite uneven; shallow bars and deep holes are visible from the banks. Myuna stream gauge is located at the downstream end of this waterhole. In 38 years of records the mean annual discharge measured by this gauge is 820 694 megalitres. A maximum annual discharge of 5 158 791 megalitres (1990-91) and a minimum annual discharge of 43 688 megalitres (1991-92) have been recorded. The highest monthly discharges occur in January, February, March and April, the lowest are in September, October and November. Two months (October 1962 and November 1965) with zero discharge have been recorded between 1960 and 1998. The highest monthly discharge recorded in this period was 2 263 429 megalitres in February 1991. The highest flood heights recorded have been 13.41m on 20 January 1970 and 13.01m on 3 February 1991. Mean annual runoff from the surrounding land is about 115mm. Two oxygen measurements were recorded from each end of the large waterhole between 11 am and 1 pm on 26 August 1999. The readings were very similar and a mean of them is presented here - oxygen concentration 113.5 percent, dissolved oxygen 10.2 mg/l. Mean water quality readings recorded at Myuna gauging station are as follows: conductivity @ 25C; 252 microsiemens per cm +/- 107.8 (61 readings), turbidity 37 NTU +/- 39 (33 readings), pH 7.74 +/- 0.48 (61 readings), temperature 25.4 degrees C +/- 4.9 (40 readings taken during peak flows), total dissolved solids 143mg/l +/- 62 (61 readings), total dissolved ions 188 mg/l +/- 82 (61 readings) and total suspended solids 106 mg/l +/- 284 (52 readings).

**Ecological features:****Significance:**

This site provides outstanding representative examples of a range of riverine wetlands. The Bowen River is one of the Burdekin River's major tributaries. It enters the Burdekin in its lower reaches and therefore must play an important role in maintaining water quality in the lower Burdekin. It is estimated to provide 14 percent of the Burdekin's flow at Clare. The large permanent waterhole is likely to be of importance as a drought refuge. Eight species of conservation significance have been recorded on the site. Of these two are listed as vulnerable in state and/or federal legislation.

**Notable flora:**

Three riparian areas in the site were visited on 26 August 1999, and the following species were recorded. Eucalyptus raveretiana (Nv, Sv), Melaleuca fluviatilis, M. leucadendra, M. trichostachya, black ti-tree (Melaleuca bracteata), doolan (Acacia salicina), grey bloodwood (Corymbia clarksoniana), Lophostemon grandiflorus, Geijera salicina, small-leaved ebony (Diospyros humilis), red kamala (Mallotus philippensis), Ficus platypoda, whitewood (Atalaya hemiglaucha), Leichhardt tree (Nauclea orientalis), Chara species, Nitella species, Myriophyllum verrucosum, Nymphaea violacea, Potamogeton javanicus, P. crispus, P. tricarinatus, swamp lily (ottelia ovalifolia), Vallisneria caulescens, water snowflake (Nymphoides indica), Maidenia rubra.

**Notable fauna:**

Estuarine crocodile (Crocodylus porosus) (Sv), radjah shelduck (Tadorna radja) (Sr), black necked stork (Ephippiorhynchus asiaticus) (Sr), cotton pygmy-goose (Nettapus coromandelianus) (Sr), white throated needle tail (Hirundapus caudacutus), white-bellied sea eagle (Haliaeetus leucogaster), and fork tailed swift (Apus pacificus) (the last three are listed in the EPBA as Migratory Species), brown-striped marshfrog (Limnodynastes peronii), bumpy rocketfrog (Litoria inermis), grey teal (Anas gracilis), Pacific black duck (Anas superciliosa), darter (Anhinga melanogaster), magpie goose (Anseranas semipalmata), great egret (Ardea alba), white-necked heron (Ardea pacifica), hardhead (Aythya australis), sharp tailed sandpiper (Calidris acuminata), Australian wood duck (Chenonetta jubata), black swan (Cygnus atratus), wandering whistling-duck (Dendrocygna arcuata), plumed whistling-duck (Dendrocygna eytoni), little egret (Egretta garzetta), white-faced heron (Egretta novaehollandiae), Eurasian coot (Fulica atra), dusky moorhen (Gallinula tenebrosa), brolga (Grus rubicunda), black-winged stilt (Himantopus himantopus), Australian pelican (Pelecanus conspicillatus), great cormorant (Phalacrocorax carbo), little pied cormorant (Phalacrocorax melanoleucus), little black cormorant (Phalacrocorax sulcirostris), pied cormorant (Phalacrocorax varius), yellow-billed spoonbill (Platalea flavipes), royal spoonbill (Platalea regia), glossy ibis (Plegadis falcinellus).

Caspian tern (*Sterna caspia*), Australasian grebe (*Tachybaptus novaehollandiae*), Australian white ibis (*Threskiornis molucca*), straw-necked ibis (*Threskiornis spinicollis*), forest kingfisher (*Todiramphus macleayii*) and redbacked kingfisher (*Todiramphus pyrrhopygia*).

**Other Fauna:****Social and Cultural values:**

Aboriginal paintings have been recorded nearby on Myuna station. A stone axe head was found during the visit on 26/08/1999. Public access to all but the camping and water reserve at the upstream end of the site is restricted.

**Land tenure:**

On site: River. Surrounding areas: Leasehold, freehold, camping and water reserve (stock route).

**Current land use:**

On site: Water extraction and limited grazing. Surrounding areas: Extensive grazing, limited horticulture.

**Disturbance or threat:**

Current: The following weeds have been recorded on the site: *Parkinsonia aculeata*, *Solanum torvum* and *Grewia asiatica*. Riparian woodland on the site may have been either wholly or partially cleared during the 1930s. Potential: The alluvial plains surrounding the site have been assessed suitable for irrigation -assuming that a dam is built and sufficient water becomes available (DNR Engineering Services 1999). If this occurs the site may be exposed to the threats of eutrophication from nutrient laden tail waters, pollution by pesticides and invasion by weeds.

**Conservation measures taken:**

None known

**Management authority and jurisdiction:**

Department of Natural Resources and Mines.

**References:**

Blackman, J.G. et al. (2002); Queensland Department of Natural Resources and Mines. (1999, 2002); Queensland Environmental Protection Agency. (2002). [See Queensland Reference List](#)

**Compiler & date:**

Perry, T.W., 2001. Edited Deacon, G. and Miller, G.J., 2004.

**Drainage:**

AWRC Division: NORTH-EAST COAST

AWRC Region: BURDEKIN

AWRC Basin: BURDEKIN RIVER

Catchment: Bowen River

Sub-catchment:

[Go to basic query form](#) | [Go to spatial query tool](#)

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| Australian Government | Australian Water Resources 2005 |  
Bureau of Meteorology | Murray-Darling Basin Authority |  
National Water Commission | Water efficiency labelling |  
Waterwatch |



## Appendix B

# Flora Species Records



Table 27 Flora species list

| Voucher ID (if vouch'd)          | Family     | Species <sup>1</sup>                                 | Common Name           | Alliance (from Table 5) <sup>2</sup> |
|----------------------------------|------------|--|-----------------------|--------------------------------------|
| SFDanielsen671                   | Malvaceae  | <i>Abutilon oxycarpum</i> var. <i>incanum</i>        |                       | AC                                   |
| SFDanielsen670                   | Malvaceae  | <i>Abutilon oxycarpum</i> var. <i>subsagittatum</i>  |                       | AC                                   |
|                                  | Mimosaceae | <i>Acacia bidwillii</i>                              | Corkwood wattle       | BX, IB, NG                           |
| SFDanielsen 88, 104,<br>666, 717 | Mimosaceae | <i>Acacia cambagei</i>                               | Gidgee                | AC, CO                               |
| SFDanielsen629                   | Mimosaceae | <i>Acacia coriacea</i> subsp.<br><i>sericophylla</i> | Desert oak            | IB, BX                               |
| SFDanielsen 113                  | Mimosaceae | <i>Acacia dietrichiana</i>                           | Dietrich's wattle     | BL                                   |
| SFDanielsen 107,<br>693          | Mimosaceae | <i>Acacia excelsa</i> subsp. <i>excelsa</i>          | Ironwood              | AC, BX, CO, IB, MXEu, ME             |
|                                  | Mimosaceae | <i>Acacia farnesiana</i> *                           | Mimosa bush           | IB, NG                               |
| SFDanielsen 115,<br>652          | Mimosaceae | <i>Acacia galiooides</i>                             | Whorled-leaved wattle | BL, IB                               |
| SFDanielsen 40                   | Mimosaceae | <i>Acacia harpophylla</i>                            | Brigalow              | AC, BX, CO, SE                       |
|                                  | Mimosaceae | <i>Acacia holosericea</i>                            | Silver wattle         | IB                                   |
| SFDanielsen 41, 87               | Mimosaceae | <i>Acacia julifera</i> subsp. <i>curvinervia</i>     | Catkin wattle         | AC, MXSh                             |
|                                  | Mimosaceae | <i>Acacia leptostachya</i>                           | Townsville wattle     | AC, BX, IB                           |
|                                  | Mimosaceae | <i>Acacia melanoxylon</i>                            | Blackwood             | MXEu                                 |
| SFDanielsen 109                  | Mimosaceae | <i>Acacia multisiliqua</i>                           | Many-seeded wattle    | BL                                   |



| Voucher ID (if vouch'd) | Family        | Species <sup>1</sup>                                   | Common Name    | Alliance (from Table 5) <sup>2</sup> |
|-------------------------|---------------|--|----------------|--------------------------------------|
| SFDanielsen693          | Mimosaceae    | <i>Acacia excelsa</i>                                  | Ironwood       | IB                                   |
| SFDanielsen 146         | Mimosaceae    | <i>Acacia oraria</i>                                   |                | ME                                   |
| SFDanielsen139          | Mimosaceae    | <i>Acacia salicina</i>                                 | Sally wattle   | AC, BX, CO, IB, MC, MXEu, NG, SE     |
|                         | Mimosaceae    | <i>Acacia shirleyii</i>                                | Lancewood      | AC, MXSh                             |
| SFDanielsen105, 716     | Mimosaceae    | <i>Acacia stenophylla</i>                              | Belalie        | MXSh                                 |
|                         | Amaranthaceae | <i>Achyranthes aspera</i>                              | Rough wattle   | BX, CO, IB, MC, MXEu, MXSh, NG       |
| SFDanielsen583          | Asteraceae    | <i>Acmella grandiflora</i> var.<br><i>brachyglossa</i> |                | NG                                   |
| SFDanielsen845          | Fabaceae      | <i>Aeschynomene indica</i>                             | Budda pea      | AC                                   |
| SFDanielsen696          | Fabaceae      | <i>Aeschynomene micranthos</i>                         |                | BL                                   |
|                         | Sapindaceae   | <i>Alectryon diversifolius</i>                         | Scrub boonaree | AC, BX, CO, IB, MXSh                 |
| SFDanielsen72           | Sapindaceae   | <i>Alectryon oleifolius</i>                            | Boonaree       | AC, BX, CO, IB, MXSh                 |
|                         | Casurinaceae  | <i>Allocasuarina littoralis</i>                        | Bull oak       | BX, IB, ME, MXEu, MXSh               |
|                         | Poaceae       | <i>Alloteropsis cimicina</i>                           | Cockatoo grass | BX, IB, NG                           |
|                         | Rhamnaceae    | <i>Alphitonia excelsa</i>                              | Soapwood       | AC, BX, CO, IB, ME, MXEu, MXSh, SE   |
|                         | Apocynaceae   | <i>Alstonia constricta</i>                             | Bitterbark     | IB, BX, SE                           |
| SFDanielsen751          | Amaranthaceae | <i>Alternanthera ficoidea</i>                          |                | NR, PG                               |
| SFDanielsen718          | Amaranthaceae | <i>Alternanthera nodiflora</i>                         | Common joyweed | CO                                   |
| SFDanielsen751          | Amaranthaceae | <i>Alternanthera</i> sp.                               |                | IB                                   |



| Voucher ID (if vouch'd)           | Family        | Species <sup>1</sup>                                    | Common Name          | Alliance (from Table 5) <sup>2</sup> |
|-----------------------------------|---------------|---|----------------------|--------------------------------------|
| SFDanielsen582                    | Fabaceae      | <i>Alysicarpus muelleri</i>                             |                      | NG                                   |
|                                   | Fabaceae      | <i>Alysicarpus rugosus</i>                              |                      | BX, IB, MC, ME, MXEu, NG             |
| SFDanielsen712                    | Lythraceae    | <i>Ammannia multiflora</i>                              | Jerry-jerry          | NG                                   |
| SFDanielsen51                     | Loranthaceae  | <i>Amyema quandang</i> var. <i>bancroftii</i>           | Grey mistletoe       | CO                                   |
| SFDanielsen695                    | Poaceae       | <i>Ancistrachne uncinulata</i>                          | Hoaky grass          | IB                                   |
|                                   | Euphorbiaceae | <i>Antidesma parvifolium</i>                            |                      | IB                                   |
| SFDanielsen 42                    | Capparaceae   | <i>Apophyllum anomalum</i>                              | Warrior bush         | AC, NG, NR                           |
| SFDanielsen 58                    | Fabaceae      | <i>Archidendropsis basaltica</i>                        | Dead finish          | BX, IB, MXSh                         |
|                                   | Papaveraceae  | <i>Argemone ochroleuca</i> *                            | Mexican poppy        | CO, MXEu                             |
| SFDanielsen729                    | Poaceae       | <i>Aristida benthamii</i> var. <i>benthamii</i>         | Bentham's wiregrass  | ME                                   |
| SFDanielsen120                    | Poaceae       | <i>Aristida calycina</i>                                | Dark wiregrass       | AC, BX, IB, ME, MXSh, NG, SE         |
| SFDanielsen627                    | Poaceae       | <i>Aristida calycina</i> var. <i>calycina</i>           | Branched wiregrass   | IB, BX                               |
| SFDanielsen638                    |               |   |                      |                                      |
| SFDanielsen 633                   | Poaceae       | <i>Aristida calycina</i> var. <i>praealta</i>           | Wiregrass            | BX                                   |
| SFDanielsen635, 705               | Poaceae       | <i>Aristida jerichoensis</i> var. <i>subspinulifera</i> | Feathertop three awn | BX, BL                               |
| SFDanielsen67                     | Poaceae       | <i>Aristida holathera</i>                               | Erect kerosene grass | BX, IB                               |
| SFDanielsen628                    |               |   |                      |                                      |
| SFDanielsen644                    |               |   |                      |                                      |
| SFDanielsen44, 622, 657, 659, 743 | Poaceae       | <i>Aristida latifolia</i>                               | Feathertop           | AC, IB, NG, PG                       |



| Voucher ID (if vouch'd)     | Family           | Species <sup>1</sup>                | Common Name         | Alliance (from Table 5) <sup>2</sup> |
|-----------------------------|------------------|-------------------------------------|---------------------|--------------------------------------|
| SFDanielsen594              | Poaceae          | <i>Aristida leptopoda</i>           | White speargrass    | NG                                   |
| SFDanielsen608              | Poaceae          | <i>Aristida polyclados</i>          |                     | IB                                   |
|                             | Poaceae          | <i>Arundinella nepalensis*</i>      | Reedgrass           | IB                                   |
| SFDanielsen679              | Poaceae          | <i>Astrebla squarrosa</i>           | Bull mitchell grass | AC, CO                               |
|                             | Sapindaceae      | <i>Atalaya hemiglaucha</i>          | Whitewood           | AC, BX, CO, IB, MC, MXSh, NG         |
| SFDanielsen668              | Chenopodiaceae   | <i>Atriplex</i> sp.                 |                     | CO                                   |
| SFDanielsen636              | Poaceae          | <i>Austrochloris dichanthioides</i> |                     | IB                                   |
|                             | Myrtaceae        | <i>Avicennia marina</i>             | Grey mangrove       | MA                                   |
| SFDanielsen685              | Scrophulariaceae | <i>Bacopa floribunda</i>            |                     | AC                                   |
| SFDanielsen667              | Lamiaceae        | <i>Basilicum polystachyon</i>       |                     | AC                                   |
|                             | Caesalpiniaceae  | <i>Bauhinia carronii</i>            | White bauhinia      | BX, CO, MXEu, NG, PG                 |
|                             | Caesalpiniaceae  | <i>Bauhinia hookeri</i>             | Red bauhinia        | AC, BX, CO, MC, NG                   |
| SFDanielsen 93              | Elatinaceae      | <i>Bergia trimera</i>               | Small water-fire    | BX                                   |
|                             | Asteraceae       | <i>Bidens pilosa*</i>               | Cobbler's pegs      | CO, MXEu                             |
| SFDanielsen564              | Connaraceae      | <i>Bonamia dietrichiana</i>         |                     | SE                                   |
| SFDanielsen606,<br>724, 733 | Poaceae          | <i>Bothriochloa decipiens</i>       | Pitted bluegrass    | AC                                   |
| SFDanielsen121              | Poaceae          | <i>Bothriochloa ewartiana</i>       | Forest bluegrass    | IB                                   |
| SFDanielsen633              |                  |                                     |                     |                                      |



