NT LINK PROJECT

INITIAL ADVICE STATEMENT

APA Group

Infrastructure Construction

NT LINK PROJECT

Initial Advice Statement

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B	24/06/15	Issued for Review	S. Fox Environmental Assessment Manager NT Link	W. Twist Project Approvals and Access Manager NT Link	T. Carroll Project Manager NT Link	24/06/15
0	15/07/15	Issue for use	S. Fox Environmental Assessment Manager NT Link	W. Twist Project Approvals and Access Manager NT Link	T. Carroll Project Manager NT Link	15/07/15

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EXECUTIVE SUMMARY

The NT Link Project

APT Pipelines Limited (APA Group (APA)) proposes to construct an underground gas pipeline between its existing facilities on the Amadeus Gas Pipeline (AGP) near Tennant Creek in the Northern Territory (NT) and the Carpentaria Gas Pipeline (CGP) near Mt Isa in Queensland. This, the NT Link Project, will provide a crucial linkage between the NT's onshore and offshore gas reserves and the east coast gas market.

The NT Link will encourage gas exploration and production of known gas reserves in the NT and the Timor Sea to meet the growing Australian liquefied natural gas (LNG) production and domestic gas demand, including opening up new markets and introducing competition in the gas supply market with far-reaching economic benefits.

The NT Link Project will be a 12-20" diameter, high pressure, bidirectional underground gas transmission pipeline approximately 632 km in length, of which approximately 173 km (KP459 – KP632) will be in Queensland. Above ground facilities will include Pipeline Inspection Gauge Launcher/Receiver Facilities, connections to the existing pipelines at each end of the alignment, a compressor station and mainline valves. The project scope currently includes a potential gas processing facility (GPF) at either Tennant Creek or Mt Isa. The GPF will be required to treat gas from the Northern Territory to ensure it meets the specification required for customers in Eastern states.

NT Link construction will be predominately staged out of camps. The location and size of the camps will be dependent on the construction sequencing (which can be influenced by weather and other external factors) with the project expecting to require about 2-3 camp locations in Queensland with a peak construction workforce of approximately 350-450 people. During initial construction stages and during pipeline commissioning some accommodation will be supplemented by existing local accommodation facilities (e.g. at Mt Isa and Tennant Creek). Construction duration is expected to be about 12-18 months, including pre-construction activities such as the development of camp locations and other ancillary areas.

In addition to the above, the construction of the GPF, if required in Queensland, will require a maximum workforce of about 100 – 150 people.

The total cost of the Project is expected to be about $1.15 billion. Should the GPF proceed then the total cost of the Project would increase to approximately $1.35 billion.

All construction will be in general compliance with the guidelines provided in the Australian Pipelines and Gas Association (APGA) Code of Environmental Practice (2013) and the 'AS 2885 – Pipelines – Gas and liquid petroleum' series of standards.

An ecological study carried out as part of the Project has confirmed that within the study area there are no:

- World heritage properties
- National heritage properties
- Wetlands of international importance (Ramsar sites)
- Threatened Ecological Communities

No EPBC Act listed flora or fauna species were detected during the site survey undertaken as part of the Project. Based on the findings of the ecological impact assessment carried out to date, the Project is considered unlikely to have a significant impact on any EPBC Act listed species. This judgement is based on the assumption that the proposed mitigation measures are implemented and further targeted species surveys are carried out as part of the environmental impact assessment to confirm species distributions.

The ecological impact assessment has also resulted in an alignment revision to avoid the wetlands associated with the Buckley River and Nottingham Creek located between KP449 and KP456. As a result, the potential for impacts on these of Matters of State Environmental Significance (MSES) is avoided.

The Proponent

The NT Link project proponent is APT Pipelines Limited (ABN 89009666700), which is wholly owned by Australian Pipeline Trust (APT) and forms part of the APA Group (APA).

APA Group is Australia's largest natural gas infrastructure business, owning and/or operating approximately $19 billion of energy assets. Its gas transmission pipelines span every state and territory in mainland Australia, delivering approximately half of the nation's gas usage. APA has direct management and operational control over its assets and investments, with the exception of the Wallumbilla to Gladstone Pipeline.

APA also has an ownership interest in - and operates - the Allgas gas distribution network as well as operating the Australian Gas Networks (formerly Envestra Limited) gas distribution networks, which together have approximately 27,000 km of gas mains and approximately 1.3 million gas consumer connections. APA also owns other energy infrastructure assets such as gas storage facilities, gas-fired power generation (part-ownership) and a wind farm.

APA also has equity interests in a number of energy infrastructure assets, including SEA Gas Pipeline, Energy Infrastructure Investments, EII2 and the Ethane Pipeline Income Fund. APA is listed on the ASX and is included in the S&P ASX 50 Index (www.apa.com.au).

Since APA was listed on the ASX, it has grown significantly - through both acquisition (including the purchase of the Berwyndale to Wallumbilla Pipeline, the South West Queensland Pipeline and the Wallumbilla to Gladstone Pipeline) and development of assets. APA's core function is the development of gas transportation facilities, with significant projects currently under development or recently completed in Victoria and Western Australia.

APA's Infrastructure Development division provides full turnkey Project delivery services for all APA's growth projects. Currently the Infrastructure Development division delivers approximately $400 million p.a. of growth assets for APA - which owns and operates all of the pipelines it has constructed.

The Initial Advice Statement (IAS)

The purpose of this Initial Advice Statement (IAS) is to:

- Support an application to the Coordinator General to declare the NT Link Project a 'coordinated project for which an Impact Assessment Report is required' under the *State Development and Public Works Organisation Act 1971* (SDPWO Act)
- Inform stakeholders and the general public of the proposed Project.

The scope of this IAS relates only to the portion of the Project within Queensland. It describes the Project and its components and reviews the existing environment within which the Project would be constructed and operated. From this information a summary is then provided of the potential impacts of the NT Link Project on Queensland's environment. Separate approvals are being sought in parallel with the NT Government.

APA is seeking a coordinated project declaration under the SDPWO Act for the Queensland portion of the NT Link Project in order to facilitate timely and effective regulatory approvals. The Project is considered suitable for declaration as a coordinated project because:

- The project would satisfy an identified demand for improved gas supply security on the eastern seaboard of Australia
- The project would enhance Queensland's gas supply infrastructure and distribution network
- The Northern Territory Government has granted Major Project Status for the North East Gas Interconnector (NEGI) project, for which the NT Link Project is APA's response to the NEGI
- The Council of Australian Governments (COAG) supports the connection of the Northern and Eastern Gas Markets via the NEGI Project.

Processes associated with obtaining project approvals would be conducted as part of the environmental impact assessment process, so as to allow construction to commence in a timely manner. If the NT Link is declared a 'coordinated project', the Petroleum Pipeline Licence issued under the *Petroleum and Gas (Production and Safety) Act 2004* (P&G Act) and the associated Environmental Authority cannot be granted until the SDPWO assessment process is completed (under s.412A of the P&G Act).

The *State Development, Infrastructure and Planning (Red Tape Reduction) and Other Legislation Amendment Act 2014* was enacted in 2014. This Act introduced a number of changes to the Environmental Impact Statement (EIS) process under the SDPWO Act, including the introduction of an Impact Assessment Report (IAR) as an alternative assessment process where projects are considered to be well-defined and low-medium risk. APA considers that this project meets the criteria for assessment via an IAR because:

- The project scope predominately involves the construction of an underground pipeline with minor above ground facilities and the potential for a gas processing facility. All of which will use standard construction practices that have been used by the construction industry for a significant period of time (i.e. no risk associated with using new technologies)
- The project area does not directly impact on any commonwealth land, commonwealth or national heritage places, critical habitat, nationally important wetlands or commonwealth reserves
- Construction, and its associated potential impacts, are likely to occur for only a short period of time
- The risks associated with a buried pipeline in this environment are not considered high
- APA has extensive experience in the design and construction execution of pipelines and are well versed in the environmental management strategies required to successfully construct a pipeline
- The condensed project timing to secure approvals would benefit from a prudent assessment and approvals process, appropriate to the low levels of risk posed by the project.

As such, to ensure timely assessment of impacts and effective regulatory approvals, APA requests that the Queensland portion of the NT Link Project's environmental assessment be undertaken as an IAR under the SDPWO Act.

1 INTRODUCTION

1.1 Background

APT Pipelines Limited (APA Group (APA)), proposes to construct a high pressure underground gas pipeline between its existing facilities on the Amadeus Gas Pipeline (AGP) near Tennant Creek in the Northern Territory (NT) and the Carpentaria Gas Pipeline (CGP) near Mt Isa in Queensland (Queensland). This, the NT Link Project, will provide a crucial linkage between the NT's onshore and offshore gas reserves and the east coast gas market. Figure 1 shows the indicative NT Link pipeline alignment.

The east coast gas market is set for a significant transformation with three LNG export Projects totalling $70 billion of investment commencing operations in Queensland. The LNG Projects are forecast to drive a tripling in east coast gas demand. The demand for gas from the LNG Projects, in addition to the issues around coal seam gas development in NSW and Victoria, is causing pressure on gas supplies which is likely to prevail in the medium term.

In the NT, current gas supply from the Bonaparte and Amadeus Basins is sufficient to meet existing demand for the medium term, but new supply is required to support growth opportunities and future market demand in the region. The NT Government has estimated that the NT has in excess of 200 trillion cubic feet (TCF) of conventional and unconventional gas reserves, both on-shore and off-shore. This is an abundant supply which is potentially available to meet, and exceed, the supply constraints facing the gas market in the south east of Australia and the NT's future demand. This provides an emerging opportunity which could make linking the NT with the south east gas market commercially viable and add substantial new reserves to be available for the demand centres in eastern Australia.

The Commonwealth Government's White paper on Developing Northern Australia proposes a number of initiatives aimed at building a strong, prosperous economy. Infrastructure will play a key role in supporting growth. The Northern Territory Government's proposed North East Gas Interconnector (NEGI) is identified in the White Paper as a project with the potential to provide efficiencies in the Australian gas market. APA's NT link project is being proposed as a solution for the NEGI.

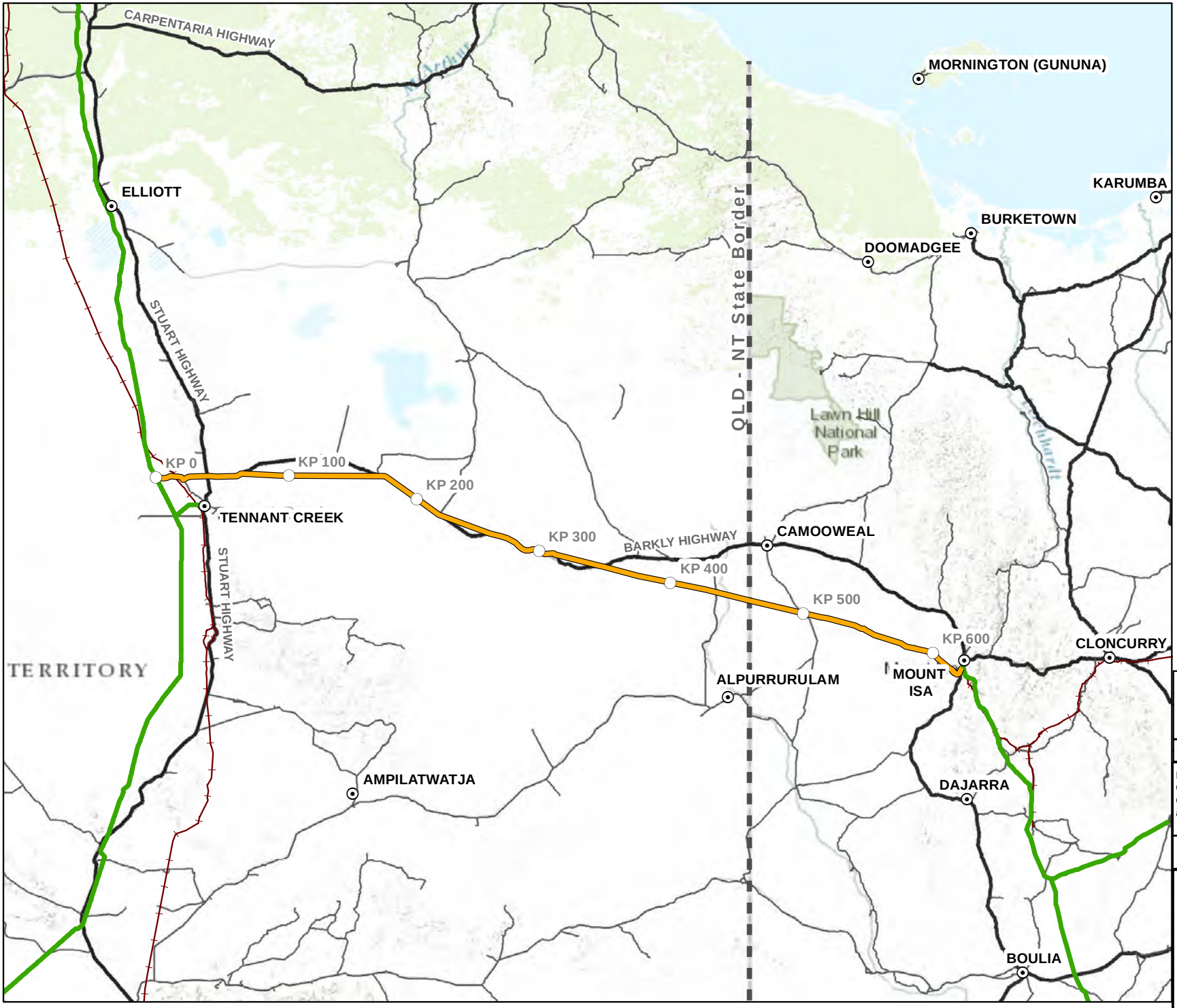
The Project is multi-jurisdictional and APA is simultaneously submitting this Initial Advice Statement (IAS) to the Queensland Government and a Notice of Intent (NOI) to the NT Government. In Queensland, APA is seeking a coordinated Project declaration under the Queensland SDPWO Act to facilitate timely and effective regulatory approvals. This IAS has been developed in accordance the Coordinator General's guidelines i.e.: http://www.statedevelopment.qld.gov.au/resources/guideline/cg/guideline-initial-advice-statement.pdf

1.2 Purpose and Scope of the Initial Advice Statement

The purpose of this IAS is to:

- Support an application to the Coordinator General to declare the NT Link Project a 'coordinated project for which an Impact Assessment Report is required' under the *State Development and Public Works Organisation Act 1971* (SDPWO Act)
- Inform stakeholders and the general public of the proposed Project.

The scope of this IAS relates only to the portion of the Project within Queensland. It describes the Project and its components and reviews the existing environment within which the Project would be constructed and operated. From this information a summary is then provided of the potential impacts of the NT Link Project on Queensland's environment.



Pipeline KPs
Towns
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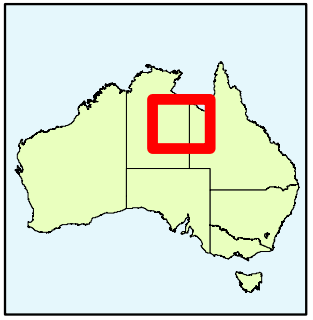

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NT Link

Figure 1 - Indicative Alignment

DATE: 17/06/2015

DATA SOURCE: APA Group,
Geoscience Australia (© Commonwealth of Australia 2015)
Cadastre and mining data supplied by State Government agencies. NT Link Indicative Alignment rev 1

Coordinate System: GCS GDA 1994
Datum: GDA 1994

APA Group

2 THE PROPONENT

2.1 APT Pipelines Limited

The NT Link Project proponent is APT Pipelines Limited (ABN 89009666700), which is wholly owned by Australian Pipeline Trust (APT) and forms part of the APA Group (APA).

APA Group's gas transmission pipelines span every state and territory in mainland Australia, delivering approximately half of the nation's gas usage. APA Group has direct management and operational control over its assets and investments, with the exception of the Wallumbilla to Gladstone Pipeline.

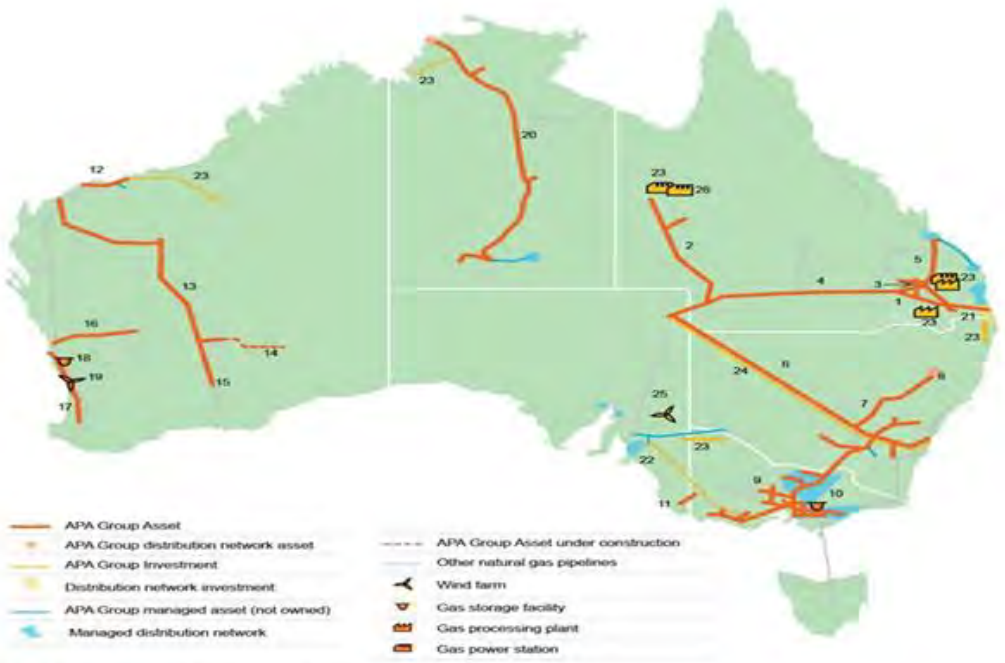
APA Group also has an ownership interest in - and operates - the Allgas gas distribution network as well as operating the Australian Gas Networks (formerly Envestra Limited) gas distribution networks, which together have approximately 27,000km of gas mains and approximately 1.3 million gas consumer connections. APA Group also owns other energy infrastructure assets such as gas storage facilities, gas-fired power generation (part-ownership) and a wind farm.

APA Group also has equity interests in a number of energy infrastructure assets, including SEA Gas Pipeline, Energy Infrastructure Investments, EII2 and the Ethane Pipeline Income Fund. APA is listed on the ASX and is included in the S&P ASX 50 Index (source: http://apa.com.au/).

2.2 Skills and Experience Needed to Undertake the Project

The footprint of gas infrastructure assets that APA Group owns or has interests in, as well as the assets operated by APA Group, is outlined in Figure 2 and Table 1 below.

Figure 2: APA Group Assets



APA GROUP ASSETS AND INVESTMENTS

ENERGY INFRASTRUCTURE

Queensland

1 Roma Brisbane Pipeline
2 Carpentaria Gas Pipeline
3 Berwyndale Wallumbilla Pipeline
4 South West Queensland Pipeline
5 Wallumbilla Gladstone Pipeline

New South Wales

6 Moomba Sydney Pipeline
7 Central West Pipeline
8 Central Ranges Pipeline

Victoria

9 Victorian Transmission System
10 Dandenong LNG facility

South Australia

11 SESA Pipeline

Western Australia

12 Pilbara Pipeline System
13 Goldfields Gas Pipeline (88.2%)
14 Eastern Goldfields Pipeline (under construction)
15 Kalgoorlie Kambalda Pipeline
16 Mid West Pipeline (50%)
17 Parmelia Gas Pipeline
18 Mondarra Gas Storage Facility
19 Emu Downs wind farm

Northern Territory

20 Amadeus Gas Pipeline

ENERGY INVESTMENTS

21 **GDI (EII) (20%) Allgas** Gas distribution network in Queensland
22 **SEA Gas Pipeline (50%)**
23 **Energy Infrastructure Investments (19.9%)** Gas pipelines, electricity transmission, gas-fired power stations and gas processing plants
24 **Ethane Pipeline Income Fund (6.1%)**
25 **EII2 (20.2%) North Brown Hill** wind farm
26 **Diamantina and Leichhardt Power Stations (50%)**

ASSET MANAGEMENT

Commercial and / or operational services to:

- Australian Gas Networks (Formerly Envestra)
- GDI (EII) - Allgas (20%)
- Energy Infrastructure Investments (19.9%)
- Ethane Pipeline Income Fund (6.1%)
- SEA Gas Pipeline (50.0%)
- EII2 (20.2%)
- other third parties

Table 1: APA Group's Main Gas Transmission Pipelines

Pipeline	Length/Capacity	Regulatory status
Queensland		
Carpentaria Gas Pipeline	944 km / 119 TJ/d	Light regulation
South West Queensland Pipeline	936 km / 384 TJ/d	Not regulated
Berwyndale Wallumbilla Pipeline	112 km	Not regulated
Roma Brisbane Pipeline	583 km	Full regulation
Wallumbilla Gladstone Pipeline	543km/1,510 TJ/d	Not regulated
New South Wales		
Moomba Sydney Pipeline	2,029 km / 439 TJ/d	Not regulated to Marsden Light regulation downstream of Marsden
Central West Pipeline	255 km	Light regulation
Central Ranges Pipeline and distribution network	294 km	Full regulation
Western Australia		
Pilbara Pipeline System	248 km	Not regulated
Goldfields Gas Pipeline (88.2%)	1,590 km / 175 TJ/d	Light regulation for Kalgoorlie Kambalda Pipeline
Mid West Pipeline (50%)	362 km	Not regulated
Telfer Gas Pipeline (19.9%)	488 km	Not regulated
Parmelia Gas Pipeline	448 km	Not regulated
Northern Territory		

Amadeus Gas Pipeline	1,673 km	Full regulation
Bonaparte Gas Pipeline (19.9%)	286 km	Not regulated
Victoria		
Victorian Transmission System	1,847 km / 1,030 TJ/d	Full regulation
South Australia		
SESA Pipeline	45 km	Not regulated
SEA Gas Pipeline (50%)	680 km	Not regulated

Since APA Group was listed on the ASX, it has grown significantly through both acquisition (including the purchase of the Berwyndale to Wallumbilla Pipeline, the South West Queensland Pipeline and the Wallumbilla to Gladstone Pipeline) and development of assets. APA has been involved in the development of the following projects:

- Construction, commissioning and operation of the Kogan North gas processing facility in Queensland in 2006
- The construction, commissioning and operation of the 27MW Daandine Power Station in Queensland in 2007
- The construction, commissioning and operation of 30MW X41 Power Station at Mt Isa in North West Queensland
- The construction, commissioning and operation of the 287 km Bonaparte Gas Pipeline in the NT in 2008
- The construction, commissioning and operation of the Diamantina Power Station (DPS). The DPS provides 242 MW Combined Cycle Gas Turbine (CCGT) power generation and the adjacent Leichardt Power Station (LPS) delivers 60 MW of Open Cycle Gas Turbine (OCGT) power. This was a joint project with AGL
- The expansion of the Goldfields Gas Pipeline in Western Australia which is currently ongoing
- The Victorian Northern Interconnect Expansion (VNIE) Project which is now completing.

As demonstrated by the above projects, APA's core function is the development of gas transportation facilities, with significant projects currently under development or completed in Victoria and Western Australia.

2.3 Experience in Financing, Designing, Constructing, Commissioning and Operating Comparable Pipelines or Other Major Infrastructure

APA Group's Infrastructure Development division provides full turnkey Project delivery services for all APA's growth Projects. Currently the Infrastructure Development division delivers approximately $400 million p.a. of growth assets for APA Group - who owns and operates all of the pipelines it has constructed.

APA Group follows a five step project delivery model which is underpinned by a governance and risk management framework at each step.

- Concept: A concept design solution based on customer load requirements is prepared. The asset capacity modelling is conducted by APA's in-house Asset Capacity Planning Team. A budget CAPEX/OPEX cost (usually 30%) is prepared along with a risk assessment for key Project. A formal gate review process is conducted to ensure the concept solution and cost has been robustly assessed
- Develop: If a project progresses beyond the concept phase a more detailed design solution is developed by APA's in-house engineering team. The key deliverables during this phase are:

  - Design Basis Memorandum (describes the scope of work)
  - Detailed Delivery Schedule
  - Project Organisation Structure (this identifies key staff required to deliver the Project and combined with the schedule identifies the timing for the key staff)
  - Procurement Strategy – The Procurement department in APA sits within Infrastructure Development. The procurement strategy considers the most effective way to package and procure the different components of the project to deliver a lower capital cost/least risk outcome. The procurement strategy is often a key driver of Project success as it enables long lead items and key interfaces to be identified and managed early
  - Alignment: Development including access to land and environmental and approvals requirements. The land and approvals pathway is often the key driver of the Project schedule and is often commenced as part of an early works package to ensure key milestone dates are met
  - The estimate is a function of all the activities and outcomes above. Where possible, market pricing and budget pricing are obtained for key components of the costs and all costs are benchmarked against recently completed similar projects
  - Risk assessment: a risk assessment matrix is prepared to identify key risks and controls for the Project.

A formal gate review process is conducted where all of the above are presented to ensure the project proposal represents a robust, value for money solution.

Plan: Project is initiated (in the form of a formal kick-off meeting) and key plans are developed and implemented for:

a. Quality
b. Construction/Commissioning
c. Procurement
d. Health Safety & Environment and Cultural Heritage

At this stage, the Project Manager reports on progress and budget performance to the Project Steering Committee (PSC). Ultimately the PSC is responsible for granting approval to proceed to the next stage.

Deliver: This is the build/construct/commission phase of the project. The Project Manager reports to the PSC monthly in terms of budget and schedule performance - and identifies key risks and mitigation strategies.

Close: This is the formal completion and handover to operations. The Project Team participates in a post implementation review and is responsible for managing Warranty Items and performance testing.

The Infrastructure Development Unit has up to 20 Projects in the concept development stage at any one time, with 20-30 projects in the plan/construction phase. Two key projects currently being delivered are:

- Eastern Gold Fields Pipeline ($140 million): 300km, 8" natural gas pipeline with gas delivery stations. This pipeline will connect two gold mines in Central Western Australia for electricity

generation via the APA's Goldfields Gas Pipeline (GGP) and Murrin lateral. Currently trenching and pipe laying are underway. APA Group is financing, designing, constructing and commissioning and will own and operate this pipeline

- VNIE: Includes constructing 163km of 16" gas transmission pipeline to partially loop the Wollert to Wodonga section of the Victorian Transmission System to provide additional capacity ($160 million). Construction has now been completed and testing and commissioning of the final loop is underway. Again, APA is undertaking the financing, design, construction and commissioning of this project, and will own and operate the pipeline. This project will be commissioned in the near future.

2.4 Contact Details

Contact details for the NT Link Project are provided in Table 2.

Table 2: Contact Details

PROPONENT DETAILS	
Full name:	APT Pipelines Limited
Place and date of incorporation:	Queensland, 15th November 1948
Company number:	009 666 700
Address of registered office:	Level 19, 580 George St SYDNEY NSW 2000
Address for correspondence and notices (no PO box):	Level 19, 580 George St SYDNEY NSW 2000
Email address for correspondence and notices:	ntlinkinfo@apa.com.au
Telephone number:	1800 831 344
Name and position of the individual nominated as Proponent's contact person (must be contactable at the addresses and numbers stated above):	Sam Pearce General Manager – Corporate Development & Investments Project Director, NT Link

2.5 Principal Consultants

Details of the principal environmental impact assessment consultants are provided in Table 3.

Table 3: Principal Consultant Details

CONSULTANT DETAILS	
Name	CNC Project Management Pty Ltd
Address	Units 10-12 'Marquesas', 247 David Low Way, Peregian Beach Queensland 4573
Phone	07 5471 3111
Website	www.cncprojects.com.au
Email	info@cncprojects.com.au

2.6 Environmental Record of Proponent

As detailed above, APA Group is Australia's largest natural gas infrastructure business.

APA Group has had none of the following:

- Catastrophic safety or environmental incidents in its operating history
- Convictions or findings against it in the last five years in any environmental court proceedings.

3 THE NATURE OF THE PROPOSAL

3.1 Scope of the Project

The NT Link Project will be a 12-20" diameter, high pressure underground gas transmission pipeline connecting APA's assets in Warrego (near Tennant Creek, NT) and Mica Creek (near Mt Isa, Queensland). The proposed pipeline will be approximately 632 km in length and its purpose is to connect the Amadeus (NT) and Carpentaria (Queensland) Pipelines, enabling gas supplies within the NT to be transported between NT and to east coast customers. Approximately 173 km of the proposed alignment is within Queensland.

The pipeline will be trenched for virtually its entire length, using conventional trenching methods, but exceptions will occur at major infrastructure crossings (road and rail lines).

All construction will be in general compliance with the guidelines provided in the Australian Pipelines and Gas Association (APGA) Code of Environmental Practice (2013) and the 'AS 2885 – Pipelines – Gas and liquid petroleum' series of standards.

The Project also includes above-ground infrastructure and temporary construction facilities including those described in more detail in s.3.4.2. The Queensland Project Area, including all potential ancillary activity and access road areas is shown in Figure 3.

3.2 Land Use

The land use associated with the Project area is predominantly grazing of natural vegetation on three Pastoral Leases spread across nine titles. There are also five Crown Land titles including Royton Timber Reserve and a number of Road Reserves, including two Travelling Stock Route (TSR).

At the completion of construction, these land uses will be able to resume over the vast majority of the Construction Corridor, with the following exceptions:

- A 3m-wide access track will be maintained along the alignment to facilitate operational maintenance where Public roads or landowner access tracks do not provide suitable access to the easement area.
- Selected temporary access tracks may be left in situ, at the wishes of the relevant leaseholder
- 3m either side of the pipeline centreline must remain free from trees and any other line-of-sight impediments (as required by the Australia Pipeline Standard AS2885)
- Sites for permanent above-ground infrastructure (as detailed in s.3.4.2).

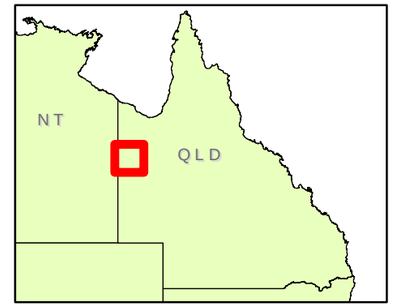
Table 4 indicates the tenure of the land parcels through which the proposed alignment passes.

Table 4: Indicative Number of Land Parcels and Tenure

Land Tenure Type	Number of impacted parcels/lots
State Leasehold	4
Unallocated State Land	2
Land Act Occupation Licence	1
Freehold	0
Reserves	1 Royton Timber Reserve
Roads	6 Roads and 2 TSRs

Please Note: the table above is for impacted parcels; in some instances, the same owner can own multiple parcels. Refer to Figure 4 for mapping of land tenure.

- Pipeline KPs
- Towns
- APA Pipelines
- Indicative Alignment
- Railways
- Principal Road
- Secondary Road
- State Border



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NT Link

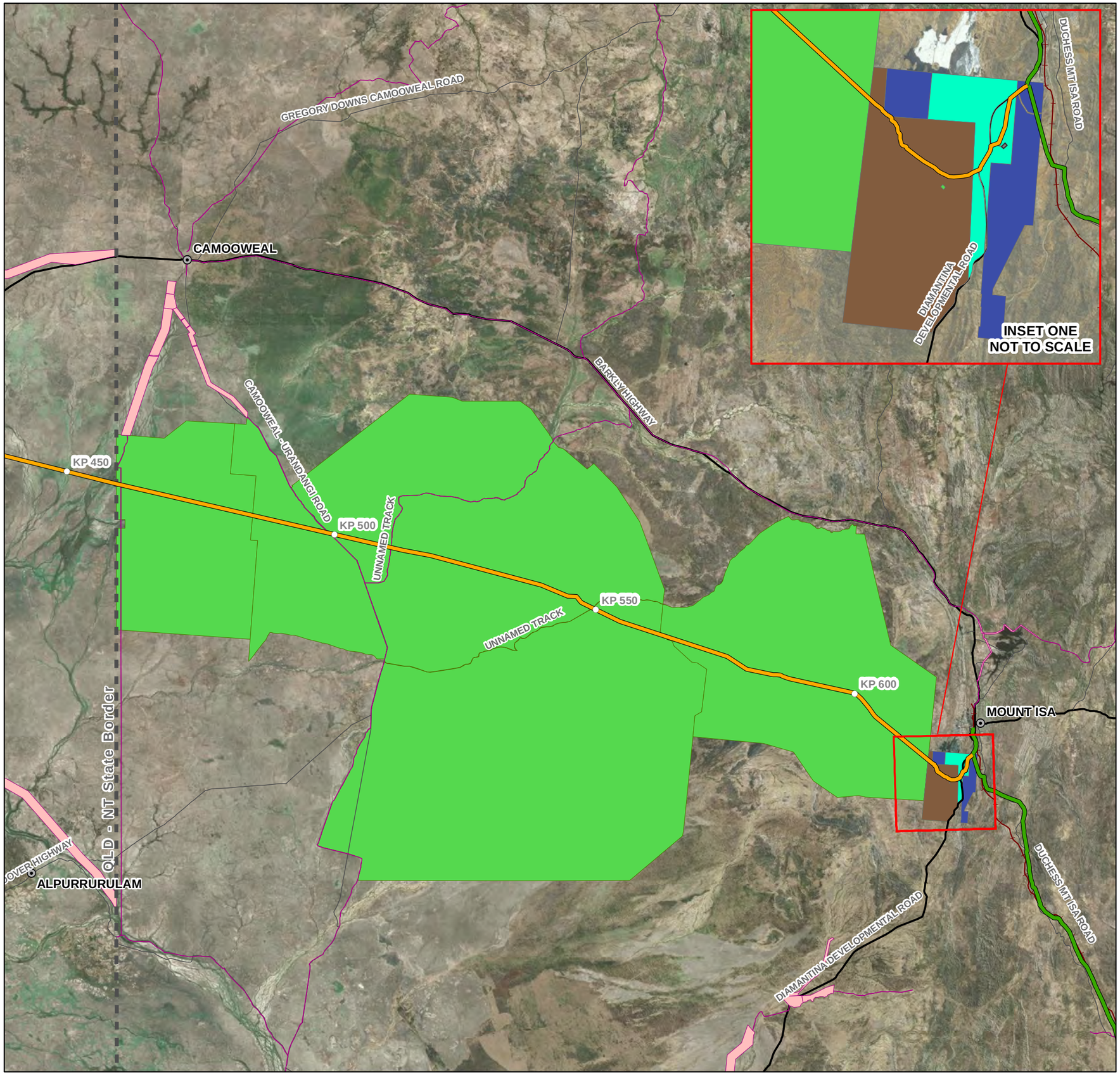
Figure 3
Queensland Project Area

DATE: 15/07/2015

DATA SOURCE: APA Group,
Geoscience Australia (© Commonwealth of Australia 2013)
Cadastre supplied by State Government agencies
NT Link Indicative Alignment rev 1

Coordinate System: GCS GDA 1994
Datum: GDA 1994

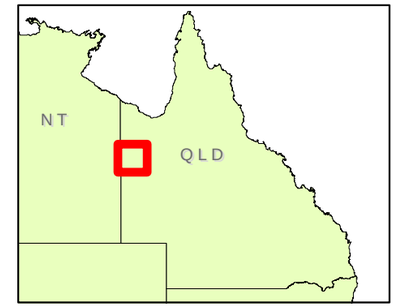
APA Group



- Towns
- Pipeline KPs
- Indicative Alignment
- APA Pipelines
- Railway
- Principal Road
- Secondary Road
- State Border
- Travelling Stock Routes

Tenure Type

- Aboriginal Freehold Land
- Freehold
- Lands Lease
- State Land
- State Land/ Lands Lease
- Timber Reserve



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NT Link

Figure 4
Land Tenure

DATE: 13/07/2015

DATA SOURCE: APA Group,
Geoscience Australia (© Commonwealth of Australia 2013)
Cadastre supplied by State Government agencies
NT Link Indicative Alignment rev 1

Coordinate System: GCS GDA 1994
Datum: GDA 1994

APA Group

3.2.1 Mineral and Petroleum Exploration and Production

In Queensland, the proposed alignment unavoidably transects several mineral exploration tenements and two Mining Leases. No petroleum tenements are intersected. APA has commenced an engagement process with the relevant mining tenement holders to identify potential interactions between the proposed alignment and their existing and planned operations.

Table 5 provides details of the tenements intersected by the Queensland segment of the proposed NT Link alignment and Figure 5 illustrates their locations (see Table 15 and Table 16 for additional tenement details). The proposed alignment does not cross any Petroleum Exploration Licences or Production Licenses.

Table 5: Mineral and Petroleum Tenements and Licences

Tenement	Number
Mineral exploration tenements	8
Mining Leases	2
Petroleum Exploration Licences	0
Petroleum Production Licences	0

3.2.2 Infrastructure and Utilities

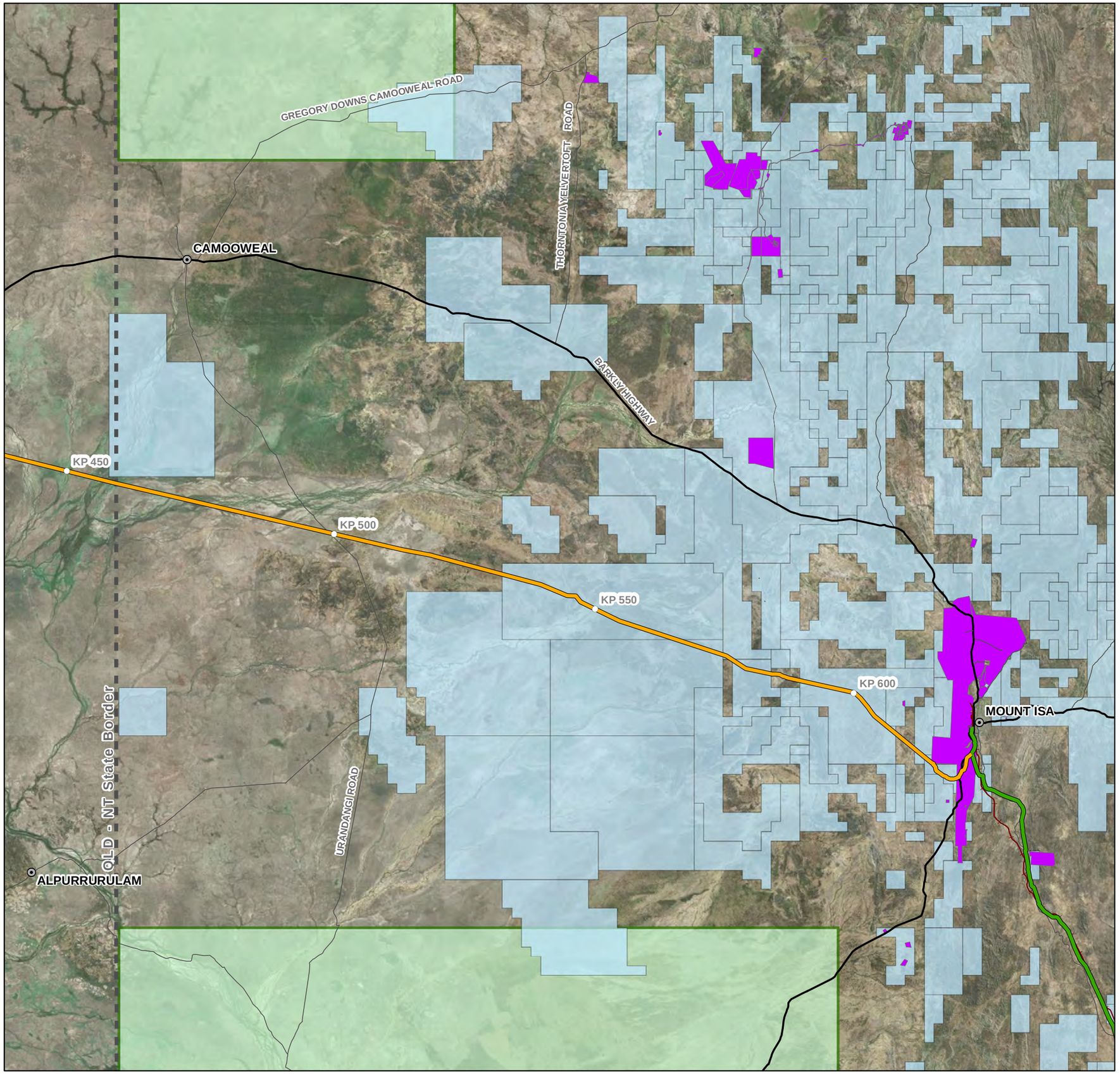
The proposed NT Link Project alignment in Queensland will cross the Diamantina Development Road (State controlled), Camooweal Urandangi Road (Mount Isa Council Controlled) (refer Figure 3 for location of road crossings) and local utilities such as buried telecommunications infrastructure. All crossings will be conducted using established crossings methodologies which will be confirmed in advance through consultation with the respective infrastructure owners. No railway lines will be crossed.

3.2.3 Travelling Stock Routes

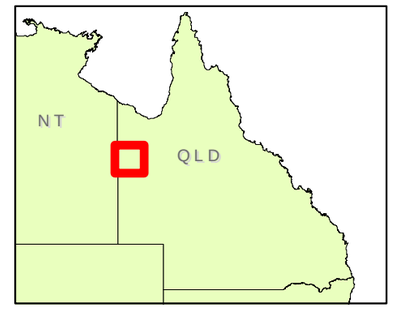
Travelling Stock Routes (TSRs) are corridors on roads, reserves, pastoral leases and unallocated state land along which stock are driven on foot and are designated for travelling stock purposes under the relevant State legislation. The proposed NT Link Project alignment traverses two TSRs (Figure 4).

3.2.4 Cultural Heritage

As part of its more detailed assessment and approval processes, APA will develop and implement a Cultural Heritage Management Plan (CHMP) with the identified Aboriginal Parties (being the prescribed bodies corporate for the determined native title holders listed in Table 6). The CHMP will detail the processes to be adopted by the Project to manage Aboriginal cultural heritage during the design, construction and operation of the Project.



- Pipeline KPs
- Towns
- APA Pipelines
- Indicative Alignment
- Railway
- Principal Road
- Secondary Road
- State Border
- Mineral Exploration Licence
- Mining Lease Surface Area
- Petroleum Exploration Permits



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NT Link

Figure 5
Mineral and Petroleum Tenements

DATE: 17/06/2015

DATA SOURCE: APA Group,
Geoscience Australia (© Commonwealth of Australia 2013)
Tenement Boundaries supplied by State Government agencies
NT Link Indicative Alignment rev 1

Coordinate System: GCS GDA 1994
Datum: GDA 1994

APA Group

3.2.5 Native Title

The Queensland portion of the Project is entirely covered by two Native Title Consent Determination areas. These existing native title determinations are summarised in Table 6 and illustrated in Figure 6. APA has already initiated contact with the Kalkadoon and Indjalandji-Dhidhanu people, and will seek to negotiate agreements with these parties for consents to the grant of tenure, permits, approvals and other authorisations for the pipeline and associated infrastructure. As well as their construction and operation. These matters will constitute Future Acts as defined under the *Native Title Act 1993*. The agreements are proposed to constitute Body Corporate Indigenous Land Use Agreements, to be registered by the National Native Title Tribunal.

Table 6: Native Title Determinations

Native Title Group	Tribunal ID
Kalkadoon People #4 (the Kalkadoon People #4 v State of Queensland)	QCD2011/007; QUD579/2005
Indjalandji-Dhidhanu People (the Indjalandji-Dhidhanu People v State of Queensland)	QCD2012/015; QUD243/2009

3.3 Project Need, Justification and Alternatives Considered

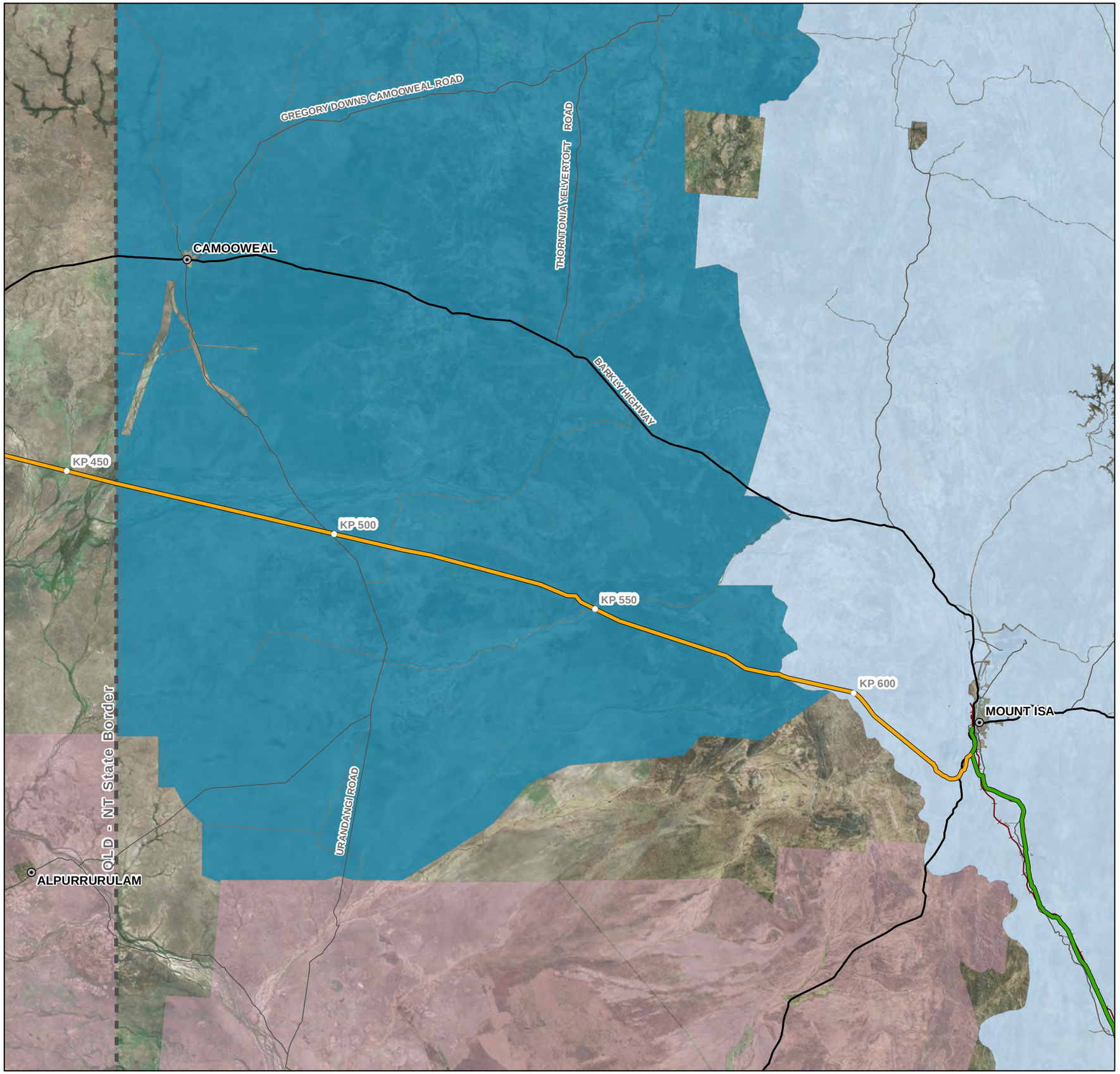
In February 2014, APA announced a feasibility study for the development of an underground gas transmission pipeline and infrastructure upgrades to link APA's existing pipeline systems in the NT with the east coast.

The NT Link will encourage gas exploration and production of known gas reserves in the NT and the Timor Sea to meet the growing Australian liquefied natural gas (LNG) production and domestic gas demand, including opening up new markets and introducing competition in the gas supply market with far-reaching economic benefits.

Australia's rapidly expanding gas industry is driving enormous investment in this country, creating more than a hundred thousand jobs and delivering about $8 billion a year in tax revenue (APPEA, 2013). As a gas infrastructure owner, builder and operator, APA is well-placed to assist in the development of a competitive gas market throughout Australia. Gas infrastructure also underpins and encourages further gas exploration, production and the growth of new industries.

The NT Government has expressed a strong interest in connecting NT gas supplies to eastern Australia, with the Department of the Chief Minister announcing the North East Gas Interconnector (NEGI) as a Major Project and facilitating the Request for Final Proposal. APA is a shortlisted proponent (one of four) under the NEGI process.

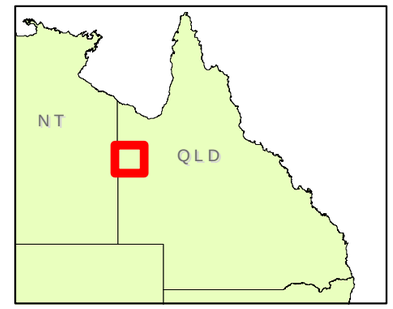
The NT Chief Minister has noted that" "The construction of this gas pipeline is an infrastructure Project of national significance. It's also a matter of urgency for the eastern states which are fast approaching an energy security crisis". An industry briefing was held in Alice Springs on 31 October 2014 to launch and explain the Project to potential proponents and to outline the competitive bid process.



Pipeline KPs
Towns
APA Pipelines
Indicative Alignment
Railway
Principal Road
Secondary Road
State Border

Native Title Determinations

Indjalandji-Dhidhanu People - QUD243/2009
Kalkadoon People - QUD579/2005
Unaffected Native Title Determinations



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NT Link

Figure 6
Native Title Determinations

DATE: 17/06/2015

DATA SOURCE: APA Group,
Geoscience Australia (© Commonwealth of Australia 2013)
Tenement Boundaries supplied by State Government agencies
NT Link Indicative Alignment rev 1

Coordinate System: GCS GDA 1994
Datum: GDA 1994

APA Group

In addition, at the 38th meeting of the Council of Australian Governments (COAG) on 10 October 2014, the nation's leaders supported the connection of the Northern and Eastern Gas Markets and included the following notes in its meeting communique:

"COAG supported the work being undertaken by the NT to establish a competitive process for the private sector to bring forward proposals for the construction and operation of a pipeline to connect the Northern and Eastern Gas Markets. COAG agreed that connecting these gas markets is the next step to developing a national gas grid and will contribute to the development of a more national and competitive domestic gas market, helping to improve supply security."

Creation of a gas energy link between the NT and Australia's east coast will:

- Create jobs (350-450 anticipated during construction in Queensland and approximately 1-2 direct jobs during operations on the entire alignment)
- Create opportunities along the approximately 630 km alignment, through negotiated tie-ins, for regional development
- Enhance energy security along the east coast
- Protect existing and promote new gas-based manufacturing opportunities in eastern Australia
- Provide enhanced markets for NT gas and encourage additional gas resource development.

APA's NT Link Project proposal is a direct response to the NEGI initiative.

If the NT Link Project (or NEGI initiative) did not occur, it would result in inefficient isolation of the NT gas supplies, reduced supply for east coast gas customers and reduced regional development and employment opportunities.

APA undertook a preliminary assessment of several possible alignments by evaluating environmental considerations and determining construction cost estimates to identify the optimal connection between the NT and eastern Australia (CNC, 2014). Options included connections from the NT to Queensland (joining the Carpentaria Pipeline) and South Australia (Moomba), as set out in Table 7.

Table 7: Alignment Options Initially Reviewed

Alignment Option	Length (km - as originally conceived)	Constraints Summary
Tennant Creek to Mt Isa	570	Shortest and most direct connection to APA's existing assets i.e. Amadeus and Carpentaria Pipelines. Key constraint is presence of Royton Timber Reserve south of Mount Isa and the presence of surface rock. Relatively few MNES (desktop results), Queensland or NT listed species encountered, least water crossings, low flood risk
Aileron Highway direct East to Boulia	735	Intersects 50+km of surface rock; highest proportion of listed flora and 2 conservation reserves; high number of land parcels to be crossed in Queensland; moderate flood risk

Alignment Option	Length (km - as originally conceived)	Constraints Summary
Alice Springs to Carpentaria Pipeline	740	Encounters very complex construction conditions for first 75km east of Alice Springs; construction challenge and operational risk presented by unstable, 20m sand dunes in north sector of Simpson Desert; technically complex crossings of braided beds of Georgina and Diamantina Rivers; moderate flood risk
Alice Springs to Moomba (via Simpson Desert)	810	Requires crossing high conservation areas in pristine central Simpson Desert; construction challenge and operational risk presented by unstable, 20m sand dunes; complex access; high flood risk
Alice Springs to Moomba (via Lake Eyre)	940	Extreme length not justified where other economically and environmentally acceptable alternatives are available; high flood risk; 26 listed threatened MNES and Ramsar Wetland along alignment based on desktop studies

Based on the results of the options review, APA has selected a connection between its Amadeus Gas Pipeline (at Warrego – north of Tennant Creek) and its Carpentaria Gas Pipeline (at Mica Creek, south of Mt Isa) as the preferred option – principally as it provides the shortest link and minimises the potential for environmental and MNES impacts. APA is progressing statutory and environmental approvals for this connection option as set out in this IAS.

A desktop assessment covering a 20 km-wide study corridor was then conducted over the proposed alignment and an on-ground ecological assessment was undertaken for the Queensland portion over the period 27 April – 1 May 2015. These assessments contributed to further refinements to the proposed alignment in order to further avoid or minimise disturbance of known physical, environmental and cultural constraints.

Consultation, preliminary design work and further field assessment work are ongoing and the proposed alignment is likely to be further refined at a local scale during the current planning phase (prior to the completion of the environmental impact assessment).

3.4 Components, Developments, Activities and Infrastructure that Constitute the Project to be Declared Coordinated

3.4.1 Below-ground Components

The pipeline will be a welded steel, 12 – 20" (diameter to be decided on the basis of engineering and economic factors still under review), high-pressure, gas pipeline along an approximately 632km alignment, of which approximately 173km (KP459 – KP632) will be in Queensland.

The pipeline will be buried to a depth to top-of-pipe varying between 600 – 1200mm, depending on geotechnical, general risk assessment and property Safety Management Study (SMS) outcomes. For a detailed description of the processes associated with pipeline construction, refer to s.3.7.

3.4.2 Above-ground Facilities

The pipeline will be underground, with the exception of certain facilities required for maintenance and management of the gas and the pipeline. Where practicable, above-ground facilities will be co-located.

3.4.2.1 Gas Processing Facility

A gas processing facility (GPF) is expected to be required. At this stage, it is expected the facility will be located in the NT close to the commencement point of the NT Link pipeline. If, however, it is decided to locate the GPF in Queensland then the following would apply.

The function of the GPF will be to process the incoming gas up to a standard required for acceptance into the east coast gas market i.e. Australian Gas Specification AS 4564. The intention of the processing is to remove excess inert gas (i.e. nitrogen) and heavier hydrocarbons from the product gas.

Whilst design studies for the GPF are ongoing, the selection of a technology will include consideration of process efficiency. The selection will account for power requirements, emissions to the environment, and capital and operational costs. APA will seek to maximise efficiency of the facility by selecting plant with low energy usages and low volumes of potentially harmful waste or emissions. The current favoured technology selection will recover approximately 91% of incoming hydrocarbon gas for sale and a further 8.9% used internally as fuel, providing a highly efficient process and minimal waste generation.

The nitrogen removal process may partially or completely remove heavier hydrocarbons, water, and low levels of mercury and odorant from the gas stream. Then the treated gas would be compressed for onward transmission and sale.

The waste streams generated by the process would be: liquid water, mercury, nitrogen, natural gas liquids and combustion products. Hydrogen sulphide (H_2S) and carbon dioxide (CO_2) in the incoming gas are expected to pass through into the sales gas stream and will not be rejected as part of the process.

There is a liquid water stream from the "mol sieve" regeneration system. This water would need to be treated and discharged.

Mercury is present at trace levels in natural gas, and it is detrimental to the proposed nitrogen removal process. Mercury is therefore removed from the incoming gas using an absorbent bed, for example. The whole mercury bed is generally removed and sent back to the supplier for disposal according to relevant hazardous waste handling and disposal requirements. This is expected to occur several times in the facility lifetime.

Waste gases are expected to comprise 99.9% nitrogen (as N_2) with the remaining 0.1% comprising low levels of hydrocarbon and CO_2. These waste gases may be released to the atmosphere by venting or flaring through an appropriately designed stack.

The rejected heavy hydrocarbons liquid will be reused for the facility's power generation. The Northern Territory Government requires transmission gas to be odourised, which is achieved using a mercaptan odorant. The majority of mercaptan is expected to be captured in the heavy hydrocarbon stream and hence be burnt for electricity and motive power generation.

Power generation for the facility would rely on gas engine or gas turbine sources. Combustion exhaust resulting from the facility's power generation will comprise CO_2, unburnt hydrocarbons and burnt mercaptan.

The GPF will be constructed and operated in general accordance with the guidelines provided within the APGA Code of Environmental Practice (APGA 2013) and is expected to have an operational footprint of approximately 400m x 400m and a construction footprint of up to 500m x 500m.

Authorisation for a gas processing facility in Queensland may require the grant of a petroleum facility licence under the P&G Act.

3.4.2.2 Pipeline Inspection Gauge (PIG) Launcher / Receiver Facility (or Scraper Station)

'Pigging' refers to the practice of using devices known as "pigs" to perform various maintenance operations, including but not limited to cleaning and inspecting the pipeline.

This is done without stopping the flow of the gas product in the pipeline and is accomplished by inserting the pig into a 'pig launcher' - an oversized section in the pipeline, reducing to the normal diameter. The launcher is then closed and the pressure-driven flow of the product in the pipeline is used to push the pig along the pipe until it reaches the receiving trap – the 'pig catcher'.

The Launcher / Receiver Facility compound will include:

- Two tie-in points to the NT Link pipeline, downstream and upstream
- Shutdown valve with bypass and associated piping and remote operation communications
- PIG launcher / receiver
- Provision for power supply
- Provision of solar panels and battery chargers
- 24VDC Battery backup supply
- Provision for fibre optic connection to the NT Link Meter Station.

PIG launchers and receivers are small, discrete facilities with a footprint of less than $50m^2$ and a typical launcher / receiver facility is illustrated in Figure 7. The PIG Launcher / Receiver will most likely be co-located with the tie-in point with the Carpentaria Gas Pipeline to the south of Mt Isa.

Figure 7: Typical PIG Launcher / Receiver Facility

3.4.2.3 Connections

The NT Link will connect to the Carpentaria Gas Pipeline at a point approximately 6km Southwest of Mt Isa. Pipeline inlet facilities and pipeline outlet facilities at each end of the NT Link will require approximately 50m x 50m each for permanent access.

Activities that are normally carried to install an inlet connection are summarised in Table 8 below.

Table 8: Typical Inlet Connection Construction Activities

Activity	Description
Clear required area	Where clearing is required, graders and/or bulldozers are used to clear an access track, site facilities area and lay down area – all within the NT Link Construction Corridor. Topsoil is stripped for the width and length of the meter station pad, typically to a depth of 100-150mm. The pad is then filled with imported, free-draining soil and compacted and filled to the design level
Excavate main line, large enough to remove confined space entry requirements	An excavation (minimum 1.5m deep) is dug for the tie in line, hot tap exposure and valve arrangement in accordance with APA Excavation procedures and Permit to Work System. Trench spoil is stockpiled within the Construction Corridor, usually on the non-working side

Activity	Description
Install pipe work	Pipe work is to be connected to the hot tap through to the custody transfer point
Complete fitted welds	The tie-in and site field welds are completed in-situ or in the temporary workshop. During welding, a habitat or tent is used to cover the weld and welder, to provide protection from the elements and screen off potential sparks
Non-destructive testing	The pipe welds are inspected using Magnetic Particle Inspection (MPI), X-ray, gamma or ultrasonic equipment
Back fill	Clean sand to be used around and 200mm above the inlet piping. Common fill to be used for remaining fill. Common fill will be weed- and disease-free, and non-acid sulphate soil
Hydrostatic testing	Pipework integrity is verified using hydrostatic testing in accordance with AS2885 Pipelines - Gas and Liquid Petroleum and as described in 3.7.6
Commission inlet connection	Following successful commissioning, first gas to NT Link can be delivered
Site clean-up and rehabilitation of areas containing temporary infrastructure	Removal of temporary facilities, equipment and surplus materials. Any areas outside that are not to remain permanently will be rehabilitated. Areas which may remain include the access track and meter skid. Where necessary, ground is re-contoured and topsoil re-spread.

3.4.2.4 Compressor and Main Line Valve Sites

Main Line Valves (MLV) are expected to be located approximately every 75km and consist of a discrete above-ground assembly within an approximate 20m x 20m protective compound, with a vent located approximately 50m away within a 5m x 5m protected area.

MLVs are essential components of any gas pipeline, as their main purposes are:

- To allow (remotely operated) gas flow shut-off which is essential for safety purposes in the event of pipeline damage, rupture etc
- To facilitate future access to the pipeline for maintenance purposes

A typical MLV assembly is shown in Figure 8.

Figure 8: Typical MLV Assembly

Compressors are required along lengthy pipelines to boost pipeline pressure and on the NT Link pipeline, two compressor stations are expected to be required, with one anticipated to be close to the pipeline origin and the second to be approximately mid-alignment – although this could be in Queensland, with locations dependent on design details yet to be completed.

The midline compressor sites will be likely to be combined with a camp site and pipe laydown and have a total (combined) construction footprint of approximately 500m x 700m. Once the camp and laydown area are rehabilitated post-construction, the compressor site will remain, as a 200m x 150m permanent compound. Compressor stations will require a permanent access track.

3.4.2.5 Construction Camps

Construction workers will be housed in camps near work sites during the construction phase of the NT Link. Key material storage areas may also be located at or near the camp facilities for convenience and to ensure requirements for additional clearing / site preparation works are minimised.

People living in the camps will include the following:

- Construction workforce
- Management and supervisory staff
- Technical and administrative support staff
- Camp catering and maintenance staff
- Safety and medical staff
- Logistics services staff
- Inspection and environmental staff
- Visitors and guests.

Camps will be modular (relocatable) units arranged into conventional construction / field camp configurations.

The camps will reflect current construction workforce standards. These standards include separate quarters for men and women and recreation/ lifestyle services such as recreational rooms and facilities.

Camp catering and housekeeping will be in accordance with industry standards, including daily facility and room cleaning, together with access to washers and dryers for personal laundry.

Camps will include a selection of personnel with first-aid training and will also have either medical personnel *in situ*, or will have emergency evacuation plans as required. For medivac purposes, camps will have a suitable helicopter landing site available or pre-arranged access to an existing dedicated landing area.

Camp sites will be developed and camps moved and installed in a timely fashion to allow pipeline and facilities construction.

Camp sites will be combined with temporary Project offices and materials and fuel storage yards wherever appropriate, to reduce the amount of land required. The camps and storage pads will have their own power sources, water treatment and waste management systems. People, equipment and supplies will generally be brought into the camps by road.

Actual camp locations and sizes will be dependent on the construction sequencing - which can be influenced by weather and other external factors - but the overall NT Link Project will need approximately 5 camp locations with a peak construction workforce of approximately 350-450 people for the pipeline and 100-150 people for the gas processing facility (if constructed in Queensland). During initial construction stages and during pipeline commissioning some accommodation may be supplemented by existing local accommodation facilities where required.

In Queensland, a NT Link construction camp is expected to be located within 75 – 120 km west of Mt Isa (i.e. between approximately KP500 – KP560). Actual camp locations will be determined in the coming months as part of the design activities.

3.4.2.6 Additional Workspace

As well as the facilities described above, additional workspace areas (AWAs) will be required along the alignment for activities such as the following:

- Temporary parking and maintenance for vehicles and equipment
- Horizontal bores at road crossings which may need a wider area for set up and operations.
- Truck turn-a-rounds – estimated to be needed every 2km or so in remote locations
- Construction in areas of significant side slope (additional safety widths required)
- Vehicle washdown facilities (for biosecurity)
- Temporary water holding facilities during hydrotesting operations
- Communication towers
- Pipe laydown areas.

The precise location and area required for additional workspace will need construction contractor inputs and so will not be finalised until just before construction commences, however an accurate calculation and suite of anticipated locations will be developed to inform the environmental impact assessment.

3.4.2.7 Communication Towers

Temporary communication towers may be required in Queensland to facilitate communications during construction. The location will be confirmed by the construction contractor during the early works program.

3.4.2.8 Pipeline Signage

As required by AS2885, the pipeline's below-ground location will be indicated by above-ground signage. The appearance, size and frequency of this signage is mandated by AS2885 and generally consists of signs such as that illustrated in Figure 9 installed at regular intervals along the pipeline line-of-sight.

Figure 9: Indicative Signage

3.4.2.9 Cathodic Protection Beds

Cathodic protection is a technique to control the corrosion of the pipe by placing it in contact with another, more easily corroded metal in contact with the pipe, to act as the anode of the electrochemical cell. It is anticipated that several cathodic protection beds (each up to approximately 20m x 20m) will need to be established up to 500m from the pipeline. The locations will be identified during detailed design based on locational characteristics. A 3m-wide, permanent access track will be required running from the Construction Corridor to each cathodic protection bed.

3.5 External Infrastructure Requirements

Power will be supplied to construction camps and active construction fronts by skid-mounted, fully bunded diesel generators. These generators will be located in a manner to minimise noise propagation to sensitive receptors and to avoid nuisance caused by exhaust fumes. Fuel supplies for generators and construction equipment will be trucked to the working construction fronts and camps from the most convenient location (i.e. Mt Isa and / or Tennant Creek).

Potable water for drinking, ablutions, cooking and other requirements will be supplied by sub-contractors, or, where possible and by pre-agreement, by the local pastoral leaseholder. For discussion of water needs for pipeline integrity testing, refer to s.3.7.

Pipe, valve assemblies and other infrastructure elements will be trucked to the working construction front and stored in the appropriate laydown yard. The most likely scenario is for pipe to be shipped into either the Port of Darwin and / or the Port of Townsville. From Townsville, rail transport would be used to ship the lengths as far as Cloncurry, Duchess or Mt Isa, with road transport from there to the appropriate pipe laydown yard. Road haulage from these rail terminals would be via the Barkly Highway (a State controlled road), or via the local council Mount Isa – Duchess Road if road haulage starts at Duchess. Oversized vehicles would be required to haul the sections of pipe. From Darwin, pipe lengths would be either transported by road or railed to Tennant Creek/Three Ways and then to a laydown along the construction front. Road trains may carry 530-720m of pipe per load, indicating approximately 1,000-

1200 road train loads may be required to carry the pipe for the entire Project. A Traffic Management Plan would be agreed with the Department of Transport and Main Roads to ensure haulage along Queensland roads will be safe and efficient.

3.6 Timeframes for the Project

Construction is expected to take approximately 12 – 18 months. It is planned to commence with the establishment of pipe laydown areas and the development of camp locations and other ancillary areas from the second half of 2016 to have construction completed by the end of 2017. Commissioning is targeted for early 2018.

The planned pipeline design life will be 60 years and at or about that time, the condition of the pipeline would be assessed and a decision made on its future. If the pipeline is not replaced, alignment rehabilitation will be conducted at the end of the pipeline design life, in accordance with existing best practice (including AS2885).

The anticipated commencement and completion dates for each stage are shown in Table 9.

Table 9: Anticipated Dates for Project Stages

Activity	Start Date	Duration	Completion Date
Planning and Design	January 2014	36 months	Jan 2017
Procurement	May 2015	24 months	April 2017
Early works and Pre-construction activities	September 2016	6 months	February 2017
Construction	March 2017	9 months	November 2017
Commissioning	December 2017	3 months	February 2018
Operation	February 2018	60 years	2078

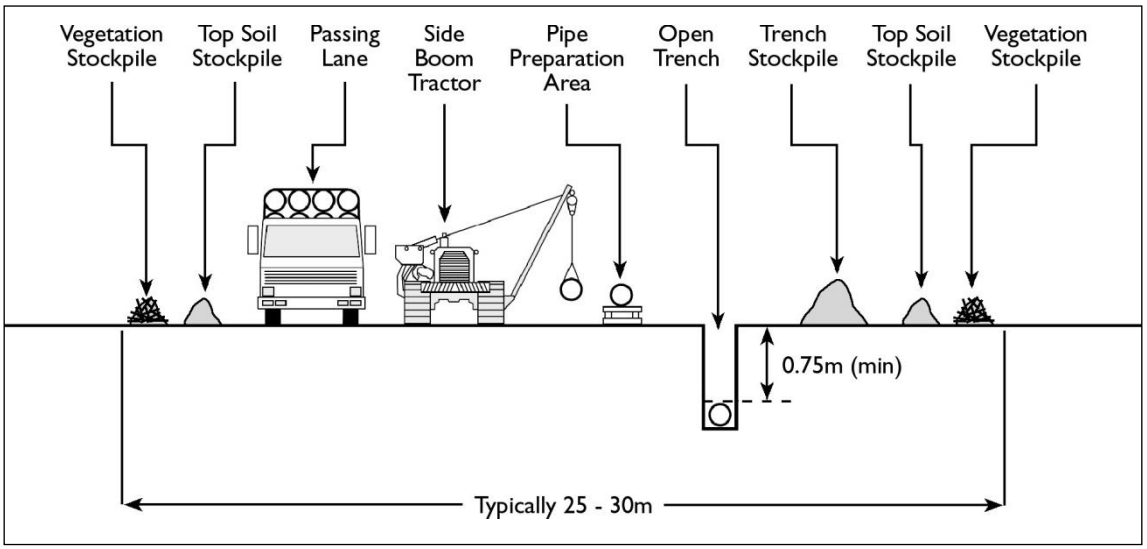
3.7 Construction and Operational Processes

3.7.1 Construction Methods and Timing

All construction will be conducted in general accordance with the applicable standards and codes, particularly 'AS2885 Pipelines – gas and liquid petroleum' and the guidelines within APGA Code of Environment Practice (APGA 2013).

Pipeline construction will typically be carried out within an approximate 30m-wide Construction Corridor, using a production line approach. An indicative cross-section of an active pipeline Construction Corridor is shown in Figure 10.

Figure 10: Typical Construction Cross-section (not-to-scale)



Source: APIA 2013

3.7.2 Pipeline Installation

A number of specialised crews pass along the easement, joining and installing the pipeline then backfilling and rehabilitating the Construction Corridor. Typical construction activities expected for the pipeline are described in Table 10.

Table 10: Typical Pipeline Construction Activities

Activity	Description
Detailed survey	Engineering, environmental and cultural heritage surveys are used both in route selection and to determine if any special construction techniques or mitigation measures are required. Once the preferred pipeline route has been determined, the centreline is surveyed and marked and engineering aspects are finalised. Markers are placed to identify the pipeline route and Construction Corridor and important environmental and cultural items from the Construction Line List
Fencing	Fences are severed and construction gates installed to allow access
Clear and Grade	Graders and bulldozers are used to clear the Construction Corridor to provide for construction activities. This Construction Corridor may be widened if required at watercourse crossings. Cleared vegetation will be stockpiled separately. Topsoil will typically be graded off and stored separately

Activity	Description
Stringing	Steel pipe is trucked to the construction site and sections laid end-to-end. The sections are placed on sandbags and raised on blocks of wood (timber skids) to protect the pipe from corrosion and coating damage
Bending	Where required, pipe sections are bent to match changes in either elevation or direction of the route
Welding	Pipe sections are welded together
Non-destructive weld testing	The pipe welds are inspected using x-ray or ultrasonic equipment, as per AS 2885.2
Joint coating	The area around the weld is grit-blasted and then coated with a protective coating to prevent corrosion
Trenching	After the route is cleared, a trench is dug for the pipeline by either a trenching machine or an excavator in accordance with pre-defined depths of burial. The required depths are determined by a risk assessment process and recorded on construction alignment sheets. Trench spoil is stockpiled within the Construction Corridor, usually on the non-working side. Trench spoil is stockpiled separately to topsoil. The trenches will be ramped at regular intervals to allow larger fauna to escape. The period that any part of a trench will be left open will be minimised. Where possible, trenching will be delayed until completion of the welding and joint coating as part of ensuring that the trench will be open for the minimum amount of time
Padding	Where required, padding machines are used to sift the excavated subsoil to remove coarse materials to prevent damage to the pipe coating. The remaining fine material is used to pad beneath and on top of the pipe. In some instances (e.g. rocky soils), imported sand or foam pillows will be used for padding
Lowering-in	Side booms or excavators are used to lower the welded pipe into the trench
Backfilling	Trench spoil is returned to the trench and material compacted to minimise the

Activity	Description
	likelihood of subsidence of material over the pipe
Restoration and Rehabilitation	The Construction Corridor is re-contoured to match surrounding landform, and erosion controls constructed where necessary. Separately stockpiled topsoil is then re-spread evenly across the Construction Corridor. Reseeding or revegetation of the Construction Corridor, using appropriate species (i.e. crops/pasture or indigenous native species of the right provenance), will be undertaken where required to restore vegetation cover. An access track will remain free of woody vegetation
Signage	Information signs indicating the presence of the buried pipeline are erected along the Construction Corridor line-of-sight, as per AS 2885.1

3.7.3 Trenched Watercourse Crossings

The Queensland portion of NT Link is expected to cross various temporary drainage lines (refer to 5.1.2 for details) and to intersect Mica Creek around KP620-626. It is currently expected that all watercourse crossings will use an open trench methodology.

Crossings completed by open-cut excavation require excavation of the banks and watercourse bed, to achieve the required minimum safe depth for pipe location at approximately 2m below the stable watercourse bed.

The increased burial depth is required to maintain pipeline integrity by ensuring flow events do not expose the pipeline. There will also be the need to extend this excavation through the riverbank profile for some distance away from the river channel, which is expected to result in a requirement for increased working width in the Construction Corridor to enable safe excavation of the trench and installation of the pipeline.

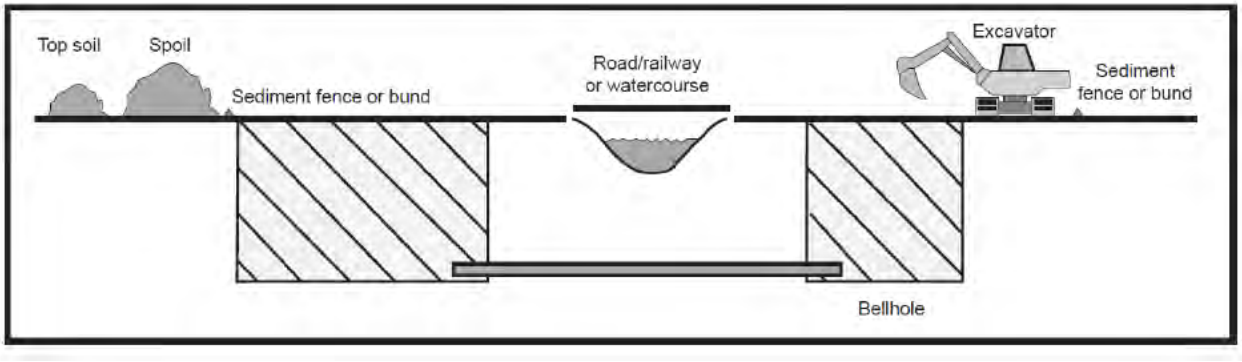
Erosion and sediment control (ESC) measures will be implemented to ensure there are no significant erosion impacts in the vicinity of the crossing, and the ongoing integrity of the crossing architecture will be monitored as part of the ongoing ROW maintenance commitment. ESC measures to be installed will comply with the objectives of the International Erosion Control Association Guidelines (IECA 2008).

3.7.4 Bored Crossings

Application of trenchless technology, such as Horizontal Thrust Bores, may occur at service crossings (such as the Diamantina Development Road) depending on negotiations with 3rd-party infrastructure owners and construction decisions and subject to technical practicability (e.g. local geology).

The installation of the pipeline by HTB involves boring a hole at the required depth beneath the surface, then pulling the welded pipe string back through the drill hole. Boring is conducted by a specially designed boring rig, operated by a specialist contractor. A variety of associated equipment and infrastructure is required at the entry and exit points are needed. Smaller, self-contained rigs (e.g. on the back of a semi-trailer) may be used for applications such as road crossings (APGA 2013). A schematic profile of a small-scale HTB operation is shown in Figure 11.

Figure 11: Schematic Profile of a bore crossing (source: APIA CoEP 2013)



All third-party infrastructure crossings will be undertaken in accordance with agreements reached beforehand with facility owners and in compliance with appropriate standards.

3.7.5 Borrow Pits

Borrow pits to win material for temporary access tracks, laydown areas, etc., may be required, with the need dependent on final demand calculations. Should a new borrow pit be required, its establishment will be discussed with the applicable landowner (and owner of the relevant material where that person is not the landholder) and regulators on a case-by-case basis, with approval from the regulatory authorities to be secured prior to the establishment of any new pit.

3.7.6 Pressure Testing

Pipeline integrity is verified using hydrostatic testing, conducted in accordance with AS 2885.5. During hydrostatic testing, the pipeline is capped with test manifolds, filled with water and pressurised up to a minimum of 125% of design maximum operating pressure for a minimum of two hours. A minimum 24-hour duration leak test then follows.

Providing it meets applicable water quality guidelines, any conditions of applicable approvals and surface disposal has landholder approval, hydro-test water is discharged to the surrounding environment, applying the minimum performance standards of the APGA Code of Environmental Practice (2013). Sources of water will be investigated as part of the environmental impact assessment but it is expected that water for pressure testing will be sourced from adjacent properties (either from existing dams or bores), with agreement from the applicable landowner. If additional groundwater is needed, extraction approval will be sought from the relevant regulators.

As an indication of the volumes involved, the total volume of a 14” NT Link pipe extending for 632km would be approximately 63ML, indicating this would be the total volume of hydrotest water required if all water was used just once. It is proposed to reuse water by transferring from one to test section to another to reduce the volume of water required.

In general, it is expected that no chemicals will be added to hydro-test water as the pipeline is internally coated and coatings may be affected by aggressive water additives. However, in some locations chemicals may need to be added if there is danger of water with a very high pH affecting the integrity of the internal coating. In such cases - and in accordance with regulatory approvals - the water may be treated to neutralise alkaline elements to an appropriate standard before discharge to the environment. This discharge is a one-off event during commissioning of the pipeline and water is re-used wherever possible for multiple hydrotesting applications.

3.7.7 Access Tracks

Construction access tracks will be required where pipe delivery and construction contractor access to the Construction Corridor is required. Existing tracks will be used wherever possible and any additional clearing for access tracks, which will be quantified as part of the ongoing design refinement, will be conducted in accordance with applicable clearance permit, with the approval of the relevant landowner and in accordance with the standards enunciated in the Project CEMP and the APGA Code of Environmental Practice (COEP) (APGA 2013).

The total number of access tracks for the entire alignment (in both NT and Queensland) is likely to be 60-80, with the final number determined by alignment definition and location of camps and other ancillary works. It is likely that approximately 15 to 25 access tracks will be required in Queensland.

In general, station access tracks will be used, and upgraded if required, to get as close to the alignment as possible, with new turn-outs built only to allow Construction Corridor access if / when required.

New access tracks will be rehabilitated at the end of construction, unless the landholder requests they are left for the landowner's use – in which case they will be left in a stable condition.

After construction, a 3m-wide strip within the NT Link Construction Corridor will provide a track for ongoing operational maintenance access where use of Public roads and existing access tracks are insufficient for access to the ROW.

3.7.8 Waste Management

All Project waste will be managed in accordance with a Waste Management Plan based on industry best practice and in accordance with the Queensland Environmental Protection Policy (Waste Management) and all applicable legislated requirements. Waste management will be based on the waste hierarchy - avoidance, re-use, recycling and disposal. Any regulated wastes that are generated or otherwise encountered during pipeline construction will be managed in accordance with legislative requirements. Further details are provided in section 7.7.

3.7.9 Pipeline Operations

The NT Link pipeline will be operated under an approved Operations Environment Management Plan and in accordance with the requirements of its Pipeline Licence. The pipeline itself will be managed as a part of the existing and well-established APA gas network.

Specific pipeline operations and maintenance activities which will apply include:

- General equipment and facility maintenance
- Filter changes
- Cathodic protection surveys
- Pipeline excavation
- Venting
- Pipeline pigging
- Pipeline patrols
- Easement, facility and equipment inspections
- Breakdown and emergency response exercises.

Fuel and resource requirements for the NT Link operations are expected to be minimal.

Pipeline Construction Corridor patrols will be the primary mode of monitoring the pipeline during operations. Vehicle patrols will be completed by pipeline technicians at least annually and involve visual

inspections of the pipeline corridor from a light vehicle. Aerial patrols may be completed more frequently – up to as often as monthly or after significant events such as flooding. Patrols may identify issues such as:

- Third-party encroachments
- Vegetation growth
- Presence of weeds
- Erosion
- Exposed pipe
- Condition of signage and aerial markers.

Additional patrols are envisaged for the initial stages post-construction. These will include monitoring and inspection as a part of the pipeline construction defects liability period for the pipeline construction contractor, as well as inspections by landowners, tenement holders and third-party infrastructure owners for compliance with agreement conditions.

3.8 Workforce Requirements during Construction and Operation

NT Link construction will be predominately staged out of camps. The location and size will be dependent on the construction sequencing (which can be influenced by weather and other external factors) and the NT Link is currently expected to require about 5 camp locations, 2-3 in Queensland, with an estimated peak construction workforce of approximately 350-450 people. During initial construction stages and during pipeline commissioning some accommodation will be supplemented by existing local accommodation facilities (e.g. at Mt Isa and Tennant Creek) if appropriate. Construction duration is expected to be about 12-18 months, including pre-construction activities such as the development of camp locations and other ancillary areas.

In addition to the above the construction of the GPF, if required in Queensland, will require a maximum workforce of about 100 – 150 people.

Worker transportation from accommodation to site will be by either company bus or light vehicle (4WD), with all on-site transportation carried out using dedicated Project light vehicles safety-equipped as required by the Project construction risk assessment.

Some local employment opportunities will be provided during the construction stage of the Project and for activities supporting construction, such as the following:

- Traffic control
- Water carts
- Personnel transport to and from site
- Materials and equipment transport to and from site
- Camp management, operation and maintenance
- Fuel, water and gravel supply
- Machine supply and maintenance
- Labour
- Administration.

In addition to local employment opportunities, APA will work with Indigenous stakeholders to identify workforce capacity, skills and experience in an attempt to match skills and capacity to employment on the Project.

Operational employment will number approximately 1-2 people, augmented by existing personnel in Mt Isa and Tennant Creek.

3.9 Economic Indicators

The total cost of the Project is expected to be about $1.15 billion. Should the Gas Processing Facility proceed the total cost of the Project would increase to $1.35 billion.

The Project is expected to provide a number of economic benefits to the NT and Queensland including:

- Economic benefits to the NT as a whole from the increased royalties stemming from higher NT gas usage
- Contribution to increased output in the Project area resulting in local and regional economic growth
- Contribution to increased household income through potential increase in consumption and potential increase in savings and investment
- Contribution to employment, particularly in construction
- Potential local and regional manufacturing opportunities stemming from availability of a cost-effective energy source
- Generate a total Project income benefit of $100 million in the Project area
- Economic benefits to all eastern Australian manufacturers relying on gas, as well as increased direct and indirect employment, stemming from the increased certainty regarding gas supplies into the eastern gas grid.

Refer also to s.10 for additional discussion of contribution to local/state/national economies

Approximately $1.15 billion will be invested in the development and operation of the NT Link Project, including:

- $65 Planning and Design
- $270 Procurement
- $15 Early works
- $540 Construction
- $10 Commissioning
- $250 Operation

APA has a dedicated in-house Commercial team responsible for the day-to-day capital management of APA's assets, as well as its subsidiary 'joint venture' investments. In calendar year 2014 (to December 2014), APA undertook approximately $1.68 billion worth of debt refinancing with varying tenors between 3.25 years and 5.25 years. In December 2014, APA announced debt and equity raisings in excess of A$6 billion to successfully fund the acquisition of the Wallumbilla Gladstone Pipeline (formerly the QCLNG Pipeline) in Queensland.

Case studies that highlight APA's ability to raise both debt and equity to fund growth opportunities can be provided (on a Commercial in Confidence basis) to the Coordinator General in support of this IAS if required. Refer also to s.2.3 for additional discussion of the similar scale developments which APA has successfully financed.

4 LOCATION OF KEY PROJECT ELEMENTS

4.1 Location

In Queensland, the NT Link Project will commence at the Northern Territory boarder at approximately KP460 on the proposed alignment. The proposed alignment will then head in an east-south-easterly direction to the south of Camooweal before turning northwards towards its terminus with the Carpentaria pipeline approximately 6km south of Mt Isa. Approximately 170 km of the NT Link Project will be within Queensland.

From a topographical/bioregional perspective, the proposed alignment passes through approximately 60-70 km of Mitchell Grass country and then 100 km of the dissected plateaus and hills of the Mt Isa Inlier before terminating at Mt Isa.

A broader Queensland Project Area has been identified for the purpose of this IAS to allow for potential alignment changes which may be required as a result of Indigenous, landholder, environmental or technical constraints being identified during the environmental impact assessment, as well as to allow for additional areas which may be required for ancillary activities (e.g. access tracks, borrow pits, water bores) to be identified and/or further defined during the environmental impact assessment period.

4.2 Tenure

The proposed alignment in Queensland will intersect or traverse the parcels and tenure types shown in Table 11 below and Figure 4 above.

Table 11: Parcels and Registered Interests Intersected and Tenure Type

LOT	PLAN	Tenure Type
575	CP857742	Land Act Occupation Licence
1	AP6625	Unallocated State Land
265	FTY1762	Timber Reserve
10	SP240553	Unallocated State land
D	SP112891	Easement
A	SP101025	Easement
42	CP847157	State Leasehold
1	RD243	State Leasehold
10	SP240553	Unallocated State Land
2	WO28	State Leasehold
42	CP847157	State Leasehold

All considerations of intended tenures will be subject to discussion with the Queensland regulatory authorities and the following represents a preliminary review of the issue.

For State / Crown Land, a Petroleum Pipeline Licence granted under the P&G Act and an easement or option easement will be sought to be granted by owners of the land. Due to the risk of delay in obtaining a final easement, option easements would provide the equivalent of full rights to operate until the easement is registered.

If necessary, easements will generally be used to secure access tracks, and Pipeline Licence boundaries will be adjusted if required, so that they include the access tracks due to the likely absence of a benefited lot.

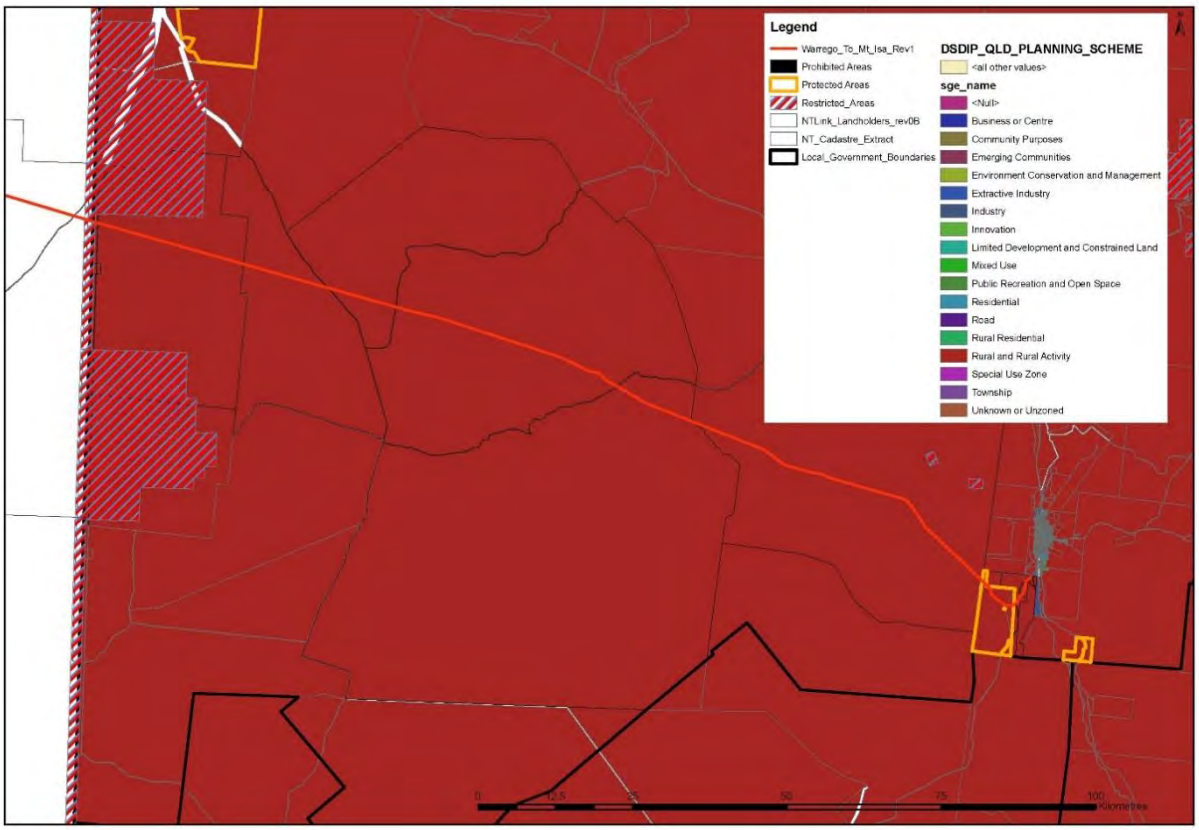
For Private Land, permissions (for the purposes of the Petroleum Pipeline Licence) will be utilised and an easement or option easement may be sought.

For roads and proposed roads under the control of Mt Isa City Council, it is assumed that tenure options include Ancillary Works and Encroachments permits (AWEs), contractual licence or no tenure. Given there appear to be few roads crossed, AWEs will be preferable. APA will confirm if potential future road works (and relevant vehicles) could pose a technical risk to pipeline integrity and adjust design and tenure strategy appropriately. APA will confirm with Mt Isa City Council, its willingness to grant AWEs.

In respect of Travelling Stock Routes (which are generally classed as roads for tenure purposes in Queensland) AWEs will be sought, subject to confirmation that Mt Isa City Council or relevant controlling authority is willing to grant AWEs for its stock routes.

The local government planning scheme is that determined by the Mt Isa City Council. Under this scheme, the entire Project area is zoned 'Rural and Rural Activity', as shown in Figure 12. APA considers that the NT Link is consistent with this zoning and will seek such planning approvals as is required from the council. A number of development activities will be conducted pursuant to the authorisations provided by petroleum tenures granted under the P&G Act for which planning approval may not be required. Planning approval is a subordinate approval stemming from the assessment process.