| Voucher ID (if vouch'd) | Family           | Species <sup>1</sup>                                   | Common Name             | Alliance (from Table 5) <sup>2</sup> |
|-------------------------|------------------|--|-------------------------|--------------------------------------|
|                         | Poaceae          | <i>Bothriochloa pertusa</i> *                          | Creeping bluegrass      | AC, BX, CO, IB, MC, ME, MXEu, NG, PG |
| SFDanielsen606          | Poaceae          | <i>Bothriochloa</i> sp.                                |                         | MXEu                                 |
| SFDanielsen733          | Poaceae          | <i>Bothriochloa</i> sp.                                |                         | BX                                   |
|                         | Poaceae          | <i>Brachyachne convergens</i>                          | Common native couch     | IB, MC, NG                           |
|                         | Sterculiaceae    | <i>Brachychiton australis</i>                          | Broad-leaved bottletree | AC, SE                               |
|                         | Sterculiaceae    | <i>Brachychiton populneus</i>                          | Kurrajong               | BX, IB                               |
| SFDaniesen674           | Acanthaceae      | <i>Brunoniella australis</i>                           |                         | AC                                   |
| SFDanielsen613          | Scrophulariaceae | <i>Buchnera gracilis</i>                               |                         | IB                                   |
| SFDanielsen654          | Cyperaceae       | <i>Bulbostylis barbata</i>                             | Dainty sedge            | BX, IB                               |
|                         | Pittosporaceae   | <i>Bursaria incana</i>                                 | Prickly pine            | BX, CO, IB, MC, MXEu, MXSh           |
| SFDanielsen68           | Fabaceae         | <i>Cajanus acutifolius</i>                             |                         | BL                                   |
| SFDanielsen593          | Fabaceae         | <i>Cajanus scarabaeoides</i> var. <i>scarabaeoides</i> |                         | BL                                   |
| SFDanielsen55           | Cupressaceae     | <i>Callitris glauophylla</i>                           | Cypress pine            | BX, IB                               |
| SFDanielsen697          | Asteraceae       | <i>Calotis hispidula</i>                               |                         | BL                                   |
| SFDanielsen581          | Asteraceae       | <i>Camptacra barbata</i>                               |                         | BL                                   |
| SFDanielsen125          | Capparaceae      | <i>Capparis canescens</i>                              | Wild orange             | IB                                   |
|                         | Capparaceae      | <i>Capparis lasiantha</i>                              | Wait-a-while            | AC, BX, CO, IB, MC, MXEu             |
| SFDanielsen99           | Capparaceae      | <i>Capparis loranthifolia</i>                          |                         | IB                                   |



| Voucher ID (if vouch'd) | Family          | Species <sup>1</sup>   | Common Name              | Alliance (from Table 5) <sup>2</sup> |
|-------------------------|-----------------|--|--------------------------|--------------------------------------|
| SFDanielsen106          | Capparaceae     | <i>Capparis shanesiana</i>                                     |                          | CO                                   |
|                         | Poaceae         | <i>Capillipedium spicigerum</i>                                | Scented top              | IB                                   |
| SFDanielsen691          | Sapindaceae     | <i>Cardiospermum halicacabum</i>                               |                          | CO                                   |
|                         | Apocynaceae     | <i>Carissa ovata</i>   | Currantbush              | AC, BX, CO, IB, NG                   |
|                         | Caesalpiniaceae | <i>Cassia brewsteri</i>  |                          | AC, BX, CO, IB, MC, NG               |
|                         | Casuarinaceae   | <i>Casuarina cunninghamiana</i>                                | River oak                | CO, MXEu                             |
|                         | Lauraceae       | <i>Cassytha filiformis</i>                                     | Dodder                   | CO, MXEu                             |
|                         | Fabaceae        | <i>Chamaecrista absus</i>                                      |                          | IB                                   |
|                         | Fabaceae        | <i>Chamaecrista coccinea</i>                                   |                          | BX, IB, NG                           |
| SFDanielsen74           | Fabaceae        | <i>Chamaecrista rotundifolia</i> var.<br><i>rotundifolia</i> * | Round-leaved cassia      | NR                                   |
| SFDanielsen584, 610     | Euphorbiaceae   | <i>Chamaesyce mitchelliana</i> var.<br><i>mitchelliana</i>     |                          | IB                                   |
| SFDanielsen97           | Poaceae         | <i>Chloris divaricata</i>                                      | Spreading windmill grass | BX, IB                               |
|                         | Poaceae         | <i>Chloris inflata</i>   | Purpletop chloris        | BX, IB, NR                           |
| SFDanielsen715          | Poaceae         | <i>Chloris</i> sp.   |                          | NG                                   |
| SFDanielsen757          | Poaceae         | <i>Chloris</i> sp.   |                          | NR                                   |
| SFDanielsen715          | Poaceae         | <i>Chloris pectinata</i>                                       | Comb chloris             | NG                                   |
| SFDanielsen736          | Poaceae         | <i>Chloris ventricosa</i>                                      | Tall chloris             | BX                                   |
|                         | Poaceae         | <i>Chloris virgata</i>   | Rhodes grass             | IB, MC, NG, NR                       |



| Voucher ID (if vouch'd) | Family          | Species <sup>1</sup>                                     | Common Name               | Alliance (from Table 5) <sup>2</sup> |
|-------------------------|-----------------|--|---------------------------|--------------------------------------|
|                         | Poaceae         | <i>Chrysopogon fallax</i>                                | Golden beard grass        | BX, IB, NG                           |
|                         | Rutaceae        | <i>Citrus glauca</i>                                     | Desert lime               | AC, BX, MC, NG                       |
|                         | Lamiaceae       | <i>Clerodendrum inerme</i>                               | Lollybush                 | IB, MXEu                             |
|                         | Fabaceae        | <i>Clitoria ternatea</i> *                               | Butterfly pea             | IB, MXEu                             |
|                         | Commelinaceae   | <i>Commelina ensifolia</i>                               | Slug lily                 | BX, IB, NG                           |
| SFDanielsen844          | Commelinaceae   | <i>Commelina</i> sp.                                     |                           | AC                                   |
| SFDanielsen740          | Sparrmanniaceae | <i>Corchorus aestuans</i>                                |                           | NR                                   |
| SFDanielsen110          | Asteraceae      | <i>Coronarium glutinosum</i>                             |                           | BL                                   |
|                         | Myrtaceae       | <i>Corymbia clarksoniana</i>                             | Clarksons' bloodwood      | BL, BX, IB, MXEu                     |
|                         | Myrtaceae       | <i>Corymbia dallachiana</i>                              | Ghost gum                 | BL, BX, IB, ME, MXEu, MXSh, PG       |
|                         | Myrtaceae       | <i>Corymbia erythrophloia</i>                            | Red bloodwood             | BL, BX, IB, MC, ME, NG               |
|                         | Myrtaceae       | <i>Corymbia intermedia</i>                               | Pink bloodwood            | BX, IB                               |
| SFDanielsen 117,<br>118 | Myrtaceae       | <i>Corymbia leichhardtii</i>                             | Leichhardt's dusty jacket | BL                                   |
| SFDanielsen 130         | Myrtaceae       | <i>Corymbia terminalis</i>                               | Western bloodwood         | CO                                   |
|                         | Myrtaceae       | <i>Corymbia tessellaris</i>                              | Carbeen, Moreton Bay ash  | MXEu, PG                             |
| SFDanielsen596          | Fabaceae        | <i>Crotalaria goreensis</i>                              | Gambia pea                | IB                                   |
|                         | Fabaceae        | <i>Crotalaria medicaginea</i>                            | Rattlepod                 | IB                                   |
| SFDanielsen707          | Fabaceae        | <i>Crotalaria medicaginea</i> var.<br><i>medicaginea</i> |                           | BL                                   |



| Voucher ID (if vouch'd)         | Family        | Species <sup>1</sup>                                      | Common Name        | Alliance (from Table 5) <sup>2</sup> |
|---------------------------------|---------------|---|--------------------|--------------------------------------|
|                                 | Fabaceae      | <i>Crotalaria montana</i>                                 |                    | IB                                   |
| SFDanielsen596, 742             | Fabaceae      | <i>Crotalaria pallida</i>                                 |                    | NG, NR                               |
|                                 | Cucurbitaceae | <i>Cucumis melo</i>                                       |                    | AC, CO, NG                           |
|                                 | Cucurbitaceae | <i>Cucumis myriocarpus</i> subsp.<br><i>myriocarpus</i> * |                    | AC                                   |
| SFDanielsen844                  | Commelinaceae | <i>Cyanotis axillaris</i>                                 |                    | AC                                   |
| SFDanielsen746                  | Asteraceae    | <i>Cyanthillium cinereum</i>                              |                    | PG, NR                               |
|                                 | Orchidaceae   | <i>Cymbidium canaliculatum</i>                            | Black orchid       | IB                                   |
| SFDanielsen704                  | Poaceae       | <i>Cymbopogon bombycinus</i>                              | Silky heads        | IB                                   |
|                                 | Poaceae       | <i>Cymbopogon obtectus</i>                                |                    | IB                                   |
|                                 | Apocynaceae   | <i>Cryptostegia grandiflora</i> *                         | Rubber vine        | BX, CO, IB, MA, ME, MXEu, PG, SE     |
| SFDanielsen749                  | Cyperaceae    | <i>Cyperus alopecuroides</i>                              |                    | MXEu                                 |
| SFDanielsen592, 738             | Cyperaceae    | <i>Cyperus concinnus</i>                                  |                    | NG, BX                               |
| SFDanielsen150,<br>684, 713     | Cyperaceae    | <i>Cyperus difformis</i>                                  | Variable flatsedge | MXEu                                 |
| SFDanielsen95, 713,<br>714, 737 | Cyperaceae    | <i>Cyperus fulvus</i>                                     | Sticky sedge       | BX, NG,                              |
| SFDanielsen678                  | Cyperaceae    | <i>Cyperus gilesii</i>                                    | Giles' sedge       | AC                                   |
| SFDanielsen576, 690             | Cyperaceae    | <i>Cyperus tuberosus</i>                                  |                    | AC, NG                               |
| SFDanielsen80                   | Cyperaceae    | <i>Cyperus victoriensis</i>                               | Yelka              | CO                                   |
|                                 | Poaceae       | <i>Dactyloctenium aegyptium</i> *                         | Coast button grass | NR                                   |



| Voucher ID (if vouch'd)     | Family         | Species <sup>1</sup>   | Common Name            | Alliance (from Table 5) <sup>2</sup> |
|-----------------------------|----------------|--|------------------------|--------------------------------------|
|                             | Poaceae        | <i>Dactyloctenium radulans</i>                                 | Button grass           | BX, IB, NR                           |
|                             | Alismataceae   | <i>Damasonium minus</i>  | Starfruit              | AC                                   |
| SFDanielsen122              | Celastraceae   | <i>Denhamia pittosporoides</i> subsp.<br><i>pittosporoides</i> |                        | IB                                   |
| SFDanielsen580              | Fabaceae       | <i>Desmodium muelleri</i>                                      | Mueller's necklace pea | NG                                   |
| SFDanielsen680              | Poaceae        | <i>Dichanthium aristatum</i> *                                 | Angleton grass         | NG, NR                               |
| SFDanielsen739              | Poaceae        | <i>Dichanthium fecundum</i>                                    | Curly bluegrass        | PG                                   |
|                             | Poaceae        | <i>Dichanthium sericeum</i>                                    | Queensland bluegrass   | NG, NR                               |
| SFDanielsen620, 706         | Poaceae        | <i>Digitaria ammophila</i>                                     | Silky umbrella grass   | IB                                   |
| SFDanielsen573,<br>637, 734 | Poaceae        | <i>Digitaria brownii</i>                                       | Cotton panic grass     | IB                                   |
| SFDanielsen618,<br>746, 758 | Poaceae        | <i>Digitaria ciliaris</i>                                      | Summer grass           | NG                                   |
| SFDanielsen617              | Poaceae        | <i>Digitaria gibbosa</i>                                       |                        | IB                                   |
| SFDanielsen559              | Poaceae        | <i>Digitaria minima</i>  |                        | IB                                   |
| SFDanielsen140              | Ebenaceae      | <i>Diospyros geminata</i>                                      | Queensland ebony       | SE                                   |
|                             | Ebenaceae      | <i>Diospyros humilis</i>                                       | Australian ebony       | AC                                   |
| SFDanielsen33               | Sapindaceae    | <i>Dodonaea stenophylla</i>                                    | Narrow-leaved hopbush  | MXEu                                 |
|                             | Putranjivaceae | <i>Drypetes deplanchei</i>                                     | Greybark               | SE                                   |
|                             | Bixaceae       | <i>Ehretia membranifolia</i>                                   | Peach tree             | AC, CO                               |
| SFDanielsen644              | Chenopodiaceae | <i>Einadia nutans</i> subsp. <i>linifolia</i>                  | Climbing saltbush      | BX                                   |



| Voucher ID (if vouch'd)          | Family         | Species <sup>1</sup>                              | Common Name           | Alliance (from Table 5) <sup>2</sup> |
|----------------------------------|----------------|---|-----------------------|--------------------------------------|
| SFDanielsen668                   | Chenopodiaceae | <i>Einadia trigonos</i> subsp. <i>stellulata</i>  |                       | AC                                   |
| SFDanielsen53                    | Cyperaceae     | <i>Eleocharis pallens</i>                         | Spikerush             | IB                                   |
| SFDanielsen683                   | Poaceae        | <i>Elytrophorus spicatus</i>                      |                       | AC                                   |
|                                  | Asteraceae     | <i>Emilia sonchifolia</i>                         |                       | IB                                   |
| SFDanielsen90                    | Chenopodiaceae | <i>Enchytraea tomentosa</i> var. <i>tomentose</i> | Ruby saltbush         | AC                                   |
| SFDanielsen650                   | Poaceae        | <i>Enneapogon gracilis</i>                        | Slender nineawn       | BX                                   |
| SFDanielsen59                    | Poaceae        | <i>Enneapogon lindleyanus</i>                     | Nineawn               | BX                                   |
| SFDanielsen561                   |                |   |                       |                                      |
| SFDanielsen634                   | Poaceae        | <i>Enneapogon polyphyllus</i>                     | Woollyoat grass       | IB                                   |
| SFDanielsen651                   | Poaceae        | <i>Enneapogon robustissimus</i>                   |                       | BX                                   |
| SFDanielsen614                   | Poaceae        | <i>Enneapogon virens</i>                          |                       | IB                                   |
| SFDanielsen676                   | Poaceae        | <i>Enteropogon acicularis</i>                     | Curly windmill grass  | AC                                   |
| SFDanielsen624,<br>572, 735, 842 | Poaceae        | <i>Enteropogon ramosus</i>                        | Twirly windmill grass | IB                                   |
| SFDanielsen721                   | Poaceae        | <i>Eragrostis confertiflora</i>                   | Spike lovegrass       | CO                                   |
| SFDanielsen609                   | Poaceae        | <i>Eragrostis cummingii</i>                       | Cumming's lovegrass   | IB                                   |
| SFDanielsen98, 730               | Poaceae        | <i>Eragrostis elongata</i>                        | Clustered lovegrass   | MXSh                                 |
| SFDanielsen621                   | Poaceae        | <i>Eragrostis pilosa</i>                          | Soft lovegrass        | IB                                   |



| Voucher ID (if vouch'd) | Family          | Species <sup>1</sup>              | Common Name              | Alliance (from Table 5) <sup>2</sup> |
|-------------------------|-----------------|-----------------------------------|--------------------------|--------------------------------------|
| SFDanielsen649          | Poaceae         | <i>Eragrostis setifolia</i>       | Neverfail grass          | BX                                   |
| SFDanielsen625, 700     | Poaceae         | <i>Eragrostis sororia</i>         |                          | IB, BL                               |
| SFDanielsen54,66,77     | Poaceae         | <i>Eragrostis speciosa</i>        | Handsome lovegrass       | IB, MXEu                             |
| SFDanielsen75           | Poaceae         | <i>Eragrostis sterilis</i>        |                          | BX, MXEu                             |
| SFDanielsen64, 682, 692 | Poaceae         | <i>Eragrostis tenellula</i>       | Delicate lovegrass       | BX, IB                               |
| SFDanielsen662          | Myoporaceae     | <i>Eremophila longifolia</i>      |                          | BX                                   |
| SFDanielsen70           | Myoporaceae     | <i>Eremophila mitchellii</i>      | False sandalwood         | AC, BX, CO, IB, ME, MXEu, MXSh       |
| SFDanielsen630          | Poaceae         | <i>Eriachne mucronata</i>         | Mountain wanderrie grass | BX, IB                               |
| SFDanielsen699          | Poaceae         | <i>Eriachne nervosa</i>           | Plains wanderrie grass   | IB                                   |
| SFDanielsen611          | Poaceae         | <i>Eriachne obtusa</i>            | Northern wanderrie grass | IB                                   |
| SFDanielsen623          | Poaceae         | <i>Eriachne rara</i>              |                          | IB                                   |
| SFDanielsen626          |                 |                                   |                          |                                      |
| SFDanielsen750          | Poaceae         | <i>Eriochloa crebra</i>           | Spring grass             | NR                                   |
| SFDanielsen837          | Poaceae         | <i>Eriochloa procera</i>          | Cup grass                | NG                                   |
| SFDanielsen 669, 750    | Poaceae         | <i>Eriochloa pseudoacrotricha</i> | Early spring grass       | BX, IB, MC, MXEu, NG                 |
|                         | Fabaceae        | <i>Erythrina vespertilio</i>      | Bat's wing coral         | BX, IB                               |
|                         | Erythroxylaceae | <i>Erythroxylum australe</i>      | Turkey bush              | BX, IB, SE                           |
|                         | Myrtaceae       | <i>Eucalyptus brownii</i>         | Brown's box              | BX                                   |



| Voucher ID (if vouch'd) | Family         | Species <sup>1</sup>   | Common Name            | Alliance (from Table 5) <sup>2</sup> |
|-------------------------|----------------|--|------------------------|--------------------------------------|
|                         | Myrtaceae      | <i>Eucalyptus camaldulensis</i>                              | River red gum          | MXEu                                 |
|                         | Myrtaceae      | <i>Eucalyptus cambageana</i>                                 | Dawson's gum           | AC                                   |
|                         | Myrtaceae      | <i>Eucalyptus coolabah</i>                                   | Coolabah               | CO                                   |
|                         | Myrtaceae      | <i>Eucalyptus crebra</i>                                     | Narrow-leaved ironbark | BX, IB, PG, SE                       |
| SFDanielsen 39          | Myrtaceae      | <i>Eucalyptus persistens</i>                                 | Mallee box             | BX                                   |
|                         | Myrtaceae      | <i>Eucalyptus platyphylla</i>                                | Poplar gum             | BX, IB, ME, MXEu, MXSh, PG           |
|                         | Myrtaceae      | <i>Eucalyptus populnea</i>                                   | Poplar box             | AC, BX, IB                           |
|                         | Myrtaceae      | <i>Eucalyptus orgadophila</i>                                | Mountain coolibah      | MC, NG                               |
|                         | Myrtaceae      | <i>Eucalyptus melanophloia</i>                               | Silver-leaved ironbark | BX, IB, NG                           |
| SFDanielsen 85          | Myrtaceae      | <i>Eucalyptus melanophloia</i> - <i>E. whitei</i> intergrade |                        | IB                                   |
| SFDanielsen 147         | Myrtaceae      | <i>Eucalyptus raveretiana</i>                                | Black ironbox          | MXEu                                 |
|                         | Myrtaceae      | <i>Eucalyptus tereticornis</i>                               | Forest red gum         | MXEu                                 |
|                         | Poaceae        | <i>Eulalia aurea</i>   | Golden silkytops       | BX, EU, NG                           |
|                         | Euphorbiaceae  | <i>Euphorbia heterophylla</i> *                              | Spurge                 | MXEu                                 |
|                         | Santalaceae    | <i>Exocarpus latifolius</i>                                  | Native cherry          | SE                                   |
|                         | Convolvulaceae | <i>Evolvulus alsinoides</i>                                  | Tropical speedwell     | BX, IB, MXEu                         |
|                         | Moraceae       | <i>Ficus virens</i>  |                        | MXEu                                 |
| SFDanielsen656          | Cyperaceae     | <i>Fimbristylis dichotoma</i>                                | Common finger rush     | BX                                   |
|                         | Fabaceae       | <i>Flemingia parvifolia</i>                                  |                        | BX, IB                               |



| Voucher ID (if vouch'd)     | Family          | Species <sup>1</sup>                                   | Common Name        | Alliance (from Table 5) <sup>2</sup> |
|-----------------------------|-----------------|--|--------------------|--------------------------------------|
|                             | Rutaceae        | <i>Flindersia dissosperma</i>                          | Leopard wood       | AC, BX, IB                           |
| SFDanielsen 142             | Phyllanthaceae  | <i>Flueggea virosa</i> subsp.<br><i>melanthesoides</i> | White berry bush   | BX, IB, SE                           |
| SFDanielsen567,<br>568, 660 | Fabaceae        | <i>Galactia tenuiflora</i>                             |                    | BX, IB                               |
| SFDanielsen 47 &<br>126     | Rutaceae        | <i>Geijera parviflora</i>                              | Wilga              | AC, BX, IB, SE                       |
| SFDanielsen648              | Fabaceae        | <i>Glycine</i> sp. (Mackay S.B.<br>Andrews+ 43)        |                    | BX, IB                               |
|                             | Amaranthaceae   | <i>Gomphrena celosioides</i>                           | Gomphrena weed     | IB                                   |
| SFDanielsen579              | Goodeniaceae    | <i>Goodenia byrnesii.</i>                              | Byrnes goodenia    | NG                                   |
| SFDanielsen726              | Goodeniaceae    | <i>Goodenia hirsuta</i>                                |                    | IB                                   |
| SFDanielsen 71              | Malvaceae       | <i>Gossypium australe</i>                              | Native cotton      | IB                                   |
|                             | Proteaceae      | <i>Grevillea pteridifolia</i>                          | Golden parrot tree | ME                                   |
|                             | Proteaceae      | <i>Grevillea striata</i>                               | Beefwood           | IB, MXSh                             |
| SFDanielsen566              | Sparrmanniaceae | <i>Grewia latifolia</i>                                |                    | MXEu                                 |
|                             | Sparrmanniaceae | <i>Grewia retusifolia</i>                              | Emu berry          | BX, IB, MXEu                         |
| SFDanielsen 111             | Proteaceae      | <i>Grevillea decora</i> subsp. <i>decora</i>           | Red grevillea      | BL                                   |
| SFDanielsen754              | Apocynaceae     | <i>Gymnanthera oblonga</i>                             |                    | NR                                   |
|                             | Hernandiaceae   | <i>Gyrocarpus americanus</i>                           |                    | MXEu                                 |
| SFDanielsen578              | Haloragaceae    | <i>Haloragis aspera</i>                                |                    | NG                                   |



| Voucher ID (if vouch'd)  | Family       | Species <sup>1</sup>             | Common Name       | Alliance (from Table 5) <sup>2</sup> |
|--------------------------|--------------|----------------------------------|-------------------|--------------------------------------|
| SFDanielsen836           | Haloragaceae | <i>Haloragis exalata</i>         |                   | NG                                   |
|                          | Fabaceae     | <i>Hardenbergia violacea</i>     |                   | BX, IB                               |
|                          | Cactaceae    | <i>Harrisia</i> spp.*            | Harrisia cactus   | AC, BX, CO, IB, ME                   |
| SFDanielsen640           | Boraginaceae | <i>Heliotropium cunninghamii</i> |                   | BX                                   |
| SFDanielsen619           | Boraginaceae | <i>Heliotropium peninsulae</i>   |                   | IB                                   |
|                          | Poaceae      | <i>Heteropogon contortus</i>     | Black spear grass | AC, BX, CO, IB, MC, MXEu, NG, PG     |
|                          | Poaceae      | <i>Heteropogon triticeus</i>     | Giant spear grass | BX, CO, IB, MXEu, PG                 |
| SFDanielsen 73           | Malvaceae    | <i>Hibiscus sturtii</i>          | Hill hibiscus     | IB, BX                               |
|                          | Malvaceae    | <i>Hibiscus trionum</i>          | Bladder ketmia    | NG                                   |
|                          | Violaceae    | <i>Hybanthus enneaspermus</i>    | Blue spadeflower  | BX, IB, NG                           |
|                          | Poaceae      | <i>Hyparrhenia rufa</i> *        | Thatch grass      | NR                                   |
| SFDanielsen575           | Hypoxidaceae | <i>Hypoxis arillaea</i>          |                   | NG                                   |
|                          | Lamiaceae    | <i>Hyptis suaveolens</i> *       | Hyptis            | IB, MXEu, NR                         |
| SFDanielsen615           | Fabaceae     | <i>Indigofera colutea</i>        | Sticky indigo     | IB                                   |
|                          | Fabaceae     | <i>Indigofera hirsuta</i>        | Hairy indigo      | IB                                   |
| SFDanielsen589           | Fabaceae     | <i>Indigofera glandulosa</i>     |                   | NG                                   |
| SFDanielsen585, 639, 828 | Fabaceae     | <i>Indigofera linifolia</i>      | Round-pod indigo  | BX, IB, MXEu, NR                     |
| SFDanielsen571           | Fabaceae     | <i>Indigofera linnaei</i>        | Birdsville indigo | BX, IB, MXEu, NR                     |
|                          | Fabaceae     | <i>Indigofera pratensis</i>      | Forest indigo     | IB                                   |



| Voucher ID (if vouch'd)     | Family           | Species <sup>1</sup>                                    | Common Name             | Alliance (from Table 5) <sup>2</sup> |
|-----------------------------|------------------|---|-------------------------|--------------------------------------|
| SFDanielsen681              | Convulvulaceae   | <i>Ipomoea coptica</i>                                  |                         | AC                                   |
| SFDanielsen577              | Convulvulaceae   | <i>Ipomoea lonchophylla</i>                             | Cow vine                | NG                                   |
| SFDanielsen569,<br>658, 672 | Convulvulaceae   | <i>Ipomoea plebeia</i>                                  |                         | AC, CO                               |
| SFDanielsen588, 841         | Poaceae          | <i>Iseilema vaginiflorum.</i>                           | Flinders grass          | NG                                   |
| SFDanielsen 114             | Fabaceae         | <i>Jacksonia ramosissima</i>                            | Angled broom brush      | CO                                   |
|                             | Oleaceae         | <i>Jasminum didymum</i>                                 | Native jasmine          | AC, IB, MXSh                         |
| SFDanielsen 141             | Caesalpiniaceae  | <i>Labichea nitida</i>                                  |                         | SE                                   |
|                             | Malvaceae        | <i>Lagunaria patersoni</i>                              | Norfolk Island hibiscus | MXEu                                 |
|                             | Verbenaceae      | <i>Lantana camara</i> *                                 | Lantana                 | IB, MXEu, MXSh, ME, PG, SE           |
| SFDanielsen 79              | Poaceae          | <i>Leptochloa digitata</i>                              | Umbrella canegrass      | CO                                   |
| SFDanielsen 63, 732         | Poaceae          | <i>Leptochloa fusca</i> subsp. <i>fusca</i>             | Brown beetle grass      | CO                                   |
| SFDanielsen 155             | Lamiaceae        | <i>Leucas lavandulifolia</i> *                          |                         | CO, MXEu                             |
| SFDanielsen711              | Scrophulariaceae | <i>Lindernia scapigera</i>                              |                         | NG                                   |
| SFDanielsen712              | Laxmanniaceae    | <i>Lomandra multiflora</i>                              |                         | NG                                   |
|                             | Myrtaceae        | <i>Lophostemon grandiflorus</i>                         | Swamp box               | MXEu                                 |
|                             | Fabaceae         | <i>Macroptilium atropurpureum</i> *                     | Siratro                 | IB, MXEu, NR                         |
| SFDanielsen600              | Fabaceae         | <i>Macrotyloma uniflorum</i> var.<br><i>stenocarpum</i> |                         | MXEu                                 |



| Voucher ID (if vouch'd) | Family        | Species <sup>1</sup>            | Common Name            | Alliance (from Table 5) <sup>2</sup> |
|-------------------------|---------------|---------------------------------|------------------------|--------------------------------------|
|                         | Malvaceae     | <i>Malvastrum americanum</i> *  | Malvastrum             | IB, MXEu, NR                         |
| SFDanielsen 91          | Celastraceae  | <i>Maytenus cunninghamii</i>    | Yellow berry bush      | BX, IB                               |
|                         | Celastraceae  | <i>Maytenus disperma</i>        |                        | IB                                   |
|                         | Poaceae       | <i>Megathyrsus maximus</i> *    | Guinea grass           | MXEu, NR                             |
| SFDanielsen 144         | Myrtaceae     | <i>Melaleuca bracteata</i>      | Black tea-tree         | CO, MXEu                             |
|                         | Myrtaceae     | <i>Melaleuca dealbata</i>       | Grey paperbark         | ME, MXEu                             |
|                         | Myrtaceae     | <i>Melaleuca fluviatilis</i>    |                        | MXEu                                 |
|                         | Myrtaceae     | <i>Melaleuca leucadendra</i>    | Weeping paperbark      | MXEu                                 |
|                         | Myrtaceae     | <i>Melaleuca nervosa</i>        | Paper-barked tea-tree  | IB                                   |
| SFDanielsen 37          | Myrtaceae     | <i>Melaleuca trichostachya</i>  | Tea-tree               | MXEu                                 |
|                         | Myrtaceae     | <i>Melaleuca viridiflora</i>    | Broad-leaved paperbark | BX, IB, MXEu                         |
|                         | Pentapetaceae | <i>Melhania oblongifolia</i>    |                        | NG, NR                               |
| SFDanielsen756          | Byttneriaceae | <i>Melochia pyramidata</i>      |                        | NR                                   |
| SFDanielsen 69          | Poaceae       | <i>Melinis repens</i>           | Red natal grass        | AC, BX, CO, IB, MC, MXEu, NR, PG     |
| SFDanielsen616          | Poaceae       | <i>Mnesithea formosa</i> *      | Silkytop grass         | IB                                   |
|                         | Poaceae       | <i>Mnesithea rotboelloides</i>  | Cane grass             | CO, MXEu, NG                         |
| SFDanielsen 78, 687     | Polygonaceae  | <i>Muehlenbeckia florulenta</i> | Lignum                 | CO                                   |
|                         | Myoporaceae   | <i>Myoporum montanum</i>        | Boobialla              | CO, MXEu                             |
| SFDanielsen843          | Haloragaceae  | <i>Myriophyllum simulans</i>    |                        | AC                                   |



| Voucher ID (if vouch'd)      | Family           | Species <sup>1</sup>              | Common Name           | Alliance (from Table 5) <sup>2</sup> |
|------------------------------|------------------|-----------------------------------|-----------------------|--------------------------------------|
|                              | Mimosaceae       | <i>Neptunia gracilis</i>          | Native sensitive weed | BX, IB, NG                           |
|                              | Oleaceae         | <i>Notelea microcarpa</i>         | Native olive          | IB, SE                               |
|                              | Nymphaeaceae     | <i>Nymphaea violacea</i>          | Water lily            | MXEu                                 |
| SFDanielsen586               | Rubiaceae        | <i>Oldenlandia argillacea</i>     |                       | NG                                   |
| SFDanielsen 112, 834         | Asteraceae       | <i>Olearia xerophila</i>          |                       | BL                                   |
|                              | Convolvulaceae   | <i>Operculina aquisepala</i>      | Paper rose            | AC                                   |
|                              | Cactaceae        | <i>Opuntia stricta</i> *          | Prickly pear          | AC, MXEu                             |
|                              | Cactaceae        | <i>Opuntia tomentosa</i> *        | Woolly prickly pear   | AC, IB                               |
|                              | Hydrocharitaceae | <i>Ottelia ovalifolia</i>         | Swamp lily            | AC (in gilgai)                       |
|                              | Meliaceae        | <i>Owenia acidula</i>             | Emu apple             | AC                                   |
|                              | Pandanaceae      | <i>Pandanus spiralis</i>          | Scrub breadfruit      | MXEu                                 |
| SFDanielsen631, 703          | Poaceae          | <i>Panicum effusum</i>            | Hairy panic           | IB                                   |
| SFDanielsen62, 689, 745, 757 | Poaceae          | <i>Panicum decompositum</i>       | Native millet         | AC, NG                               |
| SFDanielsen720               | Poaceae          | <i>Panicum larcomianum</i>        |                       | CO                                   |
|                              | Caesalpiniaceae  | <i>Parkinsonia aculeata</i> *     | Parkinsonia           | MXEu                                 |
| SFDanielsen677, 731          | Apocynaceae      | <i>Parsonsia lanceolata</i> .     |                       | AC                                   |
| SFDanielsen754               | Apocynaceae      | <i>Parsonsia</i> sp.              |                       | MXEu                                 |
|                              | Asteraceae       | <i>Parthenium hysterophorus</i> * | Parthenium            | MXEu                                 |



| Voucher ID (if vouch'd) | Family          | Species <sup>1</sup>               | Common Name           | Alliance (from Table 5) <sup>2</sup>               |
|-------------------------|-----------------|------------------------------------|-----------------------|--|
| SFDanielsen643          | Poaceae         | <i>Paspalidium caespitosum</i>     | Brigalow grass        | IB   |
| SFDanielsen673          | Poaceae         | <i>Paspalidium constrictum</i>     | Knottybutt grass      | AC   |
| SFDanielsen665          | Poaceae         | <i>Paspalidium distans</i>         |                       | AC, NG   |
| SFDanielsen604          | Poaceae         | <i>Paspalidium gausum</i>          |                       | MXEu   |
| SFDanielsen723          | Poaceae         | <i>Paspalidium jubiflorum</i>      | Warrego grass         | CO   |
| SFDanielsen642, 709     | Poaceae         | <i>Paspalidium rarum</i>           | Rare panic            | BX   |
|                         | Poaceae         | <i>Pennisetum ciliaris</i> *       | Buffel grass          | AC, BL, BX, CO, IB, MC, ME, MXEu, MXSh, NG, PG, NR |
|                         | Poaceae         | <i>Perotis rara</i>                | Comet grass           | AC, CO, IB, SE                                     |
|                         | Picrodendraceae | <i>Petalostigma banksii</i>        | Smooth-leaved quinine | AC, IB   |
|                         | Picrodendraceae | <i>Petalostigma pubescens</i>      | Quinine bush          | AC, BX, CO, IB, ME, MXEu, MXSh                     |
| SFDanielsen595, 601     | Phyllanthaceae  | <i>Phyllanthus carpentariae</i>    |                       | IB, MXEu   |
| SFDanielsen702          | Phyllanthaceae  | <i>Phyllanthus fuernrohrii</i>     |                       | IB   |
|                         | Phyllanthaceae  | <i>Phyllanthus maderaspatensis</i> | Spurge                | CO, NG   |
| SFDanielsen601          | Phyllanthaceae  | <i>Phyllanthus</i> sp.             |                       | MXEu   |
|                         | Solanaceae      | <i>Physalis minima</i>             | Gooseberry            | NG   |
|                         | Thymelaeaceae   | <i>Pimelea haematostachya</i>      | Pimelea poppy         | NG   |
|                         | Pittosporaceae  | <i>Pittosporum angustifolium</i>   | Weeping pittosporum   | IB   |
|                         | Lecythidaceae   | <i>Planchonia careya</i>           | Cocky apple           | BX, CO, IB, MC, ME, MXEu, MXSh, NG, PG             |