Figure 12: Local Government Zoning



5 DESCRIPTION OF THE EXISTING ENVIRONMENT

5.1 Natural Environment

The following sections present a description of the existing environment. It is recognised that the following descriptions are not an exhaustive and further studies will be undertaken as part of the environmental impact assessment process.

5.1.1 Land

In Queensland, the alignment extends east from the NT border through 60km of Mitchell Grass downs and then transits 100km of the dissected plateaus and hills of the Mt Isa Inlier before terminating at Mt Isa.

There are no nature conservation reserves (e.g. national parks) or areas protected by international treaties (e.g. Ramsar wetlands) potentially impacted by the Project. There is a protected area south west of Mt Isa (Royton Timber Reserve) which is transected by the proposed alignment.

There are no records of subsidence along the proposed alignment.

Visual amenity for the initial 60-70 km extending east from the NT border is generally that of open savannah country, with essentially uninterrupted vistas extending across the essentially flat and treeless plains for up to 20km. From the start of the Mt Isa Inlier foothills to the NT Link Project alignment terminus south of Mt Isa, the visual amenity ranges from unimpeded views of the low, rolling, dissected foothills with occasional longer vistas available from high points and views across ephemeral watercourses and braided drainage lines.

During daytime, the visual amenity includes relatively little evidence of human influences with occasional property lighting visible at night, increasing in relative occurrence closer to Mt Isa.

Geology mapping covering the NT Link alignment (Mt Isa 1:250,000 sheet) indicates a number of distinct geologies occur across the study area, reflecting the complexity and antiquity of the area. The geology to the west of Mt Isa is mainly classed as Palaeoproterozoic and encompasses ancient sedimentary, metamorphic and igneous rocks. The wide range of rock types and minerals is due to a very complex system of faulting and folding which continued over long periods. Some more recent Quaternary deposits are associated with Mica Creek. Around KP 552, the surface geology reflects more recent events encompassing Quaternary residual deposits and deeply weathered, duricrusted land surfaces. Extensive areas of Cainozoic clay plains dissected by Quaternary alluvium start to the east of KP 486 and continue to the NT border (for more detail and mapping, refer to 2.3 and Maps 2-1 to 2-13 of O2 2015 at Appendix A).

The landform across the study area varies from extensive clay plains between KP 428 and 486 with minor areas of residual Tertiary surfaces and riparian areas associated with current waterways. The area closer to Mt Isa becomes more undulating with areas of granite tors and waterways. Land systems mapped for the NT Link study area are listed in Table 12 (from O2 Ecology at Appendix A).

Table 12: Land Systems and Dominant Land Units

Land System	Description
M - Mt Isa	Dissected country of Georgina Basin without lateritic remnants. Rugged, hilly country with North-South ridges; mostly rock outcrops or skeletal soils; *E. leucophloia* woodland
WV - Waverley	Dissected country of Georgina Basin without lateritic remnants. Undulating to low hilly country; mostly skeletal soils occasional rounded granite boulders; *E. leucophloia* woodland
BN - Bundella	Post-Miocene coarse-textured alluvia. Undulating; "Bundella" soils; *E. leucophylla — Corymbia terminalis* shrub woodland
KL - Kallala	Post-Miocene Fine-textured Alluvia. Very gently undulating "black-soil" plains; heavy brown pedocals; *Astrebla pectinata* grassland or *Acacia georginae— Astrebla pectinata* woodland
Y - Yelvertoft	Dissected country with lateritic remnants. Hilly to undulating country; mostly skeletal soils or truncated gravelly lateritic red earths; *E. leucophloia* or *Corymbia capricornia* woodland
WH - Wonorah	Gently undulating Tertiary lateritic plains; Lateritic red earths; *E. leucophloia* woodland or E. spp. (low mallees) —*Acacia* spp. shrubland
WHB1 – Wonorah/Barkly	Gently undulating Tertiary lateritic plains with areas of Tertiary swamp; Lateritic red earths; *E. leucophloia* woodland or E. spp. (low mallees) —*Acacia* spp. shrubland. with very gently undulating areas of heavy grey pedocals; *Astrebla pectinata* grassland
G - Georgina	Channel alluvia of the Georgina River and major tributaries. Gently undulating "black-soil" plains cut by braided streamlines; Heavy grey pedocals; *Astrebla pectinata* grassland

Soil types within the Project area are generally characterised as follows:

- From the NT border to approximately KP496, the alignment crosses generally black soil plains
- From approximately KP496 to the end, the proposed alignment encounters hilly country with drainage lines and erosional areas, and the possibility of saline dispersive soils in places.

A desktop review of the land in the Project area identified:

- The land is not located within a Priority Agricultural Area, Strategic Cropping Area, Priority Living Area, Strategic Environmental Area or environmental offset
- Some potential for acid sulphate soils at inland lakes, waterways and wetlands but of a low risk overall
- That the land is suitable for pastoral agriculture but its productivity is limited by water availability
- The area is not located within an important agricultural land area identified in the Queensland Agricultural Land Audit.

5.1.2 Water

Within Queensland, the majority of the Project is located within the upper reaches of the Georgina River Basin (KP 318 – 619). This is a large drainage basin comprising land within Queensland and the Northern Territory which flows south-eastwards to Lake Eyre in South Australia. At the eastern-most extent of the Project (KP 619-630), located south of Mount Isa, the alignment crosses the headwaters of the Leichardt River Basin which flows to the Gulf of Carpentaria. The rivers present are classified as dry-land rivers. These rivers have highly variable flow patterns governed by rainfall, with limited groundwater fed flows.

Groundwater within the Georgina Basin is understood to provide relatively high yields particularly from structural elements such as limestone caverns that are large and interconnected. Water quality from these aquifers is also relatively good. Groundwater availability and quality reduces towards the eastern end of the alignment.

The allocation of surface water and groundwater for human and environmental uses within the Project area is governed by the Water Resource (Gulf) Plan 2007 and Water Resource (Georgina and Diamantina) Plan 2004 respectively.

The alignment is entirely inland and has been selected to avoid the vicinities of any permanent water bodies including wetlands, swamps and dams. It does not cross any permanent drainages and will not require the permanent diversion of any drainages, waterways or any other surface water feature.

Small, ephemeral, braided drainage lines associated with Buckley River, Nottingham Creek, Mingera Creek, Templeton River and Mica Creek will be crossed by the alignment. A number of these drainage lines may be classed as ‘watercourses’ by the Queensland Government, to the extent that the proposed alignment crosses an estimated 30 ‘watercourses’ – as described in Table 13.

Table 13: Mapped Waterways Crossed by the Current Pipeline Alignment

Location (KP)	Stream Order
Between KP 518 and 519	Unknown
Near KP438	Unknown
Near KP441	Unknown
Between KP 436 and 437	Unknown
Between KP 460 and 461	Unknown
Between KP 506 and 507	1
Between KP 518 and 519	Unknown
Near KP 519	Unknown
Between KP 436 and 437	Unknown
Near KP438	Unknown
Near KP441	Unknown
Between KP 460 and 461	Unknown
Between KP 506 and 507	1
Between KP 518 and 519	Unknown
Between KP 518 and 519	Unknown
Between KP 547 and 548	2
Between KP 550 and 551	2
Between KP 557 and 558	1
Between KP 559 and 560	2
Between KP 559 and 560	1
Between KP 559 and 560	3

Location (KP)	Stream Order
Between KP 560 and 561	4
Near KP 565	1
Between KP 567 and 568	1
Between KP 570 and 571	1
Near KP 572	1
Between KP 573 and 574	1
Between KP 576 and 577	1
Between KP 577 and 578	1
Between KP 580 and 581	2
Between KP 583 and 584	1
Near KP 588	1
Between KP 592 and 593	2
Between KP 592 and 593	1
Between KP 593 and 594	2
Between KP 594 and 595	1
Between KP 594 and 595	3

A preliminary flood risk assessment was conducted by APA as part of its initial route review and constraints analysis. This analysis focussed on broader risk across the whole alignment, particularly the risk inherent in periodic flooding and the general risk posed by seasonal rainfall.

It is recognised that the watercourses and drainage lines of the Mitchell Grass Downs which extends for approximately 60km east from the NT border are susceptible to flood events which are generally associated with the summer wet season and so a detailed flood risk study of the proposed alignment will be conducted by APA, as part of the alignment definition process and in order to identify localised risks, and options for their avoidance.

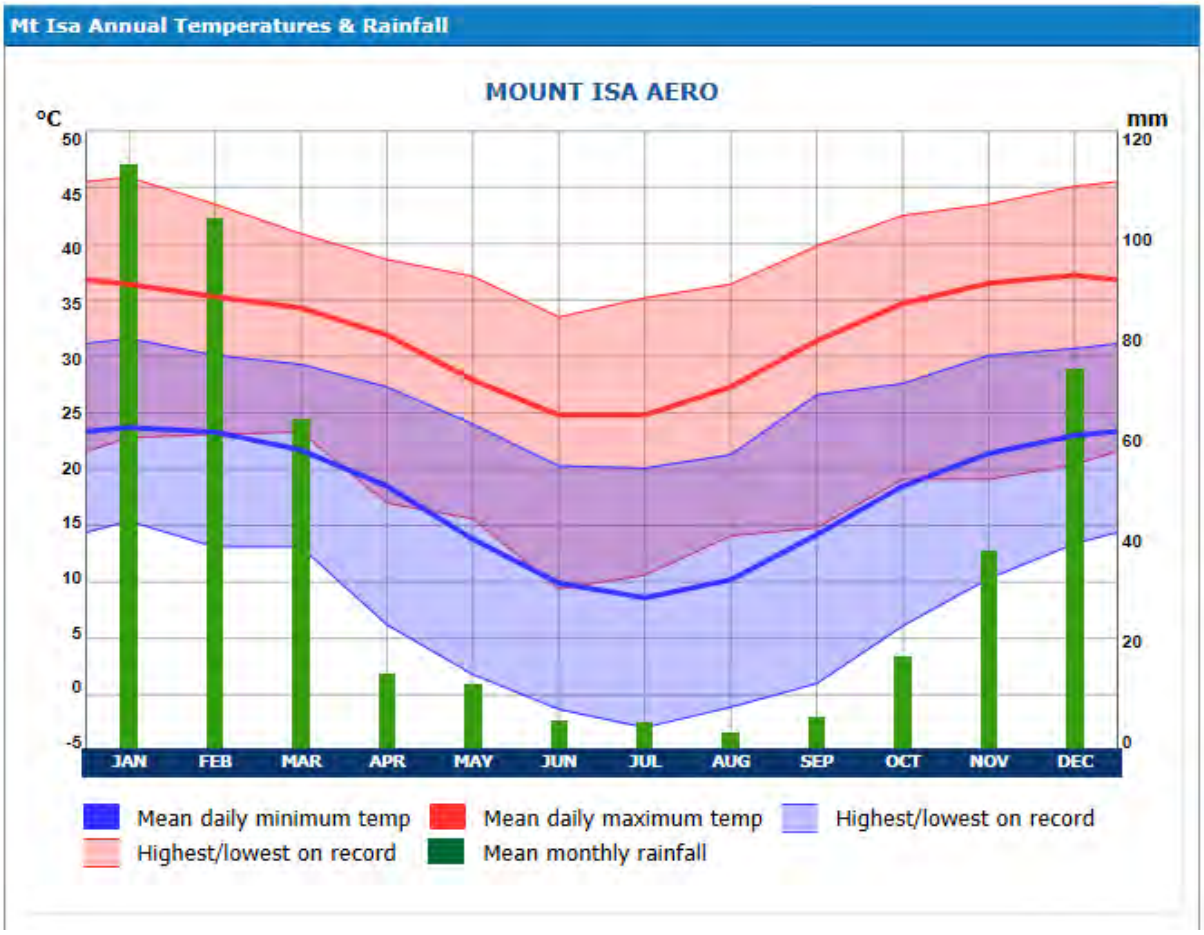
5.1.3 Air

The NT Link Project in Queensland is totally located within the Mt Isa airshed.

The air in the Mt Isa airshed is generally regarded as being of very good quality with the exception of periodic problems caused by SO_2 and PM_{10} levels in emissions from the city's industrial complexes. In response to this, a second air quality monitoring station – The Gap station – was set up in 2009, to supplement the previous station, Menzies, which is located in a direction that is often upwind of the industrial complexes.

The local climate is represented in Figure 13 which summarises weather data from the Mt Isa Bureau of Meteorology site at Mt Isa aerodrome.

Figure 13: Climate Averages for Mt Isa



Source: http://www.weatherzone.com.au/

If land-use change is not considered, Greenhouse gas (GHG) emissions in Queensland are slowly increasing, according to the most recent inventory published by the Commonwealth government at http://www.environment.gov.au/system/files/resources/255447ab-3c51-412e-9756-921ef23cb8aa/files/state-territory-inventories-11-12.pdf - up 71.6% from the base year (1990). If land-use change is taken into account, the trend reverses, with Queensland emissions declining by 9.8% since 1990. Data from the Clean Energy Regulator indicates that Mt Isa businesses are not amongst the top 20 GHG emitters.

GHG emissions from the construction elements of the Project will be limited to flaring and exhaust gases from construction equipment and power generation at the camps, Gas Processing Facility and a full

inventory of these and an associated GHG emission estimate will be developed as part of the NT Link Project environmental impact assessment (see also s.6.2.3.1).

Operational impacts for a gas pipeline are limited to deliberate gas venting for safety purposes during periodic maintenance activities. Any pipeline leaks from the operating pipeline would be detected immediately by the pipeline gas monitoring system, allowing immediate shutdown to prevent further losses.

5.1.4 Ecosystems

A desktop and field assessment has carried out by O2 Ecology (Appendix A) to identify and assess the ecological values within a 1km corridor inclusive of the proposed alignment. A five day post-wet (autumn) season fauna and flora survey was carried out between 27 April and 2 May 2015 to:

- assess flora, including endangered, vulnerable and near threatened species listed under the Queensland Nature Conservation Act 1992 (NC Act) and Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)
- assess fauna, including endangered, vulnerable and near threatened species listed under the NC Act and EPBC Act and their breeding places
- assess pest fauna and flora (weed) species
- assess vegetation communities and remnant Regional Ecosystems
- ground-truth mapped areas of high ecological significance including, but not necessarily limited to, riparian areas, nationally threatened ecological communities, large tracts of remnant vegetation, corridors and special biodiversity areas.

The following sections are based on the ecology survey conducted by O2 Ecology, as represented in the report at Appendix A.

The study area occurs within the Mitchell Grass Downs and Northwest Highlands bioregions.

Mitchell grass (*Astrebla* spp.) tussock grassland occurs on rolling plains of deep, heavy grey or brown clays dominate the Mitchell Grass Downs bioregion. The western portion of the study area falls within the Barkly Tableland subregion (MGD07) of the Mitchell Grass Downs bioregion. *Astrebla pectinata* grasslands on extensive Tertiary clay plains overlying limestone beds dominate this subregion. *Acacia aneura* (mulga), eucalypt and chenopod open woodland to shrubland communities occur on swamps or sand sheets and intermittent drainage lines and alluvial plains support eucalypt woodland, grasslands and open herb lands.

In the Northwest Highlands bioregion, stony hills and ranges dominate and mining and extensive cattle grazing are major land uses. The central portion of the study area falls within the south-western Plateaus and Floodouts subregion (NWH01) of the Northwest Highlands bioregion. Near-horizontal sand sheets overlying Cretaceous sandstones and shales and supporting a range of eucalypt woodlands dominate the subregion. The eastern portion of the study area falls within the Mt Isa Inlier subregion (NWH03) of the Northwest Highlands bioregion. This subregion contains the majority of the heavily folded sediments of the bioregion with small areas of alluvium throughout. Low open woodlands of snappy gum (*Eucalyptus leucophloia*) occur on siliceous rocks.

Version 9.0 of the certified RE mapping shows approximately 17,135 ha of remnant vegetation of 24 Regional Ecosystems and approximately 57 ha of non-remnant vegetation mapped within 500m of the proposed alignment. All transected remnant REs are classed as Least Concern under the provisions of the VM Act (see Table 6 of O2 2015 at Appendix A for descriptions of the REs).

Areas identified as Essential Habitat for the listed purple-necked rock-wallaby (*Petrogale purpureicollis*) have been mapped over the study area within Lot 575 on CP857742 (Appendix A). The proposed alignment does not pass through any mapped Essential Habitat.

Within the study area there were:

- No world heritage properties or wetlands of international importance
- No Commonwealth lands, Commonwealth or national heritage places, critical habitats, nationally important wetlands or Commonwealth reserves
- No commonwealth marine areas or Great Barrier Reef Marine Park
- No listed Threatened Ecological Communities.

There are a series of mapped Matters of State Environmental Significance (MSES) wetlands located between KP449 and KP456. Based on the recommendations provided by the ecological impact assessment the alignment has been revised to avoid any impacts on these MSES (refer Appendix A for details).

5.1.5 Flora and Fauna

5.1.5.1 Listed Species

An assessment of the likelihood of occurrence of species protected under the EPBC Act indicates that 28 listed migratory or marine species and 6 threatened species are at least moderately likely to occur within the study area. The six threatened species are:

- Australian painted snipe (*Rostratula australis*)
- Carpentarian antechinus (*Pseudantechinus mimulus*)
- Gouldian finch (*Erythrura gouldiae*)
- greater bilby (*Macrotis lagotis*)
- plains death adder (*Acanthophis hawkei*)
- red goshawk (*Erythrotriorchis radiatus*).

No EPBC Act listed flora or fauna species were detected during the survey. Refer to s6.6 for more detailed discussion of potential environmental impacts stemming from the Project on Matters of National Environmental Significance, as listed under the EPBC Act.

An assessment of the likelihood of occurrence of species protected under the NC Act indicates that 12 threatened species are at least moderately likely to occur within the study area, namely:

- Ptilotus maconochiei
- Australian painted snipe (*Rostratula australis*)
- Carpentarian grasswren (*Amytornis dorotheae*)
- ghost bat (*Macroderma gigas*)
- Gouldian finch (*Erythrura gouldiae*)
- greater bilby (*Macrotis lagotis*)
- grey falcon (*Falco hypoleucos*)
- northern leaf-nosed bat (*Hipposideros stenotis*)
- orange leaf-nosed bat (*Rhinonicteris aurantia*)
- painted honeyeater (*Grantiella picta*)
- purple-necked rock-wallaby (*Petrogale purpureicollis*)
- red goshawk (*Erythrotriorchis radiatus*).

A number of these species are priority species listed in the Desert Channels NRM region Back on Track report (Department of Environment and Resource Management 2010a) and/or in the Southern Gulf NRM region Back on Track report (Department of Environment and Resource Management 2010b).

One threatened species, purple-necked rock wallaby (*Petrogale purpureicollis*), listed as Vulnerable under the NC Act, was observed at Camp 2 (z54 E:329568, N:7704653) near Mount Isa. Areas identified as Essential Habitat for purple-necked rock-wallaby (*Petrogale purpureicollis*) have been mapped over the study area within Lot 575 on CP857742 but this will be avoided by the alignment. No NC Act listed flora species were detected during the survey.

5.1.5.2 Weeds and Pests

Weed species considered to be of greatest threat to natural and economic values on a national basis have been ranked as Weeds of National Significance (WONS). At a State level, the *Land Protection (Pest and Stock Route Management) Act 2002* (LP Act) identifies those weed and pest animal species that represent a threat to primary industries, natural resources and the environment. Under the LP Act, a weed and pest animal species can be declared as a Class 1, 2 or 3.

Wildlife Online database searches indicate that three declared pest plant species have previously been recorded within the study area, *Cascabela thevetia* (Class 3), *Parkinsonia aculeata* (Class 2 and WONS),*Tamarix aphylla* (Class 3 and WONS). One Class 2 declared animal species has also been recorded within the study area, Sus scrofa (feral pig).

Seven exotic or weed species were recorded during the field inspections, of which one was a declared weed species, *Parkinsonia aculeata*.

5.1.5.3 Flora

Including the weeds noted in s. 5.1.5.2, the ecologist field survey detected a total of 107 plant species.

5.1.5.4 Fauna

Including the listed species and pests noted in s.5.1.5.1 and s.5.1.5.2, the survey detected 52 bird, 19 mammal (three introduced) and 19 reptile species, as well as 20 aquatic invertebrate families within the study area.

5.2 Social and Economic Environment

5.2.1 Economic and Demographic Characterisation

The region between the Queensland border and the NT Link tie-in to the Carpentaria Gas Pipeline consists of natural land used primarily for low-density grazing and the urban centres of Camooweal and Mt Isa.

Camooweal is a small town located 188km north-west of the city of Mt Isa and 12km east of the NT border. Local government is provided by the Mt Isa City Council. The town lies on the Barkly Highway, and is adjacent to the Georgina River. At the 2011 census, Camooweal had a population of 187. There is an airstrip that is used by the Royal Flying Doctor Service to bring medical services to the town and to supply medical services to outlying areas. The town's two major activities are tourism and as a limited service center for outlying pastoral properties. Camooweal has no major industrial or manufacturing facilities.

The Mt Isa City Council region has a population of close to 22,000, produces excellent quality beef from its 250,000-head herd and is known internationally as one of the world's top 10 producers of copper, lead, silver, and zinc. It has a relatively young demographic, with the majority of the population less than 34 years old (ABS 2014).

Mt Isa is a vibrant and progressive city (http://www.mountisa.qld.gov.au/about-isa) and has become the administrative, commercial, and industrial centre of North West Queensland. The local government area

covers over 43,310 square kilometres (including the township of Camooweal), making it the second largest city by area in Australia. Today, the Mt Isa City Council operates tourism and entertainment facilities, supports local industry and commerce, and provides for the needs of all residents and visitors alike.

Mt Isa's industry is largely dependent on mining. Glencore (including through its subsidiary Mount Isa Mines Limited) operates the Mt Isa Mines lease adjacent to the city, which comprises the "Enterprise" underground copper mine, X41 underground copper mine, "Black Star Open Cut" silver-lead zinc mine, and metallurgical processing facilities. Silver-lead-zinc ore is also mined 20km to the north at Hilton from the "George Fisher" underground mine and the adjoining "Handlebar Hill" open cut, which is trucked back to Mt Isa for processing. Attractions include the Hard Times Mine at "Outback at Isa" and The Mt Isa Rodeo and Mardi Gras (held on the same weekend) has given Mt Isa the title of "Rodeo Capital of Australia".

Preliminary consultations with major stakeholders in the vicinity of the proposed NT Link alignment has not revealed any potential conflicts with other developments. A review of the Queensland coordinated projects database and Commonwealth EPBC Act referrals database indicate there are no major developments proposed in the region.

The proposed alignment intersects several mineral tenements as described in s.5.4.2 and listed in Table 15 and Table 16. APA has commenced consultation with the owners of these tenements to reach agreement on pipeline alignment location and the activities involved in its construction and operation.

5.2.2 Accommodation and Housing

It is expected that for the early Queensland construction period, the construction contractor will use existing Mt Isa accommodation as far as possible and where appropriate. One of the functions of the early works process will be determine the availability of pre-existing accommodation and, depending on whether construction begins in the Northern Territory or Queensland, to erect the first construction camp, the location of which will be determined during the environmental impact assessment. The main construction workforce itself, following the advance party, will largely be accommodated in the temporary construction camp located closer to the Queensland / NT border, in a location yet to be determined. See s.3.4.2.5 for additional information on the structure and function of the anticipated NT Link Project construction camp. Two to three camps are expected in Queensland.

It is anticipated that most service providers will be Mt Isa based, using their existing local accommodation.

The relatively small permanent operations workforce (1-2 persons supplemented by existing personnel) will most likely be located in either Mt Isa or Tennant Creek

5.2.3 Social and Recreational Services

Mt Isa and Camooweal provide a complete suite of social and recreational services, including clubs associated with the following activities:

- Art
- Bowls
- Cycling
- Square dancing
- Running
- Cricket
- Football

- Sporting shooters
- Fishing
- Campdrafting
- Basketball
- Golf
- Hockey
- Judo
- Water-skiing

A typical pipeline construction camp caters for personnel conducting a working shift. This does not usually involve 'weekend' type activities or extended recreational periods of any sort and so a construction will usually offer a more limited range of sport and recreational facilities, such as the following:

- Basketball
- Cricket nets
- Golf practice net
- Volleyball
- Snooker and billiards
- Running

5.3 Cultural Heritage (Indigenous and Non-Indigenous)

As part of its more detailed assessment and approval processes, APA will consult the Aboriginal Parties (identified in accordance with the Aboriginal Cultural Heritage Act 2003 (Qld) and seek to endorse them to develop a CHMP site custodians and other Aboriginal stakeholders to develop and arrange acceptance of a Cultural Heritage Management Plan. The CHMP will detail the processes to be adopted to avoid harm to Aboriginal cultural heritage sites and the mitigation measures to be applied should any previously unidentified Aboriginal cultural heritage new sites be located. Built Environment

There are no state-listed sites of European heritage within close proximity to the proposed alignment, as shown in Table 14.

Table 14: State-listed European Heritage

Queensland Heritage Listed Places - Mt Isa Shire Council			
Heritage Place	ID	Location	Impact
Bower Bird Battery	601863	Mt Isa Mining District	No Impact - proposed pipeline over 4km away
Casa Grande	601094	Nettle Street - Mt Isa	No Impact - proposed pipeline approximately 5km away
Community Hall, Camooweal	600740	CAMOOWEAL, Barkly Highway	No Impact - proposed pipeline over 40km away
Former Underground Hospital	601102	Camooweal Street, Mt Isa	No Impact - proposed pipeline over 5km away
Freckleton's Stores	600739	Barkly Street, CAMOOWEAL	No Impact - proposed pipeline over 40km away
Hodgkinson's Marked Tree	600741	Rocklands Station, MOUNT ISA	No Impact – tree is north of Camooweal
Mt Isa Mine Early Infrastructure	601182	on Mt Isa Mine Lease, Mt Isa	No Impact – proposed pipeline over 4km away
Tent House (Mt Isa)	600742	Camooweal Street, Mt Isa	No Impact - proposed pipeline over 5km away
Tree of Knowledge	600738	Barkly Street, CAMOOWEAL	No Impact - proposed pipeline over 40km away

5.3.1 Traffic and Transport

The Project region is serviced by:

- The Barkly Highway (National Highway A2) heading east-west and by the Diamantina Development Road (Major Road 83) which heads south from Mt Isa
- The Mt Isa airport which is the base for the only scheduled domestic flights in the region and is also used for extensive local helicopter and fixed-wing charter and private flight services
- Rail from Townsville – a distance of 967km. The railway between Hughenden and Cloncurry traverses black soil plains necessitating at times the imposition of speed restrictions (QR 2007).

The materials transport strategies for the Project are yet to be finalised. Options being considered are pipe material being shipped into the Port of Darwin or the Port of Townsville. Once in country, pipe will either be transported by train or truck into laydown areas at either the Cloncurry/Duchess/Mount Isa and/or Tennant Creek ends and/or to a number of intermediate laydown areas along the alignment. The highest traffic option for Queensland would be if all pipe is transported by road to the Mount Isa end of the alignment. Approximately 1,000-1,200 trailers will be required to transport the pipe to the alignment in Queensland.

Transport from any terminus to the Project will be to a holding location, from which pipe will be distributed to laydown locations close to the active construction front. These (temporary) laydown locations are expected to be determined as part of the Project's pre-construction planning.

Other significant transport activities associated with the Project will be related to general construction personnel and equipment movements (including daily personnel movements between the worksite and camp). In Queensland, it is expected that the majority of this movement will be off the main public roads.

A road and traffic impact assessment and management plan will be developed as part of the Project's environmental impact assessment process.

5.3.2 Community Amenities

The regional centre of Mt Isa offers an extensive range of community amenities, as summarised in s.5.2.3. Further information may be found at http://www.mountisa.qld.gov.au/sportandrec. A full spectrum of social services is available within the region, including emergency, health and disability services and there is a wide variety of sport and recreational grounds and facilities provided and maintained by the Mt Isa City Council.

5.4 Land Use and Tenures

5.4.1 Key Local and Regional Land Uses

Refer to s.4.1 and 4.2

5.4.2 Key Local and Regional Land Tenures

Refer to s.4.1 and 4.2.

Mining tenements traversed or intersected by the proposed NT Link alignment are shown in Table 15 and Table 16.

Table 15: Mining Exploration Permits

MINERAL TITLE - EXPLORATION – GRANTED	
Exploration Permit Number	**OWNER**
EPM 19093	AUSTRALIA NEW AGRIBUSINESS & CHEMICAL GROUP LTD
EPM 19092	AUSTRALIA NEW AGRIBUSINESS & CHEMICAL GROUP LTD

MINERAL TITLE - EXPLORATION – GRANTED	
Exploration Permit Number	**OWNER**
EPM 18817	CST MINERALS LADY ANNIE PTY LIMITED
EPM 15212	AEON WALFORD CREEK LIMITED
EPM 25894	MILLUNGERA ENERGY MINERALS PTY LTD
EPM 19373	MARK MINING AND RESOURCES PTY LTD
EPM 25894 (Application)	MILLUNGERA ENERGY MINERALS PTY LTD
EPM 19818	HAMMER METALS AUSTRALIA PTY LTD
EPM 12886	MOUNT ISA MINES LIMITED

Table 16: Mining Leases

QLD MINERAL TITLE - ML – GRANTED	
Mining Lease Number	**OWNER**
ML 8058	MOUNT ISA MINES LIMITED
ML 5576	MOUNT ISA MINES LIMITED

5.4.3 Native Title

Refer to section 3.2.5 above.

5.5 Planning Instruments, Government Policies

For descriptions of applicable legislation and approvals, please refer to section 9, and for application of the MT Isa Planning Scheme, please refer to Figure 12 in s.4.2.

Environmental Protection Policies for Queensland are subordinate instruments created under the Environment Protection Act. The following EP Policies are applicable to the Project:

- Environmental Protection (Air) Policy 2008
- Environmental Protection (Noise) Policy 2008
- Environmental Protection (Water) Policy 2009
- Environmental Protection (Waste Management) Policy 2000.

APA is also cognisant of the Queensland Government social impact mitigation measures as presented in its *Sustainable Resource Communities Policy 2008*.

Each of these policies identifies the values and performance objectives required to protect these values.

In considering these potential adverse impacts, APA is cognisant of the Queensland Government Sustainable Resource Communities Policy and is committed to its effective application to the NT Link

Project. This will be achieved largely through a scheme of analysis and mitigation measures presented in a social impact assessment. The social impact assessment may detail the roles and responsibilities of APA, government, stakeholders and communities throughout the life of the Project, in mitigating and managing social impacts and opportunities during NT Link construction, operation and the decommissioning.

6 POTENTIAL IMPACTS OF THE PROJECT

6.1 Natural Environment

6.1.1 Land

The siting of the infrastructure described in the above sections, including the approximately 630 km of underground pipeline, will require clearing of vegetation and grading (and reinstatement) of topsoils and subsoils for the pipe trench. This clearing and land disturbance generally represents a relatively narrow strip (and area) in the context of the extensive landscapes in which they will occur.

The vegetation clearing and soil disturbance will need to be carefully managed in order to minimise the risk of soil erosion, particularly in areas subject to overland flow during floods or heavy rainfall events.

Precise estimates of vegetation and land disturbance areas will be provided in the Project's environmental impact assessment.

Measures for managing waste and contamination risks will be detailed in the Project's environmental impact assessment.

The environmental impact assessment will consider the requirements of the Department of Environment and Heritage Protection's (2013) environmental authority *Application Requirements for Petroleum Activities* with respect to risks and impacts on land values.

6.1.2 Water

In the absence of appropriate management measures, potential impacts to water would include the following:

- Reduction in water quality as a result of increased sediment load
- Contamination of surface or groundwater by product or chemicals
- Altered drainage patterns and water flow regimes
- Secondary impacts on flora and fauna as a result of altered water quality or quantity
- Wasting water.

Review of these issues has allowed APA to develop water impact mitigation objectives, including the following:

- To control and minimise the volume of sediment entering waterways from erosion, from the pipeline Construction Corridor, from associated Project works or facilities or from operational activities
- To prevent contamination of surface water, watercourses and groundwater
- To manage surface water flows and to minimise potential adverse impacts associated with altered flow regimes
- To minimise indirect impacts to flora and fauna, and direct impacts to riparian, aquatic and water-dependant flora and fauna
- To minimise water use to the extent practical for the promotion of safe operations and a healthy workforce

Programs to fulfil these objectives are considered further in 7.1.2.

All water emissions will be assessed against the requirements stipulated in the *Environmental Protection Act 1994*, including considerations stated in the *Environmental Protection Regulation 2008* and the

Environmental Protection Policy (EPP) for Water 2008. The Queensland Water Quality Guidelines would apply as default objectives for any released water.

6.1.3 Ecosystem

All remnant Regional Ecosystems transected by the proposed route are classed as Least Concern under the provisions of the VM Act. As such, no listed ecosystems will be impacted by the proposed alignment.

Potential impacts to ecosystems in general terms include the following (APGA 2013):

- Reduced vegetation cover leading to:
  - erosion and sedimentation
  - loss of agricultural productivity
  - disruption of native fauna movement along migratory pathways
  - loss of visual amenity
- Disturbance to existing vegetation
- Loss of habitat for native fauna
- Disturbance of breeding habitat of native fauna
- Excessive vegetation regrowth
- Establishment of weed and invasive species.

Potential impacts to ecosystems will be quantified as part of the Project's environmental impact assessment.

6.1.4 Flora and Fauna

6.1.4.1 Flora

In relation to flora species in general, potential impacts from a pipeline Project consist of the following:

- Disturbance to existing vegetation
- Excessive vegetation regrowth
- Establishment of weed and invasive species
- Interference with or permanent alteration of waterways and / or drainage patterns
- Introduction of herbivorous pests
- Erosion and sedimentation
- Interference with connectivity.

Potential impacts to flora species will be quantified as part of the Project's environmental impact assessment. For a review of impacts on MNES please refer to section 6.6.

6.1.4.2 Fauna

Potential impacts to the known fauna species of State conservation significance, Purple-necked Rock Wallaby (*Petrogale purpureicollis*), could occur if the following take place:

- The mapped Essential Habitat for the Purple-necked Rock Wallaby within Lot 575 on CP857742 is traversed by the alignment
- Accidents involving the Purple-necked Rock Wallaby and Project traffic occur
- Purple-necked Rock Wallabies become trapped in open trenches.

Mitigation measures to minimise the risk of impacts to Purple-necked Rock Wallaby and other NC Act listed fauna will be presented as part of the Project's environmental impact assessment.

In relation to fauna species in general, potential impacts from a pipeline Project consist of the following (derived from APGA 2013):

- Construction will be in general compliance with relevant guidelines within listed in APGA CoEP
- The Project and associated works will be located away from wetland areas and waterways
- Confirmed nesting trees to Gouldian finch and red goshawk will be retained
- Preclearance flora and fauna surveys in advance of clearing activities
- Clearing works will be limited to a temporary 30 m wide corridor and ultimately a permanent 3 m wide 4wd track
- Felled brush/trees will not be burnt and will be retained in regular stockpiles in the vicinity of the ROW (subject to landholder agreement)
- Fauna spotter / catcher to be present wherever a trench is open.

Potential impacts to fauna species will be quantified as part of the Project's environmental impact assessment. Further targeted species surveys will also be carried out, including surveys for Gouldian finch and Carpentarian antechinus.

For a review of impacts on MNES please refer to section 6.6.

6.2 Amenity – Including Noise and Vibration, Air Quality, Lighting, Urban Design and Visual Aesthetics

Amenity impacts potentially include: noise, vibration, air quality, lighting, and visual aesthetics. The Project site is remote from built up areas and amenity impacts are expected to be minimal. The principle amenity issues associated with constructing a major pipeline include the following:

- Presence of workforce
- Ground disturbance activities
- Nuisance caused by night lighting
- Project visual impacts and modification on existing viewscape
- Delays in re-instatement and rehabilitation of existing environment.

These potential impacts are considered in the following sub-sections.

6.2.1 Noise

The majority of the proposed alignment is several kilometres from the nearest sensitive receptors. One exception is a residence near the eastern end of the alignment which is within 350 m. The potential to impact upon any sensitive receptors will be considered as part of the Project's environmental impact assessment.

None-the-less, construction hours will generally be restricted to the daytime with few exceptions – such as urgent response situations (safety risks), HTB of infrastructure, pipeline hydrotesting.

During commissioning of the Project, air will be discharged through valves during the purging and introduction of gas. The noise impact from air release is expected to be minimal, as this activity will be temporary and would be limited to valve sites along the proposed alignment.

No significant noise would be generated from normal operation of the Project. Valves will be located away from homesteads. However, if venting is required (e.g. emergency release) a very loud, high-pitched noise would be generated. This would generally only occur in an emergency and would be a rare event.

All noise emissions will be assessed against the requirements stipulated in the *Environmental Protection Act 1994*, including considerations stated in the *Environmental Protection Regulation 2008* and the *Environmental Protection Policy (EPP) for Noise 2008*.

6.2.2 Vibration

Construction and operation of a gas pipeline are not activities associated with vibration, with the exception of blasting. Where the use of conventional excavation or ripping equipment is not feasible, it may be necessary to use controlled blasting. The handling, storage and use of explosives is governed by prescriptive legislation and Australian Standards and will require site-specific programs to be approved by the Queensland EPA.

Given the remoteness of the Pipeline, vibration/ blasting impacts are considered unlikely. None-the-less, APA will minimise the potential impact from blasting, including potential vibration nuisance, by adopting the following approach:

- Acting in accordance with the guidelines within the APGA Code of Environmental Practice (2013)
- Conducting the selection, storage and handling of explosives in accordance with the Australian Dangerous Goods Code and the Australian Explosives Code
- Using only properly licensed , specialist sub-contractors
- Compliance with the dangerous goods aspects of the Queensland Work Health and Safety legislation.

6.2.3 Air Quality

Atmospheric dust, principally from clearing and grading, trenching, backfill and reinstatement and vehicle movements, will be the main cause of air emissions during the construction phase of the Project. The impacts of dust generation will be short term and generally localised as the construction team works through an area. Dust suppression measures will include use of water trucks where required.

Other minor sources of air emissions include exhaust fumes from earthmoving and transport equipment. However, these sources are likely to be negligible in the context of the size of the Project area and the existing pastoral, local traffic and transport land uses in the Project area. No measurable impact is likely.

Some small quantities of gas will be released into the atmosphere during commissioning activities which will involve purging the pipeline of air with product gas. The anticipated gas composition is expected to be approximately 98% methane, 0.2% carbon dioxide and 1% of nitrogen. Any purged gas not flared will be lighter than air and will rise into the atmosphere.

Fugitive emissions from pipeline operations are extremely low. Releases will comprise extremely small quantities associated with pipeline pigging activities that occur once every five years, and other very limited releases during routine operational activities (e.g. valve release testing). Pigging may occur at more frequent intervals in the unlikely event of pressure/temperature/flow data indicating that the pipeline needs cleaning to improve its efficiency.

The risk of pipeline ruptures or leaks is also extremely low due to safety factors applied during design and construction and to the implementation of preventative measures and routine monitoring, inspection and maintenance during operations.

Emissions will occur from venting or flaring at the Gas Processing Facility if this is constructed within Queensland. Emissions will most likely comprise 99.9% nitrogen (as N_2) with the remaining 0.1% comprising low levels of methane (CH_4). No carbon dioxide or hydrogen sulphide is expected to be

released during gas processing. Power generation at the facility will result in some emissions of combustion exhaust.

All emissions to air will be assessed against the requirements stipulated in the *Environmental Protection Act 1994*, including considerations stated in the *Environmental Protection Regulation 2008* and the *Environmental Protection Policy (EPP) for Air 2008*.

Mitigation is expected to revolve mostly around dust control, control of vehicle and equipment emissions and control of gas venting during commissioning and pipeline operations. These aspects are considered further in s.7.1.3.

6.2.3.1 Greenhouse Gas Emissions

Greenhouse Gas (GHG)emissions from the Project are expected to be minor in quantity. The Arrow Bowen Pipeline EIS (Arrow 2012) was released in 2012 and describes a proposal to construct a pipeline of similar length to the overall NT Link Project. In the Arrow Bowen Pipeline EIS, the proponent has quantified its GHG emissions and the following notes from this EIS are presented to illustrate that pipeline construction is a very minor emitter of GHGs:

The construction of the Arrow Bowen Pipeline is estimated to result in approximately 53,600 t CO2-e of greenhouse gases representing 26,800 t CO2-e on an annual basis. The annual emissions represent a small fraction of Queensland's (0.02%) and Australia's (0.005%) annual greenhouse gas emissions of 155.1 Mt CO2-e and 564.4 Mt CO2-e respectively as reported by The Department of Climate Change and Energy Efficiency (DCCEE) for 2010.

APA will perform a similar GHG emission quantification for the NT Link Project as part of its environmental impact assessment.

6.2.4 Lighting

In a manner similar to the potential impacts from noise, the impact of lighting from pipeline construction and operations is limited almost entirely to the transient impacts associated with construction.

Construction hours will generally be restricted to the daytime, at night, construction fronts and construction camps will be lit, as a safety measure. Lighting will be fit-for-purpose and - where operations are being conducted in the vicinity of sensitive receptors - will be screened to minimise impact as far as possible.

6.2.5 Visual Aesthetics

Compared to other major infrastructure, buried pipelines are not visually intrusive infrastructure. The associated above-ground infrastructure is generally minor and, in Queensland, remote from public access, viewsheds and residential properties. The exception may be any infrastructure (e.g. gas compressor and/or gas processing facility, if required) at the tie-in point with the Carpentaria Gas Pipeline. This infrastructure may be visible from the Diamantina Development Road, although it will be visually similar to nearby existing facilities.

In Queensland, the visual aesthetics impacts are likely to be restricted to the following:

- Temporary and relatively minor impacts associated with construction – such as localised concentration of machinery, equipment and personnel at active construction sites and temporary construction camps
- The permanent presence of above-ground facilities in protective compounds (as described in 3.4.2)

- The impact of any new tracks, which include access tracks for above-ground facilities and a selection of other un-reinstated Construction Corridor access tracks which are left for land occupier's use at the request of that land occupier
- The alignment access track – a 3m-wide, permanent track required along the alignment for maintenance and incident response purposes
- The alignment signage, described in 3.4.2.8 and required by law
- The general absence of trees above the installed pipeline - as required for safety purposes to remove the risk of root penetration around the pipeline - not expected to be visually significant given the generally 'open nature' of the existing vegetation.

6.3 Social Environment – Beneficial and Adverse Potential Impacts

Beneficial social impacts are expected to include the following:

- Employment opportunities during construction
- Regional economic boost during construction
- Wider economic benefit during operations - stemming from the increased confidence in the availability of gas to Queensland, NSW and Victorian users and potential users and benefits flowing to the NT as a result of providing access to the east coast gas market
- Increased knowledge of all types (social, environmental and cultural) through dedicated site studies associated with Project assessment and approval.

Potential adverse social impacts may include the following:

- Temporary shortage of urban accommodation
- Temporary crowding at social venues during the initial construction phase
- Minor and temporary traffic increase during peak times as the construction workforce leaves for and returns from the construction site
- Potential damage to road quality from increased traffic
- Short-term loss of amenity in the immediate construction vicinity.

Refer to s. 7.3 for further discussion of social impact mitigation.

6.4 Economic Effects

Beneficial regional economic impacts include the following:

- Direct expenditure on goods and services within the region
- Employment opportunities to supply goods and services to the Project and to the construction workforce
- Ongoing development opportunities of all types based on the availability of a clean, reliable energy source.

At the state and national level, beneficial economic effects can be listed as:

- The benefits accruing from the increased confidence among the business community that gas supplies will not run short in the near term
- The opportunity for permanent jobs – associated with manufacturing Projects brought on through the availability of a dependable, cost-effective and reliable energy source
- Benefits to the NT of providing access to the east coast gas market.

Negative impacts are likely to be limited to possible temporary shortages / price rises for goods and services for some local sectors as local demand competes with the requirements for the Project. This effect is likely to be short-lived and will peak while the construction phase is in the vicinity of Mt Isa.

Due to the remote nature of much of the Project area, the Project is not expected to have a significant impact on indigenous communities. APA will undertake extensive consultations and negotiations in regard to Aboriginal Cultural Heritage and Native Title interests and will work with Traditional owners on cultural heritage surveys and impact mitigation plans so as to minimize any potential adverse impacts to cultural heritage.

All economic impacts and benefits will be quantified as part of the studies conducted in support of the Project environmental impact assessment.

6.5 Built Environment

Temporary impacts on the built environment will be limited to the effect on road use from construction traffic and some degree of increased use of community amenities such as sporting and recreational venues. These effects will be quantified as the details of the workforce structure and the construction schedule are refined, but are expected to be relatively minor and outweighed by the local economic benefit stemming from the Project while construction is taking place in the region.

Permanent impacts on the regional built environment will be confined to the introduction of the above-ground structures associated with the NT Link Project and itemised in s.3.4.2 – and there will be no permanent discernible impacts from the Project on local traffic, transport infrastructure or community amenities with appropriate management measures implemented.