| Voucher ID (if vouch'd) | Family          | Species <sup>1</sup>                             | Common Name       | Alliance (from Table 5) <sup>2</sup> |
|-------------------------|-----------------|--|-------------------|--------------------------------------|
|                         | Sapindaceae     | <i>Pleiogynium timorense</i>                     | Burdekin plum     | MXEu                                 |
| SFDanielsen50           | Asteraceae      | <i>Pluchea baccharoides</i>                      |                   | CO                                   |
| SFDanielsen48, 830      | Plumbaginaceae  | <i>Plumbago zeylanica</i>                        | Ceylon lead root  | AC, CO                               |
|                         | Caryophyllaceae | <i>Polycarpea</i> sp.                            |                   | AC                                   |
| SFDanielsen590          | Convolvulaceae  | <i>Polymeria longifolia</i>                      | Polymeria         | NG                                   |
|                         | Convolvulaceae  | <i>Polymeria</i> sp.                             |                   | NG                                   |
|                         | Portulacaceae   | <i>Portulaca oleracea</i>                        | Pigweed           | IB, MA                               |
| SFDanielsen587          | Campanulaceae   | <i>Pratia concolor</i>                           |                   | NG                                   |
|                         | Acanthaceae     | <i>Pseuderanthemum variable</i>                  |                   | AC, CO, MXEu                         |
| SFDanielsen148          | Rubiaceae       | <i>Psydrax odorata</i> forma <i>australiense</i> |                   | IB                                   |
|                         | Asteraceae      | <i>Pterocaulon sphacelatum</i>                   | Fruit salad plant | BX, IB, NG, NR                       |
|                         | Fabaceae        | <i>Rhynchosia minima</i>                         | Rhynchosia        | BX, CO, IB, NG                       |
| SFDanielsen574          | Acanthaceae     | <i>Rostellularia adscendens</i>                  | Spade flower      | BX, IB, NG                           |
|                         | Chenopodiaceae  | <i>Salsola kali</i>                              | Soft roly-poly    | AC, CO, IB                           |
|                         | Santalaceae     | <i>Santalum lanceolatum</i>                      | Sandalwood        | AC, CO                               |
|                         | Apocynaceae     | <i>Sarcostemma viminale</i>                      | Caustic vine      | AC, IB                               |
| SFDanielsen652          | Phyllanthaceae  | <i>Sauvagesia rigens</i>                         |                   | BX                                   |
| SFDanielsen557          | Goodeniaceae    | <i>Scaevola spinescens</i>                       |                   | IB                                   |
|                         | Poaceae         | <i>Schizachyrium fragile</i>                     | Fire grass        | BX, IB                               |



| Voucher ID (if vouch'd) | Family          | Species <sup>1</sup>                                      | Common Name         | Alliance (from Table 5) <sup>2</sup> |
|-------------------------|-----------------|---|---------------------|--------------------------------------|
| SFDanielsen755          | Cyperaceae      | <i>Schoenoplectus litoralis</i>                           | Clubrush            | MXEu                                 |
| SFDanielsen560, 602     | Cyperaceae      | <i>Scleria mackaviensis</i>                               |                     | IB                                   |
| SFDanielsen 89          | Chenopodiaceae  | <i>Sclerolaena ramulosa</i>                               | Gidgee burr         | AC                                   |
| SFDanielsen 60          | Caesalpiniaceae | <i>Senna artemisioides</i> subsp.<br><i>artemisioides</i> | Silver cassia       | BX, IB                               |
| SFDanielsen646          |                 |   |                     |                                      |
| SFDanielsen647          | Caesalpiniaceae | <i>Senna artemisioides</i> subsp. <i>sturtii</i>          | Desert cassia       | IB                                   |
| SFDanielsen686          | Fabaceae        | <i>Sesbania cannabina</i>                                 | Sesbania pea        | AC                                   |
|                         | Poaceae         | <i>Setaria surgens</i>                                    | Pigeon grass        | BX                                   |
|                         | Malvaceae       | <i>Sida acuta</i> *                                       | Spinyhead sida      | BX, IB, NR                           |
|                         | Malvaceae       | <i>Sida cordifolia</i> *                                  | Flannel weed        | IB, NR                               |
| SFDanielsen708          | Malvaceae       | <i>Sida fibulifera</i>                                    | Pin sida            | IB                                   |
|                         | Malvaceae       | <i>Sida filiforme</i>                                     |                     | IB                                   |
|                         | Malvaceae       | <i>Sida hackettiana</i>                                   |                     | AC, CO, IB, MXEu, PG                 |
|                         | Poaceae         | <i>Sorghum halapense</i> *                                |                     | NR                                   |
| SFDanielsen598          | Rubiaceae       | <i>Spermacoce brachystema</i>                             |                     | AC, BX, CO, IB                       |
| SFDanielsen655          | Poaceae         | <i>Sporobolus actinocladus</i>                            | Katoora             | BX                                   |
| SFDanielsen632          | Poaceae         | <i>Sporobolus australasicus</i>                           | Australian dropseed | IB                                   |
| SFDanielsen719          | Poaceae         | <i>Sporobolus caroli</i>                                  | Fairy grass         | AC, NG                               |
| SFDanielsen744          | Poaceae         | <i>Sporobolus disjunctus</i>                              |                     | PG                                   |



| Voucher ID (if vouch'd) | Family           | Species <sup>1</sup>                                  | Common Name            | Alliance (from Table 5) <sup>2</sup> |
|-------------------------|------------------|---|------------------------|--------------------------------------|
| SFDanielsen605          | Poaceae          | <i>Sporobolus jacquemontii</i> *                      | Rat's tail grass       | MXEu                                 |
| SFDanielsen722          | Poaceae          | <i>Sporobolus mitchellii</i>                          | Swamp rat's tail grass | CO                                   |
| SFDanielsen632          | Poaceae          | <i>Sporobolus</i> sp.                                 |                        | IB                                   |
| SFDanielsen743          | Poaceae          | <i>Sporobolus</i> sp.                                 |                        | IB                                   |
|                         | Poaceae          | <i>Sporobolus virginicus</i>                          | Salt couch             | MA                                   |
|                         | Verbenaceae      | <i>Stachytarpheta jamaicensis</i> *                   | Snake weed             | MXEu, MXSh, PG                       |
| SFDanielsen 591         | Scrophulariaceae | <i>Stemodia pubescens</i>                             |                        | NG                                   |
| SFDanielsen675          | Asteraceae       | <i>Streptoglossa adscendens</i>                       | Desert daisy           | AC                                   |
| SFDanielsen 558         | Scrophulariaceae | <i>Striga curviflora</i>                              |                        | NG                                   |
|                         | Stylidiaceae     | <i>Stylium delicatum</i>                              |                        | IB                                   |
| SFDanielsen661          | Stylidaceae      | <i>Stylium eriorhizum</i>                             |                        | IB                                   |
|                         | Fabaceae         | <i>Stylosanthes</i> sp.*                              | Stylo                  | AC, BX, CO, IB, MC, ME, MXEu, NG, PG |
| SFDanielsen 154         | Fabaceae         | <i>Tephrosia astragaloides</i>                        |                        | MXEu                                 |
| SFDanielsen563          | Fabaceae         | <i>Tephrosia brachyodon</i> var.<br><i>brachyodon</i> |                        | IB                                   |
| SFDanielsen 116         | Fabaceae         | <i>Tephrosia</i> sp                                   |                        | BL                                   |
|                         | Combretaceae     | <i>Terminalia oblongata</i>                           | Yellowwood             | AC, BX, CO, IB, MC, ME               |
|                         | Thymelaeaceae    | <i>Thecanthes cornucopiae</i>                         |                        | AC, NG                               |
| SFDanielsen 65          | Poaceae          | <i>Themeda avenacea</i>                               | Native oatgrass        | MXEu                                 |



| Voucher ID (if vouch'd) | Family        | Species <sup>1</sup>                            | Common Name         | Alliance (from Table 5) <sup>2</sup> |
|-------------------------|---------------|---|---------------------|--------------------------------------|
|                         | Poaceae       | <i>Themeda triandra</i>                         | Kangaroo grass      | BL, BX, IB, MXEu, PG                 |
| SFDanielsen698          | Poaceae       | <i>Thyridolepis xerophila</i>                   |                     | AC                                   |
| SFDanielsen695          | Poaceae       | <i>Tragus australianus</i>                      | Small burrgrass     | AC, BL                               |
|                         | Ulmaceae      | <i>Trema tomentosa</i>                          | Poison peach        | IB                                   |
|                         | Boraginaceae  | <i>Trichodesma zeylandica</i>                   | Camel bush          | BX, IB, MXEu, NG                     |
| SFDanielsen 108         | Poaceae       | <i>Triodia bitextura</i>                        | Feathertop spinifex | BL                                   |
| SFDanielsen 56          | Poaceae       | <i>Triodia pungens</i>                          | Soft spinifex       | BX, IB                               |
| SFDanielsen 96          | Poaceae       | <i>Triraphis mollis</i>                         | Purple needlegrass  | BX, IB                               |
|                         | Typhaceae     | <i>Typha</i> sp.                                |                     | MXEu                                 |
|                         | Malvaceae     | <i>Urena lobata</i> *                           | Pink burr           | MXEu, SE                             |
| SFDanielsen607          | Poaceae       | <i>Urochloa foliosa</i>                         |                     | MXEu                                 |
|                         | Poaceae       | <i>Urochloa mosambicensis</i> *                 | Sabi grass          | IB, MXEu, NR                         |
| SFDanielsen748          | Poaceae       | <i>Urochloa mutica</i> *                        | Para grass          | NG                                   |
|                         | Rhamnaceae    | <i>Ventilago viminalis</i>                      | Vine tree           | AC, BX, MXEu                         |
| SFDanielsen710          | Fabaceae      | <i>Vigna lanceolata</i>                         | Maloga bean         | NG                                   |
| SFDanielsen603          | Fabaceae      | <i>Vigna vexillata</i> var. <i>angustifolia</i> |                     | MXEu                                 |
| SFDanielsen570          | Byttneriaceae | <i>Waltheria indica</i>                         | Waltheria           | AC, BX, CO, IB, MC, MXEu, PG         |
|                         | Asteraceae    | <i>Wedelia spilanthoides</i>                    |                     | BX, IB, MXEu                         |
|                         | Asteraceae    | <i>Xanthium pungens</i> *                       | Noogoora burr       | MXEu                                 |



| Voucher ID (if vouch'd) | Family     | Species <sup>1</sup>                               | Common Name    | Alliance (from Table 5) <sup>2</sup> |
|-------------------------|------------|--|----------------|--------------------------------------|
|                         | Proteaceae | <i>Xylomelum scottianum</i>                        | Woody pear     | IB                                   |
| SFDanielsen556          | Fabaceae   | <i>Zornia dyctiocarpa</i> var. <i>filifolia</i>    |                | BX                                   |
| SFDanielsen641          | Fabaceae   | <i>Zornia muriculata</i> subsp. <i>angustata</i> . | Upright zornia | IB, BX                               |
| SFDanielsen556          | Fabaceae   | <i>Zornia muelleriana</i>                          |                | BX                                   |

<sup>1</sup> \* = exotic species

<sup>2</sup> Communities

AC = Acacia dominated woodland/open forest

BL = Bloodwood woodland

BX = Box woodland on flats and plains

CO = Coolibah and gidgee open forest/woodland fringing waterways

IB = Ironbark woodland on plains and rolling rises

MA = Mangroves and tidal saltmarsh

MC = Mountain coolibah open woodland on rocky plains and rolling rises

ME = Melaleuca dominated shrublands/woodlands

MXEu = Mixed eucalypt and paperbark open forest fringing watercourses

MXSh = Mixed species shrubland/low woodland

NG = Native grasslands

NR = Non remnant & Regrowth vegetation areas (includes non-vegetated areas)

PG = Poplar gum open woodland on alluvial plains

SE = Semi-evergreen vine thicket



## Appendix C

# Terrestrial Fauna Species Records























## Appendix D

# Likelihood of Occurrence of EPBC Act and NCA Listed Flora and Fauna Species within the Study Area



### Likelihood of occurrence of conservation significant species predicted to occur

| Scientific name           | Common name    | Status |     | Habitat characteristics  | Presence of Suitable habitat   | Source                    |
|---------------------------|----------------|--------|-----|--|--|---------------------------|
|                           |                | EPBC   | NCA |  |  |                           |
| <b>Flora</b>              |                |        |     |  |  |                           |
| <i>Acacia jackesiana</i>  | Betsy's wattle | -      | NT  | This small shrub to 50 cm tall grows within open eucalypt woodlands on hill slopes or crests with rocky skeletal soils. (Calvert et al. 2005).   | Suitable habitat may occur within the study area. Three records exist in the northern half of the study area.<br><i>May occur</i>  | Wildlife Online           |
| <i>Acacia ramiflora</i>   |                | E      | V   | A shrub to 3 m recorded on sandstone hills from a number of disparate sites mostly north of the project footprint, with some records from the Gregory Development Road north of Alpha (TSSC 2008hc). | Suitable habitat is unlikely to occur within the section of the project footprint adjacent to the location of prior records.<br><i>Unlikely to occur</i>   | EPBC, Wildlife Online     |
| <i>Aristida granitica</i> |                | E      | E   | A perennial grass to 75 cm tall known to occur in sandy granite-derived soil in eucalypt woodland from only one site - Mt Pring, 10 km west of Bowen (TSSC 2008if).                                  | Suitable habitat occurs near the base of Mt Roundback and other granite sites in the northern section of the project footprint. However, the highly restricted distribution of this species indicates it is unlikely to be present in the project footprint.<br><i>Unlikely to occur</i> | Wildlife Online, Herbrecs |



| Scientific name   | Common name              | Status |     | Habitat characteristics   | Presence of Suitable habitat   | Source                    |
|---|--------------------------|--------|-----|---|--|---------------------------|
|   |                          | EPBC   | NCA |   |  |                           |
| <i>Bertya sharpeana</i>   | Mt. Coolum bertya        | -      | NT  | This species is a shrub recorded from Roma Peak 40 km south of Bowen, in dry sclerophyll vegetation. (Herbrecs results).  | Suitable habitat exists near the project footprint, however the restricted range of this species indicates it is unlikely to occur in the project footprint.<br><br><i>Unlikely to occur</i>   | Wildlife Online, Herbrecs |
| <i>Bonamia dietrichiana</i>                                     | Dietrich's morning glory | -      | NT  | A scrambling vine growing within semi-evergreen vine thicket. (Herbrecs results).   | Limited suitable habitat likely to occur in the project footprint. Two records of this species in the region.<br><br><i>Does occur</i>   | Wildlife Online, Herbrecs |
| <i>Brachychiton</i> sp.<br>(Blackwall Range<br>R.J.Fensham 971) |                          | -      | E   | A small tree found in dry rainforest and semi-evergreen vine thicket among basalt or granodiorite boulders or talus. Records believed to be restricted to Blackwall Range in the headwaters of the Bowen River, primarily from 'Exmoor' Station (30km east of project footprint). (Herbrecs results). | Blackwall Range is located approximately 40 km east of project footprint and 60 km south east of Collinsville in the northern third of the project footprint. Suitable habitat within the project footprint is likely to be limited.<br><br><i>Unlikely to occur</i> | Wildlife Online           |
| <i>Cerbera dumicola</i>   |                          | -      | NT  | A low tree recorded from dry rainforest and open lancewood forest on sandstone and clay soils, and on laterite. Also recorded from a previous mine site on rehabilitated acidic soil. (Herbrecs results).   | Recorded in the vicinity of the northern and southern thirds of the project footprint. Suitable habitat within the project footprint is likely to be limited.<br><br><i>May occur</i>  | Wildlife Online, Herbrecs |



| Scientific name              | Common name            | Status |     | Habitat characteristics   | Presence of Suitable habitat  | Source                          |
|------------------------------|------------------------|--------|-----|---|---|---------------------------------|
|                              |                        | EPBC   | NCA |   |   |                                 |
| <i>Corchorus hygrophilus</i> | native jute            | -      | V   | This small shrub to 75cm tall grows on the margins of vine thickets or in woodlands near vine thickets, on granite or limestone derived soils. It occurs in isolated populations between Eidsvold and Magnetic Island (Calvert et al. 2005).          | Limited suitable habitat exists in coastal limits of the project footprint. Only one record of this species exists within the region on Mt Abbot 5 km from the project footprint.<br><i>Unlikely to occur</i> | Wildlife Online, Herbrecs       |
| <i>Croton magneticus</i>     | Magnetic Island croton | V      | V   | This species occurs in isolated populations between Magnetic Island and the Leichardt Range, near the Cerito-Elphinstone Road. It grows in vine thickets on skeletal granite, limestone or sandstone soils and rocky seashores (Calvert et al. 2005). | Potential suitable habitat is likely to be present within the study area. Eight records of this species have been recorded in the region.<br><i>May occur</i>   | EPBC, Wildlife Online, Herbrecs |
| <i>Cycas ophiolitica</i>     | Marlborough blue       | E      | E   | This cycad has distinctly blue new fronds. It occurs chiefly in sclerophyll open forest or woodland on red clays in serpentinite landforms between Rockhampton and Marlborough (Hill 2004; Melzer and Plumb 2007).                                    | Suitable habitat does not occur within the project footprint and the project footprint is well outside of the known range of this species.<br><i>Unlikely to occur</i>  | EPBC                            |
| <i>Desmodium macrocarpum</i> |                        | -      | NT  | A twining plant found on sandy soils in eucalypt woodland (Hacker 1990). Herbrecs results yielded one record for this species from 50 km south west of Collinsville, 30 km west from the project footprint.   | Potential suitable habitat for this species is present within the study area.<br><i>May occur</i>   | Wildlife Online, Herbrecs       |



| Scientific name                   | Common name        | Status |     | Habitat characteristics  | Presence of Suitable habitat  | Source                          |
|-----------------------------------|--------------------|--------|-----|--|---|---------------------------------|
|                                   |                    | EPBC   | NCA |  |   |                                 |
| <i>Dichanthium queenslandicum</i> | king-blue grass    | V      | V   | This species occurs in natural grasslands on black cracking clay soils primarily derived from basalt. The main distribution for the species is centred on Emerald, with records from Byerwen Station near Glenden (Sharp & Simon 2002; Herbrebs results).  | This species may be present in natural grasslands on black cracking clay soils between Collingsville and Alpha.<br><i>Likely to occur</i>   | EPBC, Wildlife Online, Herbrebs |
| <i>Dichanthium setosum</i>        | bluegrass          | V      | NT  | A perennial grass to 1 m tall known to occur in association either with heavy black clay soils derived from basalt or stony red-brown loams, in moderately disturbed areas (cleared woodland, roadsides, grazed land etc). It is widespread in a number of central Queensland pastoral districts. (TSSC 2008bh). | Suitable habitat for this species is present across most of the project footprint.<br><i>May occur</i>  | Wildlife Online, Herbrebs       |
| <i>Digitaria porrecta</i>         | finger panic grass | E      | NT  | Is a grass to 70 cm tall, occurs in belah and wilga woodland on dark brown loam or as a component of bluegrass grasslands on black soils. Restricted to the Darling Downs district of south-east Queensland south of Toowoomba (Leigh et al. 1984).  | Limited suitable habitat in study area.<br><i>Unlikely to occur</i>   | EPBC                            |
| <i>Eucalyptus raveretiana</i>     | black ironbox      | V      | V   | This tree is only found on river banks and stream lines from Rockhampton to Charters Towers and the lower Burdekin (Melzer and Plumb 2007; Calvert et al 2005).  | Suitable habitat is present within the study area. Four records of this species have been recorded in the region surrounding the northern part of the study area.<br><i>Likely to occur</i> | EPBC, Wildlife Online, Herbrebs |



| Scientific name                | Common name          | Status |     | Habitat characteristics   | Presence of Suitable habitat  | Source                          |
|--------------------------------|----------------------|--------|-----|---|---|---------------------------------|
|                                |                      | EPBC   | NCA |   |   |                                 |
| <i>Leucopogon cuspidatus</i>   | northern beard heath | V      | -   | A shrub occurring on mountain tops containing woodlands and shrublands with <i>Xanthorrhoea</i> spp. Distribution of this species is to coastal ranges and islands between Blackdown Tablelands and Cooktown (Calvert et al. 2005). | Suitable habitat is unlikely to occur within the project footprint. Three records of this species exist within the region.<br><i>Unlikely to occur</i>  | EPBC, Wildlife Online           |
| <i>Livistona lanuginosa</i>    | fan palm             | V      | V   | A fan palm recorded from sandy watercourse channels in a small area of the Burdekin River catchment near Ravenswood (Rodd 1998).  | Suitable habitat is present in creek crossings within the study area. However, given the restricted distribution of this species it is not considered likely to be present.<br><i>Unlikely to occur</i> | Wildlife Online, Herbrebs       |
| <i>Marsdenia pumila</i>        |                      | -      | V   | Described in Herbrebs as a small twiner growing in grass tussocks in dry sclerophyll woodland on lateritised sedimentary rock beside the Collinsville-Mt Coolon Rd (Bowen Devt. Rd) (Herbrebs results).                             | Suitable habitat occurs within the project footprint, which passes close to the Herbrebs record.<br><i>May occur</i>  | Wildlife Online, Herbrebs       |
| <i>Ozothamnus eriocephalus</i> |                      | V      | V   | A spindly shrub or herb recorded from rocky areas and gullies in the margins of rainforest and in sclerophyll forest. Known from scattered locations in the area (eg Mt Abbot, Lake Elphinstone) (TSSC 2008aas).                    | Suitable habitat may occur within project footprint.<br><i>May occur</i>  | EPBC, Wildlife Online, Herbrebs |



| Scientific name                 | Common name | Status |     | Habitat characteristics  | Presence of Suitable habitat   | Source                    |
|---------------------------------|-------------|--------|-----|--|--|---------------------------|
|                                 |             | EPBC   | NCA |  |  |                           |
| <i>Paspalidium scabrifolium</i> |             | -      | NT  | Found immediately adjacent to the project footprint near the Suttor Development Road on clays derived from alluvium, in open forest/woodland with a tall shrub layer (Herbrecs results). Sharp and Simon (2002) indicate this species is native to brigalow country. | Suitable habitat for this species occurs within the project footprint and it has been recorded from nearby.<br><i>May occur</i>  | Wildlife Online, Herbrecs |
| <i>Peripleura scabra</i>        |             | -      | NT  | An erect daisy occurring in open woodland on rocky hills or ridges, usually in granite or sandstone in association with narrow leaved ironbark. (Calvert et al. 2005).   | Suitable habitat occurs within project footprint.<br><i>May occur</i>  | Wildlife Online, Herbrecs |
| <i>Peripleura sericea</i>       |             | -      | NT  | An erect daisy found in open eucalypt woodland, usually on gentle slopes with a southern aspect. Not known further inland or south than Ravenswood (which is the location of the single Herbrecs record) (Calvert et al. 2005).                                      | Suitable habitat occurs within project footprint, however given the restricted distribution of this species it is unlikely to be present.<br><i>Unlikely to occur</i>                                  | Herbrecs                  |
| <i>Polianthion minutiflorum</i> |             | V      | V   | This species is a shrub to 1 m that grows in sclerophyll forest and woodland on sandstone slopes and gullies, and adjacent to laterite, from 110 west of Mackay to Kingaroy (TSSC 2008wl).   | Suitable habitat for this species is present in the northern section of the project footprint, however the project footprint is outside of the known range of the species.<br><i>Unlikely to occur</i> | Wildlife Online, Herbrecs |



| Scientific name                            | Common name         | Status |     | Habitat characteristics   | Presence of Suitable habitat   | Source                    |
|--|---------------------|--------|-----|---|--|---------------------------|
|  |                     | EPBC   | NCA |   |  |                           |
| <i>Senna acclinis</i>                      | rainforest cassia   | -      | NT  | A shrub recorded from Cape Upstart in littoral shrubland (Herbrecs). Elsewhere known to occupy the margins of dry and subtropical rainforest in coastal districts (DECCW 2009).   | Marginal suitable habitat present in northern section of the project footprint only.<br><i>Unlikely to occur</i> | Herbrecs                  |
| <i>Solanum adenophorum</i>                 |                     | -      | E   | A herb to 40 cm tall with two records in Herbrecs for approximately 100 km west of Clermont. Found on black clay soil in remnant and cleared <i>Acacia cambagei</i> 'scrub' (Herbrecs results).   | Abundant suitable habitat within the central and southern sections of the project footprint.<br><i>May occur</i> | Wildlife Online, Herbrecs |
| <i>Solanum sporadotrichum</i>              | sporadic nightshade | -      | NT  | A small shrub to 2.5m that occurs in vine thicket on slopes, patchy distribution but recorded at Mt Wickham 2 km from the project footprint (Calvert et al. 2005).  | Limited suitable habitat in study area.<br><i>Unlikely to occur</i>  | Wildlife Online, Herbrecs |
| <i>Taeniophyllum muelleri</i> <sup>1</sup> | minute orchid       | V      | -   | A leafless epiphytic orchid that grows on the outer branches of trees and shrubs in coastal rainforests along water courses and humid gullies to an altitude of 250 m. Distributed from Wilson Range (NSW) to Cape York Peninsula (Qld) | Limited suitable habitat in study area.<br><i>Unlikely to occur</i>  | EPBC, Wildlife Online     |



| Scientific name                   | Common name             | Status |     | Habitat characteristics  | Presence of Suitable habitat  | Source  |
|-----------------------------------|-------------------------|--------|-----|--|---|---|
|                                   |                         | EPBC   | NCA |  |   |   |
| <i>Trioncinia retroflexa</i>      | Belyando cobbler's pegs | E      |     | Known from only 6 natural populations, 3 of which are clustered immediately to the north and east of Clermont along the Peak Downs Highway (R. Fensham pers. comm..27/6/10). Occurs in native grasslands, and is now generally only found along road verges and in stock routes that are not subject to constant ongoing trampling and grazing (Fensham, Fairfax and Holman, 2002). A landowner believes it is present on his property in vicinity of chnge 25, 000, and there is a large area of suitable habitat in this area. | Suitable habitat is present within the southern half of the project footprint, particularly where stock routes and roads are traversed. However, the nearest known populations are 80 km to the south of the project footprint.<br><i>May occur</i> | Literature review and personal communicat'n with landowner. |
| <b>Fauna</b>                      |                         |        |     |  |   |   |
| <b>Birds</b>                      |                         |        |     |  |   |   |
| <i>Calyptorhynchus lathami</i>    | glossy black-cockatoo   | -      | V   | Occurs in she-oaks, forests, woodlands and timbered watercourses of south-east Australia. Also found in eucalypts, native cypress and brigalow (Pizzey and Knight, 2003).  | Limited suitable habitat in study area. Only one record of this species is present in the region.<br><i>Unlikely to occur</i>   | Wildlife Online   |
| <i>Ephippiorhynchus asiaticus</i> | black-necked stork      | -      | NT  | Occurs in a range of wetland and inundated habitats, from the coast to irrigated inland regions (Pizzey and Knight, 2007).   | Suitable habitat exists in the study area. This species has been recorded 46 times within the region adjacent to the northern half of the alignment.<br><i>Likely to occur</i>  | Wildlife Online   |



| Scientific name                  | Common name                | Status |     | Habitat characteristics  | Presence of Suitable habitat  | Source                |
|----------------------------------|----------------------------|--------|-----|--|---|-----------------------|
|                                  |                            | EPBC   | NCA |  |   |                       |
| <i>Erythrotriorchis radiatus</i> | red goshawk                | V      | E   | The species is rare and sparsely distributed. It has specific nesting requirements (only nesting in trees taller than 20 m and within one km of water) and is likely to be vulnerable to the loss of suitable breeding habitat (Marchant and Higgins, 1993). | Suitable habitat is present in the study area. Three records of this species are present in the region surrounding the study area.<br><i>May occur</i>    | EPBC, Wildlife Online |
| <i>Falco hypoleucus</i>          | grey falcon                | -      | NT  | Inhabits lightly treed inland plains, gibber deserts, sand ridges, pastoral lands, timbered watercourses (Pizzey and Knight, 2003).  | Suitable habitat may exist in the study area. One record has been identified in the region surrounding the study area.<br><i>May occur</i>                | Wildlife Online       |
| <i>Geophaps scripta scripta</i>  | squatter pigeon (southern) | V      | V   | Occurs never far from water in grassed woodlands, foothills, watercourses, river flats, grassy plains, and environs of homesteads (Pizzey and Knight, 2003).   | This species is abundant throughout the Brigalow Belt region. This species has been recorded in areas surrounding the study area.<br><i>Does occur</i>    | EPBC, Wildlife Online |
| <i>Grantiella picta</i>          | painted honeyeater         | -      | V   | This nomadic species inhabits mistletoes in eucalypt forests/woodlands, paperbarks, casuarinas, some acacias, trees on farmland and gardens (Pizzey and Knight, 2003).   | Suitable habitat may exist in the study area however only one record of this species exists in the region surrounding the study area.<br><i>May occur</i> | Wildlife Online       |
| <i>Lophoictinia isura</i>        | square-tailed kite         | -      | NT  | Inhabits heathlands, woodlands, tropical and subtropical rainforests, timbered watercourses, hills and gorges in coastal and sub-coastal areas (Pizzey and Knight, 2003).  | Suitable habitat may exist in the study area. Six records from southern portion of the study area.<br><i>May occur</i>                                    | Wildlife Online       |



| Scientific name                     | Common name                                 | Status |     | Habitat characteristics   | Presence of Suitable habitat  | Source          |
|-------------------------------------|---|--------|-----|---|---|-----------------|
|                                     |   | EPBC   | NCA |   |   |                 |
| <i>Melithreptus gularis</i>         | black-chinned honeyeater                    | -      | NT  | Habitat preferences include dry eucalypt forest and woodlands, and well wooded margins of watercourses Pizzey and Knight, 2007).  | Suitable habitat may exist within the study area. Six records of this species exist in the region surrounding the study area.<br><i>Likely to occur</i> | Wildlife Online |
| <i>Neochmia ruficauda ruficauda</i> | star finch (eastern), star finch (southern) | E      | E   | Occurs mainly in grasslands and grassy woodlands close to fresh water. It also occurs in cleared or suburban areas. Habitat trees are typically associated with permanent water or regularly inundated areas; the most common species are <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> (Pizzey and Knight, 2003). | Limited suitable habitat in study area.<br><i>Unlikely to occur</i>   | EPBC            |
| <i>Nettapus coromandelianus</i>     | cotton pygmy-goose                          | -      | NT  | Inhabits deeper freshwater swamps, lagoons and dams that have waterlilies and other semi-emergent water plants (Pizzi and Knight 2003).   | Suitable habitat exists around farm dams located close to the study area.<br><i>Does occur</i>  | Wildlife Online |
| <i>Poephila cincta cincta</i>       | black-throated finch                        | E      | V   | This species occupies woodland savannah and riverine vegetation. Inland it prefers grassy woodland dominated by eucalypts, paperbacks or acacias, where there is access to seeding grasses and water. On the coast, it occupies open grassy plains with pandanus (TSSC 2005).   | Suitable habitat exists in the study area, particularly along creeks in the northern sections of the study area.<br><i>May occur</i>                    | EPBC            |



| Scientific name             | Common name                | Status |     | Habitat characteristics   | Presence of Suitable habitat   | Source          |
|-----------------------------|----------------------------|--------|-----|---|--|-----------------|
|                             |                            | EPBC   | NCA |   |  |                 |
| <i>Rostratula australis</i> | Australian painted snipe   | V      | V   | This cryptic species has the potential to occur among well-vegetated shallows and margins of wetlands, dams, sewage ponds, wet pastures, marshy areas, irrigation systems, lignum, tea-tree scrub and open timber (Pizzey & Knight, 1997).  | Suitable habitat exists within the study area.<br><i>May occur</i>   | EPBC            |
| <i>Tadorna radjah</i>       | radjah shelduck            | -      | NT  | Occurs in tropical coastal areas preferring shallow waters and swamps in the wet season and larger permanent bodies of water, wetlands, mangroves and estuaries during the dry season (Pizzey & Knight, 1997).  | Suitable habitat exists within the study area. Seventeen records of this species are present in region surrounding the northern half of the alignment.<br><i>May occur</i> | Wildlife Online |
| <b>Mammals</b>              |                            |        |     |   |  |                 |
| <i>Chalinolobus picatus</i> | little pied bat            | -      | NT  | Occurs in dry sclerophyll forest, woodland and scrub areas. This species roosts in caves, tree hollows and abandoned buildings, often forages along watercourses (Menkhorst and Knight 2004).   | Suitable habitat exists within the study area. Two records in the northern half of the alignment.<br><i>Does occur</i>   | Wildlife Online |
| <i>Taphozous troughtoni</i> | Troughton's sheathtail bat | -      | E   | Known only from a small area in central Queensland typified by outcropping rocks, hilly areas with drainage channels often lined with River Red Gums ( <i>Eucalyptus camaldulensis</i> ). Roosts in caves, cracks, and small solution pipes in rocky outcrops (Van Dyck & Strahan, 2008). | Suitable habitat exists within the study area. One record along the alignment.<br><i>Does occur</i>  | Field Surveys   |