6.6 MNES Under the EPBC Act

The following are listed as Matters of National Environmental Significance (MNES) under the EPBC Act:

- World heritage properties
- National heritage places
- Wetlands of international importance (Ramsar sites)
- Threatened species and ecological communities
- Migratory species
- Commonwealth marine areas
- Great Barrier Reef Marine Park
- Nuclear actions
- Water resources (where such could be affected by large extractive coal mining or coal seam gas activities)

The nature of the proposed gas pipeline and its location mean that the following MNES will not be affected based on the MNES Significant Impact Guidelines 1.1 (Department of the Environment 2013):

- Commonwealth marine areas (the Project is onshore)
- Great Barrier Reef Marine Park (the Project is not located adjacent to, or within any catchment draining to the Great Barrier Reef Marine Park)
- Nuclear actions (no nuclear activities will form part of or be affected by the Project)
- Water resources (the Project is not an extractive activity)

The remaining MNES were assessed by O2 Ecology (refer Appendix A) to identify their presence or absence, and whether a significant impact was likely to occur as a result of the Project. This included a

desktop study and a five day post-wet (autumn) season fauna and flora survey with the following objectives:

- Assess flora, including endangered, vulnerable and near threatened species listed under the EPBC Act
- Assess fauna, including endangered, vulnerable and near threatened species listed under the EPBC Act and their breeding places
- Assess pest fauna and flora (weed) species
- Assess vegetation communities and remnant Regional Ecosystems
- Ground-truth mapped areas of high ecological significance including, but not necessarily limited to, riparian areas, nationally threatened ecological communities, large tracts of remnant vegetation, corridors and special biodiversity areas.

The results of the study confirm that within the Queensland portion of the NT Link there are no nationally important designated sites, including:

- World heritage properties
- National heritage properties
- Wetlands of international importance (Ramsar sites)

In addition, field surveys confirmed that no threatened ecological communities are present along the alignment. No impacts on any nationally designated sites or threatened ecological communities are therefore predicted.

With respect to threatened species, the following endangered and vulnerable species are considered at least moderately likely to occur:

- Gouldian finch (*Erythrura gouldiae*) - endangered
- Australian painted snipe (*Rostratula australis*) - endangered
- Plains death adder (*Acanthophis hawkei*) - vulnerable
- Red goshawk (*Erythrotriorchis radiatus*) - vulnerable
- Greater bilby (*Macrotis lagotis*) - vulnerable
- Carpentarian antechinus (*Pseudantechinus mimulus*) - vulnerable

A total of 28 migratory bird species are also considered at least moderately likely to occur.

Based on the results of the ecological impact assessment undertaken to date by O2 Ecology, significant impacts are unlikely on threatened species or migratory species listed under the EPBC Act. This judgement is based on the following specific assumptions:

- Associated infrastructure is located away from wetland areas with construction completed in these areas during the dry season
- There are no significant changes to hydrology, nutrient cycling, fire regimes or invasive species as a result of the Project
- There are no significant long term changes to grass species composition within areas adjoining the construction corridor through preferred Gouldian finch habitat and avoidance of nesting trees within Gouldian finch habitat. Preferred habitat locations to be determined through site surveys as part of the Project's environmental impact assessment
- Significance clearance or disturbance to rocky habitats supporting Carpentarian antechinus is avoided. Suitable habitats to be determined through targeted surveys as part of the Project's environmental impact assessment
- The felling of potential red-goshawk nesting trees along waterways is preferentially avoided

These ecological management measures will be enhanced through the provision of the additional measures described in section 7. Notwithstanding this, APA as proponent for the Project will monitor the Project's potential to impact on MNES. APA would need to refer the Project to the Commonwealth Government under the EPBC Act if a significant impact is considered likely. Any approval under the EPBC Act would therefore be carried out separately to the Queensland environmental impact assessment process, if required.

7 ENVIRONMENTAL MANAGEMENT AND MITIGATION MEASURES

7.1 Natural Environment

7.1.1 Land

Land impacts will be minimised through adoption of the following processes:

- Ensuring the planning process considers potential land impacts and minimises disturbance of areas of sensitivity or instability as far as possible
- Keeping the Construction Corridor to the minimum width necessary for safe and responsible construction
- Ensuring construction personnel do not clear any areas additional to those required for safe operation
- Rehabilitating disturbed areas to an agreed standard and incompliance with approvals after construction
- Conducting regular maintenance inspections of the operational pipeline – and responding to any areas of land impact noted during the inspections.

It should be noted that facilities will be located in general accordance with the guidelines within APGA Code of Environmental Practice (2013) such as:

- No facilities to be located within 100m of a watercourse
- No facilities to be located in areas with high prospectively for cultural heritage significance
- All facilities to be located within previously-cleared areas as far as possible
- All facilities to be correctly stabilised so as to minimise erosion
- All facilities to be located as agreed with landowners / occupiers
- At the completion of construction, all temporary facilities to be removed / rehabilitated as agreed with landowners / occupiers and regulators.

7.1.2 Water

Water impacts will be managed through adoption of mitigation measures designed to minimise:

- Physical effects on watercourses
- The risk of pollution
- Water use.

Mitigation measures to achieve these objectives will be fully detailed in the Construction Environmental Management Plan (CEMP), which will be developed in accordance with guidance from the APGA Code of Environmental Practice (2013) and advice from the regulator. Examples of the measures that will be detailed in the Project's environmental impact assessment include those in Table 17.

Table 17: Example Impact Mitigation Measures for Water

Activity	Management Measures
Pipeline Easement	Construction water sourcing options and any related approval requirements should be considered in planning documentation, including anticipated volumes and intended

Activity	Management Measures
Management and Access	sources The requirement for holding dams should be determined at the Project planning phase, including their indicative locations Requirements for and potential locations of holding dams should be discussed with the relevant landowner – to facilitate their post-construction re-use, if permitted and appropriate, as farm infrastructure and dams, if required, shall be located, constructed, managed and rehabilitated in accordance with the principles outlined for construction camps and work sites
Clearing	Cleared vegetation, including vegetation cleared within a watercourse, should be stockpiled away from watercourses and should not be stored in or felled so as to land in watercourses
Grading	Grading and stockpiling of soil should not, as far as practicable, impede surface drainage or water flows Grading of watercourse beds and banks should be minimised, leaving an undisturbed organic mat within the riparian zone, or delayed until construction of the crossing is imminent
Trenching	Where trench de-watering is required, it should be conducted in accordance with an approved de-watering plan Appropriate measures should be undertaken to protect water quality which may include: Testing water prior to disposal to determine if it meets the relevant regulatory standards Containing and / or treating water onsite or removing water off-site for treatment/disposal if it does not meet criteria for disposal on-site Dewatering to stabilised ground via low dispersion methods to prevent erosion Preventing discharges entering surface water bodies unless permitted by relevant authority

Activity	Management Measures
	Use of sediment traps where required Bunding of dewatering pumps to prevent fuel spill contamination.
Borrow Pits	Borrow pits to be located away from groundwater recharge zones
Construction Camps and Worksites	Where practicable, camps and worksites should be located so as to not drain directly to major water courses, creeks or other surface water bodies
General	Erosion and sediment controls will be implemented as per an approved ESC Management Plan, to protect water quality The removal and subsequent discharge of water from the pipeline Construction Corridor should not result in erosion or pollutants (such as sediment, saline, contaminated or pH-modified water) being released to land or water outside of acceptable parameters
Fuel and Chemical Management	Fuels, lubricants and chemicals, including drilling fluids, should be stored in compliance with applicable environmental and safety laws and, where practicable, handled within containment facilities such as bunded areas or over leak-proof trays, designed to prevent the release of spilled substances to the environment
Hydrostatic Testing	Where practicable, test water should be re-used for multiple test sections In the absence of specific approval conditions relating to its discharge, hydrotest water should only be discharged or recycled for secondary uses, such as pasture irrigation or livestock watering, where its quality is within relevant statutory water quality guidelines. No hydrostatic test water will be released into a watercourse.
Pipeline Easement Management and Access	Should erosion and sedimentation occur, appropriate corrective action will be promptly undertaken Stability of the pipeline easement and, in particular, the condition of watercourse bed, banks and riparian vegetation will be inspected in accordance with an agreed inspection program
Fuel and	The refuelling or maintenance of equipment, machinery and vehicles, should be

Activity	Management Measures
Chemical management	conducted as far away as is reasonably practical from any surface water body and in compliance with applicable environmental and safety laws Hazardous wastes will not be stored or handled in areas that drain directly to any waterway or surface water

7.1.3 Air

Air quality management measures will aim to minimise:

- Impacts on the community and the construction workforce
- Impacts on land, water and air quality
- Impacts on flora and fauna
- Water use
- Emissions across the Project, particularly those that are reportable
- The creation of emissions-related safety hazards.

Mitigation measures design to fulfil these objectives during construction and operation include the following:

- Ensuring a dust suppression strategy is developed during the planning phase
- Monitoring emissions during construction to ensure they remain within acceptable limits
- Ensuring all plant and equipment is maintained in an efficient operating condition
- Minimising planned gas emissions during construction and operation
- Ensuring planned emissions take place during favourable meteorological conditions
- Managing vehicle speed limits so as to minimise dust creation
- Keeping traffic movement on unsealed tracks to a necessary minimum
- Minimising dust creation from stockpiles
- Attending to dust minimisation as part of any blasting activity
- Progressively reinstating disturbed areas so as to keep the un-stabilised area to a practical minimum.

A complete air quality management program will be contained in the CEMP.

7.1.4 Ecosystem

The measures adopted mitigate impacts to ecosystems are those applicable also to flora (s. 7.1.5.1), fauna (s. 7.1.5.2), and water (s.7.1.2) and land (s.7.1.3).

7.1.5 Flora and Fauna

7.1.5.1 Flora

Impact management and mitigation measures relating to flora are based on the following objectives:

- To minimise threat to native flora, particularly listed species, assemblages or ecosystems
- To prevent the introduction or spread of pest species
- To prevent the introduction or spread of invasive weed species
- To promote and maintain stable vegetation cover
- To avoid loss of agricultural production or soil productivity

- To minimise soil erosion and sedimentation.

Environmental management and impact management measures to fulfil these objectives will be developed as part of the Project CEMP and will respond to the impact mitigation hierarchy of avoidance, reduction, remedy.

Avoidance measures will include the following:

- Revise the proposed pipeline alignment to avoid impacts to significant sites
- Apply construction procedures which avoid impacts – such as biosecurity procedures, strict limits on clearing areas, etc.
- Train the Project workforce at induction in impact awareness in order to avoid unnecessary impacts
- Compliance with relevant guidelines within listed in APGA CoEP.

Flora impact reduction measures will include the following:

- Development of a Weed Management Plan
- Flagging weed areas for avoidance, flagging listed species for relocation where feasible and practical
- Strictly limiting areas to be cleared
- Controlling areas Project traffic may traverse
- Restoring the Construction Corridor through use of native species where practical and appropriate
- Stockpiling cleared native vegetation for later re-spreading back across the alignment where practical
- Applying best practice sediment and erosion control procedures
- Compliance with relevant guidelines within listed in APGA CoEP.

Flora impact remedy measures may include the following:

- Developing and implementing an offsets strategy
- Compliance with relevant guidelines within listed in APGA CoEP.

7.1.5.2 Fauna

Impact management and mitigation objectives for fauna are:

- To minimise impacts on native fauna, particularly listed species, or their habitat
- To prevent the spread or transfer of pest or weed species.

Procedures to fulfil these objectives will be developed as part of CEMP development and will respond to the impact mitigation hierarchy of avoidance, reduction, remedy.

Avoidance measures will include the following:

- Revise the proposed pipeline alignment to avoid impacts to significant sites
- Apply construction procedures which avoid impacts – such as traffic management procedures, strict limits on clearing areas, etc.
- Train the Project workforce at induction in impact awareness in order to avoid unnecessary impacts
- Compliance with relevant guidelines within listed in APGA CoEP.

Fauna impact reduction measures will include the following:

- Flagging key habitat trees for avoidance
- Preclearance flora and fauna surveys in advance of clearing activities
- Fauna spotter / catchers on site whenever there is an open trench

- Strictly limiting areas to be cleared
- Felled brush/trees will not be burnt and will be retained in regular stockpiles in the vicinity of the ROW (subject to landholder agreement
- Hollow-bearing trees (if/when encountered) will be preferentially avoided to the extent practicable (i.e. subject to consideration of safety, cultural heritage, landholder and constructability constraints)
- Controlling areas Project traffic may traverse
- Restoring the Construction Corridor through use of native species where practical and appropriate
- Compliance with relevant guidelines within listed in APGA CoEP.
-

Fauna impact remedy measures may include the following:

- Developing and implementing an offsets strategy if required
- Compliance with relevant guidelines within listed in APGA CoEP.

7.2 Built Environment

The impact mitigation objectives relating to the built environment include:

- To minimise the impact of noise, visibility and odour resulting from traffic
- To minimise disturbance from traffic to flora, fauna and cultural heritage
- To minimise soil erosion and degradation from traffic
- To minimise unnecessary traffic movements
- To work with road authorities, councils and communities to develop appropriate traffic management strategies.

A Traffic Management Plan will be developed prior to construction and implemented to achieve these objectives.

To manage impacts on community amenities, mitigation measures will include the following:

- Utilising remote camp accommodation for the majority of construction activities
- Raising workforce awareness of the importance of amenities to local communities
- Providing alternative social and recreational facilities for the Project workforce.

7.3 Social Impact Mitigation

APA will develop a social impact assessment as part of its Project assessment processes. The process will identify potential social impacts and will detail APA's response, including commitment to the Queensland Government's Social Impact Assessment principles (adapted from Queensland CG 2013), which will include:

- Assessment of the impacts (both beneficial and detrimental) arising from the Project including, where possible, cumulatively with other developments in the region
- Mitigating social impacts that are directly related to the Project
- Incorporation of the principles of adaptive management
- Consideration of the full lifecycle of the Project
- Being based on the best data available
- Identification of strategies to capitalise on social opportunities and to avoid, manage, mitigate or offset the predicted impacts arising from the Project
- Engagement with communities of interest for the life of the Project, recognising local knowledge, experience, customs and values.

Potential social impacts will be mitigated by adoption of the following:

- Installing and operating a construction camp away from Mt Isa
- Including social impact issues in workforce inductions
- Conducting regular engagement with community leaders to identify any social issues before they become major
- Conducting periodic checks of workforce compliance with requirements relating to vehicle management, drug and alcohol consumption, etc.

See also s.6.3.

7.4 Cultural Heritage Management Plan (Indigenous)

APA will seek to develop and agree Cultural Heritage Management Plans (CHMPs) in accordance with the Aboriginal Cultural Heritage Act 2003. APA has notified the relevant Aboriginal cultural heritage bodies (being the Dugalunji Aboriginal Corporation and Kalkadoon Cultural Heritage Services Pty Ltd) and will endorse and engage with the Aboriginal Parties (being the prescribed bodies corporate for the determined native title holders listed in Table 6). This engagement will be with a view to develop processes for assessment of the pipeline alignment to identify and where possible avoid areas of Aboriginal cultural heritage. Following surveys of the alignment, APA will meet with and agree relevant site protection and impact mitigation measures which will be documented in individual CHMPs.

7.5 Non-Indigenous Cultural Heritage Management Plan

A search of the Commonwealth Protected Matters Database for listings within 100km of the proposed NT Link Construction Corridor identified three listed National Heritage places (Casa Grande, Mt Isa Underground Hospital and Tent House), all of which are in Mt Isa. The NT Link alignment will be at least 6km from Mt Isa at its closest point, rendering the listed Heritage Places well beyond any potential area of likely impact. There are no state-listed items in the vicinity of the Project.

On the basis that there are no listings jeopardised by the Project, a non-indigenous cultural heritage management plan is not proposed.

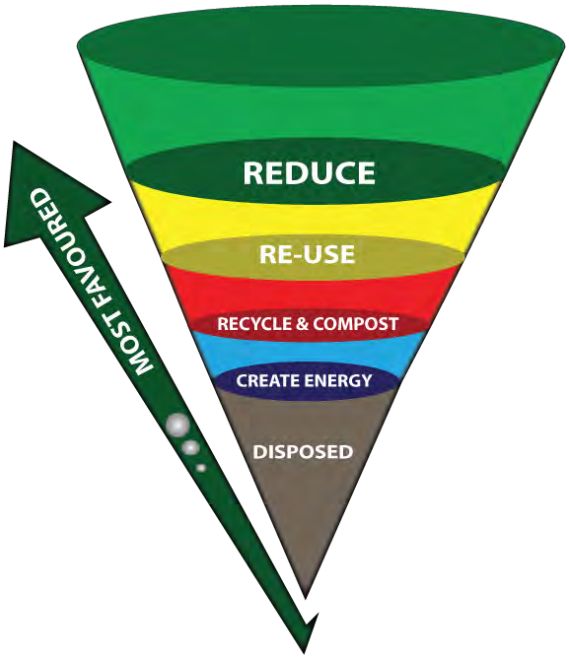
7.6 Greenhouse Gas Management Plan

Although GHG emissions are expected to be minor (as outlined in s.6.2.3.1), a GHG Management Plan will be developed as part of the environmental impact assessment.

7.7 Waste Management

The Project will manage waste in accordance with the guidance provided in the APGA Code of Environmental Practice and the Queensland EPA waste management hierarchy, as represented in Figure 14.

Figure 14: Waste Management Hierarchy



This hierarchy has led to the identification of the following waste management objectives for the Project:

- To avoid the contamination of soil and water
- To minimise potential risks to workers and the public
- To minimise adverse effects on native vegetation, livestock and wildlife
- To minimise visual impacts
- To maximise the efficiency of resource use
- To minimise health risks associated with waste management
- To minimise environmental impacts related to waste management
- To promote the principles of reduce, reuse and recycle.

Fulfilment of these objectives will be achieved through development and implementation of a Project Waste Management Plan.

7.8 Hazard and Risk, and Health and Safety

The health and safety of the community and the Project workforce will be given high priority during all phases of the Project, from construction through to its eventual decommissioning. APA maintains a Health and Safety Management System which provides a framework for continually reducing the risk of adverse health and safety impacts arising from its activities. The Project objectives relevant to health and safety include the following:

- To protect the environmental values relating to people and property, whilst maintaining a high level of safety
- To maintain a safe working environment for the construction workforce and near neighbours
- To maintain a safe working environment during operation for maintenance teams and other land users
- To prevent or minimise any losses or damage to people and property.

Measures will be put in place to restrict public access to construction activities, including installation of signs in compliance with the Manual of Uniform Traffic Control Devices and other applicable standards and implementation of traffic management plans where the Construction Corridor intersects public roads. During the operational phase, valve stations and other above-ground installations along the proposed alignment will be fenced and appropriate signs erected. Regular inspections will be made along the Construction Corridor to detect any third party activities that may interfere with the pipeline or create a public risk. Any potential health and safety impacts will be managed through appropriate health and safety policies as part of the Project Construction Health and Safety Management Plan.

To protect the construction workforce, all activities will be carried out in compliance with applicable safety standards

- risk assessments will be conducted for individual activities
- safe work procedures will be developed and implemented as required
- Health and Safety Officers will be present on the construction site to facilitate compliance with safety systems.

Safety performance will be monitored and injury statistics will be reported to both APA management and to the health and safety regulator (for example, Workplace health and Safety Queensland, Petroleum and Gas Inspectorate) as required.

7.9 Environmental Management

APA Group has an accredited ISO9000 Quality Control System and an AS4801-compliant Health and Safety Management System and is in the process of developing an ISO 14000-based Environmental Management System.

All contractors engaged on the Project will be reviewed in terms of their record for previous environmental performance with advantage given to proven performers with an enhanced environmental management record.

Environmental management of the Project is expected to be based on demonstrated compliance with applicable licences and with the Environmental Authorities referred to in Table 23.

7.9.1 CEMP

At the heart of the Project's environmental management scheme will be the approved Construction Environmental Management Plan (CEMP). This document will be developed as a draft during the environmental impact assessment process and will be reviewed and finalised as Project approvals are achieved, incorporating any additional approval conditions. It is expected that the CEMP will be a requirement of the Project's environmental authority.

The CEMP will prescribe all on-ground environmental management controls for the Project, covering aspects such as the following:

- Description of the proponent
- Description of the Project
- Applicable legislation and conditions stemming from approvals
- Project execution summary detailing aspects such as APAs policies and procedures, objectives, schedules, organisational charts and key personnel, roles and responsibilities, monitoring and reporting
- Environmental risk assessment
- Staff skilling and induction requirements

- Detailed presentation of environmental impacts and their control, covering areas such as:
  - Soil management
  - Vegetation management
  - Fauna management
  - Heritage management
  - Protection of watercourses
  - Waste management
  - Fuel and chemicals management and storage
  - Spill prevention and response
  - Incident and emergency management
  - Traffic management
  - Biosecurity
  - Community engagement
  - Stakeholder identification
  - Land access management
  - A detailed list of environmental management commitments
  - A communications and reporting procedure and schedule.

The CEMP would also have a series of specific sub-plans attached – as necessary to deal with specific aspects and stand-alone procedures.

Compliance with the requirements of the CEMP would be controlled through a compliance monitoring system involving a series of checklists which between them cover all commitments, undertakings and approval requirements controlling the Project environmental performance. Commonly, such checklists include daily, weekly and monthly spreadsheets and are summarised in the periodic internal and external reporting, as required in the Project controls.

7.9.2 Operational Control

Once the pipeline is commissioned and ready to commence operations, the CEMP will be replaced by an Operations Environmental Management Plan (OEMP). The OEMP will be drafted as the construction process draws to a conclusion. The OEMP will be a requirement of the Project's environmental authority.

An OEMP is a simpler document than the CEMP, and covers operational aspects such as the following:

- Environmental Policy
- Regulatory Framework
- Applicable State and Commonwealth legislation
- Copies of relevant regulatory approvals, licences and permits
- Operations organisation chart
- Essential company and regulator contact details
    - Manager
    - Environmental Contact
    - Emergency Contact
- Incident management procedures
- Definitions of reportable incidents
- Emergency response procedures
- Reporting program
- Complaints management system
- Site Induction and training
- Safety Management Plan.

8 IMPACT ASSESSMENT SUMMARY

The likely impacts (beneficial and adverse) of the NT Link Project have been identified in the sections above based on what effects could theoretically occur. Mitigation measures have then been described which will avoid or minimise those impacts. In particular, design measures in the form of sensitive pipeline routing, and considerate siting and co-locating of above-ground facilities will ensure that potential environmental impacts are avoided or minimised wherever possible. Where the design measures are considered unable to fully resolve potential environmental impacts, further mitigation measures have been committed to, including construction and operational environmental management plans. All mitigation measures will be secured through the project's approvals and environmental management process.

The objective of the project's environmental impact assessment is to assess the likely significance of any potential impacts. Whilst there is no statutory definition of what constitutes a 'significant' impact within Queensland, the term significance is generally taken as a function of the importance or sensitivity of a feature and the magnitude of the potential effect. Significance is sometimes determined on the basis of expert judgement applied to qualitative or quantitative information. However, for certain environmental impacts their significance is determined with reference to predicted levels of effects set against accepted levels of exposure, for example, air quality objectives.

The following generic criteria have been used in this IAS to inform the assessment of an effect:

- Extent and magnitude
- Duration and reversibility
- Sensitivity and value of the receptor
- Comparison with legal requirements, policies and standards
- Comparison with applicable environmental thresholds
- Effectiveness of mitigation

To date, the assessment has relied on professional judgement based on experience with similar pipeline projects, desk top information and visits to the site. The ecological study carried out to date is the exception and has involved more detailed site studies.

Definitions used in the project's environmental impact assessment for valuing receptors and assessing the magnitude of potential change are provided in Table 18 and Table 19 below.

Table 18 Criteria to assess the value of receptors

Importance	Criteria
Very High	Very high importance and rarity, internationally importance sites or areas, and very limited potential for substitution
High	High importance and rarity, national or State importance, and limited potential for substitution
Medium	Medium importance and rarity, regional importance (NW Qld), limited potential for substitution
Low	Low importance and rarity, local scale. Of limited value
Negligible	Very little or no interest

Table 19 Criteria to assess the magnitude of change

Magnitude	Criteria
Very Large/ Large	Complete loss of resource. Change in site or feature resulting in complete loss of its quality and integrity, severe damage to key characteristics, features or elements
Medium	Loss of resource but not adversely affecting the integrity, partial loss of/ damage to key characteristics, features or elements
Small	Some measurable change in attributes, quality or vulnerability; minor loss of or alteration to one or more characteristics, features or elements
Negligible/ No Change	Very minor or no change to one or more characteristics, features or elements

Once the value of the receptor and the magnitude of the effect have been identified, it is possible to determine the significance of the impact according to the matrix in Table 20 below.

Table 20 Significance of Impact

Magnitude of Change	Sensitivity of resource				
	Very high	**High**	**Medium**	**Low**	**Negligible**
Very Large	Major	Major	Moderate	Minor	Neutral
Large	Major	Moderate	Minor	Minor	Neutral
Medium	Moderate	Minor	Minor	Neutral	Neutral
Small	Minor	Minor	Minor	Neutral	Neutral
Negligible	Minor	Neutral	Neutral	Neutral	Neutral

The significance of impact is based on the evaluation criteria described in Table 21 below, which is applicable to both adverse and beneficial impacts. For the NT Link Project, impacts that are of major or moderate significance are deemed to be material for the purposes of approval.

Table 21 Significance Evaluation

Significance	Typical Description	Significance in terms of EIA
Major	Only adverse effects are normally assigned this level of significance. They represent key factors in the approval decision making process. These effects are generally associated with features of international, national or State importance that are likely to suffer a most damaging impact and loss of resource integrity. However, a major change in a site or feature of local importance may enter this category	Yes
Moderate	These beneficial or adverse impacts are considered to be important considerations and material in the approval decision making process	Yes

Minor	These beneficial or adverse impacts may be, but are not likely to be, important approval decision making factors. The cumulative effects of such factors may influence decision making if they lead to an increase in the overall adverse effect on a particular receptor	No - unless cumulatively they amount to moderate or above
Neutral	No effects or those that are beneath levels of perception, within normal bounds of variation or within the margin of forecasting error	No

Applying this methodology, Table 22 below summarises the findings of the environmental impact assessment undertaken as part of this IAS. These findings will be confirmed through further environmental impact assessment studies.

Table 22 Impact Assessment Summary

Receptor	Sources and type of effect	Significance	Impact mitigation (avoidance and minimisation)	Residual Significance	Evaluation in terms of EIA
Land Use and Agriculture					
Land take effects existing landholders and businesses	Temporary land loss to agricultural, forestry or mining production	Minor Medium value/ small effect	Alignment to avoid sensitive land uses and minimise land fragmentation. Agreements with holders of other land interests. Compensation for temporary land loss. Final footprint reduced as far as possible (3 m wide access track and limited surface infrastructure)	Neutral Medium value/ negligible effect	Not significant
Effects on farming practices	Changes to grazing practices caused by construction due to land take, severance and access issues	Minor Medium value/ small effect	Compensation for temporary land loss. Provision of alternative access where applicable. Managing site access to minimise traffic impacts.	Neutral Medium value/ negligible effect	Not significant
Economic effects	Reduced production due to land disturbance from pipeline construction	Minor Medium value/ small effect	Compensation for temporary land loss. Suitable rehabilitation of disturbed land that is safe, non-polluting, stable and able to sustain agreed land use.	Neutral Medium value/ negligible effect	Not significant
Fodder and livestock	Compaction of soils and change to soil structure.	Minor Medium value/ small effect	Soil Management Plan. Soils to be correctly removed, stored and replaced.	Neutral Medium value/ negligible	Not significant

Receptor	Sources and type of effect	Significance	Impact mitigation (avoidance and minimisation)	Residual Significance	Evaluation in terms of EIA
	Risk of biosecurity due to disease transfer between farms		Vehicles washed down as required. Imported construction materials to demonstrate no risk to human health or the environment.	effect	
Land					
Soils	Chemical spills	Neutral low value/ small effect	The storage and use of fuel and oils on site would be in accordance with AS 1940	Neutral low value/ negligible effect	Not significant
	Disturbance of contaminated land	Neutral low value/ small effect	Low risk of contamination. Any contamination to be handled and disposed according to relevant regulations and procedures	Neutral low value/ negligible effect	Not significant
	Compaction and erosion of topsoil and subsoil	Minor Medium value/ small effect	Topsoil Stripping and Reinstatement Management Plan. Topsoils to be stripped and stockpiled appropriately. Ripping of subsoil prior to topsoil replacement. Erosion and Sediment Control Plan.	Neutral Medium value/ negligible effect	Not significant

Receptor	Sources and type of effect	Significance	Impact mitigation (avoidance and minimisation)	Residual Significance	Evaluation in terms of EIA
Landscape and Visual Amenity					
Landscape character	Temporary construction effects Enduring buried pipeline New facilities at tie-ins to existing pipelines Enduring above ground infrastructure	Neutral low value/ small effect	Avoidance of key landscape features through alignment location Sensitive siting of above ground infrastructure Tie-ins will appear similar to existing infrastructure Rehabilitation of disturbed areas to a stable landform, safe and non-polluting	Neutral low value/ negligible effect	Not significant
Visual receptors	Temporary construction effects Enduring buried pipeline Enduring above ground infrastructure	Neutral low value/ small effect	Avoidance of key landscape features through alignment location Sensitive siting of above ground infrastructure Rehabilitation of disturbed land	Neutral low value/ negligible effect	Not significant
Water Resources					
Watercourses	Temporary effects of excavation and diverting flows	Minor Medium value/ small effect	Works in watercourses to be in general accordance with industry practice and will avoid impacts on hydrology and hydraulics, including flood risk	Neutral Medium value/ negligible	Not significant

Receptor	Sources and type of effect	Significance	Impact mitigation (avoidance and minimisation)	Residual Significance	Evaluation in terms of EIA
				effect	
	Temporary effect of silt laden runoff entering watercourses	Minor Medium value/ small effect	Erosion and Sediment Control Plan.	Neutral Medium value/ negligible effect	Not significant
	Temporary effect of pollution entering water courses from spills / leaks	Minor Medium value/ small effect	The storage and use of fuel and oils on site would be in accordance with AS 1940	Neutral Medium value/ negligible effect	Not significant
	Morphological effect of reinstatement following construction	Minor Medium value/ small effect	Works in watercourses to be in general accordance with industry practice and will avoid impacts on hydrology and hydraulics Rehabilitation Plan to ensure stability	Minor or Neutral Medium value/ small effect or negligible effect (TBC)	Not significant
	Disposal of hydrostatic test water	Minor Medium	Disposal to be in accordance with Queensland Water Quality Guidelines if beneficial reuse not found.	Minor or Neutral	Not significant

Receptor	Sources and type of effect	Significance	Impact mitigation (avoidance and minimisation)	Residual Significance	Evaluation in terms of EIA
		value/ small effect		Medium value/ small effect or negligible effect (TBC)	
	Wastewater generated by temporary construction camps	Minor Medium value/ small effect	Disposal to be in accordance with Queensland Water Quality Guidelines if treatment and beneficial reuse not found.	Neutral Medium value/ negligible effect	Not significant
	Temporary effect of pollution entering groundwater from spills / leaks	Minor Medium value/ small effect	The storage and use of fuel and oils on site would be in accordance with AS 1940	Neutral Medium value/ negligible effect	Not significant
	Dewatering of water levels at crossings	Minor Medium value/ small effect	If required, water levels to be monitored and extraction to be within sustainable limits.	Neutral Medium value/ negligible effect	Not significant
Property, infrastructure and ecosystems	Increased flood risk from presence of pipeline	Minor Medium	Pipeline to be buried and designed to ensure impacts on hydrology and hydraulics, including flood risk, are avoided.	Neutral Medium	Not significant

Receptor	Sources and type of effect	Significance	Impact mitigation (avoidance and minimisation)	Residual Significance	Evaluation in terms of EIA
		value/ medium effect	Ongoing site monitoring during operations.	value/ negligible effect	
	Reduced flow to groundwater bores, watercourses or dams	Minor Medium value/ small effect	Temporary access to water during construction agreed with land holders / tenement holders. Flows and groundwater levels to be monitored at any production bores and maintained as required to sustain existing supplies.	Neutral Medium value/ negligible effect	Not significant
Air					
Project not located near any homesteads, except one located within 350 m of the alignment near eastern end. No internationally or nationally significant ecological receptors nearby. State Significant wetlands near KP449 and KP456	Temporary dust effects during construction with deposition on adjacent vegetation	Minor Medium value/ small effect	Alignment located away from State significant wetlands Air Quality Management Plan. Specific consideration to minimising dusty activities, minimising drop heights, sensitive siting of stockpiles. Water sprays for dust suppression where required, in vicinity of sensitive receptors Record complaints and take action to reduce emissions.	Neutral Medium value/ negligible effect	Not significant
	Release of exhaust from vehicles,	Minor	Regular servicing of vehicles and equipment	Neutral	Not significant

Receptor	Sources and type of effect	Significance	Impact mitigation (avoidance and minimisation)	Residual Significance	Evaluation in terms of EIA
	machinery and plant	Medium value/ small effect		Medium value/ negligible effect	
	Fugitive emissions from pipeline during operations	Minor Medium value/ small effect	Air emissions to meet EPP Air objectives at sensitive receptors. GHG Management Plan.	Neutral Medium value/ negligible effect	Not significant
	Gas Processing Facility emissions	Minor Medium value/ small effect	Facility design to maximise efficiency and reduce waste. Power supplied using gas rather than electrical or diesel generators. Air emissions to meet EPP Air objectives at sensitive receptors. Releases through appropriately designed stack GHG Management Plan.	Minor or Neutral Medium value/ small effect or negligible effect (TBC)	Not significant
Ecosystem, flora and fauna					
Vegetation No WHAs, Ramsars, GBRMP, or listed TECs. No Qld protected plants.	Loss and damage Spread of weeds and pests	Minor Medium value / medium effect	Alignment located away from State significant wetlands Design to avoid felling of mature trees where possible. Strict adherence to construction working zones.	Minor or Neutral Medium value/ small effect or negligible	Not significant

Receptor	Sources and type of effect	Significance	Impact mitigation (avoidance and minimisation)	Residual Significance	Evaluation in terms of EIA
State Significant wetlands near KP449 and KP456			Design to avoid the loss of habitat for key flora species. Further surveys to be carried out to determine extent of any preferred habitat for key species. Rehabilitation Plan to include vegetation rehab across the construction area. Only 3m wide access track to be maintained free of vegetation during operations. Residual loss of State Matter of Environmental Significance regional ecosystem vegetation to be offset. Pest and Weed Management Plan to control introduction or establishment of weeds.	effect (TBC)	
Fauna No essential habitat impact. Potential for listed migratory species and listed threatened species but none recorded during site surveys to date. Further surveys to confirm.	Loss of habitat, temporary disturbance and possible harm Entrapment in construction trench Spread of weeds and pests	Minor Medium value / medium effect	Design to avoid the loss of habitat for key fauna species. Further surveys to be carried out to determine extent of any preferred habitat for key species, and their presence/ absence. Fauna spotters to relocate wildlife from construction working area to adjacent suitable habitat nearby No impact on hydraulics of aquatic habitats. Feral Species Management Plan to control	Minor or Neutral Medium value/ small effect or negligible effect (TBC)	Not significant

Receptor	Sources and type of effect	Significance	Impact mitigation (avoidance and minimisation)	Residual Significance	Evaluation in terms of EIA
			introduction or establishment of pest species.		
Noise and Vibration					
Project not located near any homesteads, except one located within 350 m of the alignment near eastern end. No internationally or nationally significant ecological receptors nearby. State Significant wetlands near KP449 and KP456	Construction of the pipeline will generally be in daytime hours only except emergencies, hydrotesting, stringing, traffic movements Blasting	Minor Medium value/ small effect	Noise Management Plan. Blast Management Plan.	Neutral Medium value/ negligible effect	Not significant
	Maintenance works including venting of the operational pipeline	Minor Medium value/ small effect	Valves to be located away from sensitive receptors. Noise emissions to meet EPP Noise objectives at sensitive receptors.	Neutral Medium value/ negligible effect	Not significant
Waste					
Human and environmental health	Chemical spills	Neutral low value/ small effect	The storage and use of fuel and oils on site would be in accordance with AS 1940	Neutral low value/ negligible effect	Not significant

Receptor	Sources and type of effect	Significance	Impact mitigation (avoidance and minimisation)	Residual Significance	Evaluation in terms of EIA
	Disturbance of contaminated land	Neutral low value/ small effect	Low risk of contamination. Any contamination to be handled and disposed according to relevant regulations and procedures	Neutral low value/ negligible effect	Not significant
	Excess or residual construction materials	Neutral low value/ small effect	Waste Management Plan	Neutral low value/ negligible effect	Not significant
	Disposal of hazardous waste from the gas processing facility (i.e. mercury bed)	Minor Medium value/ medium effect	Waste Management Plan Unloading, transport and disposal of hazardous waste according to legislative requirements (authorised waste handler, waste tracking, etc)	Neutral Medium value/ negligible effect	Not significant
Hazard and Risk					
Public and environmental health Workforce safety Property	Operating high pressure gas pipeline and processing facility	Minor Medium value/ medium effect	Risk assessments will be conducted for individual activities Safe work procedures will be developed and implemented as required Health and Safety Officers will be present on the construction site to facilitate compliance	Neutral Medium value/ negligible effect	Not significant

Receptor	Sources and type of effect	Significance	Impact mitigation (avoidance and minimisation)	Residual Significance	Evaluation in terms of EIA
			with safety systems		
Cultural Heritage					
Sites of Aboriginal importance	Excavation	Minor Medium value/ medium effect	Works to be agreed through a CHMP with relevant Aboriginal parties, prior to ground disturbing activities taking place.	Neutral Medium value/ small effect	Not significant
Sites of European importance – none recorded along alignment	Excavation	Neutral low value/ negligible effect	Not required. Contingency planning as appropriate.	Neutral low value/ negligible effect	Not significant
Traffic and Transport					
Roads	Movement of materials and plant for construction (temporary)	Minor Medium value/ medium effect	Construction traffic limited to certain roads using agreed routes. Road User Management Plan.	Minor or Neutral Medium value/ small effect or negligible effect (TBC)	Not significant
	Disruption to the road network cause by construction traffic	Minor Medium value/ medium	Traffic Management Plan to mitigate disruption.	Minor or Neutral Medium value/ small	Not significant

Receptor	Sources and type of effect	Significance	Impact mitigation (avoidance and minimisation)	Residual Significance	Evaluation in terms of EIA
		effect		effect or negligible effect (TBC)	
	Temporary closure of roads during construction	Minor Medium value/ medium effect	Traffic Management Plan to mitigate disruption.	Minor or Neutral Medium value/ small effect or negligible effect (TBC)	Not significant
Travelling stock routes	Temporary closure of stock routes during construction	Minor Medium value/ small effect	Works to be managed in stock routes to reduce disruption, as agreed with appropriate authorities and stakeholders. Rehabilitation Management Plan to restore disturbed land	Minor or Neutral Medium value/ small effect or negligible effect (TBC)	Not significant
Rail	No railway lines crossed by alignment.	Neutral low value/ negligible effect	Not required.	Neutral low value/ negligible effect	Not significant
Socio-Economics					
Economy	Increased economic output	Minor Medium value/	Management Plan for how local services, suppliers and labour will be utilised, where possible	Minor Medium value/	Not significant

Receptor	Sources and type of effect	Significance	Impact mitigation (avoidance and minimisation)	Residual Significance	Evaluation in terms of EIA
		medium effect	Enhancements to business/industry capability to improve regional economic development Proposals for Indigenous participation	medium effect	
Community facilities in Mt Isa	Temporary increase in demand on community facilities during construction	Minor Medium value/ small effect	Construction camp away from Mt Isa Including social impact issues in workforce inductions Conducting regular engagement with community leaders to identify any social issues before they become major Conducting periodic checks of workforce compliance with requirements relating to vehicle management, drug and alcohol consumption, etc.	Minor or Neutral Medium value/ small effect or negligible effect (TBC)	Not significant

9 APPROVALS REQUIRED FOR THE PROJECT

The Project is multi-jurisdictional and APA is simultaneously submitting a Notice of Intent (NOI) to the NT Government, this Initial Advice Statement (IAS) to the Queensland Government

In Queensland, APA is seeking a coordinated Project declaration under the Queensland SDPWO Act for the Queensland portion of the NT Link Project in order to facilitate timely and effective regulatory approvals.

In Queensland, NT Link has an existing Pipeline Survey Licence (PSL 91) and will require a Queensland Petroleum Pipeline Licence, an Environmental Authority as well as a suite of subordinate approvals (see Table 23). A Petroleum Facility Licence may be required if the Gas Processing Facility is located in Queensland.

Processes associated with obtaining these would be conducted in conjunction with and after the environmental impact assessment, so as to allow construction to commence in a timely manner after conclusion of the environmental impact assessment process. If the NT Link is declared a 'Coordinated Project' under the SDPWO Act, the Petroleum Pipeline and Facility tenures, issued under the P&G Act, and their associated Environmental Authorities cannot be granted until the SDPWO assessment process is complete (under s.412A of the P&G Act).

Table 23: Queensland and Commonwealth Approvals Inventory

Act	Administering Authority	Approval Needed	Project Trigger
Commonwealth			
Aboriginal & Torres Strait Islander Heritage Protection Act 1984	Department of the Environment	Determination that there are no unacceptable impacts to matters of Aboriginal cultural heritage and that an acceptable ILUA has been established under the applicable Queensland legislation	Potential impacts on items of Aboriginal cultural heritage
Environment Protection & Biodiversity Conservation Act 1999	Department of the Environment	EPBC Permit required for an action that may have a significant impact on a Matter of National Environmental Significance (MNES). Projects likely to result in a significant impact must be referred to the Department for determination of the need and level of any assessment and subsequent approval. The Project is not expected to trigger approval requirements under this Act.	Potential impacts on MNES
Native Title Act 1993	National Native Title Tribunal	Impacts of the project on native title	Action proposed on land where

Act	Administering Authority	Approval Needed	Project Trigger
		rights and interests must be validated through an Indigenous Land Use Agreement (ILUA). An ILUA can be over land where native title has, or is yet to be, determined or settled separately from a native title claim.	Native Title has not been extinguished
Queensland			
State Development and Public Works Organisation Act 1971	Department of State Development and Infrastructure Planning (Qld)	Projects may be declared as a coordinated project if the project is has: complex approval requirements, strategic significance, significant environmental effects, or significant infrastructure requirements. The NT Link project is considered to trigger the requirements for this declaration. Approval of the project is provided within the Coordinator General's Report. The report may state conditions to be included in the environmental authority	The project would satisfy an identified demand for improved gas supply security on the eastern seaboard of Australia The project would enhance Queensland's gas supply infrastructure and distribution network The Northern Territory Government has granted Major Project Status for the North East Gas Interconnector (NEGI) project, for which the NT Link Project is

Act	Administering Authority	Approval Needed	Project Trigger
		and/ or pipeline licence, or other approvals	APA's response to the NEGI The Council of Australian Governments (COAG) supports the connection of the Northern and Eastern Gas Markets via the NEGI Project.
Environmental Protection Act 1994 (EP Act) and Regulations	Department of Environment and Heritage Protection	Environmental Authority (EA)	An environmental authority is required to authorise a resource activity (including a petroleum activity authorised under the P&G Act) and to perform an environmentally relevant activity (ERA). The project exceeds the eligibility criteria thresholds for a standard petroleum pipeline EA. A site-specific EA application will need to be made for the pipeline and, if required, the petroleum pipeline facility.

Act	Administering Authority	Approval Needed	Project Trigger
			Relevant ERAs that may be applicable (if ERA screening thresholds in EP Regs are triggered) include: 8(a) – chemical storage 10 – Gas producing 14 – Electricity generation (at GPF) 14(2), 15(1) – diesel generators (size criteria apply) and fuel consumption (quantum criteria applies) 15 - flaring 16 – extractive and screening activities (road base preparation, threshold exceedance to be confirmed) 63 – operating a STP 64 - water treatment plant

Act	Administering Authority	Approval Needed	Project Trigger
Petroleum and Gas (Safety and Production) Act 2004	Department of Natural Resources and Mines	Petroleum Pipeline Licence (PPL)	The NT Link Project will require a point-to-point PPL to construct and operate the gas pipeline.
Aboriginal Cultural Heritage Act 2003	Department of Aboriginal and Torres Strait Islander Partnerships	Approved CHMP	Potential impacts on Aboriginal cultural heritage
Forestry Act 1957	Department of Natural Resources and Mines	Clearing permit	Clearing vegetation within Royton Timber Reserve.
Land Act 1994	Department of Natural Resources and Mines	Clearing permit	Clearing in road reserve or on State Land
Land Protection (Pest and Stock Route Management) Act 2002	Department of Agriculture and Fisheries	s.175 approval	Activity that may 'damage' a Travelling stock route
Local Government Act 2009	Department of Infrastructure, Local Government and Planning, Mt Isa City Council	Temporary road closure approval	Any temporary road closures
		AWE Permit	Works within the area of a local government road
Nature Conservation Act 1992 and Regulations	Department of Agriculture and Fisheries and Department of Environment and Heritage	Clearing Permit	Clearing generally, including any requirement for clearing protected plants

Act	Administering Authority	Approval Needed	Project Trigger
	Protection	Wildlife Permit	Potential for injury to animals during clearing
Queensland Heritage Act 1992	Department of Environment and Heritage Protection	Permit to enter or interfere with registered place or thing	If any Queensland-listed areas or things to be disturbed
Sustainable Planning Act 2009	Department of Infrastructure, Local Government and Planning as delegated to Mt Isa City Council	Development Consent	Authorised petroleum activities, and projects assessed and approved under the SDPWO Act as a coordinated project do not require approvals under the Sustainable Planning Act. This would exempt the Project from the need to obtain permits for building work, waterway barrier works, clearing native vegetation, taking or interfering with water, or riverine protection. Works not approved as part of the petroleum activities or the coordinated project may require SPA approval.

Act	Administering Authority	Approval Needed	Project Trigger
Transport Infrastructure Act 1994	Department of Transport and Main Roads	AWA Permit	Works of any kind within a state road corridor
		Traffic Control Permit	Required for any traffic control in a state road
Water Act 2000 and regulations	Department of Natural Resources and Mines	Operational Works Permit	Authorised petroleum activities do not require a permit to take or interfere with the use of water and underground water. Any interference with bed or banks of any watercourse where not dealt with by the SDPWO Act or PG (P&S) Act/EP Act.
Work Health and Safety Act 2011	Department of Justice and Attorney-General	Authorisation - to operate any defined plant	Applies to works, such as constructing or operating hazardous works (anything to do with HP gas), water extraction and gravel extraction.

Please note: Table 23 is not intended to be exhaustive, merely indicative of the principal approvals required in Queensland for the Project.

9.1 Application for Declaration as a Coordinated Project for which an IAR is Required Under Section 26(1)(b) of the SDPWO Act

The Project is considered suitable for declaration as a coordinated project because:

- The project would satisfy an identified demand for improved gas supply security on the eastern seaboard of Australia
- The project would enhance Queensland's gas supply infrastructure and distribution network
- The Northern Territory Government has granted Major Project Status for the North East Gas Interconnector (NEGI) project, for which the NT Link Project is APA's response to the NEGI
- The Council of Australian Governments (COAG) supports the connection of the Northern and Eastern Gas Markets via the NEGI Project.

The *State Development, Infrastructure and Planning (Red Tape Reduction) and Other Legislation Amendment Act 2014* was enacted in 2014. This Act introduced a number of changes to the Environmental Impact Statement (EIS) process under the SDPWO Act, including the introduction of an Impact Assessment Report (IAR) as an alternative assessment process where coordinated projects are considered to be well-defined and low to medium risk.

APA considers that this project meets the criteria for assessment via an IAR because:

- The project scope predominately involves the construction of an underground pipeline with minor above ground facilities and the potential for a gas processing facility. The disturbance expected to be generated by the Project is relatively small
- All of which will use standard construction practices that have been used by the construction industry for a significant period of time (i.e. no risk associated with using new technologies)
- The project area does not directly impact on any commonwealth land, commonwealth or national heritage places, critical habitat, nationally important wetlands or commonwealth reserves
- Construction, and its associated potential impacts, are likely to occur for only a short period of time
- The risks associated with a project such as this in an environment such as this are not considered high (refer section 8)
- APA has extensive experience in the design and construction execution of pipelines and are well versed in the environmental management strategies required to successfully construct a pipeline
- The condensed project timing to secure approvals would benefit from a prudent assessment and approvals process, appropriate to the low levels of risk posed by the project.

As such, in order to ensure the timely assessment of impacts and effective regulatory approvals, APA seek that the Queensland portion of the NT Link Project's environmental assessment be undertaken as an IAR.

10 COSTS AND BENEFITS SUMMARY

10.1 General Benefit for Local, State and National Economies

The NT Link Project has the potential to provide a significant boost in the areas of construction and then manufacturing.

The east coast gas market is set for a significant transformation with three LNG export Projects totalling $70 billion of investment to commence operations in Queensland. The LNG Projects are forecast to drive a tripling in east coast gas demand. The demand for gas from the LNG Projects, in addition to the issues around coal seam gas development in NSW and Victoria, is causing pressure on gas supplies which is likely to prevail in the medium term.

In the NT, current gas supply from the Bonaparte and Amadeus Basins is sufficient to meet existing demand for the medium term, but new supply is required to support growth opportunities and future market demand in the region.

The NT Government has estimated that the NT has in excess of 200 TCF of conventional and unconventional gas reserves, both on-shore and off-shore. This is an abundant supply which is potentially available to meet and exceed the supply constraints facing the gas market in the south east of Australia and the NT's future demand. This provides an emerging opportunity which could make linking the NT with the south east gas market commercially viable and add substantial new reserves to be available for the demand centres in eastern Australia.

Connection of the proposed pipeline between Warrego and Mt Isa provides the shortest link and will enable the seamless transport of gas from any gas source between the Timor Sea and Bass Strait to any east coast demand centre. The proposed link opens up new market opportunities for existing and potential gas producers in the NT and provides commercial incentive to develop new sources of both conventional and unconventional gas.

The interconnectivity offered by APA's gas pipeline grid provides the market with the most efficient end-to-end transport solution.

The NT Link Project is forecast to cost approximately $1.35 billion (including the gas processing facility).

10.2 Optimising Regional Opportunities

As part of its Expression of Interest to the NT Government in response to the NEGI Project opportunity, APA noted that it will consult with the NT Government's Department of Business and the NT Industry Capability Network to develop an Industry Participation Plan. The Plan can be used as a model for a similar approach in Queensland.

In Queensland, APA will also consult with the Department of State Development and the Department of Tourism, Major Events, Small Business and the Commonwealth Games to review industry participation opportunities and seek the maximum achievable Queensland share of Project expenditure and employment. Matters to be considered would be drawn from the following:

- How services, suppliers and labour will be utilised
- Enhancements to business/industry capability
- Regional economic development benefits
- Proposals for Indigenous participation
- Communications strategy.

APA will proactively use local and/or indigenous people where this does not compromise the safe and efficient construction and operation of the pipeline. Local and/or indigenous participation will also be facilitated by using local suppliers and services where possible.

11 COMMUNICATION AND ENGAGEMENT

APA has developed and commenced implementation of a Communication and Engagement Plan (CAEP) to:

- Ensure a consistent consultation approach throughout the Project
- Meet the statutory requirements and expectations of regulatory agencies in relation to the consultative processes used by the Project for key stakeholder, traditional owners, landowners and occupiers
- Ensure that consultation activities enable key stakeholders, traditional owners, landowners and occupiers to better understand the Project through the timely distribution of Project information that is presented in an understandable format
- Ensure that APA understands the views of key stakeholders, traditional owners, landowners and occupiers
- Ensure key stakeholders, traditional owners, landowners and occupiers are sufficiently informed about the Project, the aspects that they can influence and their rights
- Outline the process of consultation and engagement with key stakeholders, traditional owners, landowners and occupiers and the complaints process, to ensure consistency with regulatory requirements
- Allow key stakeholders to make informed decisions in relation to the Project in a timely manner by being kept informed on the progress of the Project (without compromising the NEGI Request for Final Proposal process).

The CAEP has identified key interest groups and identified strategies appropriate to effectively involve each of them in aspects of the NT Link Project of interest to them. Key groups / individuals in Queensland include the following:

- Pastoral and land lease owners and occupiers
- Aboriginal representatives
- Elected representatives
- Regulators and other government agencies
- Tenement holders
- Mt Isa City Council
- Community, environment and special interest groups.

APA will use the CAEP as a vehicle to guide engagement with the community, identify its interests and concerns and map out responses.

A range of communications tools have been and will continue to be used, including email, phone, use of specialist communicators and mailing information such as the Fact Sheets.

In Queensland, communications conducted to date include making initial contact with directly-affected Pastoral Lease occupiers along the potential alignment and holding introductory meetings with both the Kalkadoon and Indjalandji-Dhidhanu Native Title Groups. Consultations and negotiations with each of these entities will be undertaken during the course of the Project's approvals phase and will comprise regular face-to-face meetings with individuals and larger groups, as well as regular written updates and notifications.

APA has commenced an engagement process with the relevant mining tenement holders in order to identify potential interactions between the proposed alignment and their existing and planned operations.

To facilitate the success of its stakeholder engagement, APA will have a dedicated Stakeholder Management Team consisting of:

- Land access specialists responsible for:
  - Face to face contact and liaising with landowners
  - Liaising with overlapping tenement holders
  - Liaising with third party service and infrastructure providers, including relevant Government Agencies
  - Negotiating access arrangements and options.
- Native Title and Cultural Heritage specialists
- Environmental and approvals specialists who will liaise with the relevant regulatory Agencies
- Construction/Site Environmental Compliance Managers.

12 CONCLUSION

This IAS has provided detailed information on the NT Link Project and it's proponent, APA, and summary information on the existing environment, potential impacts and proposed management and mitigation measures for the Queensland portion of the project.

Potential impacts from the NT Link Project on MNES listed for Queensland have been reviewed in s.6.6. Based on the findings of the initial assessments APA currently believes that the NT Link Project is unlikely to have, a significant impact on any MNES. As such, APA does not intend to refer the Project to the Commonwealth Government at the current time. However, APA may subsequently refer the Project if appropriate and will regularly review any findings relevant to MNES from the ongoing studies which will be part of the Project's environmental impact assessment.

APA is seeking a coordinated Project declaration under the SDPWO Act to facilitate the timely and effective regulatory assessment of the Project. Based on the scope of the Project and the potential impacts associated with it, APA requests that the project be assessed using an IAR process.

13 REFERENCES AND DATA SOURCES

ABS 2014: Australian Bureau of Statistics website latest published data for Mt Isa LGA, interrogated on 28/5/15 at: http://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/LGA353002002-2006?OpenDocument&tabname=Details&prodno=LGA35300&issue=2002-2006&num=&view=&

Australian Pipelines and Gas Association (APGA) Code of Environmental Practice (CoEP) 2013: Australian Pipeline Industry Association Code of Environmental Practice for Onshore Pipelines October 2013

APPEA 2013: Australian Petroleum Production & Exploration Association website, available at http://www.appea.com.au/tags/lng

Arrow 2012: Arrow Bowen Pipeline EIS - prepared by Sinclair Knight Merz Pty Ltd in conjunction with Arrow Bowen Pipeline Pty Ltd, March 2012, available from https://www.arrowenergy.com.au/Projects/Project-assessment-eis/arrow-bowen-pipeline-eis

CNC 2014: NT Link Options Assessment Report, an internal report prepared for APA Group by CNC Project Management P/L, July 2014

Department of Environment and Heritage Protection (DEHP) 2013: Application requirements for petroleum activities, Version 4.

IECA 2008: International Erosion Control Association 'Best Practice Erosion and Sediment Control', Books 1-3, IECA Australasia November 2008

Queensland CG (2013) Social impact assessment guideline, available from http://dilgp.qld.gov.au/resources/guideline/social-impact-assessment-guideline.pdf

QR 2007: Queensland Rail Mt Isa System Information Pack, Issue 2.1, May 2007

14 ACRONYMS AND ABBREVIATIONS

Abbreviation	Description
APGA	Australian Pipeline and Gas Association (formerly APIA)
APIA	Australian Pipeline Industry Association (now APGA)
ASX	Australian Stock Exchange
BA	Bilateral Agreement
CAEP	Communication and Engagement Plan
CoEP	Code of Environmental Practice
CSN	Control System Network
EA Act	Environmental Assessment Act 2012 (NT)
EIS	Environmental Impact Statement
EP Act	Environmental Protection Act 1994 (Queensland)
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth)
ESC	Erosion and Sediment Control
GHG	Greenhouse Gas
GPF	Gas Processing Facility
HTB	Horizontal Thrust Boring
IAS	Initial Advice Statement
Land Act	Land Act 1994 (Queensland)
LP Act	Land Protection (Pest and Stock Route Management) Act 2002 (Queensland)
MNES	Matters of National Environmental Significance
NC Act	Nature Conservation Act 1992 (Queensland)
NEGI	North East Gas Interconnector
NOI	Notice of Intent

Abbreviation	Description
NT	Northern Territory
NT Link	The NT Link Gas Pipeline Project
P&G Act	Petroleum and Gas (Production and Safety) Act 2004 (Queensland)
PIG	Pipeline Inspection Gauge
RFFP	Request for Final Proposal
ROW	Right-of-Way
SCADA	Supervisory Control and Data Acquisition
SDPWO Act	State Development and Public Works Organisation Act 1971 (Queensland)
SIA	Social Impact Assessment
SMS	Safety Management Study
TOR	Terms of Reference
TSR	Travelling Stock Route

Appendix A O2 Ecology Report

Flora and Fauna Assessment Report
NT Link (Queensland Portion)

CLIENT:
CNC Project Management

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Final

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Important Note

This report has been prepared for the sole use of **CNC Project Management** and **APA Group** (herein, 'the client'), for a specific site (herein 'the site', the specific purpose specified in Section 1 of this report (herein 'the purpose'). This report is strictly limited for use by the client, to the purpose and site and may not be used for any other purposes.

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	Draft	M. Ng, A. Franks	P. Fox			5/6/2015
a	Draft	M. Ng, A. Franks	A. Franks P. Fox	Addition of MNES assessment Address client feedback 11/6/2015		15/6/2015
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Transmission Register

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Executive Summary

A desktop and field assessment was carried out to identify and assess the ecological values along approximately 180 km of proposed pipeline for the NT Link Project from the Queensland/Northern Territory border to Mount Isa with a buffer of 500 m either side of the alignment. A five day post-wet season (autumn) fauna and flora survey was carried out along the proposed alignment (dated 22 April 2015 - this alignment is in close proximity, less than 300 m at most distant point, to the Indicative Alignment Rev 1, the basis for the IAS submission) between 27 April and 2 May 2015 to:

- assess flora, including endangered, vulnerable and near threatened species listed under the Queensland *Nature Conservation Act 1992* (NC Act) and Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act);
- assess fauna, including endangered, vulnerable and near threatened species listed under the NC Act and EPBC Act and their breeding places;
- assess pest fauna and flora (weed) species;
- assess vegetation communities and remnant Regional Ecosystems; and
- ground-truth mapped areas of high ecological significance including, but not necessarily limited to, riparian areas, nationally threatened ecological communities, large tracts of remnant vegetation, corridors and special biodiversity areas.

This report presents the results of desktop investigations, field survey methods, survey limitations and findings. A significant impact self-assessment for species listed under the EPBC Act is also provided. The information presented by this report will inform the Initial Advice Statement (IAS) and form the basis for any EPBC Act Referral.

The proposed pipeline crosses 30 watercourses that are mapped by the Queensland Government at a scale of 1:100,000. These 30 watercourses appear on Vegetation Management Watercourse Maps and as such are defined as Matters of State Environmental Significance (MSES). The majority of watercourses crossed by the pipeline are small ephemeral streams.

The proposed pipeline passes through Royton Timber Reserve, a protected area under the NC Act.

All of the 24 mapped remnant Regional Ecosystems are classed as Least Concern under the provisions of the VM Act.

Three declared pest plant species have previously been recorded within the search area: **Cascabela thevetia* (C3), **Parkinsonia aculeata* (C2, WONS),**Tamarix aphylla* (C3, WONS). One C2 declared animal species has also previously been recorded within the search area: **Sus scrofa* (feral pig). **Parkinsonia aculeata* (C2, WONS), **Sus scrofa* (feral pig) (C2) and **Felis catus* (feral cat) were detected during the survey.

Matters of National Environmental Significance

Within the study area there are:

- no world heritage properties or wetlands of international importance;
- no commonwealth lands, commonwealth or national heritage places, critical habitats, nationally important wetlands or commonwealth reserves;
- no commonwealth marine areas or Great Barrier Reef marine; and
- no listed Threatened Ecological Communities.

An assessment of the likelihood of occurrence, based on a combination of desktop searches and site data, of species protected under the EPBC Act indicates that 28 listed migratory or marine species and six EPBC Act listed threatened species are at least moderately likely to occur within the study area. Three of these species are priority species listed in the Desert Channels NRM region Back on Track report (Department of Environment and Resource Management 2010b) and two of these species are priority species listed in the Southern Gulf NRM region Back on Track report (Department of Environment and Resource Management 2010a).

No EPBC Act listed flora or fauna species were detected during the survey.

No migratory or listed marine species were observed during the survey.

The alignment and corridor contains potential habitat for six threatened species as well as migratory birds:

- Australian painted snipe (*Rostratula australis*)
- Carpentarian antechinus (*Pseudantechinus mimulus*)
- Gouldian finch (*Erythrura gouldiae*)
- greater bilby (*Macrotis lagotis*)
- plains death adder (*Acanthophis hawkei*)
- red goshawk (*Erythrotriorchis radiatus*)

There is potential habitat for 28 migratory bird species within the study area:

- Australian reed-warbler (*Acrocephalus australis*)
- bar-tailed godwit (*Limosa lapponica*)
- black-tailed godwit (*Limosa limosa*)
- Caspian tern (*Hydroprogne caspia*)
- cattle egret (*Ardea ibis*)
- common greenshank (*Tringa nebularia*)
- common sandpiper (*Actitis hypoleucos*)
- curlew sandpiper (*Calidris ferruginea*)
- eastern osprey, osprey (*Pandion cristatus, Pandion haliaetus*)
- glossy ibis (*Plegadis falcinellus*)
- great egret, eastern great egret (*Ardea alba, Ardea modesta*)
- Latham's snipe (*Gallinago hardwickii*)
- little curlew (*Numenius minutus*)
- long-toed stint (*Calidris subminuta*)
- marsh sandpiper (*Tringa stagnatilis*)
- oriental pratincole (*Glareola maldivarum*)
- pacific golden plover (*Pluvialis fulva*)
- red-necked stint (*Calidris ruficollis*)
- sharp-tailed sandpiper (*Calidris acuminata*)
- Swinhoe's snipe (*Gallinago megala*)
- terek sandpiper (*Xenus cinereus*)
- white-bellied sea-eagle (*Haliaeetus leucogaster*)
- white-winged black tern (*Chlidonias leucopterus*)
- wood sandpiper (*Tringa glareola*)
- yellow wagtail species (*Motacilla flava*)
- fork-tailed swift (*Apus pacificus*)
- oriental Plover (*Charadrius veredus*)

- rainbow bee-eater (*Merops ornatus*)

The significant impact self-assessment for species listed under the EPBC Act has been carried out under the assumption that the project will be based upon construction methods, timing and mitigation measures as specified within this report. On this basis, the assessment indicates that these species are unlikely to be significantly impacted upon provided that the following species-specific mitigation measures are implemented:

- associated infrastructure is located away from wetland areas with construction completed in these areas during the dry season;
- there are no significant changes to hydrology, nutrient cycling, fire regimes or invasive species as a result of the project;
- there are no significant long-term changes to grass species composition within areas adjoining the construction corridor through preferred Gouldian finch (*Erythrura gouldiae*) habitat, and preferentially avoiding nesting trees within Gouldian finch habitat (preferred habitat locations to be determined during the project's environmental impact assessment);
- significant clearance or disturbance to rocky areas supporting Carpentarian antechinus (*Pseudantechinus mimulus*) is avoided (targeted surveys to be carried out during the project's environmental impact assessment); and
- the felling of potential red-goshawk (*Erythrotriorchis radiatus*) nesting trees along waterways is preferentially avoided.

Matters of State Environmental Significance

There are a series of mapped MSES wetlands between KP 449 and KP 456. MSES waterways associated with Buckley River, Nottingham Creek, Mingera Creek, Templeton River and Mica Creek will be crossed by the alignment.

An assessment of the likelihood of occurrence, based on a combination of desktop searches and site data, of species protected under the NC Act indicates that 12 NC Act listed threatened species are at least moderately likely to occur within the study area. Seven of these species are priority species listed in the Desert Channels NRM region Back on Track report (Department of Environment and Resource Management 2010b) and six of these species are priority species listed in the Southern Gulf NRM region Back on Track report (Department of Environment and Resource Management 2010a).

One threatened species, purple-necked rock wallaby (*Petrogale purpureicollis*), listed as Vulnerable under the NC Act, was observed at Camp 2 (z54 E:329568, N:7704653) near Mount Isa. Areas identified as Essential Habitat for purple-necked rock-wallaby (*Petrogale purpureicollis*) have been mapped over the study area within lot 575 on CP857742.

No NC Act listed flora species were detected during the survey.

There is potential habitat for 12 threatened species within the study area:

- *Ptilotus maconochiei*
- Australian painted snipe (*Rostratula australis*)
- Carpentarian grasswren (*Amytornis dorotheae*)
- ghost bat (*Macroderma gigas*)
- Gouldian finch (*Erythrura gouldiae*)
- greater bilby (*Macrotis lagotis*)
- grey falcon (*Falco hypoleucos*)
- northern leaf-nosed bat (*Hipposideros stenotis*)

- orange leaf-nosed bat (*Rhinonicteris aurantia*)
- painted honeyeater (*Grantiella picta*)
- purple-necked rock-wallaby (*Petrogale purpureicollis*)
- red goshawk (*Erythrotriorchis radiatus*)

Alignment Suitability

The assessed alignment is appropriate in terms of minimising the number of waterway crossings and avoiding rocky outcrops, cliffs, and boulder piles on the eastern side of the study area. With the adoption of the alignment revision requested by O2 Ecology on 22 June 2015 (**Figure 12**), the alignment avoids MSES wetlands mapped between KP 449 and KP 456. Subject to the results of further studies, the assessed alignment is appropriate in terms of minimising potential impacts to ecological values.

Further ecological studies will be undertaken as required to meet the project's Terms of Reference for its environmental impact assessment.

List of Abbreviations

Abbreviation	Definition
ALA	Atlas of Living Australia
AVH	Australia's Virtual Herbarium
Biodiversity Status:	
E	Endangered
OC	Of Concern
NC	No Concern at Present
BOM	Bureau of Meteorology
CNC	CNC Project Management
DEHP	Queensland Department of Environment and Heritage Protection
DOE	Commonwealth Department of the Environment
DSITI	Queensland Department of Science, Information Technology and Innovation
EDL	Ecologically Dominant Layer
EH	Essential habitat
EPBC Act	Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*
EVNT	Endangered, Vulnerable or Near Threatened (conservation status listing of species under the EPBC Act or NC Act)
GIS	Geographic information system
GPS	Global positioning system
ha	Hectare
IAS	Initial Advice Statement
IBRA	Intrim Biogeographic Regionalisation of Australia
km	Kilometre
KP	Kilometre Point along the alignment based the alignment current at the time of the survey
LP Act	*Land Protection (Pest and Stock Route Management) Act 2002*
MNES	Matter of National Environmental Significance
MSES	Matters of State Environmental Significance
NC Act	Queensland's *Nature Conservation Act 1992*
NRM	Natural Resource Management
NT	Northern Territory
OZCAM	Online Zoological Collections of Australian Museums
PMAV	Property Map of Assessable Vegetation
PMST	Commonwealth EPBC Act Protected Matters search tool
QEOP	Queensland Environmental Offset Policy
Qld	Queensland
RE	Regional Ecosystem
REDD	Regional Ecosystem Description Database

Abbreviation	Definition
SPP	State Planning Policy
TEC	Threatened Ecological Community
VM Act	Queensland's *Vegetation Management Act 1999*
VM Class (VM Act):	
E	Endangered
OC	Of Concern
LC	Least Concern
WONS	Weeds of National Significance

1. Introduction

CNC Project Management (CNC) commissioned O2 Ecology to carry out an ecological survey along approximately 180 km of proposed pipeline from Mount Isa to the Queensland/Northern Territory border.

A five day post-wet season (autumn) fauna and flora survey was carried out along the proposed alignment (dated 22 April 2015 - this alignment is in close proximity, less than 300 m at most distant point, to the Indicative Alignment Rev 1, the basis for the IAS submission) between 27 April and 2 May 2015 to:

- assess flora, including endangered, vulnerable and near threatened species listed under the Queensland *Nature Conservation Act 1992* (NC Act) and Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act);
- assess fauna, including endangered, vulnerable and near threatened species listed under the NC Act and EPBC Act and their breeding places;
- assess pest fauna and flora (weed) species;
- assess vegetation communities and remnant Regional Ecosystems (RE); and
- ground-truth mapped areas of high ecological significance including, but not necessarily limited to, riparian areas, nationally threatened ecological communities, large tracts of remnant vegetation, corridors and special biodiversity areas.

This report presents the results of desktop investigations, field survey methods, survey limitations and findings. The information presented here will inform the Initial Advice Statement (IAS) and form the basis for any EPBC Act Referral.

1.1. Project Location

The study area includes the Queensland portion of the NT Link Project, approximately 180 km of proposed pipeline (alignment dated 22 April 2015 - this alignment is in close proximity, less than 300 m at most distant point, to the Indicative Alignment Rev 1, the basis for the IAS submission) from the Queensland/Northern Territory border to Mount Isa (**Figure 5** in **Appendix A**) with a buffer of 500 m either side of the alignment. The alignment passes through seven land parcels associated with four land managers (**Table 1**).

Table 1 Land parcels associated with the study area

Lot	Plan	Name	Land Use
2	WO28	Barkly Downs	Pastoral
42	CP847157	Barkly Downs	Pastoral
24	SP265794	May Downs	Pastoral
265	FTY1762	Royton Timber Reserve	Conservation
1	AP6625	Glencoe	Pastoral
575	CP857742	Glencoe	Pastoral
10	SP240553	Glencoe	Pastoral

1.2. Brief Project Description

The NT Link Project is a 12-20" diameter gas transmission pipeline connecting APA Group's assets in Warrego (near Tennant Creek, NT) and Mica Creek (near Mount Isa, Queensland). The proposed pipeline is approximately 632 km in length and its purpose is to connect the Amadeus (NT) and Carpentaria (Qld) Pipelines, enabling gas supplies within the NT to be transported to east coast customers.

The proposed alignment passes through several pastoral leasehold properties; from its western terminus in the north of the Tanami Region, NT, it extends east for approximately 280 km through the low rolling hills of the Davenport Murchison Range, traversing the Barkly Tablelands (Mitchell Grass Downs bioregion) and the northern parts of the Channel Region for another 130 km before crossing into Qld at a point approximately 45 km south-southwest of Camooweal. Once in Qld, the alignment passes through a further 60 km of alluvial (channel) country and then transits 100 km of the dissected plateaus and hills of the Mt Isa Inlier before terminating at Mount Isa.

The proposed corridor commences from a location on the Amadeus Pipeline near the APA's Warrego Compressor Station and heads east, generally along Warrego Road, to the intersection of the Stuart Highway and the Barkly Highway ('Three Ways') at approximately KP40.

From Three Ways, the corridor parallels the Barkly Highway for approximately 27 km within Aboriginal Freehold Land. At approximately KP67, the corridor leaves the Barkly Highway alignment heading in an easterly direction through a pastoral lease before intersecting the Wakaya Desert along the northern boundary between KP95 to KP160.

The corridor crosses the Barkly Highway at KP160 and continues adjacent to the road reserve to the north until ~KP310 where it moves up to 5 km north of the Barkly Highway alignment. In this stretch, the corridor runs through two additional pastoral leases; the corridor crosses the Barkly Highway again at ~KP350, running successively through several additional pastoral leases before crossing into Qld at ~KP460. The proposed alignment then heads in an ESE direction to the south of Camooweal traversing a further pastoral lease before its terminus with the Carpentaria pipeline approximately 6 km south of Mt Isa.

The pipeline will be trenched for virtually its entire length, using conventional trenching methods; exceptions will occur at major infrastructure crossings (road and rail lines) – and possibly at one or more watercourse crossings – where trenchless construction techniques may be applied.

All construction will be in compliance with the minimum acceptable industry standard defined in the Australian Gas and Pipeline Association Code of Environmental Practice (APGA 2013) and the 'AS 2885 – Pipelines – Gas and liquid petroleum' series of standards.

Construction methods and timing are attached in **Appendix J**.

2. Desktop Review

A review of available information was undertaken prior to the field survey to identify records or potential occurrences of conservation significant flora, fauna and ecosystems within the study area and inform the design of the field survey. Information was collected from a variety of sources and summarised in **Section 2.3** (existing environmental values). This section also contains an assessment of the likelihood of each protected species to occur within the study area based on species records, species ecology and potential habitats occurring within the study area (mapped habitats ground truthed during the field survey).

2.1. Data Sources

Desktop assessments of available State and Commonwealth databases were undertaken prior to the commencement of the field survey to identify records or potential occurrences of conservation significant flora and fauna species and ecosystems within the study area. The desktop assessment utilised the below databases and documents and the search areas are depicted in **Figure 6** in **Appendix A**.

The Commonwealth Department of the Environment (DOE) Protected Matters search tool (PMST) was used to identify species listed under the Commonwealth EPBC Act that may occur within the search area. The PMST is a predictive database that identifies EPBC Act listed flora and fauna species with a Moderate Potential to Occur in a given search area based on bioclimatic modelling. The search area was defined by three polygons (**Table 2**).

Table 2 PMST search areas

Polygon	Vertex 1	Vertex 2	Vertex 3	Vertex 4	Vertex 5	Location
1	-20.34496 137.99669	-20.46138 138.54616	-20.37902 138.57362	-20.30825 137.99737	-20.34496 137.99669	West
2	-20.461383 138.546158	-20.461383 138.548904	-20.379016 138.573624	-20.546278 139.144913	-20.631126 139.125687	Central
3	-20.499978 139.084488	-20.499978 139.084488	-20.744184 139.496475	-20.84689 139.469009	-20.587423 139.046036	East

Regional Ecosystems (REs) are vegetation communities that are consistently associated with a particular combination of geology, land form and soil in a bioregion. The Queensland Herbarium (DSITI) has mapped the remnant and pre-clearing extent of REs for much of the State using a combination of satellite imagery, aerial photography interpretation and on-ground studies. The VM Act Regional Ecosystem and Remnant Map Version 9.0, Essential Habitat Map Version 4.0, Regrowth Vegetation Map Version 2.1 and Property Maps of Assessable Vegetation (PMAVs) were used to determine the extent and type of remnant or regrowth vegetation within the study area. REs can be used to predict the occurrence of suitable habitat.

Matters of State Environmental Significance (MSES) are referenced in the biodiversity State interest under the State Planning Policy (SPP) and are mapped by the Queensland government. The Environmental Offsets Regulation 2014 also prescribes MSES for the purposes of the environmental offsets legislation in Queensland. Many of the MSES in the Environmental Offsets Regulation 2014 coincide with the MSES listed under the SPP, however, there are additional items listed under the Environmental Offsets Regulation 2014 that are not listed in the SPP. The MSES mapping includes certain environmental values that are protected under Queensland legislation such as State conservation areas, waterways and wetlands, regulated vegetation and offset areas. The mapping was used to determine areas of biodiversity importance within the vicinity of the study area.

The Queensland Department of Environment and Heritage Protection's (DEHP) Wildlife Online database was used to identify all fauna species that have been recorded within the search area and reported to DEHP since 1980. Records were compiled for a search area defined by four central latitude/longitude coordinates with a 20 km buffer: -20.4379, 138.5608; -20.5640, 138.9201; -20.3557, 138.1875; -20.6797, 139.2859.

BirdLife Australia's Birdata was used to provide a list of all bird species observed within a one degree squares containing latitude/longitude coordinates -20.3407, 138.31678 and -20.62864, 139.02848.

The Atlas of Living Australia (ALA) database contains records of Australia's Virtual Herbarium (AVH) and the Online Zoological Collections of Australian Museums (OZCAM) and provides information on all the known species in Australia aggregated from a wide range of data providers: museums, herbaria, community groups, government departments, individuals and universities. Database records for the area surrounding the site were used to provide locations of any threatened species records within the area.

The Desert Channels Natural Resource Management Region (Department of Environment and Resource Management 2010b) and Southern Gulf Natural Resource Management Region (Department of Environment and Resource Management 2010a) Back on Track Actions for Biodiversity reports were used to identify priority species and actions for the regions.

2.2. Likelihood of Occurrence Assessment

An assessment was undertaken of the likelihood of occurrence for threatened species identified through the desktop review. The field survey further informed and verified this likelihood of occurrence assessment. The DOE and DEHP do not have prescriptive likelihood of occurrence guidelines within their policies but rather clarify the scale of assessment required to determine the level of impact (e.g. level of assessment, previous record searches, and distribution maps). The below criteria have been developed with the aim of considering this scale of assessment in order to identify the likelihood of occurrence for threatened species:

- **Low potential to occur** – the species has not been recorded in the region (no records from desktop searches) and/or current known distribution does not encompass study area and/or suitable habitat is generally lacking from the study area.
- **Moderate potential to occur** – the species has been recorded in the region (desktop searches) however suitable habitat is generally lacking from the study area or species has not been recorded in the region (no records from desktop searches) however potentially suitable habitat occurs at the study area.
- **High potential to occur** – the species has been recorded in the region (desktop searches) and suitable habitat is present at the study area.
- **Known to occur** – the species has been recorded on-site in the recent past (i.e. last 5-10 years) and the site provides suitable habitat for it.

2.3. Existing Environmental Values

The Queensland section of the NT Link study area falls between the Queensland/Northern Territory border and the population centre of Mount Isa in north western Queensland (**Figure 5** in **Appendix A**). The study area falls within the Mount Isa City Council local government area and lies almost entirely in the Desert Channels natural resource management (NRM) region, with a small portion on the eastern end of the alignment within the Southern Gulf NRM region.

2.3.1. Climate

The study area experiences an arid grassland to desert climate with hot summers and mild winters with the majority of rainfall falling in summer (Bureau of Meteorology 2012).

Figure 1 shows the mean monthly rainfall recorded at the nearest Bureau of Meteorology (BOM) long term rainfall station (Barkly Downs 037003) and temperature recorded at the nearest BOM long term weather station (Mount Isa Aero 029127). The mean maximum temperatures range from 24.8°C in July to 37.2°C in December, with the mean minimum temperatures ranging from 8.6°C in July to 23.7°C in January. The mean annual rainfall is 355.8 mm with January, the wettest month, averaging 86.6 mm of rainfall and August, the driest month, averaging 2.5 mm of rainfall. Approximately 62% of the rainfall occurs between December and February (inclusive) (Bureau of Meteorology 2014).

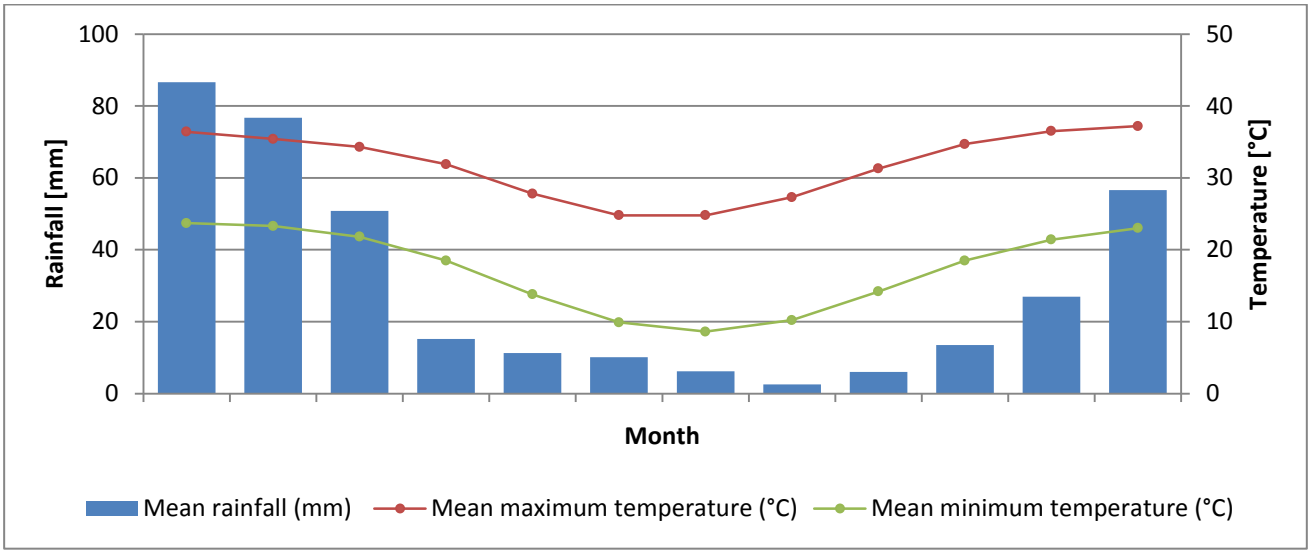

Figure 1 Mean monthly rainfall (Barkly Downs 037003) and temperature (Mount Isa Aero 029127)

2.3.2. Geology and Geomorphology

Geology mapping covering the NT Link alignment (Mount Isa 1:250,000 sheet) indicates a number of distinct geologies occur across the study area, reflecting the complexity and antiquity of the area. The geology to the west of Mount Isa is mainly classed as Palaeoproterozoic and encompasses ancient sedimentary, metamorphic and igneous rocks. The wide range of rock types and minerals is due to a very complex system of faulting and folding which continued over long periods. Some more recent Quaternary deposits are associated with Mica Creek. Around KP 552, the surface geology reflects more recent events encompassing Quaternary residual deposits and deeply weathered duricrusted land surfaces. Extensive areas of Cainozoic clay plains dissected by Quaternary alluvium start to the east of KP 486 and continue to the Northern Territory border. Major geologies occurring in the study area are described in **Table 3** and shown in **Figure 7** in **Appendix A**.

Table 3 Major geologies occurring in the study area

Map Code	Age	Description
Qa	Quaternary	Clay, silt, sand, gravel; flood-plain alluvium
Qa\c	Quaternary	Clay, commonly 'black soil'; flood-plain alluvium
Qf	Quaternary	Clay, silt, sand and clayey to sandy gravel; alluvial fans, sheetwash and floodout sheets
Qha	Holocene	Sand, gravel, silt and clay; active stream channels and low terraces
Qhab	Holocene	Sand, gravel, silt and clay; active and abandoned stream channels and overbank deposits in braided stream systems
Ql	Quaternary	Clay and silt; lacustrine and lagoonal deposits
Qpa	Pleistocene	Clay, silt, sand, gravel; flood-plain alluvium on high terraces

Map Code	Age	Description
Qpa,Ed	Pleistocene	Clay, silt, sand, gravel; flood-plain alluvium on high terraces
Qpa\c	Pleistocene	Clay and silt; flood-plain alluvium on high terraces
Qpa\s	Pleistocene	Sand and silt; alluvium on high terraces
TQa\s	Late Tertiary - Quaternary	Sand and mud; high-level alluvium and colluvium
TQd\q	Late Tertiary - Quaternary	Silcrete
TQr	Late Tertiary - Quaternary	Clay, silt, sand, gravel and soil; colluvial and residual deposits (generally on older land surfaces)
TQr\c>Ed	Late Tertiary - Quaternary	Clay, black soil; colluvial and residual deposits
TQr>PLgse	Late Tertiary - Quaternary	Clay, silt, sand, gravel and soil; colluvial and residual deposits (generally on older land surfaces)
TQr>PLgst	Late Tertiary - Quaternary	Clay, silt, sand, gravel and soil; colluvial and residual deposits (generally on older land surfaces)
Td	Tertiary	Duricrusted palaeosols at the top of deep weathering profiles, including ferricrete and silcrete; duricrusted old land surfaces
Td,Tpf	Tertiary	Duricrusted palaeosols at the top of deep weathering profiles, including ferricrete and silcrete; duricrusted old land surfaces
Td,Tpf>Ed	Tertiary	Duricrusted palaeosols at the top of deep weathering profiles, including ferricrete and silcrete; duricrusted old land surfaces
M	Mesozoic	Ferruginous sandstone, conglomerate, siltstone and claystone
Ed(w)	Middle Cambrian	Deeply weathered dolomite, pelletal dolomite, dolomitic limestone, limestone, calcarenite, chert nodules
Eme	Cambrian	Chert, siliceous shale with trilobite fossils, basal conglomerate
Eme(w)	Cambrian	Deeply weathered chert, siliceous shale with trilobite fossils, basal conglomerate
PLgmv	Mesoproterozoic	Medium-grained, hornblende-biotite granodiorite; strongly deformed
PLac	Palaeoproterozoic	Layered calc-silicate rocks, fine-grained amphibolite and quartzite
PLac/p	Palaeoproterozoic	Pelitic schist, cordierite-quartz schist, andalusite-sillimanite schist, quartzite and amphibolite
PLac/q	Palaeoproterozoic	Quartzite, feldspathic and micaceous quartzite, minor gneiss
PLac/s	Palaeoproterozoic	Feldspathic and micaceous quartzite, minor gneiss
PLbu	Palaeoproterozoic	Pebble to cobble conglomerate and medium to very coarse sandstone near the base. Most of this unit is very fine to fine sandstone and siltstone
PLgs	Palaeoproterozoic	Foliated coarse-grained porphyritic biotite granite
PLgs/mg	Palaeoproterozoic	Fine to medium-grained, equigranular (muscovite)-biotite granite; locally abundant xenoliths
PLgs/p	Palaeoproterozoic	Pegmatitic biotite granite and muscovite-biotite granite; tourmaline and beryl-bearing pegmatite
PLgsh	Palaeoproterozoic	Variably porphyritic medium to coarse biotite granite.
PLgsl	Palaeoproterozoic	Leucogranite, banded pegmatite and aplite
PLgsm	Palaeoproterozoic	Foliated coarse-grained porphyritic biotite granite
PLgst	Palaeoproterozoic	Medium to coarse-grained slightly porphyritic biotite granite, microgranite.
PLhc	Palaeoproterozoic	Metabasalt, amygdaloidal metabasalt, flow-top breccia, tuff
PLhe	Palaeoproterozoic	Metabasalt, amygdaloidal basalt, quartzite, tuff, pelitic schist
PLhe/p	Palaeoproterozoic	Micaceous psammite, psammopelite, pelite, minor schist
PLhe/q	Palaeoproterozoic	Quartz sandstone, feldspathic quartzite, conglomerate, pebbly quartz sandstone, epidote quartzite; minor dolomitic sandstone
PLhe/s	Palaeoproterozoic	Pelitic schist, cordierite schist, quartzite and amphibolite

Map Code	Age	Description
PLhl	Palaeoproterozoic	Feldspathic quartzite, orthoquartzite with rare pebbles
PLhp	Palaeoproterozoic	Grey-green metabasalt, red-brown trachybasalt, orthoquartzite, feldspathic quartzite, amygdaloidal metabasalt, flow-top breccia, tuff
PLhs	Palaeoproterozoic	Plagioclase-K-feldspar-quartz gneiss containing minor biotite, sillimanite and muscovite and migmatised cordierite-K-feldspar gneiss
PLib	Palaeoproterozoic	Grey siliceous siltstone and shale
PLim	Palaeoproterozoic	Cream to red-brown laminated siltstone, fine sandstone, dolomitic siltstone and dolomite
PLin	Palaeoproterozoic	Dolomitic siltstone, dolomite, siliceous siltstone, chert
PLmw/1	Palaeoproterozoic	Orthoquartzite, conglomerate
PLr	Palaeoproterozoic	Quartzite, sandstone, calcareous sandstone, conglomerate, siltstone, shale
PLr(w)	Palaeoproterozoic	Deeply weathered quartzite, conglomerate, siltstone, shale, calcareous sandstone, sandstone
PLss	Palaeoproterozoic	Almost entirely quartzite and sandstone, very rare siltstone
PLui	Palaeoproterozoic	Fine to coarse-grained, medium to thick-bedded sandstone with minor siltstone.

The landform across the study area varies from extensive clay plains between KP 428 and 486 with minor areas of residual Tertiary surfaces and riparian areas associated with current waterways. The area closer to Mount Isa becomes more undulating with areas of granite tors and waterways.

2.3.3. Land Systems

Land systems mapped for the NT Link study area are listed in **Table 4** (CSIRO 1954). Land systems mapping was undertaken at a scale greater than 1:500,000. Land systems descriptions were referred to assist RE determination.

Table 4 Land systems and dominant land units mapped for the NT Link study (CSIRO 1954).

Land System	Description
M - Mount Isa	Dissected country of Georgina Basin without lateritic remnants. Rugged, hilly country with North-South ridges; mostly rock outcrops or skeletal soils; *E. leucophloia* woodland
WV - Waverley	Dissected country of Georgina Basin without lateritic remnants. Undulating to low hilly country; mostly skeletal soils occasional rounded granite boulders; *E. leucophloia* woodland.
BN - Bundella	Post-Miocene coarse-textured alluvia. Undulating; "Bundella" soils; *E. leucophylla — Corymbia terminalis* shrub woodland
KL - Kallala	Post-Miocene Fine-textured Alluvia. Very gently undulating "black-soil" plains; heavy brown pedocals; *Astrebla pectinata* grassland or *Acacia georginae—Astrebla pectinata* woodland
Y - Yelvertoft	Dissected country with lateritic remnants. Hilly to undulating country; mostly skeletal soils or truncated gravelly lateritic red earths; *E. leucophloia* or *Corymbia capricornia* woodland
WH - Wonorah	Gently undulating Tertiary lateritic plains; Lateritic red earths; *E. leucophloia* woodland or E. spp. (low mallees) —*Acacia* spp. shrubland
WHB1 –Wonorah/Barkly	Gently undulating Tertiary lateritic plains with areas of Tertiary swamp; Lateritic red earths; *E. leucophloia* woodland or E. spp. (low mallees) —*Acacia* spp. shrubland. with very gently undulating areas of heavy grey pedocals; *Astrebla pectinata* grassland
G - Georgina	Channel alluvia of the Georgina River and major tributaries. Gently undulating "black-soil" plains cut by braided streamlines; Heavy grey pedocals; *Astrebla pectinata* grassland

2.3.4. Regional Ecosystems

In Queensland, remnant vegetation is classified into REs, which are discrete vegetation communities in a bioregion that are consistently associated with a particular combination of geology, landform and soil. Each RE has a number that serves as a shorthand description of its characteristics and locations, for example, RE 4.3.17. The first number, 4, indicates the bioregion in which the RE is located, in this case the Mitchell Grass Downs bioregion. The second number, 3, indicates the land zone on which the ecosystem is found, in this case alluvium associated with river and creek flats. The third number, 17, is the ecosystem number and relates to the dominant vegetation, in this case *Astrebla pectinata* ± *Astrebla* spp. ± *Aristida latifolia* grassland.