| Scientific name                | Common name                 | Status |     | Habitat characteristics   | Presence of Suitable habitat   | Source                |
|--------------------------------|-----------------------------|--------|-----|---|--|-----------------------|
|                                |                             | EPBC   | NCA |   |  |                       |
| <i>Dasyurus hallucatus</i>     | northern quoll              | E      | -   | Found in a variety of treed habitats, particularly in broken, rocky country and open eucalypt forest near the coast. This species dens in hollow tree trunks, and tends to breed more successfully when access to surface water is available (Strahan, 1995). | Suitable habitat exists in the study area. Three records in the region surrounding the alignment.<br><br><i>May occur</i>  | EPBC, Wildlife Online |
| <i>Lasiorhinus krefftii</i>    | northern hairy-nosed wombat | E      | E   | This species is limited to a small area of sandy grassy woodland in Epping Forest National Park north-east of Clermont (Menkhorst and Knight 2004).   | Suitable habitat may exist in the study area however due to low population numbers and restricted range this species is unlikely to occur in the study area.<br><br><i>Unlikely to occur</i> | Wildlife Online       |
| <i>Pteropus conspicillatus</i> | spectacled flying-fox       | V      | -   | This species camps in tall rainforest, gallery forest, mangrove or paperbark forest. The range of this species is limited to coastal areas of Qld from Cape York to Tully (Menkhorst and Knight 2004).  | Limited suitable habitat in study area.<br><br><i>Unlikely to occur</i>  | EPBC                  |
| <i>Xeromys myoides</i>         | water mouse                 | V      | V   | This species is found in saline grassland, mangroves, margins of freshwater swamps and lakes in coastal areas of NT and south Qld (Menkhorst and Knight 2004).  | Limited suitable habitat in study area.<br><br><i>Unlikely to occur</i>  | EPBC                  |
| <b>Reptiles</b>                |                             |        |     |   |  |                       |



| Scientific name                | Common name        | Status |     | Habitat characteristics   | Presence of Suitable habitat  | Source                |
|--------------------------------|--------------------|--------|-----|---|---|-----------------------|
|                                |                    | EPBC   | NCA |   |   |                       |
| <i>Acanthophis antarcticus</i> | common death adder | -      | NT  | Inhabits wet and dry eucalypt forests, woodlands and coastal heaths of eastern Australia (Queensland Museum 2009).  | Suitable habitat exists in the study area. Three records in region surrounding the northern half of the alignment.<br><br><i>Likely to occur</i>                          | Wildlife Online       |
| <i>Ctenotus capricorni</i>     | Capricorn Ctenotus | -      | NT  | This small skink is endemic to the region between Jericho and Bladensburg National Park. It typically occurs in semi-arid sandy areas with spinifex.  | Suitable habitat exists in the southern end of the study area. One record of this species exists.<br><br><i>May occur</i>   | Wildlife Online       |
| <i>Denisonia maculata</i>      | ornamental snake   | V      | V   | This species is known only from the Brigalow Belt region of Qld, within the drainage system of the Fitzroy and Dawson Rivers. It occurs in Brigalow ( <i>Acacia harpophylla</i> ) woodland growing on clay and sandy soils, riverside woodland, and open forest growing on natural levees. This is a nocturnal species (DEWHA 2009a). | Suitable habitat exists within the study area around the Dawson River catchment area. This species has been recorded 85 times within the region.<br><br><i>Does occur</i> | Wildlife Online       |
| <i>Egernia rugosa</i>          | yakka skink        | V      | V   | This species is generally found in dry sclerophyll forest and open woodlands. It takes cover under fallen vegetation and timber (Cogger, 2000).   | Suitable habitat exists in the study area. This species has been recorded in the region surrounding the southern half of the alignment.<br><br><i>Likely to occur</i>     | EPBC, Wildlife Online |



| Scientific name             | Common name          | Status |     | Habitat characteristics   | Presence of Suitable habitat  | Source                |
|-----------------------------|----------------------|--------|-----|---|---|-----------------------|
|                             |                      | EPBC   | NCA |   |   |                       |
| <i>Furina dunmalli</i>      | Dunmall's snake      | V      | V   | This species occurs in Brigalow ( <i>Acacia harpophylla</i> ) forest and woodland growing on cracking black clay and clay loam soils. It is known from very few localities, most records are from sites between 200 and 500 m asl (DEWHA 2009b).  | Some suitable habitat occurs in the study area.<br><i>May occur</i>   | EPBC                  |
| <i>Paradelma orientalis</i> | brigalow scaly-foot  | V      | V   | This lizard occurs in open forest habitats including remnant Brigalow ( <i>Acacia harpophylla</i> ) woodland with sparse tussock grasses on grey cracking clay soils; eucalypt open forest on loose sandy clay; and in <i>Allocasuarina luehamannii</i> closed forest on a similar substrate. Specimens are often found under sandstone slabs, surface debris or in grass hummocks (DEWHA 2009c). | Some suitable habitat occurs in the northern half of the study area. Five records of this species exist.<br><i>Likely to occur</i>                                | EPBC, Wildlife Online |
| <i>Crocodylus porosus</i>   | salt-water crocodile | Mi     | V   | Inhabits coastal rivers, swamps and open sea north from the central QLD coast (Wilson 2005).  | Some suitable habitat occurs in the study area, mainly in the larger river systems containing permanent water in the north of the study area.<br><i>May occur</i> | Wildlife Online       |
| <b>Amphibians</b>           |                      |        |     |   |   |                       |



| Scientific name         | Common name       | Status |     | Habitat characteristics   | Presence of Suitable habitat   | Source          |
|-------------------------|-------------------|--------|-----|---|--|-----------------|
|                         |                   | EPBC   | NCA |   |  |                 |
| <i>Litoria revelata</i> | whirring treefrog | -      | NT  | Found in a range of habitats from coastal swamps and ponds to montane forests, usually associated with still water. Only known from three locations in Qld and northern NSW (Barker et al. 1995). | One record of this species exists within the region however Limited suitable habitat is present in study area.<br><i>Unlikely to occur</i> | Wildlife Online |



## Appendix E

### Land zone definitions



### **Land Zone 1**

Quaternary estuarine and marine deposits subject to periodic inundation by saline or brackish marine waters. Includes mangroves, salt pans, off-shore tidal flats and tidal beaches. Soils are predominantly Hydrosols (saline muds, clays and sands) or beach sand.

### **Land Zone 2**

Quaternary coastal dunes and beach ridges. Includes degraded dunes, sand plains and swales, lakes and swamps enclosed by dunes, as well as coral and sand cays. Soils are predominantly Rudosols and Tenosols (siliceous or calcareous sands), Podosols and Organosols.

### **Land Zone 3**

Quaternary alluvial systems, including floodplains, alluvial plains, alluvial fans, terraces, levees, swamps, channels, closed depressions and fine textured palaeo-estuarine deposits. Also includes estuarine plains currently under fresh water influence, inland lakes and associated dune systems (lunettes). Excludes talus slopes, colluvial deposits and pediments. Includes a diverse range of soils, predominantly Vertosols and Sodosols, also with Hydrosols in higher rainfall areas.

### **Land Zone 4**

Cainozoic clay deposits, usually forming level to gently undulating plains above current alluvial systems. Excludes clay plains and downs formed in-situ on bedrock. Mainly Vertosols with gilgai microrelief, but includes small areas of thin sandy or loamy surfaced Sodosols and Chromosols.



## **Land Zone 5**

Extensive, uniform near level or gently undulating Cainozoic plains with sandy or loamy soils. Includes dissected remnants of these surfaces. Also includes plains with sandy or loamy soils of uncertain origin, and plateau remnants with deep soils usually overlying duricrust. Excludes Quaternary alluvial deposits (land zone 3), exposed duricrust (land zone 7), and soils derived from underlying bedrock (land zones 8 to 12). Soils are usually Tenosols and Kandosols, also minor deep sandy surfaced Sodosols and Chromosols. There may be a duricrust at depth.

## **Land Zone 6**

Quaternary inland dunefields, interdune areas, degraded dunefields, and associated aeolian sandplains. Excludes alluvial systems, which may traverse this zone, and intermittent lakes and claypans (land zone 3). Soils are predominantly Rudosols and Tenosols, some Kandosols and minor Calcarosols.

## **Land Zone 7**

Cainozoic duricrusts formed on a variety of rock types, usually forming mesas or scarpes. Includes exposed ferruginous, siliceous or mottled horizons and associated talus and colluvium, and remnants of these features, for example low stony rises on downs. Soils are usually shallow Rudosols and Tenosols, with minor Sodosols and Chromosols on associated pediments, and shallow Kandosols on plateau margins and larger mesas.

## **Land Zone 8**

Cainozoic igneous rocks, predominantly flood basalts forming extensive plains and occasional low scarpes. Also includes hills, cones and plugs on trachytes and rhyolites, and associated interbedded sediments, and talus. Excludes springs (land zone 3), and deep soils overlying duricrust (land zone 5). Soils include Vertosols, Ferrosols, and shallow Dermosols.

## **Land Zone 9**

Fine-grained sedimentary rocks, generally with little or no deformation, forming undulating landscapes with a broad range of fine textured soils of moderate to high fertility. Siltstones, mudstones, shales, calcareous sediments, and lithic and labile sandstones are typical rock types although minor interbedded volcanics may occur. Excludes areas of duricrust (land zone 7). Includes a diverse range of soils of moderate to high fertility, predominantly Vertosols, Sodosols, and Chromosols.

## **Land Zone 10**

Medium to coarse-grained sedimentary rocks, with little or no deformation, forming plateaus, ledges and scarpes. Includes siliceous sandstones, conglomerates and minor interbedded volcanics, and springs associated with these rocks. Excludes overlying Cainozoic sand deposits (land zone 5). Soils are predominantly shallow Rudosols and Tenosols of low fertility, but include sandy surfaced Kandosols, Kurosols, Sodosols and Chromosols.

## **Land Zone 11**



Metamorphosed rocks, forming ranges, hills and lowlands. Primarily lower Permian and older sedimentary formations which are generally moderately to strongly deformed. Includes low- to high-grade and contact metamorphics such as phyllites, slates, gneisses of indeterminate origin and serpentinite, and interbedded volcanics. Soils are mainly shallow, gravelly Rudosols and Tenosols, with Sodosols and Chromosols on lower slopes and gently undulating areas. Soils are typically of low to moderate fertility.

#### **Land Zone 12**

Mesozoic to Proterozoic igneous rocks, forming ranges, hills and lowlands. Predominantly granitic rocks and intermediate to acid volcanics such as granites, granodiorites, andesites and rhyolites, as well as minor areas of associated interbedded sediments and basic intrusive rock types such as gabbros and dolerites. Excludes serpentinites (land zone 11) and younger igneous rocks (land zone 8). Soils are mainly Tenosols and Rudosols on steeper slopes with Chromosols and Sodosols on lower slopes and gently undulating areas. Soils are typically of low to moderate fertility.

**From:** Dept. Environment and Resource Management website: [http://www.derm.qld.gov.au/wildlife-ecosystems/biodiversity/regional\\_ecosystems/land\\_zone\\_definitions.html#supplementary](http://www.derm.qld.gov.au/wildlife-ecosystems/biodiversity/regional_ecosystems/land_zone_definitions.html#supplementary)



## Appendix F

# VAST Table of Vegetation Condition

**Table 1 Vegetation Assets, States and Transitions**

**Increasing vegetation modification from left to right**

|                                 |   | <b>Native Vegetation Cover</b>   |  |  |  | <b>Non-native Vegetation Cover</b>  |   |  |
|---------------------------------|---|--|--|--|--|---|---|--|
|                                 |   | Dominant structuring plant species indigenous to the locality and spontaneous in occurrence – i.e. a vegetation community described using definitive vegetation types relative to estimated pre1750 types* |  |  |  |   |   |  |
| <b>Vegetation Cover Classes</b> |   | Type 0:<br><b>RESIDUAL BARE</b><br>Areas where native vegetation does not naturally persist  | Type I:<br><b>RESIDUAL</b><br>native vegetation community structure, composition, and regenerative capacity intact – no significant perturbation from land use/land management practice                      | Type II:<br><b>MODIFIED</b><br>native vegetation community structure, composition and regenerative capacity intact – perturbed by land use/land management practice  | Type III:<br><b>TRANSFORMED</b><br>native vegetation community structure, composition and regenerative capacity significantly altered by land use/land management practice | Type IV:<br><b>REPLACED - ADVENTIVE</b><br>native vegetation replacement – species alien to the locality and spontaneous in occurrence  | Type V:<br><b>REPLACED - MANAGED</b><br>native vegetation replacement with cultivated vegetation                      | Type VI:<br><b>REMOVED</b><br>vegetation removal |
| <b>Diagnostic criteria</b>      | Current regenerative capacity                                   | Natural regenerative capacity unmodified   | Natural regenerative capacity tolerates / endures under past &/ or current land management practices   | Natural regenerative capacity limited / at risk under past &/ or current land use or land management practices. Rehabilitation and restoration possible through modified land management practice  | Regeneration of native vegetation community has been suppressed by ongoing disturbances of the natural regenerative capacity. Limited potential for restoration.           | Regeneration of native vegetation community lost or suppressed by intensive land management. Limited potential for restoration  | Nil or minimal  |  |
|                                 | Vegetation structure  | Nil or minimal   | Structural integrity of native vegetation community is very high   | Structure is predominantly altered but intact e.g. a layer / strata and/or growth forms and/or age classes removed   | Dominant structuring species of native vegetation community significantly altered e.g. a layer / strata frequently & repeatedly removed                                    | Dominant structuring species of native vegetation community removed or predominantly cleared or extremely degraded  | Dominant structuring species of native vegetation community removed   | Vegetation absent or ornamental                  |
|                                 | Vegetation composition  | Nil or minimal   | Compositional integrity of native vegetation community is very high  | Composition of native vegetation community is altered but intact   | Dominant structuring species present - species dominance significantly altered   | Dominant structuring species of native vegetation community removed   | Dominant structuring species of native vegetation community removed   | Vegetation absent or ornamental                  |
| <b>Examples</b>                 | Bare mud; rock; river and beach sand; salt and freshwater lakes | Old growth forests; Native grasslands that have not been grazed; Wildfire in native forests and woodlands of a natural frequency and/or intensity;   | Native vegetation types managed using sustainable grazing systems; Selective timber harvesting practices; Severely burnt (wildfire) native forests and woodlands not of a natural frequency and/or intensity | Intensive native forestry practices; Heavily grazed native grasslands and grassy woodlands; Obvious thinning of trees for pasture production; Weedy environmental remnant patches; Degraded roadside reserves; Degraded coastal dune systems; Heavily grazed riparian vegetation | Severe invasions of introduced weeds; Invasive native woody species found outside their normal range; Isolated native trees/shrubs/grass species in the above examples     | Forest plantations; Horticulture; Tree cropping; Orchards; Reclaimed mine sites; Environmental and amenity plantings; Improved pastures. (includes heavy thinning of trees for pasture); Cropping; Isolated native trees/ shrubs/ grass species in the above examples | Water impoundments; Urban and industrial landscapes; quarries and mines; Transport infrastructure; salt scalded areas |  |

Thackway, R. and Lesslie, R. (2005). *Vegetation Assets, States, and Transitions (VAST): accounting for vegetation condition in the Australian landscape*. Technical Report. Bureau of Rural Sciences, Canberra.



Appendix G

## Terrestrial Ecology Survey of Colinta Properties



CLIENTS | PEOPLE | PERFORMANCE

## Hancock Prospecting Pty Ltd

### Report for Alpha Coal Project (Rail) Supplementary EIS

#### Appendix G - Terrestrial Ecology Survey of Colinta Properties

March 2011

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# 1. Introduction

Ecological studies for the Hancock Coal Project (Rail) (hereafter, the project) were undertaken in November / December 2009 and April 2010. At the time of these surveys access to two properties through which the proposed rail line traverses to the south of Collinsville (operated by Colinta Holdings Pty Ltd) was unable to be obtained. These two properties (hereafter referred to as the Colinta properties) were subsequently surveyed in February 2011. The locations of the Colinta properties with respect to the alignment are displayed in Figure 1.

This report provides an overview of the findings of the terrestrial ecology survey of the Colinta properties. The existing terrestrial ecological values of the properties are described. Potential impacts to these identified values arising from construction and operation of the proposed rail line are discussed. As a detailed ecological impact assessment has already been undertaken for the project (i.e. in the project EIS), only previously undescribed and/or site-specific impacts identified from this field assessment are discussed in detail in this report. Previously identified impacts (and associated mitigation measures) applicable to the terrestrial ecological values of the Colinta properties will be cross-referenced to the applicable section of the Terrestrial Ecology Report (GHD, 2010a) submitted as part of the EIS (Appendix F2 of Volume 6a), and to which this summary report is appended.

The information provided in this report will contribute to the Supplementary EIS for the project.

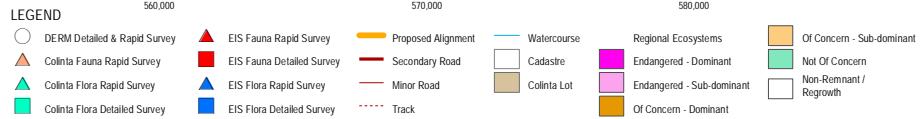
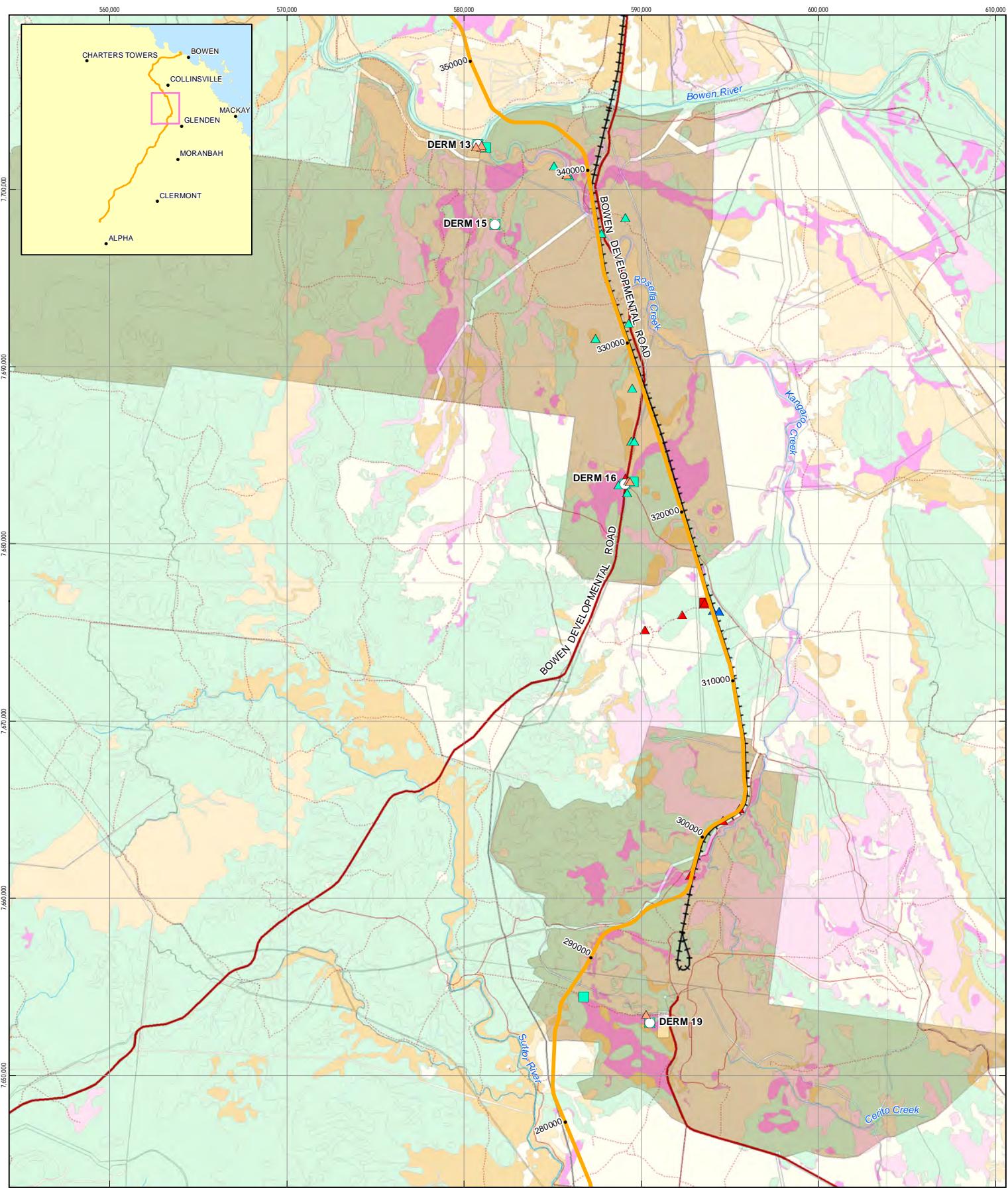
Note the following terms (as defined in the Terrestrial Ecology Report (GHD, 2010a)) are discussed in this report:

***Project footprint:***

- ▶ An easement of approximately 495 km long and 60 m wide
- ▶ A series of laydown areas and construction nodes
- ▶ Local construction access tracks (that will be used during construction only)
- ▶ Local maintenance access tracks (that will be used and maintained through the operational phase).

***Study area:***

- ▶ Land 1 km either side of the alignment, for the length of the proposed rail alignment.



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1:200,000 (at A3)  
Kilometres  
Map Projection: Universal Transverse Mercator  
Horizontal Datum: Geocentric Datum of Australia 1994  
Grid: Map Grid of Australia, Zone 55

**HANCOCK PROSPECTING PTY LTD**  
Alpha Coal Project  
Supplementary Environmental Impact Statement

**COLINTA  
STUDY AREA**

Job Number 41-23742  
Revision A  
Date 10-03-2011

Figure: 1

## 2. Methodology

The methodology employed to describe the existing terrestrial ecological values of the Colinta properties is largely analogous to the methods detailed in the Terrestrial Ecology Report (GHD, 2010a).

Desktop reviews relating to the terrestrial ecological values of the project footprint and the wider project study area (incorporating the Colinta properties) were conducted as part of the EIS (refer to Section 2.3 of the Terrestrial Ecology Report (GHD, 2010a)).

Terrestrial flora and fauna survey sites were selected based on the criteria detailed in Section 2.4.2 of the Terrestrial Ecology Report (GHD, 2010a). These sites are displayed in Figure 1. **While not all flora and fauna assessment sites occurred within the project study area (i.e. 1 km either side of proposed alignment), they nonetheless provided information on the vegetation community attributes, fauna habitat types and values, and flora and fauna species assemblages that were considered likely to be representative of communities / habitats in the project footprint / study area.**

Flora surveys were undertaken in accordance with the methods detailed in Section 2.4.5 of the Terrestrial Ecology Report (GHD, 2010a) with the only exception being that the Vegetation Assets, States and Transitions (VAST) methodology for assessing vegetation condition was not employed during the recent surveys. Seven comprehensive flora survey sites and 12 rapid flora survey sites were assessed across the Colinta properties.

Terrestrial fauna surveys were generally undertaken in accordance with the methods detailed in Section 2.4.6 of the Terrestrial Ecology Report (GHD, 2010a). Deviations from this methodology included:

- ▶ Hair tubes were not used
- ▶ Targeted threatened fauna searches were modified:
  - Searches for black-throated finch (*Poephila cincta cincta*) and star finch (eastern, southern) (*Neochmia ruficauda ruficauda*) were incorporated into general bird surveys at all sites
  - Remote cameras targeting the northern quoll (*Dasyurus hallucatus*) were not deployed, as habitat at the Colinta properties was considered to be sub-optimal for the species
  - Searches for threatened reptiles (i.e. brigalow scaly-foot (*Paradelma orientalis*), ornamental snake (*Denisonia maculata*), Dunmall's snake (*Furina dunmalli*) and yakka skink (*Egernia rugosa*) were undertaken during diurnal reptile surveys and nocturnal searches (in addition to systematic trapping)
  - Nocturnal call playback was only performed for birds (not frogs), and only at two of four comprehensive trapping sites.

Four terrestrial fauna comprehensive trapping sites were established at or near locations recommended by the Queensland Department of Environment and Resource Management (DERM). A total of 12 terrestrial fauna rapid assessments were undertaken, four of which occurred at the comprehensive trapping sites.

A summary of the terrestrial fauna survey effort is provided in Table 1.

**Table 1 Summary of fauna survey effort**

| Systematic                                       |             |           |                 | Non-systematic   |                    |                          |                  |
|--|-------------|-----------|-----------------|------------------|--------------------|--------------------------|------------------|
| Number of traps<br>(four night trapping program) |             |           |                 | Number of nights |                    | Number of minutes        |                  |
|  | Funnel trap | Cage trap | Elliot box trap | Anabat detector  | Nocturnal searches | Bird survey <sup>#</sup> | Diurnal searches |
| <b>DERM 13</b>                                   | 12          | 10        | 20              | 2                | 1                  | 60                       | 60               |
| <b>DERM 15</b>                                   | 12          | 10        | 20              | 2                | 1                  | 60                       | 60               |
| <b>DERM 16</b>                                   | 12          | 10        | 20              | 2                | 1                  | 60                       | 60               |
| <b>DERM 19</b>                                   | 12          | 10        | 20              | 2                | 1                  | 60                       | 60               |

<sup>#</sup> Aural and visual detection within 4 hours of dawn / 2 hours of dusk in an unbounded 2 ha area (approximate).

## 2.1 Survey timing and weather

The ecological assessment of the Colinta properties was undertaken between 22 February 2011 and 26 February 2011.

Weather conditions during the survey were typified by hot, humid, cloudy days and warm nights. While data is not available for all five days of the survey, information acquired from the Australian Bureau of Meteorology (BoM) website for the Collinsville Post Office weather station (Station 033013) revealed that average daily temperature range during the survey was 19.9°C – 31.8°C (BoM, 2011). Small rainfall events occurred during the survey, including a thunderstorm on the afternoon of Tuesday February 22 (no rainfall data available) and a shower of 11 mm on Thursday February 24 (BoM, 2011).

## 3. Existing Terrestrial Ecological Values

The Colinta properties are characterised by relatively flat terrain that contains a mix of fragmented remnant vegetation and cleared agricultural land. A number of ephemeral waterways traverse the properties, amongst which the largest are Rosella Creek and Stony Creek. The Bowen River forms the northern boundary of the northernmost Colinta property.

Cattle grazing is the primary land use at the Colinta properties. As described in [Section 3.3](#) of the Terrestrial Ecology Report (GHD, 2010a), grazing impacts upon the land through vegetation clearing, introduction of exotic pasture grasses and consequent displacement of native grasses and herbs, reduced ground cover, soil erosion, soil compaction and erosion of creek banks. Evidence of these impacting processes was noted, in places, at the Colinta properties.

### 3.1 Flora assessment

#### 3.1.1 Regional Ecosystems

Based on field investigations of the vegetation communities within and adjacent to the study area, the regional ecosystems (RE) present were for the most part consistent with the amended<sup>1</sup> RE mapping presented in the EIS (refer to [Figure 3-3, Sheet 22 of 37 to Sheet 27 of 37](#) in Terrestrial Ecology Report (GHD, 2010a)).

The vegetation communities at two rapid survey sites were found to be inconsistent with RE mapping presented in the EIS. The recommended RE map amendments at one of these locations (i.e. Rapid Site 6, which occurs within one km of the proposed alignment) is illustrated in Figure 2, while both RE mapping discrepancies are described in Table 2. As a result of the amendment within the study area, approximately 9 ha of mapped remnant vegetation (i.e. mapped as mixed Of Concern (sub-dominant) polygon 11.9.2/11.9.10/11.9.9)) within the project footprint is non-remnant, thereby reducing the extent of remnant vegetation clearing.

**Note:** due to changes in the alignment (and thus project footprint) since submission of the EIS, and taking into account amendments to RE mapping based on further field studies (i.e. as exemplified above), clearing extent calculations for all REs are being recalculated for the entire length of the alignment.

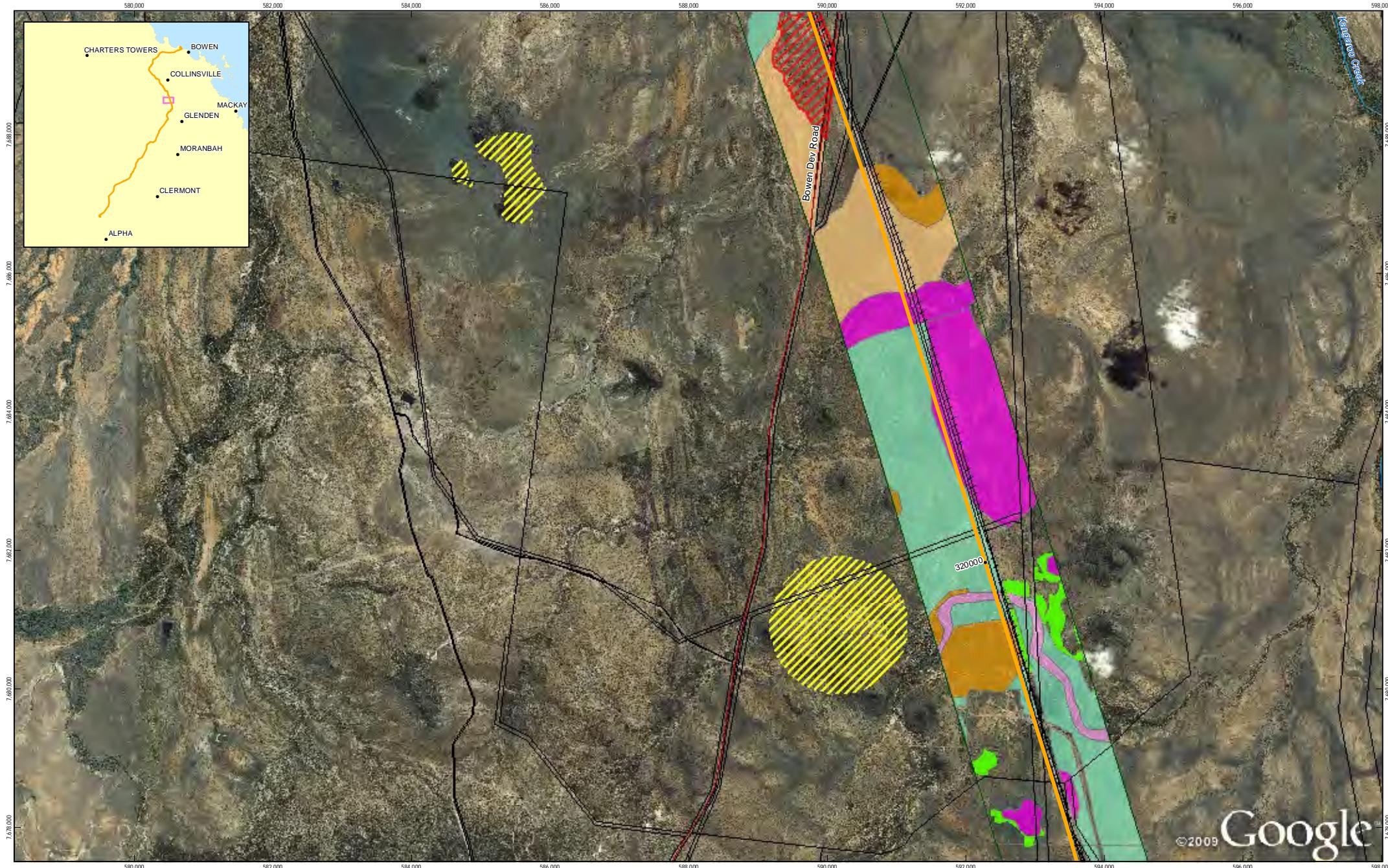
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<sup>1</sup> Note: the amended mapping is based on DERM Certified RE mapping v.6b, and has been ground-truthed at survey sites in the study area

**Table 2 Regional Ecosystems found to be inconsistent with current Certified DERM RE mapping**

| Flora Site   | Regional Ecosystem (Certified v. 6b mapping) | Characteristic Vegetation   | Justification for RE Change and Recommendations  | Photo  |
|--------------|--|---|--|--|
| Rapid Site 4 | 11.9.10<br>(OC-dominant)                     | This vegetation community was dominated by medium height <i>Eucalyptus crebra</i> and <i>Corymbia erythrophloia</i> . Brigalow ( <i>Acacia harpophylla</i> ) was rarely observed in the sub canopy.<br><br>The shrub layer was sparse and the ground layer mainly contained non native species. Both showed signs of disturbance from cattle grazing. | <p><b>The survey area is likely to form part of the surrounding heterogeneous polygon (i.e. 11.9.2/11.9.10/11.9.9 (OC- subdominant)).</b></p> <p>The DERM Certified RE mapping is inconsistent with the vegetation present on the ground due to the low abundance of brigalow and dominance of species associated with the surrounding REs.</p> <p>It is recommended that further detailed surveys be undertaken to map the true extent of this RE.</p> <p>This survey area is located outside the study area.</p> |   |
| Rapid Site 6 | 11.9.2/11.9.10/11.9.9<br>(OC- subdominant)   | This vegetation community was heavily disturbed and fragmented. Small pockets of vegetation existed within the mostly grazed landscape. These patches consisted of a mix of eucalypt species with brigalow and <i>Terminalia oblongata</i> within the sub-canopy.   | <p><b>The survey area was considered non-remnant due to the extent of fragmentation and small patch sizes of remnant vegetation.</b></p> <p>Brigalow occurred as regrowth vegetation and was scattered throughout the patches of vegetation.</p> <p>It is recommended that the detailed boundary mapping is undertaken for this RE to determine its true extent.</p> <p>This RE occurs within the project footprint and adjacent study area (see Figure 2).</p>  |  |

Queensland Vegetation Management Act 1999 (VM Act) Status: LC, Least Concern; OC, Of Concern; E, Endangered



HANCOCK PROSPECTING PTY LTD

Alpha Coal Project  
Supplementary Environmental Impact Statement

## AMENDED REGIONAL ECOSYSTEMS AND HIGH VALUE REGROWTH

Job Number 41-23742  
Revision A  
Date 11-03-2011

Figure: 2

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### **3.1.2 Vegetation Communities**

Vegetation communities observed during field surveys were consistent with the 15 vegetation alliances detailed in [Section 3.5, Table 11](#) of the Terrestrial Ecology Report (GHD, 2010a). The vegetation communities were assigned an alliance based on general species composition, characteristic landforms, condition, commonly encountered weeds and representative REs.

The one exception was Rapid Site 6 which, as a result of ground truthing, no longer meets the criteria for the vegetation alliance associated with the previously mapped RE. As detailed in Section 3.1.1 the vegetation at this survey site was found to contain non-remnant vegetation and therefore constitutes the ‘Non-remnant vegetation alliance’. Amendments to the vegetation community (and associated fauna habitat) mapping can be found in Figure 3.