The Queensland Herbarium is responsible for mapping REs, using a combination of remotely sensed data sets and on-ground studies. Version 9 of the RE mapping is certified under the VM Act, includes both a VM Class (e.g. Endangered, Of Concern or Least Concern) and Biodiversity Status (e.g. Endangered, Of Concern or No Concern at Present), and maps the extent of remnant REs as of 2013. The currently available RE mapping and locations of survey sites are presented in **Figure 8** in **Appendix A**.

Bioregion and Subregion

The study area occurs within the Mitchell Grass Downs and Northwest Highlands bioregions (**Figure 9** in **Appendix A**). The Northwest Highlands bioregion corresponds to the Mount Isa Inlier bioregion as defined under the Intrim Biogeographical Regionalisation of Australia (IBRA) system.

The Mitchell Grass Downs bioregion covers 23,788,550 ha, approximately 13.8% of the State. Mitchell grass (*Astrebla* spp.) tussock grassland on rolling plains of deep, heavy grey or brown clays dominate the region. Drainage lines support open grasslands, herbland or eucalypt woodlands and isolated remnant plateaus support hummock grassland and shrubland vegetation. The bioregion supports a number of distinctive fauna species which are found only in this bioregion in Queensland or are found mainly in the Mitchell grass grasslands. Extensive grazing for sheep and cattle production occurs throughout the bioregion (Wilson 1999).

The Northwest Highlands bioregion covers 7,223,855 ha, approximately 4% of the State. Stony hills and ranges dominate the bioregion and mining and extensive cattle grazing are major land uses (Morgan 1999).

The western portion of the study area falls within the Barkly Tableland subregion (MGD07) of the Mitchell Grass Downs bioregion. *Astrebla pectinata* grasslands on extensive Tertiary clay plains overlying limestone beds dominate this subregion. *Acacia aneura* (mulga), eucalypt and chenopod open woodland to shrubland communities occur on swamps or sand sheets and intermittent drainage lines and alluvial plains support eucalypt woodland, grasslands and open herblands (Wilson 1999). As of 2013, approximaetly 99% of remnant vegetation is remaining within this subregion (Accad & Neldner 2015) with the majority subjected to grazing.

The central portion of the study area falls within the Southwestern Plateaus and Floodouts subregion (NWH01) of the Northwest Highlands bioregion. Near-horizontal sand sheets overlying Cretaceous sandstones and shales and supporting a range of eucalypt woodlands dominate the subregion (Morgan 1999). As of 2013, approximaetly 99% of remnant vegetation is remaining within this subregion (Accad & Neldner 2015) with the majority subjected to grazing.

The eastern portion of the study area falls within the Mount Isa Inlier subregion (NWH03) of the Northwest Highlands bioregion. This subregion contains the majority of the heavily folded sediments of the bioregion with small areas of alluvium throughout.

Low open woodlands of snappy gum (*Eucalyptus leucophloia*) on siliceous rocks and Cloncurry box (*E. leucophylla*) on more basic geologies dominate the subregion (Morgan 1999). As of 2013, approximately 99% of remnant vegetation is remaining within this subregion (Accad & Neldner 2015) with the majority subjected to grazing and mining to a lesser extent.

Detailed vegetation data is sparse throughout these two bioregions and further regional ecosystems are likely to be defined as more information is collected by the Queensland Herbarium.

Land Zones

Land zones represent significant differences in geology and the associated landforms, soils and physical processes and generally correspond to broad geological and geomorphological categories and are a critical component of the RE classification scheme.

Land zones have been delineated across the study area based on the available surface geology mapping covering the area. Seven land zones have been delineated from the study area and are broadly consistent with the surface geology mapping (**Table 5**).

Table 5 Land zones and associated geologies occurring in the study area (Descriptions as per Wilson and Taylor (2012))

Land zone	Description	Associated Geology Unit
3	Recent Quaternary alluvial systems, including closed depressions, palaeo-estuarine deposits currently under fresh water influence, inland lakes and associated wave built lunettes. Excludes colluvial deposits such as talus slopes and pediments. Includes a diverse range of soils, predominantly Vertosols and Sodosols; also with Dermosols, Kurosols, Chromosols, Kandosols, Tenosols, Rudosols and Hydrosols; and Organosols in high rainfall areas.	Qa, Qa\c, Qf, Qha, Qhab, Ql, Qpa
4	Tertiary-early Quaternary clay deposits, usually forming level to gently undulating plains not related to recent Quaternary alluvial systems. Excludes clay plains formed *in-situ* on bedrock. Mainly Vertosols with gilgai microrelief, but includes thin sandy or loamy surfaced Sodosols and Chromosols with the same paleo-clay subsoil deposits.	TQa\s, TQr
5	Tertiary-early Quaternary extensive, uniform near level or gently undulating 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 moderate to deep soils usually overlying duricrust. Excludes recent Quaternary alluvial systems (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.	TQr, Td, Tpf, Ed(w), Eme (w), PLr(w)
7	Cainozoic duricrusts formed on a variety of rock types, usually forming mesas or scarps. 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.	TQd\q, Td, Tpf, Eme(w), PLr(w)
9	Fine grained sedimentary rocks, generally with little or no deformation and usually forming undulating landscapes. Siltstones, mudstones, shales, calcareous sediments, and labile sandstones are typical rock types although minor interbedded volcanics may occur. Includes a diverse range of fine textured soils of moderate to high fertility, predominantly Vertosols, Sodosols, and Chromosols.	M, Eme, PLbu, PLib, PLim
10	Medium to coarse grained sedimentary rocks, with little or no deformation, forming plateaus, benches and scarps. Includes siliceous (quartzose) 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.	M, Eme, PLbu, PLhe/q, PLin, PLmw/1

Land zone	Description	Associated Geology Unit
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.	Eme, PLgmu, PLac, Plac/p, PLac/s, PLbu, PLhc, PLhe, PLhe/p, PLhe/q, PLhe/s PLhl, PLhp, PLhs, PLib, PLim, PLr, PLss, Plui
12	Mesozoic to Proterozoic igneous rocks, forming ranges, hills and lowlands. Acid, intermediate and basic intrusive and volcanic rocks such as granites, granodiorites, gabbros, dolerites, andesites and rhyolites, as well as minor areas of associated interbedded sediments. Excludes serpentinites (Land Zone 11) and younger igneous rocks (Land Zone 8). Soils are mainly Tenosols on steeper slopes with Chromosols and Sodosols on lower slopes and gently undulating areas. Soils are typically of low to moderate fertility.	PLgs, PLgs/ms, PLgs/p, PLgsh, PLgsl, PLgsm, PLgst, PLhc, PLhe, PLmw/1

Regional Ecosystem Status

Each RE is assigned a vegetation management class, which is based on its current and pre-clearing areal extent (how much of it remains) within a bioregion. The RE class definitions are set out in the VM Act and are defined as follows:

- Endangered:
  - If less than 10% of the pre-clearing extent remains; or
  - If 10-30% of the pre-clearing extent remains (if the remnant extent of the RE within the bioregion is less than 10,000 ha).
- Of Concern:
  - If 10-30% of the pre-clearing extent remains; or
  - More than 30% of the pre-clearing extent remains (if the extent of the RE within the bioregion is less than 10,000 ha).
- Least Concern:
  - If more than 30% of the pre-clearing extent remains; and,
  - If the remnant extent of the RE within the bioregion is more than 10,000 ha.

Furthermore, the DEHP assign a biodiversity status to REs according to the condition of the RE and its perceived threats, in addition to its pre-clearing and remnant extent. The biodiversity status is applicable under the *Environmental Protection Act 1994* (EP Act). 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[1]; or
  - 10 - 30% of the pre-clearing extent unaffected by severe degradation and/or biodiversity loss and the remnant vegetation is less than 10 000 ha; or,
  - A rare[2] RE subject to a threatening process[3].
- Of Concern if it has:

[1] 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

[2] Pre-clear extent less than 1000 ha or patch size 100 ha and of limited extent across its range

[3] For example, clearing, weed invasion, fragmentation, inappropriate fire regime or grazing, or infrastructure development

  - 10 - 30% of the pre-clearing extent unaffected by moderate degradation[4] and/or biodiversity loss.
- No Concern at Present if it:
  - Does not meet the degradation criteria listed for Endangered and Of Concern REs.

Woody vegetation is mapped as remnant if it has never been cleared or, if previously cleared, where the dominant canopy has:

- >50% of the predominant canopy cover that would exist if the vegetation community were undisturbed; and
- >70% of the height of the predominant canopy that would exist if the vegetation community were undisturbed; and
- The same floristic species that would exist if the vegetation community were undisturbed.

This definition is known as the '50-70-species' criteria.

The latest certified RE mapping (Version 9.0, including pre-clearing and 2013 remnant REs) was obtained for the study area (**Appendix B**). The remnant REs present in the study area are described in **Table 6**. Version 9.0 of the certified RE mapping has approximately 17,135 ha of remnant vegetation of 24 REs and approximately 57 ha of non-remnant vegetation mapped across the study area. **Figure 8** in **Appendix A** illustrates the extent of the remnant RE areas mapped within the study area (areas of RE mapped outside the study area are not shown on these figures but are indicated in the extract of the certified RE mapping appearing in **Appendix B**).

All of the 24 mapped remnant REs are classed as Least Concern under the provisions of the VM Act.

[4] 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

Table 6 Remnant REs mapped over the study area (Descriptions as per (Queensland Herbarium 2015))

RE	VM Act Class	Biodiversity Status	Short Description	Description
1.11.2a	LC	NC	*Eucalyptus leucophloia* low open woodland	Low open woodland of *Eucalyptus leucophloia* often with *Corymbia* spp., *Terminalia aridicola* and *E. leucophylla* with shrub layer of *Acacia* spp. and ground layer of *Triodia* spp. Occurs on steep hills and strike ridges. (BVG1M: 19a)
1.11.2d	LC	NC	*Eucalyptus leucophloia* low open woodland	Low open woodland of *Eucalyptus leucophloia* often with *E. leucophylla*, *Corymbia* spp., *Terminalia aridicola* and/or *Brachychiton collinus* on rock outcrops with a very sparse shrub layer of *Acacia* spp. and a sparse to very sparse ground layer of *Triodia pungens*. Occurs on steep rocky slopes and crests on metamorphosed igneous rocks. (BVG1M: 19a)
1.11.2x1	LC	NC	*Eucalyptus leucophloia* low open woodland	Low open woodland of *Corymbia capricornia*, often with *Eucalyptus leucophloia* and *Triodia* spp. understorey. Treeless areas common. Occurs on upper slopes and summits of hills and ranges on strongly folded metamorphic pre-Cambrian rocks, skeletal soils. (BVG1M: 19a)
1.11.2x2	LC	NC	*Eucalyptus leucophloia* low open woodland	*Acacia cambagei* low woodland. Occurs on hills and ranges of fine grained metamorphic sediments. (BVG1M: 26a)
1.11.2x5	LC	NC	*Eucalyptus leucophloia* low open woodland	Open shrubland of *Eucalyptus odontocarpa* with a mixed shrub layer including *Acacia monticola*, *Acacia retivenea* and *Grevillea wickhamii* with a *Triodia pungens* ground layer. Occurs on siliceous metamorphics on the far west of the Mount Isa Inlier. (BVG1M: 19a)
1.11.3a	LC	NC	*Corymbia terminalis* low open woodland on basic metamorphics	Low open woodland *Eucalyptus leucophylla* often with *Corymbia terminalis*, *C. aparrerinja* and *Atalaya hemiglauca* with scattered shrubs of *Acacia chisholmii* and a sparse ground layer of *Triodia pungens*. Occurs on broad low hills; metamorphosed igneous rocks. (BVG1M: 19b)
1.11.3b	LC	NC	*Corymbia terminalis* low open woodland on basic metamorphics	Low open woodland of *Corymbia terminalis* and/or *Eucalyptus leucophylla* often with *E. leucophloia* with a sparse shrub layer dominated by *Acacia chisholmii* and a sparse ground layer dominated by *Triodia pungens*. Occurs on hills, rises: metamorphosed igneous rocks. (BVG1M: 19b)
1.11.3x1b	LC	NC	*Corymbia terminalis* low open woodland on basic metamorphics	Low open woodland *Eucalyptus leucophylla* often with *Corymbia terminalis*, *C. aparrerinja* and *E. leucophloia* with a variable, patchy shrub layer dominated by *Acacia* spp. and a very sparse ground layer of *Triodia pungens* with *Triodia* spp. and/or tussock grasses. Occurs on broad low hills; gently undulating. (BVG1M: 19b)
1.12.1	LC	NC	*Eucalyptus leucophloia* low open woodland on granites	Low open woodland of *Eucalyptus leucophloia*, sometimes with *E. leucophylla*, *Corymbia terminalis* or *C. aparrerinja* with an *Acacia* spp. dominated shrub layer and *Triodia* spp. dominated ground layer. Includes areas of treeless *Triodia* spp. grasslands and *Acacia* spp. shrublands. Occurs on ranges and stony hills and rises on igneous rocks; skeletal soils and some shallow red earths. (BVG1M: 19a)

RE	VM Act Class	Biodiversity Status	Short Description	Description
1.12.1x1	LC	NC	*Eucalyptus leucophloia* low open woodland on granites	Low open woodland of *Eucalyptus leucophylla* often with *Corymbia terminalis* or *C. aparrerinja*, shrub layer of *Acacia chisholmii* with hummock grass ground layer of Triodia spp. Includes areas of treeless *Triodia* spp. grasslands and *Acacia* spp. shrublands. Occurs on ranges and stony hills and rises on igneous rocks; skeletal soils and some shallow red earths. (BVG1M: 19b)
1.12.2	LC	NC	*Eucalyptus melanophloia* low open woodland on low hills and tor fields on biotite granites	Low open woodland of *Eucalyptus melanophloia* subsp. *nana* (silver-leaved ironbark) over *Triodia* spp. With occasional *Terminalia aridicola*. *Acacia* spp. Understorey. Occurs on tor fields and low rounded hills on foliated biotite granite; skeletal and shallow coarse sands. (BVG1M: 17b)
1.12.2x1	LC	NC	*Eucalyptus melanophloia* low open woodland on low hills and tor fields on biotite granites	Low open woodland of *Terminalia aridicola* and *Brachychiton collinus*. *Acacia* spp. shrub layer and ground layer of *Triodia* spp. and tussock grasses. Occurs on tor fields and low rounded hills on foliated biotite granite. (BVG1M: 29b)
1.3.4	LC	OC	*Acacia cambagei* low open woodland to woodland on earths in valleys	Low open woodland and low woodland of *Acacia cambagei* (gidgee) over annual grasses. Occasional *Atalaya hemiglauca*, Hakea *lorea* subsp. *lorea*, *Grevillea striata* and *Acacia excelsa*. Occurs on alluvial plains and valley bottoms between ranges formed on strongly folded pre-Cambrian rocks; red or brown earths and clays. (BVG1M: 26a)
1.3.4x1	LC	OC	*Acacia cambagei* low open woodland to woodland on earths in valleys	*Aristida* spp. sparse tussock grassland, bare for much of the year, sometimes with *Triodia longiceps* with scattered emergent trees of *Grevillea striata* and/or *Acacia cambagei* and/or *Atalaya hemiglauca* and/or *Acacia excelsa* subsp. *angusta* and/or *Corymbia* spp. and/or *Eucalyptus* spp. and/or *Hakea* spp. Occurs on flat bare areas adjacent watercourses. (BVG1M: 31a)
1.3.6a	LC	OC	*Corymbia aparrerinja*, *Corymbia terminalis* open woodland on sandy terraces	Floodplain (other than floodplain wetlands). Woodland of *Corymbia aparrerinja* often with *C. terminalis*, *Eucalyptus leucophylla*, *E. camaldulensis*, *Lysiphyllum cunninghamii* and/or *Acacia cambagei* with a sparse ground layer of tussock grasses with *Triodia longiceps* in some places. Occurs on river terraces. (BVG1M: 16c)
1.3.6x1	LC	OC	*Corymbia aparrerinja*, *Corymbia terminalis* open woodland on sandy terraces	Riverine wetland or fringing riverine wetland. Woodland of *Eucalyptus leucophylla* and/or *Eucalyptus pruinosa* subsp. *pruinosa*, often with *Corymbia terminalis*, *Acacia cambagei*, *Atalaya hemiglauca* and *C. aparrerinja* with a mixed ground layer of tussock grasses and *Triodia* spp. Occurs on recent alluvial terraces of larger watercourses and in channel deposits of ephemeral streams. (BVG1M: 19b)
1.3.6x1a	LC	OC	*Corymbia aparrerinja*, *Corymbia terminalis* open woodland on sandy terraces	Floodplain (other than floodplain wetlands). *Eucalyptus leucophylla* and/or *Eucalyptus pruinosa* subsp. *pruinosa* woodland often with *Corymbia terminalis*, *Eucalyptus camaldulensis* and *Acacia cambagei* with a sparse mixed shrub layer and a sparse ground layer dominated by *Bothriochloa ewartiana* and *Sehima nervosum*, often with *Triodia longiceps*. Occurs on ephemeral watercourses with active beds. (BVG1M: 19b)

RE	VM Act Class	Biodiversity Status	Short Description	Description
1.3.6x1c	LC	OC	*Corymbia aparrerinja*, *Corymbia terminalis* open woodland on sandy terraces	Floodplain (other than floodplain wetlands). *Acacia cambagei* and *Eucalyptus leucophylla* woodland with a sparse ground layer of tussock grasses and *Triodia longiceps*. Occurs on terraces. (BVG1M: 26a)
1.3.6x1d	LC	OC	*Corymbia aparrerinja*, *Corymbia terminalis* open woodland on sandy terraces	Floodplain (other than floodplain wetlands). *Eucalyptus leucophylla* and/or *Eucalyptus pruinosa* subsp. *pruinosa* open woodland, often with *Corymbia terminalis*, *Acacia cambagei*, *Atalaya hemiglauca*, *Grevillea striata* and *C. aparrerinja*, with a scattered shrub layer and mid-dense ground layer of tussock grasses and *Triodia* spp. Occurs on wide terraces adjacent major rivers. (BVG1M: 19b)
1.3.7a	LC	E	*Eucalyptus camaldulensis* woodland on channels and levees (south)	Riverine wetland or fringing riverine wetland. Fringing woodland of *Eucalyptus camaldulensis*, usually with *Lophostemon grandiflorus* and *Melaleuca leucadendra* and/or *M. argentea*. Occurs on recent levees and channel deposits of major watercourses and larger tributaries. (BVG1M: 16a)
1.3.7b	LC	E	*Eucalyptus camaldulensis* woodland on channels and levees (south)	Riverine wetland or fringing riverine wetland. Fringing woodland of *Eucalyptus camaldulensis*, usually with *Lophostemon grandiflorus* and *Melaleuca bracteata* and/or *M. dissitiflora*. Occurs on recent levees and channel deposits of medium and smaller tributaries which are dry for most of the year; alluvial soils. (BVG1M: 16a)
1.5.3	LC	NC	*Eucalyptus leucophloia* low open woodland on red earths on plateaus	*Eucalyptus leucophloia* (snappy gum) low open woodland and woodland sometimes with shrubby understorey dominated by *Acacia* spp. Usually *Triodia* spp. dominated ground cover. Includes areas of *Corymbia terminalis* woodland. Occurs on undulating plateau surfaces with occasional low mesas; lateritic red earths, and small areas of shallow sandy loams and skeletal soils. (BVG1M: 19a)
1.5.4	LC	NC	*Eucalyptus leucophylla* low open woodland on red earths in valleys	Low open woodland to low woodland of *Eucalyptus leucophylla* (Cloncurry box) and *Corymbia terminalis*, over annual grasses with areas of *Triodia* spp. Occasional *Corymbia aparrerinja*, *Atalaya hemiglauca* and *Grevillea striata* and small areas of *Acacia cambagei* and *Eucalyptus leucophloia*. Occurs on plains and valley bottoms; red earths, shallow loams, clays and skeletal soils. (BVG1M: 19b)
1.5.4a	LC	NC	*Eucalyptus leucophylla* low open woodland on red earths in valleys	Low open woodland of *Corymbia terminalis*, scattered shrub layer of *Carissa lanceolata* and tussock grass ground layer. Occurs on older alluvial and residual soils with significant clay content. (BVG1M: 19b)
1.5.4x1a	LC	NC	*Eucalyptus leucophylla* low open woodland on red earths in valleys	Low open woodland of *Eucalyptus pruinosa* subsp. *pruinosa* often with *Corymbia terminalis*, *C. aparrerinja*, *E. leucophylla*, *E. leucophloia*, *Acacia cambagei* and *Grevillea striata* and with a sparse mixed shrub layer and a mid-dense ground layer dominated by *Aristida* spp. with some areas of *Triodia* spp. Occurs on sandsheet. (BVG1M: 19c)

RE	VM Act Class	Biodiversity Status	Short Description	Description
1.5.6	LC	NC	*Atalaya hemiglauca*, *Ventilago viminalis*, *Grevillea striata* low open woodland on red earth plains	Low open woodland of *Atalaya hemiglauca* (whitewood), *Acacia excelsa*, *Ventilago viminalis* (vine tree), *Grevillea striata* (beefwood), *Hakea lorea* subsp. *lorea*, *Ehretia saligna*, *Owenia* spp., *Corymbia terminalis* and *C. aparrerinja*. Shrubby understorey includes *Acacia* spp. and *Carissa lanceolata*. Occasional *Acacia aneura* in the west. Ground cover dominated by *Aristida* spp., sometimes forming grasslands. Occurs on outwash plains from ranges of strongly folded pre-Cambrian rocks, usually adjacent to clay plains; red earths and clays. (BVG1M: 27b)
1.5.6x2	LC	NC	*Atalaya hemiglauca*, *Ventilago viminalis*, *Grevillea striata* low open woodland on red earth plains	Low woodland of *Acacia cambagei* with generally sparse ground layer of *Triodia longiceps* and/or tussock grasses. Bare patches are common. Occurs on older alluvial and residual soils. (BVG1M: 26a)
1.5.7	LC	NC	*Corymbia terminalis* and/or *Acacia aneura* low open woodland on sandy red earth plains	Low open woodland of *Corymbia terminalis* (bloodwood) and *Acacia aneura* (mulga). Associated species include *Grevillea striata*, *Acacia excelsa*, *Corymbia aparrerinja*, *Owenia* spp. And *Hakea lorea* subsp. *lorea*. Shrubby understorey. Sparse ground cover dominated by *Triodia* spp. +/- other perennial and annual grasses. Occurs on Tertiary and Quaternary outwash sandplains, in places reworked by wind; deep loamy red earths. (BVG1M: 23a)
1.5.7a	LC	NC	*Corymbia terminalis* and/or *Acacia aneura* low open woodland on sandy red earth plains	Low open woodland of *Acacia aneura*, often groved and often including *Eucalyptus leucophloia* and/or *Acacia cambagei* as sub-dominant species with a variable shrub layer of *Senna* spp. and *Acacia* spp. and ground layer of tussock grasses and *Triodia* spp. Occurs on sandsheets. (BVG1M: 23a)
1.5.7b	LC	NC	*Corymbia terminalis* and/or *Acacia aneura* low open woodland on sandy red earth plains	Low open woodland of *Corymbia capricornia*, usually with *C. aparrerinja* and *Eucalyptus odontocarpa* with a ground layer of *Triodia pungens* and/or *Aristida hygrometrica*. Occurs on older alluvium around low metamorphic hills. (BVG1M: 19a)
1.5.7x2	LC	NC	*Corymbia terminalis* and/or *Acacia aneura* low open woodland on sandy red earth plains	*Erythrina vespertilio* and *Corymbia aparrerinja* low open woodland. Occurs on sandy residual soils. (BVG1M: 18c)
1.7.1	LC	NC	*Eucalyptus leucophloia* low open woodland on skeletal soils on lateritic scarps and plateaus	Low open woodland of *Eucalyptus leucophloia* (snappy gum) and/or *Corymbia aspera* and/or *E. normantonensis* over *Triodia* spp. Areas of *Acacia shirleyi* low open forest. Occurs on scarps and dissected areas of eroded Tertiary plateaus; skeletal soils formed largely on the exposed weathered zone. (BVG1M: 19a)
1.7.1c	LC	NC	*Eucalyptus leucophloia* low open woodland on skeletal	*Triodia pungens* grassland on remnant lateritic surfaces. Occurs on remnant lateritic surfaces. (BVG1M: 19a)

RE	VM Act Class	Biodiversity Status	Short Description	Description
			soils on lateritic scarps and plateaus	
1.7.1x3	LC	NC	*Eucalyptus leucophloia* low open woodland on skeletal soils on lateritic scarps and plateaus	Low open woodland of *Corymbia capricornia* +/- *Eucalyptus leucophloia* with mixed shrub layer usually including *Grevillea wickhamii* and ground layer of *Triodia pungens* and *Schizachyrium fragile*. Occurs on silcrete. (BVG1M: 19a)
1.9.1x3	LC	NC	*Astrebla* spp. grassland on shallow clays on limestones	Tall shrubland of *Eucalyptus normantonensis* with a dense hummock grass ground layer of *Triodia longiceps*. Occurs on lithosols in stony hills. (BVG1M: 19b)
1.9.6a	LC	NC	*Eucalyptus leucophloia* and *Corymbia terminalis* low open woodland on limestone hills	Low open woodland of *Eucalyptus leucophloia*, often with *E. odontocarpa*. Occurs on lithosols in stony hills. (BVG1M: 19a)
4.3.12a	LC	NC	*Chenopodium auricomum* ± *Duma florulenta* open shrubland on swamps	Palustrine wetland (e.g. vegetated swamp). *Chenopodium auricomum* dwarf open shrubland, commonly with *Eragrostis* spp. and *Astrebla elymoides*. A wooded fringe of *Eucalyptus coolabah* commonly occurs. Occurs in seasonal swamps in closed depressions on broad clay plains overlying limestones. Cracking clay soils. (BVG1M: 34b)
4.3.16a	LC	NC	*Astrebla elymoides* ± *A. squarrosa* ± *Aristida latifolia* grassland on alluvium	Floodplain (other than floodplain wetlands). *Astrebla elymoides* tussock grassland, commonly with *Astrebla* spp., *Eulalia aurea*, *Aristida latifolia*. May include small areas of *Chenopodium auricomum*. Occurs in shallow depressions in broad clay plains, commonly overlying Cambrian limestones. Cracking clay soils. (BVG1M: 30a)
4.3.17	LC	NC	*Astrebla pectinata* ± *Astrebla* spp. ± *Aristida latifolia* grassland on alluvium	Open tussock grassland to tussock grassland, rarely sparse tussock grassland, dominated by *Astrebla pectinata* (PFC <10-25%) with *A. lappacea* and *A. elymoides* sometimes co-dominant. The predominant ephemeral grass is *Iseilema vaginiflorum* with *Enneapogon avenaceus* locally common and species such as *Brachyachne convergens Dactyloctenium radulans*, *Dichanthium sericeum* spp. *humilius*, and *Panicum* spp. occurring infrequently. The forbs *Abutilon malvifolium*, *Crotalaria dissitiflora*, *Goodenia fascicularis*, *Ipomoea lonchophylla*, **Portulaca oleracea*, and *Sida spenceriana* occur frequently, and many others, including species from the Aizoaceae, Asteraceae, Brassicaceae, Chenopodiaceae, Euphorbiaceae, Fabaceae, Malvaceae and other families occur infrequently. Occurs on alluvial plains. Soils predominately Very deep, neutral to very strongly alkaline, red, brown and grey-brown cracking clays with a crusted or self-mulching surface. Gypsum may be present at depth. (BVG1M: 30a)
4.3.3	LC	OC	*Eucalyptus coolabah*, E. *camaldulensis* ± *Lysiphyllum gilvum* open woodland on drainage lines	*Eucalyptus coolabah* usually predominates forming a distinct but discontinuous upper canopy layer. *E. camaldulensis* is conspicuous in sandy or gravelly channels. A lower tree understorey or tall shrub layer may be present in places. Low shrubs frequently occur and in places form a distinct layer. The ground layer is variable being composed of grasses and forbs with either predominating depending on seasonal conditions. Asteraceae spp. particularly abundant following favourable

RE	VM Act Class	Biodiversity Status	Short Description	Description
				seasons. Occurs on levees and banks of intermediate and larger drainage channels and associated alluvial plains. Soils very deep, brown or grey clays with sand and silt bands common in profile. (BVG1M: 16a)
4.3.4x2a	LC	NC	*Eucalyptus coolabah* open woodland on drainage lines and/or plains	Floodplain (other than floodplain wetlands). *Eucalyptus coolabah* low open woodland, commonly with *Acacia georginae*. A shrub layer commonly occurs, including *A. georginae* and *Eremophila bignoniiflora*. The ground layer is tussock grasses, including *Astrebla* spp. And annual species. Occurs on broad, active Quaternary alluvial plains with clay parent material. Cracking clay soils. (BVG1M: 16c)
4.3.5b	LC	NC	*Eucalyptus coolabah* ± *E. camaldulensis* ± *Acacia georginae* open woodland on drainage lines and/or plains	Riverine wetland or fringing riverine wetland. *Eucalyptus coolabah* and/or *E. microtheca* low open woodland, occasionally with *E. camaldulensis* and *Acacia cambagei*. A sparse shrub layer may occur. The ground layer is tussock grasses. Occurs on banks/fringes of northern parts of the Georgina River. Cracking clay soils. (BVG1M: 16a)
4.3.8	LC	NC	*Acacia cambagei* low woodland on braided channels or alluvial plains	*Acacia cambagei* open shrub land, occasionally low open woodland or open woodland (ht 5-10m; density 75-150/ha). The beds of clearly defined channels are bare, but elsewhere the ground stratum is dominated by the perennial tussock grasses *Astrebla elymoides*, *A. pectinata*, and *Eulalia aurea* (PFC10-30%). *Astrebla lappacea*, *A. squarrosa*, *Chrysopogon fallax* and *Sporobolus mitchellii*, and the perennial sedges *Cyperus bifax* and *C. victoriensis* may be locally prominent, while scattered tussocks of *Enteropogon acicularis* occur frequently. The ephemerals *Iseilema vaginiflorum* and *Panicum decompositum* may be seasonally abundant. A large number of mostly ephemerals forbs occur infrequently, including *Abutilon* spp., *Atriplex* spp., *Sclerolaena* spp., *Calotis* spp., *Neptunia* spp., *Sida* spp. and many more particularly form the Asteraceae and Fabaceae. Occurs on shallow braided channels on alluvia above major drainage lines. Very deep, crusted, red, brown and grey cracking clays with minor crusted non-cracking red clays. Gravel may occur in the profile and gypsum usually occurs at depth. Textures range from sandy clays to heavy clays with non-cracking clays having silty clay textures. Soils are neutral to alkaline. (BVG1M: 26a)
4.4.1c	LC	NC	*Astrebla pectinata* ± *Aristida latifolia* ± *Eulalia aurea* grassland on Tertiary sediments overlying limestone	Open tussock grassland to tussock grassland, rarely sparse tussock grassland, dominated by *Astrebla pectinata* (PFC <10-25%) with *A. lappacea* and *A. elymoides* sometimes co-dominant. The predominant ephemeral grass is *Iseilema vaginiflorum* with *Enneapogon avenaceus* locally common and species such as *Brachyachne convergens Dactyloctenium radulans*, *Dichanthium sericeum* spp. *humilius*, and *Panicum* spp. occurring infrequently. A range of forbs frequently occur. Occurs on older alluvial plains in the north west of the bioregion. Soils predominately Very deep, neutral to very strongly alkaline, red, brown and grey-brown cracking clays with a crusted or self-mulching surface. Gypsum may be present at depth. (BVG1M: 30a)
4.4.1d	LC	NC	*Astrebla pectinata* ± *Aristida latifolia* ± *Eulalia aurea* grassland on Tertiary sediments overlying	*Astrebla pectinata* tussock grassland, commonly with *Eulalia aurea*, *Astrebla* spp., *Aristida latifolia*, *Iseilema* spp., annual grasses and forbs. Emergent *Atalaya hemiglauca, Acacia georginae*, *Acacia cambagei* and *Ventilago viminalis* may occur. Occurs on broad, Tertiary clay plains, commonly overlying limestones. Occasionally overlain by Quaternary sand deposits. Cracking clay soils. Surface gravel lag may occur. (BVG1M: 30b)

RE	VM Act Class	Biodiversity Status	Short Description	Description
			limestone	
4.4.1x2	LC	NC	*Astrebla pectinata* ± *Aristida latifolia* ± *Eulalia aurea* grassland on Tertiary sediments overlying limestone	Low open woodland and woodland of *Eucalyptus microtheca*. Occurs around the edge of cracking clay plains, usually where there is a thin surface layer of sand. (BVG1M: 18c)
4.9.14x40a	LC	NC	*Acacia georginae* or *A. cambagei* low open woodland with *Astrebla* spp. on limestone	*Acacia cambagei* and/or *Acacia georginae* low open woodland, occasionally with *Atalaya hemiglauca*, *Corymbia terminalis* and *Acacia excelsa* subsp. *angusta*. A lower shrub layer of *Acacia cambagei* and/or *Acacia georginae* commonly occurs. The ground layer is patchy tussock grasses. Occurs on eroding margins of Tertiary clay plains and high-level, old alluvial deposits east of the Georgina River. Cracking clay soils, commonly with surface gravel lag. (BVG1M: 26a)
4.9.4x1a	LC	NC	*Astrebla pectinata* and herbs ± *Astrebla* spp. grassland on Cretaceous sediments	*Astrebla pectinata* tussock grassland, commonly with *Aristida latifolia*, *Astrebla lappacea* and *Eulalia aurea*. Emergent *Atalaya hemiglauca*, *Ventilago viminalis* and *Vachellia sutherlandii* may occur. Occurs on undulating plains of Cambrian limestone and dolomite. Brown cracking clays with limestone rocks. (BVG1M: 30b)

VM Act Class: LC = Least Concern
Biodiversity Status: E = Endangered, OC = Of Concern, NC = No Concern at Present

2.3.5. Matters of National Environmental Significance

Based on the results of the EPBC PMST (**Appendix B**), within the study area there are:

- no world heritage properties or wetlands of international importance;
- no commonwealth lands, commonwealth or national heritage places, critical habitats, nationally important wetlands or commonwealth reserves; and
- no commonwealth marine areas or Great Barrier Reef marine.

Threatened Ecological Communities and threatened species are discussed in **Sections 2.3.6** and **2.3.11**.

2.3.6. Threatened Ecological Communities

Ecological communities are naturally occurring biological assemblages that occur in a particular type of habitat. Threatened ecological communities (TECs) are ecological communities that have been assessed and assigned to a particular category related to the status of the threat to the community at a national scale, i.e. extinct, critically endangered, endangered, vulnerable, and conservation dependant. TECs are protected under the EPBC Act.

No listed TECs were identified by the EPBC PMST (**Appendix B**) within the search area.

2.3.7. Waterways and Wetlands

The Queensland Wetlands Program defines wetlands as areas of permanent or periodic/intermittent inundation, with water that is static or flowing fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed 6 m. To be a wetland the area must have one or more of the following attributes:

- at least periodically the land supports plants or animals that are adapted to and dependent on living in wet conditions for at least part of their life cycle, or
- the substratum is predominantly undrained soils that are saturated, flooded or ponded long enough to develop anaerobic conditions in the upper layers, or
- the substratum is not soil and is saturated with water, or covered by water at some time.

Examples under this definition include:

- those areas shown as a river, stream, creek, swamp, lake, marsh, waterhole, wetland, billabong, pool or spring on the latest Sunmap 1:25,000, 1:50,000, 1:100,000 or 1:250,000 topographic map
- areas defined as wetlands on local or regional maps prepared with the aim of mapping wetlands
- wetland regional ecosystems (REs) as defined by the Queensland Herbarium (Environmental Protection Agency 2005a)
- areas containing recognised hydrophytes as provided by the Queensland Herbarium
- saturated parts of the riparian zone
- artificial wetlands such as farm dams
- water bodies not connected to rivers or flowing water such as billabongs and rock pools.

Examples under this definition exclude:

- areas that may be covered by water but are not wetlands according to the definition
- floodplains that are intermittently covered by flowing water but do not meet the hydrophytes and soil criteria
- riparian zone above the saturation level.

The ecological significance and legislative status of wetlands are assessed at international, national and state scales. The Convention on Wetlands of International Importance (also known as the Ramsar Convention) is an intergovernmental treaty that provides a framework for national action and international cooperation on the conservation and wise use of wetlands. The Commonwealth EPBC Act protects Australian Ramsar wetlands as a MNES. Ramsar wetlands are also protected under the Queensland EP Act.

The Directory of Important Wetlands in Australia (DIWA) identifies and classifies nationally important wetlands within three broad categories - marine and coastal zone wetlands, inland wetlands and human-made wetlands (Environment Australia, 2001, DSEWPC, 2010a). The directory and associated updates provide detailed descriptions of all DIWA wetlands.

At a State level, a comprehensive mapping exercise has been undertaken for wetlands of high ecological significance (HES) and general ecological significance (GES) across Queensland. These wetlands, collectively termed referable wetlands, incorporate two layers:

- Wetland Protection Areas (WPAs) are wetlands of HES within catchments of the Great Barrier Reef (GBR) Catchments. WPAs include lacustrine and palustrine wetlands, but not riverine wetlands. WPA mapping incorporates trigger areas, which are buffers up to 500 m surrounding wetlands in non-urban areas and buffers up to 100 m in urban areas.
- Wetland Management Areas (WMAs) are wetlands of GES within the GBR catchment and wetlands of GES and HES in other parts of Queensland. The Areas of Ecological Significance method has been applied to identify HES and GES wetlands outside GBR catchments. WMAs include lacustrine, palustrine, riverine and estuarine wetlands. A 100 m trigger area buffer has been generated around WMAs.

No nationally significant or Ramsar listed wetlands are traversed by or are located immediately downstream of the proposed NT Link pipeline. There are a series of mapped MSES wetlands between KP 449 and KP 456. Waterways associated with Buckley River, Nottingham Creek, Mingera Creek, Templeton River and Mica Creek will be crossed by the alignment.

The proposed pipeline crosses 30 watercourses that are mapped by the Queensland Government at a scale of 1:100,000. The majority of watercourses crossed by the pipeline are small ephemeral streams. The names and locations of these watercourse crossings are provided in **Table 7** and represented on **Figure 8**. All of these 30 watercourses appear on Vegetation Management Watercourse Maps and as such are defined as MSES Watercourses.

Table 7 Mapped waterways crossed by the current pipeline alignment

Waterway	Location (KP)	Stream Order
Anabranch of Buckley River	Between KP 436 and 437	Unknown
Buckley River (braided channel)	Near KP438	Unknown
Buckley River (braided channel)	Near KP441	Unknown
Unnamed tributary of Buckely RIver	Between KP 460 and 461	Unknown
Unnamed channel	Between KP 506 and 507	1
Mingera Creek (braided channel)	Between KP 518 and 519	Unknown
Mingera Creek (braided channel)	Between KP 518 and 519	Unknown
Mingera Creek (braided channel)	Near KP 519	Unknown
Unnamed tributary of Mosquito Creek	Between KP 547 and 548	2
Mosquito Creek	Between KP 550 and 551	2

Waterway	Location (KP)	Stream Order
Unnamed tributary of Templeton River	Between KP 557 and 558	1
Unnamed tributary of Templeton River	Between KP 559 and 560	2
Unnamed tributary of Templeton River	Between KP 559 and 560	1
Unnamed tributary of Templeton River	Between KP 559 and 560	3
Templeton River	Between KP 560 and 561	4
Unnamed tributary of Templeton River	Near KP 565	1
Unnamed tributary of Templeton River	Between KP 567 and 568	1
Unnamed tributary of Templeton River	Between KP 570 and 571	1
Unnamed tributary of Templeton River	Near KP 572	1
Unnamed tributary of Templeton River	Between KP 573 and 574	1
Unnamed tributary of Templeton River	Between KP 576 and 577	1
Unnamed tributary of Templeton River	Between KP 577 and 578	1
Templeton River	Between KP 580 and 581	2
Unnamed tributary of Templeton River	Between KP 583 and 584	1
Unnamed tributary of Mica Creek	Near KP 588	1
Unnamed tributary of Mica Creek	Between KP 592 and 593	2
Unnamed tributary of Mica Creek	Between KP 592 and 593	1
Mica Creek	Between KP 593 and 594	2
Unnamed tributary of Mica Creek	Between KP 594 and 595	1
Mica Creek	Between KP 594 and 595	3

2.3.8. Essential Habitat

To manage clearing and prevent loss of biodiversity, the DEHP has mapped areas designated as essential habitat for species listed as Endangered, Vulnerable, or Near Threatened (EVNT) under the NC Act. Essential habitat (EH) mapping identifies sites and locations considered to contain important habitat for flora and fauna species of conservation significance. It is only mapped over remnant or mature regrowth vegetation, and is based on either confirmed sightings or records of a species of conservation significance breeding or utilising major habitat resources in that location (e.g. for shelter or feeding resources), or known suitable habitat or resources for a species of conservation significance occurring at a location, or habitat that forms part of a potentially important corridor for a species of conservation significance. Where EH mapping is based on confirmed sightings, the sighting point is buffered by one kilometre, and includes all remnant vegetation within the buffer that meets the requirements of that species.

Areas identified as EH for purple-necked rock-wallaby (*Petrogale purpureicollis*) have been mapped over the study area within Lot 575 on CP857742 (**Figure 11** in **Appendix A**).

2.3.9. Matters of State Environmental Significance

Matters of state environmental significance (MSES) are referenced in the biodiversity State interest under the SPP and are mapped by the Queensland Government. The Environmental Offsets Regulation 2014 also prescribes MSES for the purposes of the environmental offsets legislation in Queensland.

Many of the MSES in the Environmental Offsets Regulation 2014 coincide with the MSES listed under the SPP, however, there are additional items are listed under the Environmental Offsets Regulation 2014 that are not listed in the SPP. The MSES mapping includes certain environmental values that are protected under Queensland legislation such as State conservation areas, marine parks, waterways and wetlands, protected habitat, fish habitat, regulated vegetation, connectivity areas and offset areas.

MSES are defined under the Environmental Offset Regulation 2014 and include the following:

- protected areas (including all classes of protected area except coordinated conservation areas) under the NC Act
- marine parks and land within a 'marine national park', 'conservation park', 'scientific research', 'preservation' or 'buffer' zone under the *Marine Parks Act 2004*
- areas within declared fish habitat areas that are management A areas or management B areas under the Fisheries Regulation 2008
- threatened wildlife under the NC Act and special least concern animal under the Nature Conservation (Wildlife) Regulation 2006
- regulated vegetation under the VM Act that is:
    - Category B areas on the regulated vegetation management map, that are 'endangered' or 'of concern' regional ecosystems
    - Category C areas on the regulated vegetation management map that are 'endangered' or 'of concern' regional ecosystems
    - Category R areas on the regulated vegetation management map
    - areas of essential habitat on the essential habitat map for wildlife prescribed as 'endangered wildlife' or 'vulnerable wildlife' under the NC Act
    - regional ecosystems that intersect with watercourses identified on the vegetation management watercourse map
    - regional ecosystems that intersect with wetlands identified on the vegetation management wetlands map
- high preservation areas of wild river areas under the *Wild Rivers Act 2005* (see below about transition to strategic environmental areas designated precincts)
- connectivity areas containing remnant vegetation Category B as depicted in the Environmental Offset Landscape Connectivity Assessment Tool
- wetlands in a wetland protection area or wetlands of high ecological significance shown on the Map of Referable Wetlands under the Environmental Protection Regulation 2008
- wetlands and watercourses in high ecological value waters as defined in the Environmental Protection (Water) Policy 2009, schedule 2 legally secured offset areas

Figure 11 in **Appendix A** shows the MSES mapping over the study area. There are a series of mapped MSES wetlands between KP 449 and KP 456.

Waterways associated with Buckley River, Nottingham Creek, Mingera Creek, Templeton River and Mica Creek catchments will be crossed by the alignment as discussed in **Section 2.3.7**.

Wildlife habitat is also shown in the MSES mapping as discussed in **Section 2.3.8**.

2.3.10. Protected areas

Part of the alignment passes through Royton Timber Reserve, a protected area under the NC Act.

2.3.11. Conservation Significant Species

Conservation significant flora and fauna species are those species listed under the provisions of the Commonwealth EPBC Act and/or the Queensland Nature Conservation (Wildlife) Regulation 2006, the regulation to the NC Act, including EVNT species as well as internationally protected wildlife and migratory species. Potentially occurring threatened flora and fauna species are listed in **Appendix C** with an account of their likelihood of presence within the study area based on known records, species biology and ecology and habitats available within the study area. Not all of the threatened species indicated through desktop information are expected to occur within the study area due to the absence of suitable habitat for some species.

Of the three threatened flora species known or predicted to occur, *Ptilotus maconochiei* (listed as Near Threated under the NC Act) has been previously recorded within the search area.

Of the 55 conservation significant fauna species known or predicted to occur, 32 species have been previously recorded within the search area. **Table 8** lists the threatened fauna and flora species that are at least moderately likely to occur within the study area based on the likelihood of occurrence assessment.