### **3.1.3 Threatened Ecological Communities**

Several of the survey sites contained REs associated with Endangered Threatened Ecological Communities (TEC). Regional Ecosystems that constitute the Brigalow TEC that were surveyed including 11.3.1, 11.9.1 and 11.9.5. Brigalow was present at all survey sites containing these REs, though the abundance and dominance of this species varied across sites, particularly where heterogeneous polygons existed. However, based on the surveys, no recommendations are made to change the extent of Brigalow TEC within the project study area (as detailed in the Terrestrial Ecology Report (GHD, 2010a)). The extent of clearing of these REs is described in [Section 3.4.2, Tables 3 to 9](#) of the Terrestrial Ecology Report (GHD, 2010a), and is summarised in [Section 5.3.2, Table 18](#) (**Note:** these calculations may be updated due to changes in the alignment).

### **3.1.4 Flora Species**

Four flora species additional to previous surveys were recorded during the survey at the Colinta properties. These included:

- ▶ Coffee bush (*Breynia oblongifolia*)
- ▶ High sida (*Sida trichopoda*)
- ▶ Green couch (*Cynodon dactylon*) (non-native)
- ▶ Blue billygoat weed (*Ageratum houstonianum*) (non-native).

No threatened species listed under Commonwealth or State legislation were recorded.

### **3.1.5 Weeds**

A number of weed species were recorded during field surveys including those listed in [Appendix B](#) of the Terrestrial Ecology Report (GHD, 2010a). Included were the following ‘declared weeds’ under the Queensland *Land Protection (Pest and Stock Route Management) Act 2002* (LP Act):

- ▶ Prickly pair (*Opuntia stricta*), Class 2
- ▶ Parkinsonia (*Parkinsonia aculeata*), Class 2
- ▶ Parthenium (*Parthenium hysterophorus*), Class 2; and
- ▶ Lantana (*Lantana camara*), Class 3.

## **3.2 Fauna assessment**

### **3.2.1 Fauna habitats**

A total of five broad terrestrial habitat types were identified at the Colinta properties. The habitat types (and habitat values) identified in the assessment of the Colinta properties are generally analogous to those identified in Section 3.6, Table 12 of the Terrestrial Ecology Report (GHD, 2010a). Habitats identified included:

- ▶ Acacia dominated shrubland
- ▶ Open woodland with grassy understorey
- ▶ Mature woodland with variable shrub and understorey
- ▶ Woodland and open forest fringing ephemeral and permanent watercourses
- ▶ Sparse regrowth (i.e. cleared land).

The Colinta properties contain a range of habitats from acacia-dominated shrublands to mature open woodlands fringing ephemeral and permanent watercourses. The habitat types identified vary in their value for terrestrial fauna depending on intensity of grazing pressure, presence of introduced species, availability of microhabitats and connectivity across the landscape. The proposed alignment intersects a number of waterways and riparian habitat.

### **3.2.2 Fauna species**

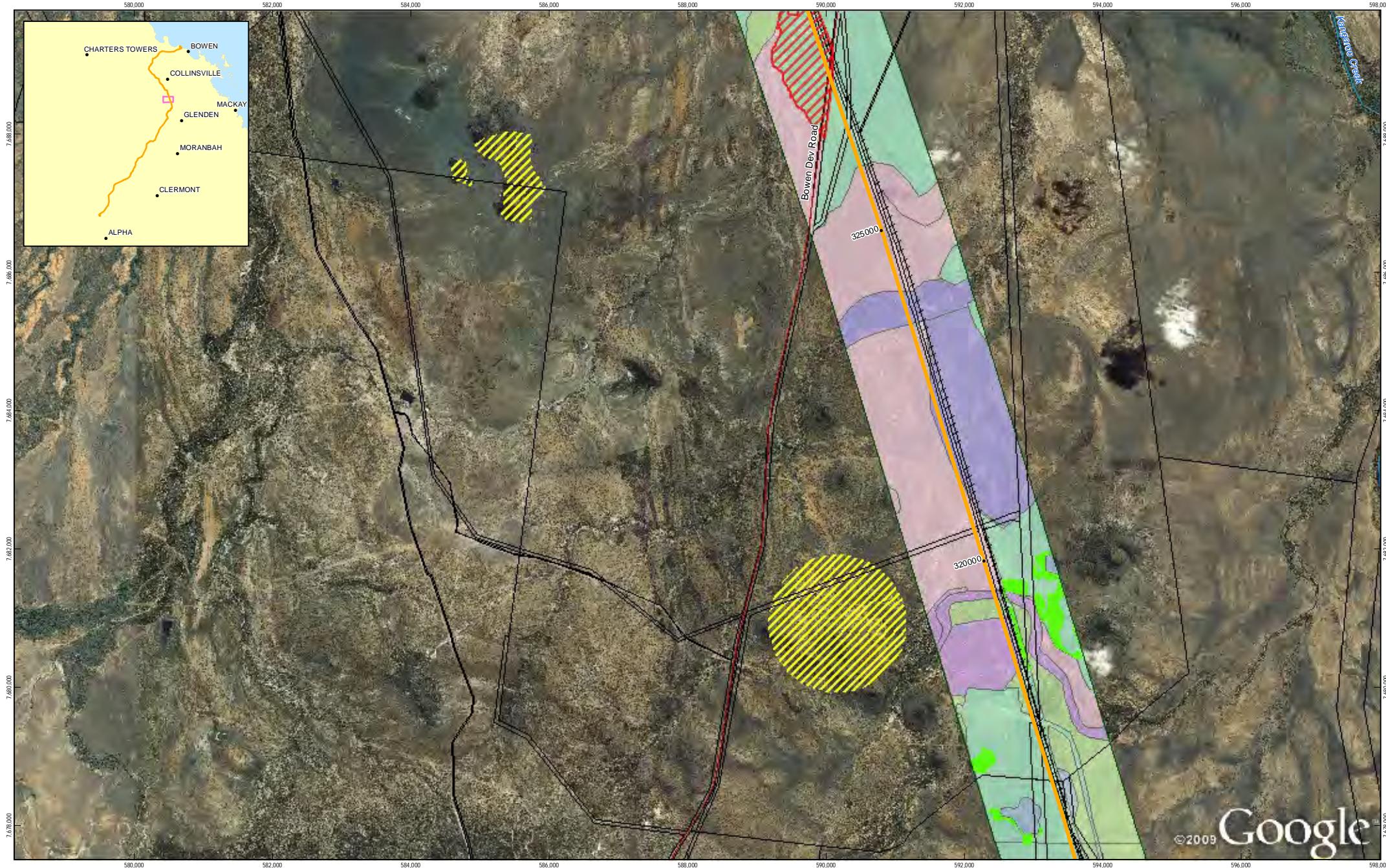
A total of 88 fauna species were detected during fauna surveys at the Colinta properties. This comprised:

- ▶ Five amphibian species, including:
  - One species not recorded during the EIS (Lesueur's frog (*Litoria lesueuri*))
  - One introduced species (cane toad (*Rhinella marina*)).
- ▶ Nine reptile species, including:
  - Four species not recorded during the EIS (common tree snake (*Dendrelaphis punctulata*), ornamental snake (*Denisonia maculata*), elegant snake-eyed skink (*Cryptoblepharus pulcher*) and a crocodile species (slides observed on banks of Bowen River))
  - The ornamental snake is listed as Vulnerable under the Queensland *Nature Conservation Act 1992* (NC Act) and the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)
  - While the crocodile slides observed could not be attributed to a particular species, both the estuarine crocodile (*Crocodylus porosus*) and the freshwater crocodile (*Crocodylus johnstoni*) have the potential to occur. The estuarine crocodile is listed as Vulnerable under the Queensland NC Act, and is listed as Migratory and Marine under the Commonwealth EPBC Act. The freshwater crocodile is listed as Marine under the EPBC Act.
- ▶ 18 mammal species (12 of which were common microchiropteran bats), including:
  - Two species not recorded during the EIS (black rat (*Rattus rattus*) and ringtail possum (*Pseudocheirus peregrinus*)))
  - One introduced species (black rat); and
- ▶ 56 bird species, including:

- Three species not recorded during the EIS (diamond dove (*Geopelia cuneata*), varied sittella (*Daphoenositta chrysoptera*) and plum-headed finch (*Neochmia modesta*))
- One threatened species recorded during the EIS (squatter pigeon (southern) (*Geophaps scripta scripta*) (Plate 1) – listed as ‘Vulnerable’ under the EPBC Act and NC Act)
- Two EPBC Act-listed ‘Migratory’ and 12 listed ‘Marine’ species, all of which were recorded during the EIS.



**Plate 1      Squatter pigeons observed near DERM 15 fauna trapping site**



1:50,000 (at A3)  
0 0.5 1 1.5 2 2.5 Kilometres  
Map Projection: Universal Transverse Mercator  
Horizontal Datum: Geocentric Datum of Australia 1994  
Grid: Map Grid of Australia, Zone 55

**LEGEND**  
 ● Town  
 ○ Proposed Alignment  
 — State Road  
 — Existing Railway  
 ■ Watercourse  
 ■ Amended RF  
 ■ Cadastre  
 ■ 2km Corridor  
 ■ High Value Regrowth  
 ■ Essential Habitat  
 ■ Habitat Type  
 ■ Acacia dominated shrubland  
 ■ Coastal Wetland  
 ■ Eucalypt woodland on micky rises  
 ■ Eucalypt/paperbark woodland along watercourses  
 ■ Grassland  
 ■ Mangroves and tidal saltmarsh  
 ■ Mature woodland with variable shrub and understorey  
 ■ Melaleuca shrubland  
 ■ Mixed low woodland  
 ■ Open woodland with grassy understorey  
 ■ Semi-evergreen vine thicket  
 ■ Sparse woodland/grassland on cracking clay soils  
 ■ Woodland and open forest fringing watercourses  
 ■ Non-remnant  
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**Alpha Coal Project**  
**Supplementary Environmental Impact Statement**

## FAUNA HABITAT AND VEGETATION COMMUNITIES

Job Number 41-23742  
 Revision A  
 Date 11-03-2011

Figure: 3

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## 4. Discussion

The ecological assessment at the Colinta properties revealed a suite of flora and fauna values that are largely analogous to those described in the Terrestrial Ecological Report (GHD, 2010a) for the project study area. Namely:

- ▶ Amended RE mapping presented in the Terrestrial Ecological Report (GHD, 2010a) (based upon DERM Certified RE mapping v.6b, and ground truthed in the field) was found to be accurate for the majority of the alignment where it bisects the Colinta properties. One small area of mapped remnant vegetation to the west of (approximate) chainage 328,000 was deemed to be non-remnant vegetation based on field verification. The amended RE mapping has been updated to reflect this change.
- ▶ Vegetation communities observed during surveys at the Colinta properties were largely consistent with the 15 vegetation alliances described in the Terrestrial Ecology Report (GHD, 2010a). Vegetation community (and fauna habitat) mapping was updated at one location to reflect the non-remnant status of mapped vegetation (as detailed in the point above).
- ▶ Constituent REs of the EPBC Act-listed Endangered Brigalow TEC were recorded at sites in the Colinta properties. It is not recommended that the extent of Brigalow TEC within the project footprint be altered from that detailed in the Terrestrial Ecology Report (GHD, 2010a) (i.e. no discrepancies in Certified RE mapping v.6b relating to Brigalow TEC constituent REs were observed at Colinta properties).
- ▶ Four flora species not recorded during the EIS were noted from the Colinta properties. This included three non-threatened native species and one introduced species. A number of weed species were detected, including four ‘declared weeds’ under the Queensland LP Act.
- ▶ The five terrestrial fauna habitats (i.e. habitat type and general habitat value) identified at the Colinta properties corresponded with those described in the Terrestrial Ecology Report (GHD, 2010a). Site-specific habitat variability (i.e. associated with impacts from cattle grazing, weeds, introduced fauna, land clearing) is likely to impact upon the value of habitats for fauna species.
- ▶ Of the 88 fauna species recorded at the Colinta properties, ten species were not recorded during the EIS.
- ▶ Three fauna species of conservation significance were recorded: a crocodile species (slides observed on banks of Bowen River), ornamental snake and squatter pigeon.

### 4.1 Impact assessment

While the ecological assessment at the Colinta properties identified a number of flora and fauna species not previously recorded during studies for the project, in general, vegetation species and communities, and fauna species and habitat were consistent with those recorded during the EIS. As such, the potential impacts of the project (construction and operation) on the ecological values of the Colinta properties project footprint are considered to be analogous to those described for the project as a whole. These impacts are summarised in Section 5.2 of the Terrestrial Ecology Report (GHD, 2010a).

Notwithstanding a minor change to the extents of RE clearing based on an update to the amended RE mapping, impacts associated with vegetation loss (and associated habitat loss) in the Colinta properties

project footprint will be as described in [Section 5.3.1 – 5.3.9](#) of the Terrestrial Ecology Report (GHD, 2010a). This includes impacts to Endangered and Of Concern REs, and REs that are constituents of the Brigalow TEC. Mitigation measures described to alleviate these impacts, and offset obligations detailed in the Terrestrial Ecology Report (GHD, 2010a) ([Section 5.3.10](#) and [Section 5.3.11](#), respectively) are applicable to the Colinta properties. Beyond vegetation loss, other construction phase impacts (and the mitigation measures outlined to address these) relevant to the project footprint where it bisects the Colinta properties, include:

- ▶ Terrestrial fauna mortality ([Section 5.3.12](#))
- ▶ Habitat degradation – light, noise and vibration disturbance ([Section 5.3.13](#))
- ▶ Dust ([Section 5.3.14](#))
- ▶ Introduced species ([Section 5.3.15](#))
- ▶ Fire hazards ([Section 5.3.16](#))
- ▶ Restriction of fauna movement ([Section 5.3.17](#))
- ▶ Sedimentation and erosion ([5.3.18](#)).

Operational phase impacts (and associated mitigation measures) described in the Terrestrial Ecology Report (GHD, 2010a) that are of relevance to the Colinta properties project footprint include:

- ▶ Terrestrial fauna mortality ([Section 5.4.1](#))
- ▶ Habitat degradation – light, noise and vibration disturbance ([Section 5.4.2](#))
- ▶ Dust pollution ([Section 5.4.3](#))
- ▶ Introduced species ([Section 5.4.4](#))
- ▶ Restriction of fauna movement ([Section 5.4.5](#))
- ▶ Sedimentation and run-off ([Section 5.4.6](#))
- ▶ Changes to floodplain hydrology ([Section 5.4.7](#)).

Three conservation significant fauna species were confirmed present during field studies at the Colinta properties. Potential species-specific impacts to the squatter pigeon and ornamental snake are detailed in [Section 5.5.2](#) of the Terrestrial Ecology Report (GHD, 2010a). In addition to the mitigation measures outlined through [Section 5.3](#) (Construction Phase Impacts) and [Section 5.4](#) (Operational Impacts), a list of mitigation measures applicable to these threatened species is provided in [Section 5.5.2](#). As both the squatter pigeon and ornamental snake are known from the Colinta properties, and are potentially susceptible to impacts from the project, it is important that the mitigation measures detailed in [Section 5](#) of the Terrestrial Ecology Report (GHD, 2010a) are implemented.

Potential impacts to crocodiles (species not confirmed) inhabiting the Bowen River are discussed in the Aquatic Ecology Report (GHD, 2010b) prepared for the project EIS ([Section 4.4.1](#)). Assessment against the *EPBC Act Matters of National Environmental Significance Significant Impact Guidelines 1.1* (Commonwealth Department of Environment, Water, Heritage and the Arts (now Department of Sustainability, Environment, Water, Population and Communities), 2009) for both the freshwater crocodile (EPBC Act-listed Marine) and estuarine crocodile (EPBC Act-listed Migratory and Marine) indicated that the project would have a *low impact* (Aquatic Ecology Report (GHD, 2010b), [Section 4.4.1](#)). Confirmation of crocodiles inhabiting the Bowen River near the project footprint is unlikely to alter the results of the assessment presented in the Aquatic Ecology Report, particularly as the assessment

was undertaken based on the consideration that crocodiles may occur in low numbers throughout the study area (including the Bowen River). Construction and Operational impacts to aquatic environments (including the Bowen River) are detailed in Section 4.2 and Section 4.3 (respectively) of the Aquatic Ecology Report (GHD, 2010b), as are relevant mitigation measures. Implementation of these mitigation measures is likely to substantially reduce impacts to resident crocodiles, with any residual impacts considered likely to be short-term (i.e. upstream / downstream displacement during construction).

The outcomes of the impact and risk assessment undertaken to assess the risk of the project on the terrestrial environment, as presented in Section 6 of the Terrestrial Ecology Report (GHD, 2010a), are applicable to the identified terrestrial ecology values of the Colinta properties project footprint.

## 5. References

Commonwealth Department of Environment, Water, Heritage and the Arts (now Department of Sustainability, Environment, Water, Population and Communities), 2009. *EPBC Act Matters of National Environmental Significance Significant Impact Guidelines 1.1*. Department of Sustainability, Environment, Water, Population and Communities. Canberra.

GHD 2010a, *Report for Proposed Alpha Rail EIS – Terrestrial Ecology*, Volume 6a, Appendix F2. Prepared for Hancock Prospecting Pty Ltd by GHD

GHD 2010b, *Report for Proposed Alpha Rail EIS – Freshwater Aquatic Flora and Fauna*, Volume 6a, Appendix F1. Prepared for Hancock Prospecting Pty Ltd by GHD.

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| B       | S.Danielsen,<br>S.Hodgkison,<br>L.Muller,<br>D.Marsh,<br>J.Newton | Dr David Dique |           |                    |           | 04/03/2011 |
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