Table 8 Conservation significant species likely to occur within the study area

Class	Common name	Scientific Name	EPBC Act	NC Act	Previous Record*
Birds	Australian reed-warbler	*Acrocephalus australis*	M	SL	Y
Birds	common sandpiper	*Actitis hypoleucos*	M	SL	Y
Birds	Carpentarian grasswren	*Amytornis dorotheae*		NT	Y
Birds	fork-tailed swift	*Apus pacificus*	M, Ma	SL	N
Birds	great egret, eastern great egret	*Ardea alba, Ardea modesta*	M, Ma	SL	Y
Birds	cattle egret	*Ardea ibis*	M, Ma	SL	Y
Birds	sharp-tailed sandpiper	*Calidris acuminata*	M	SL	Y
Birds	curlew sandpiper	*Calidris ferruginea*	M	SL	Y
Birds	red-necked stint	*Calidris ruficollis*	M	SL	Y
Birds	long-toed stint	*Calidris subminuta*	M	SL	Y
Birds	oriental plover, oriental dotterel	*Charadrius veredus*	M, Ma	SL	Y
Birds	white-winged black tern	*Chlidonias leucopterus*	M	SL	Y
Birds	red goshawk	*Erythrotriorchis radiatus*	V	E	Y
Birds	Gouldian finch	*Erythrura gouldiae*	E	E	Y
Birds	grey falcon	*Falco hypoleucos*		NT	Y
Birds	Latham's snipe	*Gallinago hardwickii*	M	SL	Y
Birds	Swinhoe's snipe	*Gallinago megala*	M	SL	Y
Birds	oriental pratincole	*Glareola maldivarum*	M, Ma	SL	N
Birds	painted honeyeater	*Grantiella picta*		V	Y
Birds	white-bellied sea-eagle	*Haliaeetus leucogaster*	M, Ma	SL	Y
Birds	Caspian tern	*Hydroprogne caspia*	M	SL	Y
Birds	bar-tailed godwit	*Limosa lapponica*	M		Y
Birds	black-tailed godwit	*Limosa limosa*	M	SL	Y
Birds	rainbow bee-eater	*Merops ornatus*	M, Ma	SL	Y
Birds	yellow wagtail species	*Motacilla flava*	M	SL	Y
Birds	little curlew	*Numenius minutus*	M	SL	Y
Birds	eastern osprey, osprey	*Pandion cristatus, Pandion haliaetus*	M	SL	Y
Birds	glossy ibis	*Plegadis falcinellus*	M	SL	Y

Class	Common name	Scientific Name	EPBC Act	NC Act	Previous Record*
Birds	pacific golden plover	*Pluvialis fulva*	M	SL	Y
Birds	Australian painted snipe	*Rostratula australis*	E, M	V	Y
Birds	painted snipe	*Rostratula benghalensis (sensu lato)*	E, M, Ma		N
Birds	wood sandpiper	*Tringa glareola*	M	SL	Y
Birds	common greenshank	*Tringa nebularia*	M	SL	Y
Birds	marsh sandpiper	*Tringa stagnatilis*	M	SL	Y
Birds	terek sandpiper	*Xenus cinereus*	M	SL	Y
Mammals	northern leaf-nosed bat	*Hipposideros stenotis*		V	Y
Mammals	ghost bat	*Macroderma gigas*		V	Y
Mammals	greater bilby	*Macrotis lagotis*	V	E	Y
Mammals	purple-necked rock-wallaby	*Petrogale purpureicollis*		V	Y
Mammals	Carpentarian antechinus	*Pseudantechinus mimulus*	V		Y
Mammals	orange horseshoe-bat	*Rhinonycteris aurantia*		V	Y
Reptiles	common death adder	*Acanthophis antarcticus*		NT	Y
Reptiles	plains death adder	*Acanthophis hawkei*	V		N
Plant		*Ptilotus maconochiei*		NT	Y

*Previous recording – Wildlife Online, Birdata or ALA database records: Y = Yes, N = No
EPBC Act (species listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)): E = Endangered, V = Vulnerable, M = Migratory Ma = Listed Marine
NC Act (species listed under the Nature Conservation (Wildlife) Regulation 2006): E = Endangered, V = Vulnerable, NT = Near Threatened, SL = Special Least Concern

EPBC Protected Matters

The EPBC PMST identified the search area as having potential habitat for no nationally threatened flora and 19 conservation significant fauna (eight of which are migratory or marine) species listed under the EPBC Act (**Appendix B**).

It should be noted that the EPBC online search gives details of species that are predicted to be present with the defined area based on bioclimatic modelling. As such, these species have not necessarily been observed within the study area and suitable habitat may not occur.

Wildlife Online

A query of the Wildlife Online database (**Appendix B**) returned 549 plant species that have been historically recorded within the study area. These included 520 native species and 29 exotic species. There was a historical record for one threatened flora species, *Ptilotus maconochiei*, within the search area.

The Wildlife Online database returned 171 vertebrate species that have been historically recorded within the area containing the study area. These included 166 native species and five exotic species. There were historical records for thirteen conservation significant fauna species within the search area (**Table 8**).

It should be noted that the Wildlife Online database consists of observations that come from a wide range of public sources. As a consequence there is no control over quality and the veracity of individual records may vary.

Birdata

BirdLife Australia's Birdata (**Appendix B**) shows records of 232 bird species observed within the search area. Of those, 30 species are listed under the EPBC Act and/or NC Act, including 25 migratory species protected under the EPBC Act (**Table 8**).

Atlas of Living Australia

The ALA database returned records (**Appendix B**) for three flora and 26 fauna species listed under the EPBC Act and/or NC Act within the search area (**Table 8**).

Desert Channels Natural Resource Management Region Back on Track Report

The Desert Channels NRM region Back on Track report (Department of Environment and Resource Management 2010b) identifies nine priority plant, 15 invertebrate and 23 vertebrate species for the region. As the Desert Channels NRM region encompasses a large area, some species and impacts listed in the Back on Track report are not relevant to the study area.

None of the nine priority flora species listed in the report have been previously recorded in the database search area.

Out of the 38 priority fauna species listed in the report, eight species have been previously recorded in the database search area (**Table 9**).

Table 9 Priority fauna species for the Desert Channels NRM region previously recorded in the area

Class	Species Name	Common name
Aves	*Amytornis ballarae*	Kalkadoon grasswren
Aves	*Amytornis dorotheae*	Carpentarian grasswren
Aves	*Erythrotriorchis radiatus*	red goshawk
Aves	*Grantiella picta*	painted honeyeater
Aves	*Rostratula australis*	Australian painted snipe
Mammalia	*Macroderma gigas*	ghost bat
Mammalia	*Macrotis lagotis*	greater bilby
Reptilia	*Acanthophis antarcticus*	common death adder

Southern Gulf Natural Resource Management Region Back on Track Report

The Southern Gulf NRM region Back on Track report (Department of Environment and Resource Management 2010a) identifies four priority plant, one invertebrate and 25 vertebrate species for the region. As the Southern Gulf NRM region encompasses a large area and extends to the coast, some species and impacts listed in the Back on Track report are not relevant to the study area.

None of the four priority flora species listed in the report have been previously recorded in the database search area.

Out of the 26 priority fauna species listed in the report, seven species have been previously recorded in the database search area (**Table 9** except *Macrotis lagotis*).

2.3.12. Weeds and Pests

A weed is defined as any plant that requires some form of action to reduce its harmful effects on the economy, the environment, human health and amenity (Natural Resource Management Ministerial Council 2007). There are two types of invasion: introduction of exotic plants and movement by native species into new areas well outside their native range. Weeds have an adverse effect on an area's environmental values and ecological functioning for the following reasons:

- Competition with native species;
- Change in the structure of a plant community through addition or removal of strata;
- Repress recruitment of native species;
- Change the natural fire fuel characteristics, which can change the natural fire regime to the detriment of native species, often resulting in the loss of native species;
- Change the food sources and habitat values available to native fauna, reducing some and increasing others;
- May change geomorphological processes such as erosion; and
- May lead to changes in the hydrological cycle.

Weed species considered to be of greatest threat to natural and economic values on a national basis have been ranked as Weeds of National Significance (WONS) (Thorp & Lynch 2000). Weed significance at a national level was assessed using four major criteria:

- Invasiveness;
- Impacts;
- Potential for spread; and
- Socio-economic and environmental impacts.

At a State level, the *Land Protection (Pest and Stock Route Management) Act 2002* (LP Act) identifies those weed and pest animal species that represent a threat to primary industries, natural resources and the environment. Under the LP Act, a weed and pest animal species can be declared as a Class 1, 2 or 3 Pest based on its potential to become a serious pest and the degree of infestation in Queensland (**Table 10**).

Table 10 Categories of declared pests in Queensland

Priority Class	Description
Class 1	A Class 1 pest is one that is not commonly present in Queensland, and if introduced would cause an adverse economic, environmental or social impact. Class 1 pests established in Queensland are subject to eradication from the state. Landowners must take reasonable steps to keep land free of Class 1 pests.
Class 2	A Class 2 pest is one that is established in Queensland and has, or could have, a substantial adverse economic, environmental or social impact. The management of these pests requires coordination and they are subject to local government-, community or landowner-led programs. Landowners must take reasonable steps to keep land free of Class 2 pests.
Class 3	A Class 3 pest is one that is established in Queensland and has or could have a substantial adverse economic, environmental or social impact. Its impact or potential impact is however considered to be less significant than that of a Class 2 pest.

The Wildlife Online database searches indicates that three declared pest plant species have previously been recorded within the search area: **Cascabela thevetia* (C3), **Parkinsonia aculeata* (C2, WONS),**Tamarix aphylla* (C3, WONS). One C2 declared animal species has also been recorded within the search area: **Sus scrofa* (feral pig).

3. Field Survey Methods

A post-wet season field survey was conducted as part of this study to obtain specific ecological information relevant to the study area and to ground-truth results from desktop assessment. Field surveys also aimed to determine the likelihood of occurrence of threatened species or ecological communities considered to have the potential to occur in the study area, as identified by desktop searches (Federal listings under EPBC Act, or State listings under NC Act or VM Act). Survey sites were selected to sample representative vegetation communities present in the study area. Verification was based on direct observations of species, habitats and vegetation, including soils, geology and landforms.

3.1. Timing of Field Surveys

One post-wet season field survey was undertaken in the period between and inclusive of the 27th of April and 2nd of May 2015. The survey period coincided with the recommended optimal period for vegetative vigour and inflorescence set, particularly for herbaceous and grass species. The timing of the survey is considered adequate for a post-wet season fauna survey, given daytime and evening temperatures and some areas of remaining pooled water in the ephemeral streams.

3.2. Site Selection

Field surveys were undertaken in representative vegetation communities across the study area. Survey site locations are shown in **Figure 8** (flora and vegetation) and **Figure 10** (fauna) in **Appendix A**. Sites were selected on the basis of:

- Aerial photography interpretation of site characteristics;
- Presence of remnant vegetation;
- Verification of certified RE mapping extent and attribution;
- Verification of mature regrowth mapping;
- Verification of areas supporting MNES and MSES;
- Targeted threatened flora and fauna species, ecological communities and their habitats identified from database searches; and
- The presence of fauna habitat features (e.g. structure and hollows, gullies, topographic features and riparian areas).

3.3. Flora and Vegetation Survey Methods

Targeted floristic surveys were conducted using methods defined by the Queensland Herbarium (DSITI) for mapping REs and vegetation communities (Neldner *et al*. 2012). Flora surveys were conducted in areas of remnant vegetation including mapped REs and within high-value regrowth and non-remnant vegetation. Flora sampling methods included:

- CORVEG sampling (Neldner *et al*. 2012);
- BioCondition site assessment (Eyre *et al*. 2015);
- Site species lists; and
- Traverses.

3.3.1. CORVEG Sampling

A total of 52 survey sites (**Appendix H**) were assessed across the study area. Sites were surveyed by enhanced quaternary level CORVEG plots, as necessary to verify the extent and attribution of the certified RE mapping and to assist with determination of remnant status. Enhanced quaternary sites recorded key attributes of vegetation structure and composition to assist in verifying the certified RE mapping within the study area. Location of flora field sites are indicated in **Figure 8** in **Appendix A**.

The remnant/non-remnant status of native vegetation was determined by comparing the existing predominant canopy of a site with that in a normal or undisturbed state. The predominant canopy is defined by the Queensland Herbarium (DSITI) as the ecologically dominant layer (EDL) or that layer of the vegetation which contains the most above ground biomass. The EDL can be defined in terms of growth form, height, cover density and species. In the majority of cases, the EDL is equivalent to the upper stratum of Walker and Hopkins (1990). Woody vegetation is defined as remnant if it has never been cleared or, if previously cleared, where the dominant canopy has:

- >50% of the predominant canopy cover that would exist if the vegetation community were undisturbed; and
- >70% of the height of the predominant canopy that would exist if the vegetation community were undisturbed; and
- The same floristic species that would exist if the vegetation community were undisturbed.

This definition is known as the '50-70-species' criteria.

3.3.2. BioCondition Sampling

In addition to the CORVEG assessment sites, specific areas within the study area were assessed in terms of the habitat condition using the BioCondition method (Eyre *et a*l. 2015). BioCondition is a widely accepted condition assessment framework for Queensland that provides a measure of how well a terrestrial ecosystem is functioning in terms of its biodiversity values. It is a site-based, quantitative method that can be used in any vegetative state and provides a score which indicates the functional condition of the site for biodiversity. In BioCondition, the condition refers to the degree to which the measured attributes of a patch of vegetation differ from the attributes of the same vegetation type in its reference state as described in published benchmark documents.

BioCondition assessments are made up of 11 attributes. The first 10 attributes are derived from field based assessments while the remaining landscape attribute is derived by desktop spatial analysis within a GIS environment. Desktop assessments for intact bioregions include distance from accessible permanent watering point and is described in further detail below.

Distance from permanent water

Distance from permanent water points is therefore a landscape level attribute that is measured and scored in BioCondition for the intact landscapes of the Queensland rangelands. Scoring is based on the shortest distance from the centre of the site to the nearest accessible permanent water point within the one fenced area.

Three sources of water are used to provide permanent water for stock in the rangelands (James et al. 1999), including:

- unconfined aquifers, where water is pumped to the surface by windmill, solar or diesel pumps
- artesian and sub-artesian aquifers e.g. the Great Artesian Basin, where water is either naturally forced to the surface or pumped

- stored surface runoff, where surface runoff from rain is trapped in dams.

For the BioCondition assessment, permanent water points are typically dams (earth tanks), raised ring tanks and troughs on pipelines, but can include natural permanent water supplies such as rivers and waterholes.

3.3.3. Site species lists

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

Plant species were either identified in situ or collected for later identification. For those species for which identification or confirmation was required, a specimen was sent to the Queensland Herbarium for verification.

3.3.4. Traverses

In addition to the CORVEG assessment sites, specific areas of vegetation in the study area were traversed on foot and the random meander technique (Cropper 1993) applied. The random meander technique is a widely accepted method to survey for threatened flora species that may not occur in surveyed plots. It involves traversing sections of the study area and recording vegetation type and vascular flora species along each traverse. The purpose of this type of assessment was to ensure adequate site coverage and to establish a comprehensive floral species list for the study area.

3.4. Fauna and Habitat Survey Methods

The post-wet season fauna survey included trapping, targeted fauna surveys and detailed habitat assessments using methods recommended by the Australian and Queensland governments for general terrestrial fauna surveys and targeted species surveys. Fauna surveys were conducted in areas of remnant vegetation including mapped REs. Three survey sites were selected for a terrestrial trapping survey to comply with DEHP *Terrestrial Vertebrate Fauna Survey Guidelines for Queensland* (The State of Queensland 2014).

The survey was conducted over four nights, with three trapping sites, two overnight sites to allow nocturnal (spotlighting) surveys and dawn bird surveys and 11 other opportunistic survey sites. Each of the three trapping and two overnight sites sampled different habitats and the opportunistic sites sampled representative locations for different vegetation or habitat in the landscape.

The survey was designed to:

- gather a detailed fauna species list (including pests) along the alignment;
- identify the fauna habitats and their distribution along the alignment; and
- assess the likelihood of EVNT fauna species to occur and to map the extent of potential habitat for EVNT species.

3.4.1. Sampling Techniques

Habitat assessments were undertaken to describe fauna habitats within the study area including their potential suitability for conservation significant species. Information such as structural complexity of vegetation, description of habitat features such as hollows, sources of disturbance and any characteristics specific to the target conservation significant species identified by the desktop assessment was collected.

The following sections briefly describe the sampling techniques employed to assess the fauna present during the survey. All observed species were recorded.

Mammals - General

A combination of techniques was employed during surveys to increase the likelihood of detection of large and small ground-dwelling mammals.

One T-shaped plot (**Figure 2**) of 20 Elliot traps (type A) was placed strategically within each of the three selected sites. In accordance with the DEHP Terrestrial Vertebrate Fauna Survey Guidelines for Queensland (The State of Queensland 2014), trapping Ts were located within vegetation representative of that site, or within ecotones or changes within vegetation communities. Traps were located in a rough T formation with 5 traps placed approximately 10 m apart adjoining the shaft of the T (formed by the drift fences) and 15 traps placed approximately 10 m apart running parallel to the top of the T, centred on the intersection of the drift fences. Individual trap placement was chosen based on the microhabitat available near each trap location. The traps were set with bait containing peanut butter, honey, oats and sardines.

Remote digital infrared cameras were deployed at 14 locations across the study area in a range of habitats showing signs of fauna traffic.

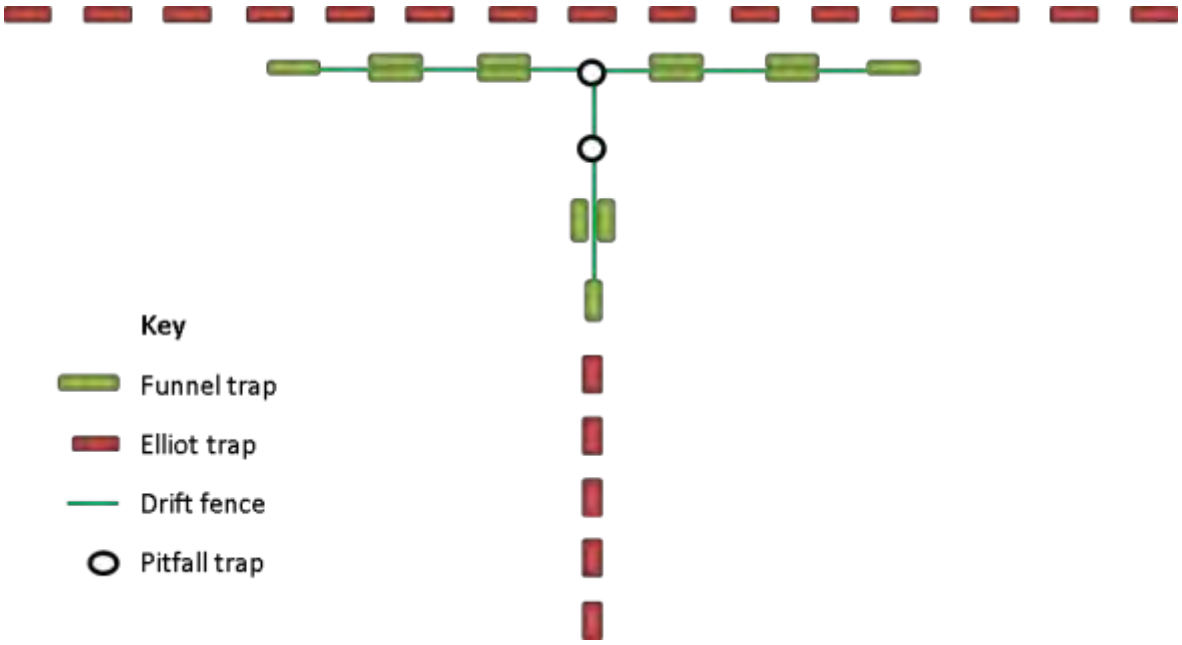

Figure 2 Diagrammatic layout of drift fences with Elliot, funnel and pitfall traps. Figure not to scale.

Diurnal and nocturnal (spotlight) survey techniques were employed to detect other mammal species. Species presence was determined via direct observation and the collection of scats and/or observation of tracks and other traces. Spotlighting was conducted on foot within each of the represented habitats at the overnight sites using high powered torches and head lamps. Incidental birds, frogs and reptiles were also recorded.

Targeted Mammals – Bats

Microchiropteran (insectivorous) bats were surveyed using ultrasonic call detectors (SM2+BAT and Anabat II Bat Detectors®).

The echolocation calls of insectivorous bats were recorded at eight sites and analysed for species identification. The detector locations were selected based on:

- potential roost, flyway and watering habitats;
- attempts to maximise diversity of bat species detected; and

- the degree to which the locations represent fauna habitat types within the site.

Prior to field placement, each detector was calibrated and set to operate at a uniform sensitivity level (at a level of seven, where the maximum is ten). Detectors were placed on the ground in suitably open areas (to maximise acoustic clarity) with the microphone directed upwards at a 45° angle from the ground.

Bat survey results can be influenced by factors such as time of day, weather, season and survey effort. To try to overcome the natural variation in bat activity levels over different nights, both survey methods were employed for at least two consecutive nights at each site where possible. All bat calls were recorded on memory cards, downloaded and sent to a qualified and experienced bat-call analyst (Greg Ford; Balance Consulting) for identification.

Reptiles

Reptile species were detected using a combination of trapping techniques and active searches.

Drift fences, funnel traps and pitfall traps were established at each of the three sites. Each trapping plot consisted of a strategically placed T-shaped drift fence (30 m x 15 m) with two pitfall traps and 13 reptile funnel traps (**Figure 2**). Funnel and pitfall traps were provided with cover to minimise heat exposure to any animals caught and contained wet sponges to provide moisture.

Opportunistic searches for reptiles were conducted during the day by raking leaf and bark litter drifts, overturning logs and stones, searching under the bark of dead trees, investigating burrows and recording tracks. Reptiles were also opportunistically observed while spotlighting at night time.

Avifauna

Dawn avifauna surveys were undertaken in each main fauna habitat present at the two overnight sites. Each survey involved an average of 10 minute census of birds per unbounded 1 ha area within four hours of sunrise. Birds detected visually (with the aid of binoculars) and/or aurally were recorded. Relevant weather details and the time of the surveys were also noted.

All opportunistic observations of birds outside of systematic surveys were also recorded.

Amphibians

Diurnal searches for suitable habitat of protected amphibian species were conducted. Given the seasonal nature of some amphibians, the habitat assessments incorporate potential habitat characteristics for any target amphibians.

Incidental Observations

The above methods were supplemented with incidental observations such as those made while carrying out other activities like travelling between sites, checking traps and conducting habitat assessments.

Aquatic Invertebrates

Aquatic sampling for macro-invertebrates using a 250 µm net was carried out in the pools at Camp 1 and Site 2. Samples were analysed by Lisa Le Strange of AQUEN Aquatic & Environmental Consulting.

3.5. Field Survey Constraints

The survey period coincided with the recommended optimal period for vegetative vigour and inflorescence set, particularly for herbaceous and grass species. However, the region has experienced lower than average rainfall over the past three years and observed species diversity and vigour may be less than after good seasons.

The timing of the survey is considered adequate for a post-wet season fauna survey, given daytime and evening temperatures and some areas of remaining pooled water in the ephemeral streams. However, the prevailing conditions during the survey period were not ideal for fauna observation. The windy conditions hindered our ability to make aural observations (particularly for birds) and are likely to have influenced the behaviour of other fauna species which may have otherwise been easily observed. The number of consecutive years with lower than average rainfall leading up to the survey may also have impacted on species detectability.

3.6. Nomenclature

Scientific names for terrestrial flora are consistent with those used in the Census of the Queensland Flora (Bostock & Holland 2014) and botanical binomials presently accepted by the Queensland Herbarium (DSITI). An asterisk (*) preceding a species name indicates a non-native exotic species and a plus sign ($^{+}$) indicates a non-indigenous native species, i.e. those native species that are well out of their natural range and have characteristics typical of weed species. The description of REs follows that of the Regional Ecosystem Description Database (REDD, Version 9.0 (Queensland Herbarium 2015)).

Scientific and common names for terrestrial fauna follow those used in the following sources:

- Australian Faunal Directory (Department of Environment Water Heritage and the Arts 2009);
- Field Guide to Mammals of Australia (Menkhorst & Knight 2004);
- A Complete Guide to Reptiles of Australia (Wilson & Swan 2013);
- Field Guide to Australian Birds (PDA Solutions 2012);
- Tadpoles and Frogs of Australia (Anstis 2013); and
- A Field Guide to the Frogs of Australia (Tyler & Knight 2009).

3.7. Mapping

Positional data was collected with a handheld Garmin eTrex Global Positioning System (GPS) unit, with accuracy between 4 and 8 m. Locations were recorded using the UTM coordinate system with a GDA94 datum. All locations presented in this report are within UTM zone 54K.

Site data was analysed and incorporated into a GIS environment (ArcGIS 10) upon returning from the field.

4. Results

4.1. Regional Ecosystem Mapping

A total of 52 survey sites were assessed across the alignment by enhanced quaternary level CORVEG plots to verify the extent and attribution of the mapped RE. Details of the field survey sites are listed in **Table 11** with their location illustrated in **Figure 8** in **Appendix A**.

The site verified 28 different REs with the RE at 14 sites differing from the mapped RE (v9.0). With appropriate mitigation, impacts associated with the construction of the pipeline on native vegetation are expected to be limited to the direct removal of remnant vegetation. All of the verified REs are classed as Least Concern under the provision of the VM Act.

We recommend that the RE polygon extent be remapped at 1:10,000 scale and attributed based on the results of the field site sampling.

Table 11 Comparison of the pre-field verified RE and verified RE from each of the study sites sampled

Site No.	Easting	Northing	KP	Mapped RE (v9.0)	Checked RE	VM Class	Differs from Mapped
Q01	228957	7741012	472 – 473	1.5.4x1a/1.7.1/1.5.7x2	1.5.4x1a	LC	
Q02	273951	7728760	518 – 519	1.3.6a	1.3.6a	LC	
Q03	273980	7729047	518 – 519	1.5.4a/1.3.4x1/1.5.4x1a	1.5.4x3	LC	Y. Relative species dominance fits best with 1.5.4x3.
Q04	273966	7728676	near 519	1.3.7a/1.3.4x1	1.3.7a	LC	
Q05	274013	7728506	near 519	1.3.4x1/1.3.6x1/4.3.4x2a/4.3.8	1.3.4x1	LC	
Q06	228921	7741306	471 – 472	4.4.1d	4.4.1d	LC	
Q07	221906	7743074	464 – 465	4.9.4x1a	4.9.4x1a	LC	
Q08	221784	7742875	464 – 465	4.4.1c	4.4.1c	LC	
Q09	218217	7744112	461 – 462	4.3.17/4.3.16a/4.3.3	4.3.16a	LC	
Q09a	218213	7744135	461 – 462	4.3.17/4.3.16a/4.3.3	4.3.17	LC	
Q10	240539	7738422	483 – 484	4.3.12a/4.3.16a	4.3.12a	LC	
Q10a	240366	7738735	483 – 484	4.3.12a/4.3.16a	4.3.12a	LC	
Q10b	240299	7738786	483 – 484	4.4.1c/4.3.16a	4.3.16a	LC	
Q11	198330	7747810	440 – 441	4.3.17/4.3.16a	4.3.16a	LC	

Site No.	Easting	Northing	KP	Mapped RE (v9.0)	Checked RE	VM Class	Differs from Mapped
Q12	198597	7747951	440 – 441	4.3.5b/4.3.17/4.3.16	4.3.5b	LC	
Q12a	198619	7747951	440 – 441	4.3.5b/4.3.17/4.3.16	4.3.5b	LC	
Q12b	198726	7747871	440 – 441	4.3.5b/4.3.17/4.3.16	4.3.5b	LC	
Q13	262323	7732882	near 506	1.11.2x1/1.7.1/1.11.2x5	1.11.2	LC	Y. Relative species dominance fits best with 1.11.2.
Q14	262423	7732963	near 506	1.11.2x1/1.7.1/1.11.2x5	1.11.2	LC	Y. Relative species dominance fits best with 1.11.2.
Q15	262632	7733008	near 506	1.11.2x1/1.7.1/1.11.2x5	1.7.1	LC	
Q16	323291	7710418	572 – 573	1.5.4/1.5.3	1.9.5	LC	Y. Most likely a fine grained sedimentary derived soil (LZ9) as evident of fossiliferous surface rock. Fits best with 1.9.5.
Q16a	323229	7710308	572 – 573	1.5.4/1.5.3	1.5.3	LC	
Q17	323152	7710215	572 – 573	1.12.1	1.12.1	LC	
Q18	323242	7710430	572 – 573	1.5.4/1.5.3	1.5.4	LC	
Q19	329733	7704435	581 – 582	1.12.1x1/1.5.4	1.12.1	LC	Y Relative species dominance fits best with 1.12.1.
Q19a	329781	7704552	581 – 582	1.3.6x1c/1.3.7b	1.3.7c	LC	Y. Relative species dominance fits best with 1.3.7c.
Q20	252377	7736256	495 – 496	1.5.4x1a/1.5.7	1.5.6	LC	Y. Relative species dominance fits best with 1.5.6.
Q21	252441	7736122	495 – 496	1.7.1/1.5.4x1a	1.5.4x1a	LC	
Q22	280688	7725755	526 – 527	1.7.1c/1.7.1	1.7.1	LC	
Q23	323445	7710319	572 – 573	1.3.7b/1.3.6a	1.3.7b	LC	
Q23a	323462	7710376	572 –	1.3.7b/1.3.6a	1.3.6a	LC	

Site No.	Easting	Northing	KP	Mapped RE (v9.0)	Checked RE	VM Class	Differs from Mapped
			573				
Q23b	323495	7710384	572 – 573	1.5.4/1.5.3	1.5.4	LC	
Q24	307434	7715678	south of 555	1.11.2a/1.3.6x1	1.11.2a	LC	
Q25	316129	7714411	north of 564	1.12.2/1.12.1x1/1.12.2x1	1.12.1	LC	Y. Relative species dominance fits best with 1.12.1.
Q25a	316078	7714479	north of 564	1.12.2/1.12.1x2/1.12.2x1	1.12.1x1b	LC	Y. Relative species dominance fits best with 1.12.1xb
Q26	335509	7698802	589 – 590	1.12.1x1/1.12.1/1.12.2	1.12.1	LC	
Q27	341631	7701075	599 – 600	1.11.3b/1.11.2a	1.11.2a	LC	
Q28	340145	7697538	595 – 596	1.11.3x1b/1.11.2x2	1.11.2x2	LC	
Q29	340011	7697429	595 – 596	1.11.3x1b/1.11.2x2	1.11.3x1b	LC	
Q30	339918	7697258	595 – 596	1.11.2a	1.11.2a	LC	
Q31	339827	7696840	594 – 595	1.3.7a/1.3.7b/1.3.6a	1.3.7a	LC	
Q32	338946	7696596	593 – 594	1.11.2a	1.3.6a	LC	Y. Most likely alluvial surface geology (LZ 3 rather than LZ11).
Q33	337867	7696596	592 – 593	1.11.3x1b/1.11.2x2	1.11.2x2	LC	
Q34	337534	7696791	592 – 593	1.3.7b/1.3.4/1.5.6x2	1.3.7b	LC	
Q35	337494	7696827	592 – 593	1.3.7b/1.3.4/1.5.6x2	1.5.6x2	LC	
Q36	337447	7697008	592 – 593	1.3.7a/1.3.7b/1.3.6a	1.3.7b	LC	
Q37	337441	7697040	592 – 593	1.3.7a/1.3.7b/1.3.6a	1.12.1x2	LC	Y. Most likely granite derived soils (LZ12) rather than alluvial (LZ3). Fits best with 1.12.1x2.
Q37a	337293	7697119	592	1.12.2/1.12.2x1	1.12.1x2	LC	Y. Relative species

Site No.	Easting	Northing	KP	Mapped RE (v9.0)	Checked RE	VM Class	Differs from Mapped
							dominance fits best with 1.12.1x2.
Q38	336995	7697222	591 – 592	1.12.2/1.12.2x1	1.12.1	LC	Y. Relative species dominance fits best with 1.12.1.
Q39	335766	7698302	590	1.11.2d/1.11.2a	1.11.2d	LC	
Q40	335723	7698590	589 – 590	1.11.2d/1.11.2a	1.11.2d	LC	
Q40a	339390	7696775	594 - 595	1.3.7a/1.3.7b/1.3.6a	1.11.2a	LC	Y. Most likely a metamorphic land surface rather than alluvial. Fits best with 1.11.2a.

Notes: VM Act Class: LC = Least Concern

4.2. BioCondition Results

The BioCondition survey locations are shown in **Figure 8** in **Appendix A**. Two sites were fully assessed via the BioCondition method (Eyre *et al.* 2015), these being sites BC01 and BC03. A third BioCondition site (BC02) was started but was not fully assessed and has been excluded from further discussion. BioCondition forms a critical component of the Guide to Determining Terrestrial Habitat Quaility v1.1 (Biodiversity Integration and Offsets 2014) which is the accepted method for determining the habitat quality of a land based offset under the Queensland Environmental Offset Policy (QEOP).

Timing of assessment corresponded to the optimal time for greatest floristic diversity as prescribed in the BioCondition method (Eyre *et al*. 2015). Results of the BioCondition assessments undertaken appear below and in **Appendix H** and are summarised in **Table 12**.

Table 12 Field and landscape attribute data for BioCondition sites undertaken in project area

Attribute	Benchmark 1.3.7a	Benchmark 4.3.16	BC01 (1.3.7a)	BC03 (4.3.16)	BC01 score	BC03 score
Tree canopy height (m)	6-21	na	16.7	na	5	-
Tree canopy cover (%)	35	na	25.4	na	5	-
Subcanopy height (m)	na	na	8.5	na	-	-
Subcanopy cover (%)	na	na	8.8	na	-	-
Number of large trees/ha	no data	na	20	na	-	-
Native shrub canopy cover (%)	22	na	0	na	0	-
Dominant native canopy recruitment (%)	100	na	66	na	3	-
Coarse woody debris (m/ha)	no data	na	64.9	na	-	-
Native tree species richness	6	2	3	0	2.5	-
Native shrub species richness	6	4	2	1	2.5	2.5
Native grass species richness	6	19	8	3	5	0

Attribute	Benchmark 1.3.7a	Benchmark 4.3.16	BC01 (1.3.7a)	BC03 (4.3.16)	BC01 score	BC03 score
Native forbs/other species richness	3	29	9	4	5	0
Native perennial grass cover (%)	8	10-30	15	0.8	5	0
Organic litter cover (%)	5	no data	7.3	1.7	5	-
Non-native plant cover (%)	0	0	<1	<1	10	10
Distance from water			2km	4.5km	5	10

4.2.1. Site BC01

Site BC01 (**Plate 1**) occurs within Mingera Creek. The polygon assessed was determined to be a patch of remnant RE 1.3.7a. A full 100m x 50m BioCondition plot was assessed with the final score calculated as 0.663 out of a maximum possible score of 1.0. Since no benchmark data was available for large trees/hectare or coarse woody debris, the maximum possible scored for this plot was reduced to 80 instead of 100. A mid-point in the range given as the benchmark for tree canopy height was used in the determining the score for this attribute. The closest permanent water point was determined to be 2 km to the north of the plot. Scoring of the plot was calculated as 53 giving a final score of 0.663, indicating a moderately good condition.

Plate 1 Representative photographs of Site BC01 looking south (left) and east (right)

Figure 3 illustrates how the calculated site attributes scores (red line) compare to the maximum permissable score for that attribute (blue line). It indicates where an attribute scores less than the maximum possible score. For example, as illustrated in **Figure 3**, Site BC01 scored well with the field attributes measured for the canopy height and cover but scored poorly in terms of shrub cover and shrub species richness. The site also scored less than the maximum score for tree species richness and evidence of recruitment. Since no benchmark value is available for the number of large trees and coarse woody debris were, **Figure 3** indicates a zero value but these two attributes were excluded from the socring of the site as discussed above.

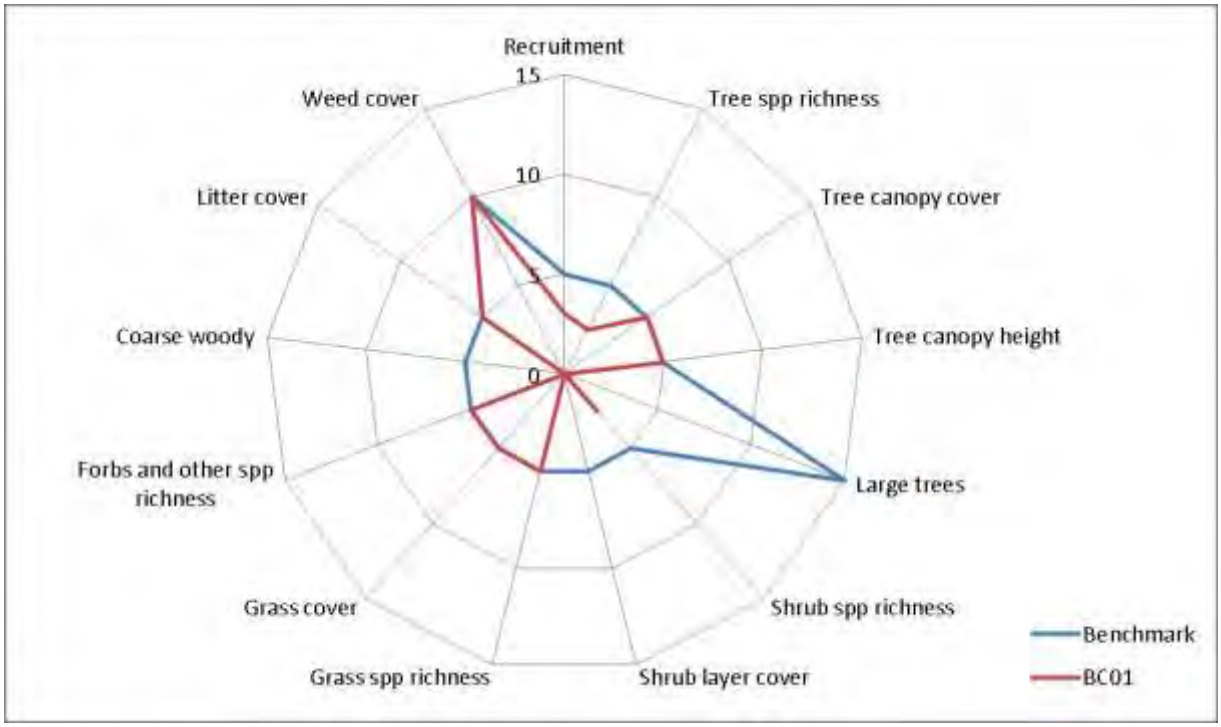

Figure 3 Radar plot of the BioCondition scores for the field based attributes (red line) as compared to the benchmark (blue line) for site BC01. Note that no benchmark values for large trees or coarse woody debris is available.

4.2.2. Site BC03

Site BC03 (**Plate 2**) is a mapped MSES wetland (RE 4.3.16a) on Barkly Downs. The polygon assessed occurs along the pipeline alignment near KP 456 and had been heavily grazed (**Plate 2**). A 50m x 10m BioCondition plot was assessed with the final score calculated as 0.5 out of a maximum possible score of 1.0. A mid-point in the range given as the benchmark for native perennial grass cover was used in the determining the score for this attribute. The closest permanent water point was determined to be 4.5 km to the north of the plot.

Plate 2 Representative photographs of Site BC03 looking north (left) and south (right)

As illustrated in **Figure 4**, Site BC03 scored poorly with most field attributes measured. It should be noted that only five of the ten field-based attributes assessed with BioCondition are measured in grassland vegetation, these being: grass species richness, forb and other species richness, grass cover, organic litter

cover and weed cover. Since no benchmark data was available for organic litter cover, the maximum possible scored for this plot was reduced to 45 instead of 50.

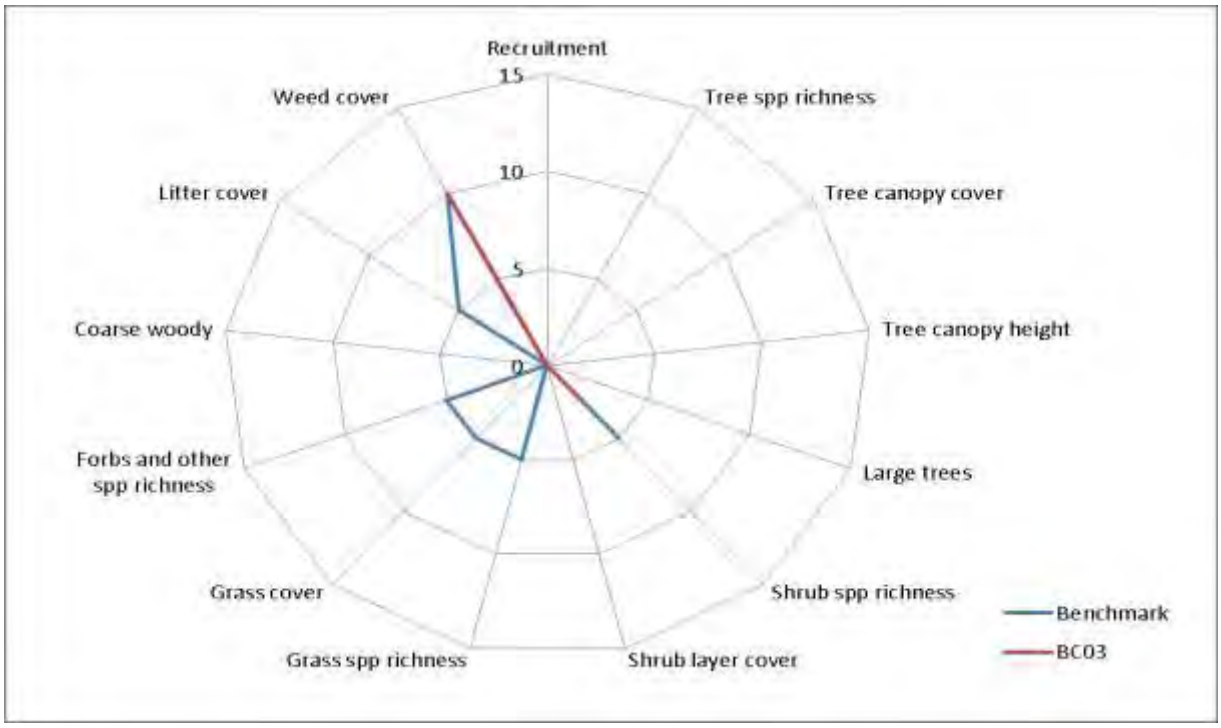

Figure 4 Radar plot of the BioCondition scores for the field based attributes (red line) as compared to the benchmark (blue line) for Site BC03.

With the adoption of the alignment revision requested by O2 Ecology on 22 June 2015 (Attachment K), the alignment avoids MSES wetlands mapped between KP 449 and KP 456.

4.3. Flora

The survey detected 107 plant species (2 mosses/liverworts, 105 flowering plants), including seven introduced species within the study area. The five most species rich plant families (**Appendix D**) are: Poaceae (27 taxa), Myrtaceae (13 taxa), Mimosaceae (12 taxa), Fabaceae (6 taxa), and Malvaceae (5 taxa). The four most species rich genara are: *Acacia* (10 taxa), *Eucalyptus* (6 taxa), *Astrebla* (4 taxa) and *Aristida* (4 taxa). In terms of life forms, the most prevalent life form recorded was shrub 35 (taxa) followed by grass (25 taxa) with 19 taxa classed as trees. All taxa recorded during field surveys are classed as Least Concern under the NC Act.

The flora survey locations are shown in **Figure 8** in **Appendix A**. Raw data is located in **Appendix H**.

4.3.1. Threatened Species

No threatened plant species as listed under the EPBC Act or the NC Act were detected during the survey.

4.3.2. Weeds

Of the 107 plant species recorded from all sites surveys during the field inspections (**Appendix D**), 7 (7%) are exotic or weed species. One species, *Parkinsonia aculeata* (Parkinsonia), is both a Class 2 declared LP Act species and a Weed of National Significance (WONS).

Parkinsonia is currently sporadic in its distribution within the study area, with occasional, isolated plants or small clumps and no known infestations. However, this species is adapted to many soil types and

proliferates within disturbed areas. Proposed activities could potentially create large areas of disturbance with increased available water suitable for the proliferation of this species. Measures to minimise the introduction and spread of weeds during pipeline construction and operations will be developed during the EIS process.

4.4. Fauna

The survey detected 52 bird, 19 mammal (three introduced) and 19 reptile species and 20 aquatic invertebrate families within the study area (**Appendix E**, **Appendix F** and **Appendix G**). Of these species, purple-necked rock wallaby (*Petrogale purpureicollis*) is of State conservation significance.

The fauna survey locations are shown in **Figure 10** in **Appendix A**. Raw data is located in **Appendix I**.

4.4.1. Habitat Descriptions

The properties within the study area are used for grazing with a portion of the alignment passing through Royton Timber Reserve. The alignment traverses largely remnant vegetation apart for a section proximal to Mount Isa.

Areas that are heavily grazed and degraded are of lowest habitat value within the study area. The areas of intact vegetation provide a range of habitats that may support a diversity of fauna species. It is important to note that although these areas are of higher ecological value, they have often been modified and disturbed by grazing in the past.

Landscape features of benefit to wildlife (Queensland Government 2014) include:

- Large vegetation patches can support larger populations; fauna that require large territories and/or occur in low population densities; and may support a larger diversity of wildlife
- Patches that are rounded in shape have a smaller edge-to-area ratio and suffer fewer edge effects than patches of a similar size that are long and thin. Edge effects that can impact on wildlife include increased weed invasion, predation, wind, high temperature and solar radiation
- Patches of vegetation that are in close proximity to other patches provide opportunities for wildlife to move between patches as there is a lower risk of predation during movement
- The proportion of the landscape that is cleared of suitable habitat affects wildlife, with birds and mammals negatively affected if more than 70% of the suitable habitat is removed from the landscape. Remaining patches of vegetation are important to wildlife conservation and restoration projects.

Microhabitat features within the larger landscape are also important to native fauna (Queensland Government 2014):

- Large trees with or without hollows, fallen logs, leaf litter, and understorey vegetation provide food, shelter and breeding sites for native mammals.
- Many native birds are specialised in their habitat requirements and rely on natural bushland for shelter, food and nesting.
- Native vegetation, tree hollows, hollow logs, peeling bark, rocky outcrops, surface rock and leaf litter provide food, shelter and breeding sites for reptiles.
- Creeks, dams and temporary puddles provide breeding, food and shelter to frog species reliant on water. Riparian vegetation including grasses, sedges and shrubs provides shelter and insect prey while logs and rocks near water offer shelter. Some frog species inhabit areas away from water.
- Large areas of mowed grass are of little benefit to native fauna and encourage cane toads.

The following sections describe the habitats that occur within the study area. Mapping provided in **Figure 10** in **Appendix A** uses version 9 of the RE mapping and descriptions as per REDD, Version 9.0 (Queensland Herbarium 2015) to show where each of the habitats described occurs along the alignment.

Note that the mapping is based on the certified RE mapping, which differs from the actual habitat present in some areas (see **Section 4.1**). The dominant RE has been used where heterogeneous polygons are mapped and categorised as shown in **Table 13**.

We recommend that this mapping is updated when the RE polygon extents are remapped at 1:10,000 scale and attributed based on the results of the field site sampling.

Table 13 Summary of habitat type by mapped Regional Ecosystem

Habitat Type	Regional Ecosystem (v9)
Ephemeral waterway and riparian vegetation	1.3.7a, 1.3.7b, 4.3.5b
Ephemeral waterway and riparian vegetation with woodland	1.3.6x1, 1.3.6x1a, 1.3.6x1c, 1.3.6x1d
Hummock grassland with rocky habitat	1.7.1c
Hummock grassland with rocky habitat and woodland	1.11.2a, 1.11.2d, 1.11.2x1, 1.11.3a, 1.11.3b, 1.11.3x1b, 1.12.1, 1.12.1x1, 1.12.2, 1.7.1
Hummock grassland with woodland	1.3.6a, 1.5.3, 1.5.4, 1.5.4x1a, 1.5.6, 1.5.7, 1.9.6a
Palustrine wetland	4.3.12a
Tussock grassland	1.3.4x1, 4.3.17, 4.4.1c, 4.4.1d, 4.9.4x1a
Tussock grassland with woodland	1.5.4a, 1.5.7a, 4.4.1x2

Tussock Grassland: Camp 1, WP183, WP182, Q7, WP180, Site 2

Plate 3 Mitchell grass tussock grassland

Tussock grasslands consist mainly of Mitchell grasses (*Astrebla* spp.) or bluegrasses (*Dichanthium* spp.) (RE 1.3.4x1, 1.5.4x3, 4.3.16a, 4.3.17, 4.4.1c, 4.4.1d, 4.9.4x1a). The Mitchell grass grasslands are a relatively depauperate habitat for vertebrate fauna but support some distinctive species (e.g. Australian pratincole). Habitat values include:

- Provides food for herbivores and seed eaters and supports small mammals, birds, snakes, monitors
- Cracking clay soils provide shelter for a variety of invertebrates, small marsupials and reptiles
- The tussock grasslands are heavily affected by grazing due to the value of these grasses for fodder. There are large patches of this habitat, particularly on the western end side the study area.
- Potential habitat for plains death adder (*Acanthophis hawkei*) in flat, treeless, cracking-soil areas associated with riverine floodplains
- Potential habitat for grey falcon (*Falco hypoleucos*), which favours timbered lowland plains, particularly acacia shrubland that are crossed by tree-lined watercourses, but also frequents grassland habitats
- Potential habitat for northern leaf-nosed bat (*Hipposideros stenotis*) in open grassland where sandstone and limestone caves, boulder piles, and disused mines with shallow overhangs or splits in sandstone cliffs are nearby (eastern portion of the alignment)
- Potential foraging areas for orange leaf-nosed bat (*Rhinonicteris aurantia*) where black-soil grassland occurs near cave roosts with appropriate microclimate conditions (eastern portion of the alignment)

Hummock Grassland: Site 1, WP191, WP188, Site 2, WP192, WP193, WP194, Site 3, WP177, Camp 2, WP195

Plate 4 *Triodia* sp. hummock grassland

Hummock grasslands are characterised by *Triodia* spp. (RE 1.11.2a, 1.11.2d, 1.11.3x1b, 1.12.1, 1.5.3, 1.5.4, 1.5.6x2, 1.7.1, 1.9.5) and a food web dominated by spinifex, termites and lizards. Habitat values include:

- Provides food for sap and seed eaters and supports prey (invertebrates and small vertebrates) for small mammals, birds and reptiles
- Hummocks provide shelter and protected nesting areas for breeding for a variety of invertebrates, small mammals, birds and reptiles
- The hummock grasslands are generally in good condition, largely unaffected by human impacts such as clearing and grazing. Large patches of this habitat adjoin and form the understory of woodland habitats.
- Potential habitat for Carpentarian grasswren (*Amytornis dorotheae*) where mature hummock grassland occurs on rugged terrain that offers protection from fire
- Potential habitat for greater bilby (*Macrotis lagotis*) where hummock grassland has an overstorey of Acacia and Melaleuca
- Potential habitat for Carpentarian Antechinus (*Pseudantechinus mimulus*), which inhabits rocky areas and shelters among pebbles, boulders and stony hillsides or outcrops with shrubby open woodland and hummock grass understorey
- Potential habitat for northern leaf-nosed bat (*Hipposideros stenotis*) in hilly areas where sandstone and limestone caves, boulder piles, and disused mines with shallow overhangs or splits in sandstone cliffs are nearby (eastern portion of the alignment)
- Potential habitat for purple-necked rock-wallaby (*Petrogale purpureicollis*) where spinifex grasslands occur in association with boulder piles, rocky slopes, cliffs and gorges in limestone areas, and sandstone and quartzite outcrops amongst dry Eucalyptus and Acacia woodlands (eastern portion of the alignment)
- Potential foraging areas for orange leaf-nosed bat (*Rhinonicteris aurantia*) where spinifex grassland occurs near cave roosts with appropriate microclimate conditions (eastern portion of the alignment)

Ephemeral Waterway and Riparian Vegetation: Camp 1, Site 2, WP178, Camp 2

Plate 5 Ephemeral waterway and riparian vegetation

Riparian areas (RE 1.3.7a, 1.3.7b, 1.3.7c, 4.3.5b) often have significantly higher fauna diversity than surrounding areas, particularly if habitat diversity is correspondingly high. Habitat values include:

- Provides water and supports flowering and seeding vegetation as well as prey (aquatic species, invertebrates and small vertebrates) for small mammals, birds and reptiles
- Riparian vegetation provides refuge, sheltered movement corridors for fauna and shade for creeks and pools
- Pools support aquatic, riparian-associated and other fauna species (bats, birds and introduced species) may rely on the water during drier periods
- Riparian woodlands are of critical importance for hollow-dependent animals (e.g. parrots, bats)
- The waterways were impacted by cattle and used by feral cats
- Potential habitat for Gouldian finch (*Erythrura gouldiae*) where eucalypt and paperbark woodlands, usually with a grassy understorey, occur in the vicinity
- Potential habitat for red goshawk (*Erythrotriorchis radiatus*) where trees tall enough for nesting are restricted to the banks of major rivers
- Potential habitat for grey falcon (*Falco hypoleucos*), which favours timbered lowland plains, particularly acacia shrubland that are crossed by tree-lined watercourses
- Potential habitat for painted honeyeater (*Grantiella picta*) where riparian woodlands have an abundance of mistletoes.
- Potential water source for ghost bat (*Macroderma gigas*), northern leaf-nosed bat (*Hipposideros stenotis*) and orange leaf-nosed bat (*Rhinonicteris aurantia*) where water occurs near suitable roost sites (eastern portion of the alignment)

Palustrine Wetland: WP187

Plate 6 Palustrine wetland (dry)

Palustrine wetlands are intermittent swamps and clay pans (non floodplains) in the study area (RE 4.3.12a). Some of these wetlands are mapped as MSES (**Figure 11**). Habitat values include:

- Provides habitat for freshwater aquatic species and fauna that preys on these species
- Provides feeding, resting and potential nesting grounds for migratory birds
- There is evidence of heavy use of these areas by cattle, even while the habitats are dry
- The deep cracking clay soils provide shelter for a variety of invertebrates, small marsupials and reptiles
- While water persists, the wetlands support aquatic, wetland-associated and other fauna species (including introduced species) that may rely on the water
- Potential habitat for Australian painted snipe (*Rostratula australis*) where wetland is a shallow, temporary freshwater wetland or saltmarsh, generally with good cover of grasses, low scrub, lignum, open timber or samphire
- Potential habitat for migratory birds that prefer wetland habitats

Plate 7 Rocky habitats

Boulder piles, rocky slopes, stony hills and rock outcrops (land zones 7, 11, 12) are found mostly in the eastern portion of the study area. Habitat values include:

- Provide shelter and protected areas for breeding for a variety of fauna
- The rocky habitats are largely unaffected by human impacts such as grazing. Some of this habitat is protected by Royton Timber Reserve near Mount Isa.
- Potential habitat for Carpentarian grasswren (*Amytornis dorotheae*) where mature hummock grassland occurs on rugged terrain that offers protection from fire
- Potential habitat for Carpentarian Antechinus (*Pseudantechinus mimulus*), which inhabits rocky areas and shelters among pebbles, boulders and stony hillsides or outcrops with shrubby open woodland and hummock grass understorey
- Potential roost habitat for ghost bat (*Macroderma gigas*) where there are caves, boulder piles, shallow escarpments, deep natural caves or disused mines that provide the appropriate specific microclimate
- Potential habitat for northern leaf-nosed bat (*Hipposideros stenotis*) with sandstone and limestone caves, boulder piles, and disused mines with shallow overhangs or splits in sandstone cliffs
- Potential habitat for purple-necked rock-wallaby (*Petrogale purpureicollis*) where there are boulder piles, rocky slopes, cliffs and gorges in limestone areas, and sandstone and quartzite outcrops amongst dry Eucalyptus and Acacia woodlands
- Potential roosts areas for orange leaf-nosed bat (*Rhinonicteris aurantia*) where caves provide appropriate microclimate conditions

Woodland or Shrubland: Site 1, WP191, WP188, Site 2, WP192, WP193, WP194, Site 3, WP177, Camp 2, WP195

Plate 8 Low open woodland

Low open woodland or shrubland (RE 1.11.2, 1.11.2a, 1.11.2d, 1.11.2x2, 1.11.3x1b, 1.12.1, 1.12.1x1b, 1.12.1x2, 1.3.6a, 1.5.3, 1.5.4, 1.5.4x1a, 1.5.6, 1.5.6x2, 1.7.1, 1.9.5) can be associated with any of the above habitat types. Habitat values include:

- Woodland trees and shrubs provide food for sap and nectar eaters and supports prey (invertebrates and small vertebrates) for small mammals, birds and reptiles
- Provide shelter and protected areas for breeding for a variety of fauna, including live vegetation and fallen woody debris
- Woodlands with hollow bearing trees are of critical importance for hollow-dependent animals (e.g. parrots, bats)
- Potential habitat for grey falcon (*Falco hypoleucos*), which favours timbered lowland plains, particularly acacia shrubland that are crossed by tree-lined watercourses, but also frequents woodland habitats
- Potential habitat for painted honeyeater (*Grantiella picta*) where woodlands have an abundance of mistletoes, usually where *Acacia* spp. dominate.
- Potential foraging habitat for northern leaf-nosed bat (*Hipposideros stenotis*) in open eucalypt woodland with grassland or shrubland understories where suitable roosting habitat is nearby
- Potential foraging habitat for ghost bat (*Macroderma gigas*) where suitable roosting habitat is nearby
- Potential habitat for purple-necked rock-wallaby (*Petrogale purpureicollis*) dry *Eucalyptus* and *Acacia* woodlands occur in association with boulder piles, rocky slopes, cliffs and gorges in limestone areas, and sandstone and quartzite outcrops
- Potential habitat for Carpentarian Antechinus (*Pseudantechinus mimulus*), which inhabits rocky areas and shelters among pebbles, boulders and stony hillsides or outcrops with shrubby open woodland and hummock grass understorey
- Potential foraging areas for orange leaf-nosed bat (*Rhinonicteris aurantia*) where eucalypt woodland occurs near cave roosts with appropriate microclimate conditions

4.4.2. Fauna Survey Results

The survey detected 52 bird, 17 mammal (three introduced), 19 reptile species and 20 aquatic invertebrate families within the study area (**Appendix E**, **Appendix F**, **Appendix G** with raw data supplied in **Appendix I**). Two additional microbat species were possibly present, but not reliably identified by calls. Of these species, purple-necked rock wallaby (*Petrogale purpureicollis*) is of State conservation significance.

The fauna observation data has been summarised by site in **Table 15**, **Table 16** and **Table 17**. Note that numbers are only indicative of confirmed sightings at sites other than trapping Site 1, Site 2 and Site 3 as the actual numbers were often not recorded for opportunistic sightings (all other sites).

Photos of some species recorded in the study area are included in **Plate 10** and **Plate 11**.

4.4.3. Anabat Survey Results

Acoustic sampling of microbats utilising Anabat II Bat Detectors® and the SM2+BAT detector units may result in variable recording quality and quantity for the sampling period. During call analysis (**Appendix F**), species presence during each recording session is generally coded according to the level of confidence achieved in call identification. Bats are classified as either positively or not positively occurring depending on the quality of the recording or ability to distinguish too species with similar calls.

At least twelve species were recorded during the pre-wet season survey but only ten species were positively identified as shown in **Table 14**. Two other call types were observed.

None of the detected bat species are listed under the EPBC Act or NC Act. None of the detected bat species are listed in the Desert Channels NRM Region Back on Track Report or the Southern Gulf NRM Region Back on Track Report.

Table 14 Microbat species recorded within the study area

Site	Site 1	Site 2	Site 2	Site 3	Site 3	Camp 2	Camp 2	Camp 2
Species positively identified								
Chaerephon jobensis		♦	♦	♦	♦	♦		
Chalinolobus gouldii		♦	♦	♦	♦	♦	♦	♦
Mormopterus lumsdenae (Syn. *M. beccarii*)					♦			
Nyctophilus sp.		♦	♦		♦			
Saccolaimus flaviventris		♦	♦	♦	♦			
Scotorepens balstoni		♦	♦		♦			
Scotorepens greyii		♦	♦	♦	♦			
Vespadelus baverstocki		♦	♦		♦			
Vespadelus caurinus							♦	
Vespadelus finlaysoni			♦	♦	♦	♦	♦	
Calls NOT positively identified								
Chalinolobus nigrogriseus			□	□	□			
Mormopterus species		□	□	□	□	□	□	□
Scotorepens greyii						□	□	
Vespadelus baverstocki						□	□	
Vespadelus caurinus				□	□	□		

4.4.4. Aquatic Habitat and Fauna Results

Aquatic invertebrates were collected in pools in the main channel at Camp 1 on the Buckley River and Site 2 on Mingera Creek (**Figure 10**) using a 250 µm net. These were the only available water sources encountered along the alignment during the survey.

A total of 20 aquatic invertebrate families were sampled, with 12 families present at Camp 1 and 17 families present at Site 2. The most numerous aquatic invertebrates at Camp 1 were non-biting midges from Family Chironomidae. The most numerous aquatic invertebrates sampled at Site 2 were the mayfly nymphs from the Family Caenidae. The full analysis report is contained in **Appendix G**.

Plate 9 Pools sampled for macro-invertebrates

Above: Pool in Buckley River at Camp 1
Right: Pool in Mingera Creek at Site 2

The riverine habitat was assessed at four sites, Buckley River at Camp 1, Mingera Creek at Site 2, Templeton River at Site 3 and Templeton River at Camp 2, using the AusRivas habitat assessment method for Queensland (Queensland Department of Natural Resources and Mines 2001). All three waterways are ephemeral and were not flowing during the surveys. The Templeton River was dry at both sites assessed.

Based on the observable characteristics, the Templeton River at Site 3 and Camp 2 scored the highest for aquatic habitat when the River contains water, followed by Mingera Creek at Site 2 and finally Buckley River at Camp 1. The Site 2 and Camp 1 waterways have erodible substrate and provide less cover and lower bank stability.

The AusRivas habitat assessment supports the water health indicated by the macroinvertebrate analysis. The SIGNAL scores calculated for the macroinvertebrate sampling at Camp 1 and Site 2 are low. Low SIGNAL scores are usually indicative of degraded aquatic environments. However, the ephemeral nature of the waterways affects species abundance, richness and distribution and the macroinvertebrates were sampled from intermittent ephemeral pools, important habitat for macroinvertebrate communities during seasons with low rainfall events. The Mingera Creek sampling site (Site 2) had a higher species richness and more sensitive taxa than the Buckley River sampling site (Camp 1), potentially indicating a less environmentally degraded site at Mingera Creek compared with Buckley River.

Gilbert's dragon
(*Lophognathus gilberti*)

Robust gecko
(*Gehyra robusta*)

Grey-headed honeyeater
(*Lichenostomus keartlandi*)

Common wallaroo
(*Macropus robustus*)

Phasmid striped gecko
(*Strophurus taeniatus*)

Photographs were taken within the study area.

Plate 10 Some fauna species observed within the study area

Eyrean earless dragon
(*Tympanocryptis tetraporophora*)

Leopard ctenotus
(*Ctenotus pantherinus*)

White-necked heron
(*Ardea pacifica*)

Pebble dragon
(*Tympanocryptis cephalus*)

Stripe-faced dunnart
(*Sminthopsis macroura*)

Photographs were taken within the study area.

Plate 11 Some fauna species observed within the study area

Table 15 Mammal capture data by site and method

Site	Camp 1	Camp 2	Q7	Site 1	Site 2	Site 3	WP 180	WP 182	WP 183	WP 187	WP 188	Total
Mammals	**2**	**19**	**1**	**1**	**21**	**28**	**1**	**2**	**1**	**1**	**1**	**78**
**Bos taurus*	1	2	1				1	1	1	1	1	**9**
Chaerephon jobensis		1			2	2						**5**
Chalinolobus gouldii		3			2	2						**7**
***Chalinolobus nigrogriseus*					1	2						**3**
**Felis catus*					3							**3**
Macropus robustus		1				6						**7**
Mormopterus lumsdenae (Syn. *M. beccarii*)						1						**1**
**Mormopterus species*		3			2	2						**7**
Nyctophilus sp.					2	1						**3**
Petrogale purpureicollis		1										**1**
Planigale ingrami				1								**1**
Saccolaimus flaviventris					2	2						**4**
Scotorepens balstoni					2	1						**3**
Scotorepens greyii		2			2	2						**6**
Sminthopsis macroura						2						**2**
**Sus scrofa*	1							1				**2**
Vespadelus baverstocki		2			2	1						**5**
Vespadelus caurinus		2				2						**4**
Vespadelus finlaysoni		2			1	2						**5**

Note that numbers are only indicative of confirmed sightings at sites other than trapping Site 1, Site 2 and Site 3 as the actual numbers were often not recorded for opportunistic sightings (all other sites)

* Introduced species ** Species possibly present but not reliably identified from recorded calls

Table 16 Reptile capture data by site and method

Site	Camp 1	Camp 2	Site 1	Site 2	Site 3	WP 182	WP 183	WP 188	Total
Reptiles	**2**	**11**	**13**	**26**	**25**	**1**	**2**	**1**	**81**
Carlia munda			1						**1**
Cryptoblepharus metallicus	1								**1**
Ctenophorus caudicinctus								1	**1**
Ctenophorus isolepis					4				**4**
Ctenotus lateralis			7	11	4	1			**23**
Ctenotus pantherinus			3	2	3				**8**
Ctenotus robustus			1	5					**6**
Ctenotus striaticeps					3				**3**
Demansia quaesitor					1				**1**
Diplodactylus tessellatus	1								**1**
Diporiphora magna			1		8				**9**
Gehyra robusta		8							**8**
Heteronotia binoei		1							**1**
Lophognathus gilberti				7					**7**
Menetia greyii				1	1				**2**
Strophurus taeniatus					1				**1**
Tympanocryptis cephalus		1							**1**
Tympanocryptis tetraporophora							2		**2**
Varanus acanthurus		1							**1**

Note that numbers are only indicative of confirmed sightings at sites other than trapping Site 1, Site 2 and Site 3 as the actual numbers were often not recorded for opportunistic sightings (all other sites)

Table 17 Bird data by site and method

Site	Camp 1	Camp 2	Site 1	Site 2	Site 3	Timber reserve	WP 182	WP 187	WP 188	WP 191	WP 192	WP 193	WP 194	Total
Birds	**189**	**28**	**8**	**59**	**20**	**2**	**3**	**2**	**2**	**11**	**1**	**1**	**2**	**328**
Accipiter cirrocephalus	1													**1**
Accipiter fasciatus		1												**1**
Aegotheles cristatus	1													**1**
Anas superciliosa	1													**1**
Aprosmictus erythropterus				1										**1**
Aquila audax			1				1						1	**3**
Ardea pacifica				6										**6**
Artamus cinereus	4									1				**5**
Artamus leucorynchus	55													**55**
Artamus minor				1										**1**
Artamus personatus	5													**5**
Barnardius zonarius		1		1	1									**3**
Cacatua sanguinea			1	1						9				**11**
Colluricincla harmonica				1	1									**2**
Coracina novaehollandiae	6	10			2									**18**
Corvus coronoides	4	2		2	1									**9**
Corvus orru	2			3										**5**
Cracticus nigrogularis	2			1	1									**4**
Cracticus tibicen				1	1									**2**
Cracticus torquatus	1													**1**
Dicaeum hirundinaceum	3			1										**4**

Site	Camp 1	Camp 2	Site 1	Site 2	Site 3	Timber reserve	WP 182	WP 187	WP 188	WP 191	WP 192	WP 193	WP 194	Total
Egretta novaehollandiae	1													**1**
Eolophus roseicapillus	13			5			1							**19**
Falco berigora					1						1			**2**
Falco cenchroides									1					**1**
Geopelia humeralis				1										**1**
Geophaps plumifera						1								**1**
Grallina cyanoleuca	4			2										**6**
Grus rubicunda				1			1							**2**
Haliastur sphenurus	1			3										**4**
Lichenostomus keartlandi		2		2								1		**5**
Lichenostomus penicillatus	9			4	2									**15**
Lichenostomus virescens	1		2							1				**4**
Malurus lamberti		4		1	1									**6**
Manorina flavigula	7			2										**9**
Melithreptus albogularis		1												**1**
Melopsittacus undulatus	2	1	1	1	1			1						**7**
Milvus migrans	2			3										**5**
Nymphicus hollandicus	48		1	1										**50**
Ocyphaps lophotes	9			4	1									**14**
Pachycephala rufiventris						1								**1**
Pardalotus striatus				3	2									**5**
Phaps chalcoptera		1												**1**
Pomatostomus temporalis				1										**1**

Site	Camp 1	Camp 2	Site 1	Site 2	Site 3	Timber reserve	WP 182	WP 187	WP 188	WP 191	WP 192	WP 193	WP 194	Total
Psitteuteles versicolor				3										**3**
Ptilonorhynchus maculatus		2												**2**
Rhipidura fuliginosa	1													**1**
Rhipidura leucophrys	3		1	1										**5**
Smicrornis brevirostris				1	2								1	**4**
Taeniopygia guttata	2	3	1	1	2			1	1					**11**
Todiramphus pyrrhopygius	1				1									**2**

Note that numbers are only indicative of confirmed sightings at sites other than trapping Site 1, Site 2 and Site 3 as the actual numbers were often not recorded for opportunistic sightings (all other sites)

4.4.5. Threatened Species

One threatened species, purple-necked rock wallaby (*Petrogale purpureicollis*), listed as Vulnerable under the NC Act, was observed during the survey.

There is potential habitat for 15 threatened species within the study area.

Matters of National Environmental Significance

An assessment of the likelihood of occurrence, based on a combination of desktop searches and site data, indicates that six EPBC Act listed threatened species are at least moderately likely to occur within the study area. No EPBC Act listed threatened species were observed during the survey.

The study area contains potential habitat for these six EPBC Act listed threatened species (**Sections 4.4.1**, **5.1**, **5.2** and **Appendix C**):

- Australian painted snipe (*Rostratula australis*)
- Carpentarian antechinus (*Pseudantechinus mimulus*)
- Gouldian finch (*Erythrura gouldiae*)
- greater bilby (*Macrotis lagotis*)
- plains death adder (*Acanthophis hawkei*)
- red goshawk (*Erythrotriorchis radiatus*)

Matters of State Environmental Significance

One threatened species, purple-necked rock wallaby (*Petrogale purpureicollis*), listed as Vulnerable under the NC Act, was observed at Camp 2 (z54 E:329568, N:7704653) near Mount Isa. This species inhabits areas of rocky outcrops, cliffs, and boulder piles near dry forests savannas and spinifex grasslands, as well as rocky slopes and gullies within dry eucalypt and acacia woodland with spinifex understories (Curtis & Dennis 2012; McKnight 2008).

An assessment of the likelihood of occurrence, based on a combination of desktop searches and site data, indicates that 12 NC Act listed threatened species are at least moderately likely to occur within the study area.

The study area contains potential habitat for these 12 NC Act listed threatened species:

- *Ptilotus maconochiei*
- Australian painted snipe (*Rostratula australis*)
- Carpentarian grasswren (*Amytornis dorotheae*)
- ghost bat (*Macroderma gigas*)
- Gouldian finch (*Erythrura gouldiae*)
- greater bilby (*Macrotis lagotis*)
- grey falcon (*Falco hypoleucos*)
- northern leaf-nosed bat (*Hipposideros stenotis*)
- orange leaf-nosed bat (*Rhinonicteris aurantia*)
- painted honeyeater (*Grantiella picta*)
- purple-necked rock-wallaby (*Petrogale purpureicollis*)
- red goshawk (*Erythrotriorchis radiatus*)

4.4.6. Migratory and Marine Species

An assessment of the likelihood of occurrence, based on a combination of desktop searches and site data, indicates that 28 listed migratory and marine species are at least moderately likely to occur within the study area. No migratory or listed marine species were observed during the survey.

The study area contains potential habitat for 28 migratory bird species (**Sections 4.4.1**, **5.3** and **Appendix C**):

- Australian reed-warbler (*Acrocephalus australis*)
- bar-tailed godwit (*Limosa lapponica*)
- black-tailed godwit (*Limosa limosa*)
- Caspian tern (*Hydroprogne caspia*)
- cattle egret (*Ardea ibis*)
- common greenshank (*Tringa nebularia*)
- common sandpiper (*Actitis hypoleucos*)
- curlew sandpiper (*Calidris ferruginea*)
- eastern osprey, osprey (*Pandion cristatus, Pandion haliaetus*)
- glossy ibis (*Plegadis falcinellus*)
- great egret, eastern great egret (*Ardea alba, Ardea modesta*)
- Latham's snipe (*Gallinago hardwickii*)
- little curlew (*Numenius minutus*)
- long-toed stint (*Calidris subminuta*)
- marsh sandpiper (*Tringa stagnatilis*)
- oriental pratincole (*Glareola maldivarum*)
- pacific golden plover (*Pluvialis fulva*)
- red-necked stint (*Calidris ruficollis*)
- sharp-tailed sandpiper (*Calidris acuminata*)
- Swinhoe's snipe (*Gallinago megala*)
- terek sandpiper (*Xenus cinereus*)
- white-bellied sea-eagle (*Haliaeetus leucogaster*)
- white-winged black tern (*Chlidonias leucopterus*)
- wood sandpiper (*Tringa glareola*)
- yellow wagtail species (*Motacilla flava*)
- fork-tailed swift (*Apus pacificus*)
- oriental Plover (*Charadrius veredus*)
- rainbow bee-eater (*Merops ornatus*)

4.4.7. Introduced and Pest Species

Three introduced species, European cattle (**Bos taurus*), cat (**Felis catus*) and pig (**Sus scrofa*), were observed during the survey. Feral cats and pigs are Class 2 declared pests under the LP Act.

Plate 12 Cats photographed at Site 2 near a water hole

5. Significant Impact Assessment for MNES

According to the MNES Significant Impact Guidelines 1.1 (Department of the Environment 2013):

- A 'significant impact' is an impact which is important, notable, or of consequence, having regard to its context or intensity. Whether or not an action is likely to have a significant impact depends upon the sensitivity, value, and quality of the environment which is impacted, and upon the intensity, duration, magnitude and geographic extent of the impacts.
- To be 'likely', it is not necessary for a significant impact to have a greater than 50% chance of happening; it is sufficient if a significant impact on the environment is a real or not remote chance or possibility.
- If there is scientific uncertainty about the impacts of the action and potential impacts are serious or irreversible, the precautionary principle is applicable. Accordingly, a lack of scientific certainty about the potential impacts of an action will not itself justify a decision that the action is not likely to have a significant impact on the environment.
- If a self-assessment is undertaken and it is still unclear whether the action is likely to have a significant impact on a MNES then the action should be refered to the Department of the Environment.

The significant impact self-assessment for species listed under the EPBC Act has been carried out under the assumption that the project will be based upon construction methods, timing and mitigation measures as specified in **Appendix J** and that species-specific mitigation measures (including those specified in this report) are implemented during all phases of the project.

5.1. Vulnerable Species under the EPBC Act

Significant impact criteria for vulnerable species according to the MNES Significant Impact Guidelines 1.1 (Department of the Environment 2013):

An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:

- *lead to a long-term decrease in the size of an important population of a species*
- *reduce the area of occupancy of an important population*
- *fragment an existing important population into two or more populations*
- *adversely affect habitat critical to the survival of a species*
- *disrupt the breeding cycle of an important population*
- *modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline*
- *result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat*
- *introduce disease that may cause the species to decline, or*
- *interfere substantially with the recovery of the species.*

There are four vulnerable species listed under the EPBC Act that are at least moderately likely to occur within the study area.

5.1.1. *Acanthophis hawkei* plains death adder

Moderate potential to occur: Species has not been recorded in the region (no records from desktop searches) however potentially suitable habitat occurs at the study area.

This species is found in earth fissures during the dry season and shelters under ground debris in the wet season. It is said to be confined to the Barkly Tablelands on the black soil Mitchell grass plains (Cogger 2014).

This species was not observed during the survey. However, detection of this species may be difficult during dry periods when individuals are sheltering in earth fissures. Potentially suitable habitat for this species occurs within the study area.

Although the desktop search found no records of this species within the search area, it is possible that the species occurs within the study area due to the presence of suitable habitat and location within the limited range of the species.

The databases rely on people from a number of sources (including museums, herbaria, community groups, government departments, individuals and universities) submitting data to the various databases. The study area covers a vast area that is not easily reached by road, is mostly associated with private property and is therefore unlikely to be the subject of citizen science. The lack of records within the study area cannot be used as an indication of the absence of a species.

The project is unlikely to have a significant impact on this species provided that the construction methods, timing and mitigation measures as specified in **Appendix J** and that species-specific mitigation measures (including the following) are implemented during all phases of the project:

- associated infrastructure is located away from wetland areas with pipeline construction completed in these areas during the dry season; and
- there are no significant changes to hydrology, nutrient cycling, fire regimes or invasive species as a result of the project.

Table 18 Significant Impact Assessment – *Acanthophis hawkei* plains death adder

Criteria	Significant Impact Assessment ***Acanthophis hawkei* plains death adder**
Lead to a long-term decrease in the size of an important population of a species	Unlikely
Reduce the area of occupancy of an important population	Unlikely
Fragment an existing important population into two or more populations	Unlikely
Adversely affect habitat critical to the survival of a species	Unlikely
Disrupt the breeding cycle of an important population	Unlikely
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	Unlikely
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	Unlikely
Introduce disease that may cause the species to decline	Unlikely
Interfere substantially with the recovery of the species	Unlikely

5.1.2. *Erythrotriorchis radiatus* red goshawk

Moderate potential to occur: Species has not been recorded in the region (no records from desktop searches) however potentially suitable habitat occurs at the study area.

This species is known to prefer forest and woodland with a mosaic of vegetation types, large prey populations (birds), and permanent water. The vegetation types include eucalypt woodland, open forest,

tall open forest, gallery rainforest, swamp sclerophyll forest, and rainforest margins. The red goshawk nests in large trees, frequently the tallest and most massive in a tall stand, and nest trees are invariably within one km of permanent water (Department of the Environment 2014a).

This species was not observed during the survey. However, potentially suitable habitat for this species occurs within the study area.

Although the desktop search found no records of this species within the search area, it is possible that the species occurs within the study area due to the presence of suitable habitat and location within the species range.

The databases rely on people from a number of sources (including museums, herbaria, community groups, government departments, individuals and universities) submitting data to the various databases. The study area covers a vast area that is not easily reached by road, is mostly associated with private property and is therefore unlikely to be the subject of citizen science. The lack of records within the study area cannot be used as an indication of the absence of a species.

The project is unlikely to have a significant impact on this species provided that the construction methods, timing and mitigation measures as specified in **Appendix J** are implemented and the felling of potential red-goshawk nesting trees along waterways is preferentially avoided.

Table 19 Significant Impact Assessment – *Erythrotriorchis radiatus* red goshawk

Criteria	Significant Impact Assessment *Erythrotriorchis radiatus* red goshawk
Lead to a long-term decrease in the size of an important population of a species	Unlikely
Reduce the area of occupancy of an important population	Unlikely
Fragment an existing important population into two or more populations	Unlikely
Adversely affect habitat critical to the survival of a species	Unlikely
Disrupt the breeding cycle of an important population	Unlikely
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	Unlikely
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	Unlikely
Introduce disease that may cause the species to decline	Unlikely
Interfere substantially with the recovery of the species	Unlikely

5.1.3. *Macrotis lagotis* greater bilby

Moderate potential to occur: Species has not been recorded in the region (no records from desktop searches) however potentially suitable habitat occurs at the study area.

This species occupies three major vegetation types; open tussock grassland on uplands and hills, mulga woodland/shrubland growing on ridges and rises, and hummock grassland in plains and alluvial areas. Laterite and rock feature substrates are an important part of greater bilby habitat (Department of the Environment 2015r). The greater bilby occupies primarily the flat to gently undulating clay areas, but also some stony plains, of the Channel Country amongst a diverse range of annual and perennial grasses and forbs (Curtis & Dennis 2012). The main Queensland population mostly occurs within the Astrebla Downs National Park.

While there is potentially suitable habitat for the species within the study area and the study area is located within the extent of occurrence for the species, there are no recent (most recent is 1940) records of the species within the vicinity of the study area and current information indicates that the species is unlikely to occur within the area.

Table 20 Significant Impact Assessment – *Macrotis lagotis* greater bilby

Criteria	Significant Impact Assessment *Macrotis lagotis* greater bilby
Lead to a long-term decrease in the size of an important population of a species	Unlikely
Reduce the area of occupancy of an important population	Unlikely
Fragment an existing important population into two or more populations	Unlikely
Adversely affect habitat critical to the survival of a species	Unlikely
Disrupt the breeding cycle of an important population	Unlikely
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	Unlikely
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	Unlikely
Introduce disease that may cause the species to decline	Unlikely
Interfere substantially with the recovery of the species	Unlikely

5.1.4. *Pseudantechinus mimulus* Carpentarian antechinus

Moderate potential to occur: Species has not been recorded in the region (no records from desktop searches) however potentially suitable habitat occurs at the study area.

The species is known from the Mount Isa area where it is found in woodland of *Eucalyptus leucophloia*, *Corymbia terminalis*, *Eucalyptus normantonensis*, *Atalaya hemiglauca* and *Acacia* spp. with *Trioda* spp. ground cover (Department of the Environment 2015z; Curtis & Dennis 2012). The species inhabits rocky areas or woodlands close to rocky areas.

This species was not observed during the survey. However, potentially suitable habitat for this species occurs within the study area.

Although the desktop search found no records of this species within the search area, it is possible that the species occurs within the study area due to the presence of suitable habitat and location within the limited range of the species.

The databases rely on people from a number of sources (including museums, herbaria, community groups, government departments, individuals and universities) submitting data to the various databases. The study area covers a vast area that is not easily reached by road, is mostly associated with private property and is therefore unlikely to be the subject of citizen science. The lack of records within the study area cannot be used as an indication of the absence of a species.

The project is unlikely to have a significant impact on this species provided that the construction methods, timing and mitigation measures as specified in **Appendix J** are implemented and significant clearance or disturbance to rocky areas supporting Carpentarian antechinus is avoided (targeted surveys to be carried out during the project's environmental impact assessment).

Table 21 Significant Impact Assessment – *Pseudantechinus mimulus* Carpentarian antechinus

Criteria	Significant Impact Assessment ***Pseudantechinus mimulus* Carpentarian antechinus**
Lead to a long-term decrease in the size of an important population of a species	Unlikely
Reduce the area of occupancy of an important population	Unlikely
Fragment an existing important population into two or more populations	Unlikely
Adversely affect habitat critical to the survival of a species	Unlikely
Disrupt the breeding cycle of an important population	Unlikely
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	Unlikely
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	Unlikely
Introduce disease that may cause the species to decline	Unlikely
Interfere substantially with the recovery of the species	Unlikely

5.2. Endangered Species under the EPBC Act

Significant impact criteria for endangered species according to the MNES Significant Impact Guidelines 1.1 (Department of the Environment 2013):

An action is likely to have a significant impact on a critically endangered or endangered species if there is a real chance or possibility that it will:

- *lead to a long-term decrease in the size of a population*
- *reduce the area of occupancy of the species*
- *fragment an existing population into two or more populations*
- *adversely affect habitat critical to the survival of a species*
- *disrupt the breeding cycle of a population*
- *modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline*
- *result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat*
- *introduce disease that may cause the species to decline, or*
- *interfere with the recovery of the species.*

There are two endangered species listed under the EPBC Act that are at least moderately likely to occur within the project area.

5.2.1. *Erythrura gouldiae* Gouldian finch

High potential to occur: Species has been recorded in the region (desktop searches) and suitable habitat is present at the study area.

The species inhabits open woodlands that are dominated by *Eucalyptus* trees and support a ground cover of Sorghum and other grasses. Often found in vegetation along watercourses. Critical components of suitable core habitat for the Gouldian finch include the presence of favoured annual and perennial grasses (especially *Sorghum*), a nearby source of surface water and, in the breeding season, unburnt hollow-bearing *Eucalyptus* trees (especially *E. tintinnans*, *E. brevifolia* and *E. leucophloia*). Its breeding habitat is

usually confined to ridges and rocky foothills, probably due to the presence of *Sorghum* grasses (Department of the Environment 2015l; Morcombe 2003).

This species was not observed during the survey. However, potentially suitable habitat for this species occurs within the study area and sorghum grasses occur throughout the region.

The project is unlikely to have a significant impact on this species provided that:

- the construction methods, timing and mitigation measures as specified in **Appendix J** are implemented;
- there are no significant long-term changes to grass species composition within areas adjoining the construction corridor through preferred Gouldian finch habitat; and
- nesting trees within Gouldian finch habitat are preferentially avoided (preferred habitat locations to be determined during the project's environmental impact assessment).

Table 22 Significant Impact Assessment – *Erythrura gouldiae* Gouldian finch

Criteria	**Significant Impact Assessment *Erythrura gouldiae* Gouldian finch**
Lead to a long-term decrease in the size of a population	Unlikely
Reduce the area of occupancy of the species	Unlikely
Fragment an existing population into two or more populations	Unlikely
Adversely affect habitat critical to the survival of a species	Unlikely
Disrupt the breeding cycle of a population	Unlikely
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	Unlikely
Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat	Unlikely
Introduce disease that may cause the species to decline, or	Unlikely
Interfere with the recovery of the species.	Unlikely

5.2.2. *Rostratula australis* Australian painted snipe (Syn. *R. benghalensis*)

High potential to occur: Species has been recorded in the region (desktop searches) and suitable habitat is present at the study area.

This species uses a variety of habitats but generally requires presence of water. It inhabits shallow terrestrial freshwater wetlands, including temporary and permanent lakes, swamps, claypans, inundated or waterlogged grassland or saltmarsh, dams, rice crops, sewage farms and bore drains (Department of the Environment 2014b).

This species was not observed during the survey. However, potentially suitable habitat for this species occurs within the study area.

The project is unlikely to have a significant impact on this species provided that the construction methods, timing and mitigation measures as specified in **Appendix J** are followed and:

- associated infrastructure is located away from wetland areas with pipeline construction completed in these areas during the dry season; and
- there are no significant changes to hydrology, nutrient cycling, fire regimes or invasive species as a result of the project.

Table 23 Significant Impact Assessment – *Rostratula australis* Australian painted snipe

Criteria	Significant Impact Assessment *Rostratula australis* Australian painted snipe
Lead to a long-term decrease in the size of a population	Unlikely
Reduce the area of occupancy of the species	Unlikely
Fragment an existing population into two or more populations	Unlikely
Adversely affect habitat critical to the survival of a species	Unlikely
Disrupt the breeding cycle of a population	Unlikely
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	Unlikely
Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat	Unlikely
Introduce disease that may cause the species to decline, or	Unlikely
Interfere with the recovery of the species.	Unlikely

5.3. Migratory Species under the EPBC Act

Significant impact criteria for migratory species according to the MNES Significant Impact Guidelines 1.1 (Department of the Environment 2013):

An action is likely to have a significant impact on a migratory species if there is a real chance or possibility that it will:

- *substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species*
- *result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species, or*
- *seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species.*

There are 28 migratory species listed under the EPBC Act that are at least moderately likely to occur within the project area.

The majority of migratory species that are at least moderately likely to occur within the study area are associated with waterways or wetlands and/or visit the area during the summer months (**Table 24**).

The project is unlikely to have a significant impact on this species provided that the construction methods, timing and mitigation measures as specified in **Appendix J** are implemented and:

- associated infrastructure is located away from wetland areas with pipeline construction completed in these areas during the dry season; and
- there are no significant changes to hydrology, nutrient cycling, fire regimes or invasive species as a result of the project.

Table 24 Migratory species associated with waterways or wetlands

Class	Common name	Scientific Name	EPBC Act	NC Act	Previous Record*
Birds	Australian reed-warbler	*Acrocephalus australis*	M	SL	Y
Birds	Bar-tailed godwit	*Limosa lapponica*	M	SL	Y
Birds	Black-tailed godwit	*Limosa limosa*	M	SL	Y
Birds	Caspian tern	*Hydroprogne caspia*	M	SL	Y
Birds	Cattle egret	*Ardea ibis*	M, Ma	SL	Y
Birds	Common greenshank	*Tringa nebularia*	M	SL	Y
Birds	Common sandpiper	*Actitis hypoleucos*	M	SL	Y
Birds	Curlew sandpiper	*Calidris ferruginea*	M	SL	Y
Birds	Eastern osprey, osprey	*Pandion cristatus, Pandion haliaetus*	M	SL	Y
Birds	Glossy ibis	*Plegadis falcinellus*	M	SL	Y
Birds	Great egret, eastern great egret	*Ardea alba, Ardea modesta*	M, Ma	SL	Y
Birds	Latham's snipe	*Gallinago hardwickii*	M	SL	Y
Birds	Little curlew	*Numenius minutus*	M	SL	Y
Birds	Long-toed stint	*Calidris subminuta*	M	SL	Y
Birds	Marsh sandpiper	*Tringa stagnatilis*	M	SL	Y
Birds	Oriental pratincole	*Glareola maldivarum*	M, Ma	SL	N

Class	Common name	Scientific Name	EPBC Act	NC Act	Previous Record*
Birds	Pacific golden plover	*Pluvialis fulva*	M	SL	Y
Birds	Red-necked stint	*Calidris ruficollis*	M	SL	Y
Birds	Sharp-tailed sandpiper	*Calidris acuminata*	M	SL	Y
Birds	Swinhoe's snipe	*Gallinago megala*	M	SL	Y
Birds	Terek sandpiper	*Xenus cinereus*	M	SL	Y
Birds	White-bellied sea-eagle	*Haliaeetus leucogaster*	M, Ma	SL	Y
Birds	White-winged black tern	*Chlidonias leucopterus*	M	SL	Y
Birds	Wood sandpiper	*Tringa glareola*	M	SL	Y
Birds	Yellow wagtail species	*Motacilla flava*	M	SL	Y

*Previous recording – Wildlife Online, Birdata or ALA database records: Y = Yes, N = No
EPBC Act (species listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)): M = Migratory Ma = Listed Marine
NC Act (species listed under the Nature Conservation (Wildlife) Regulation 2006): SL = Special Least Concern

Table 25 Significant Impact Assessment – Migratory species associated with waterways or wetlands

Criteria	Significant Impact Assessment Migratory species associated with waterways or wetlands (Table 24)
Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species	Unlikely
Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species, or	Unlikely
Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species.	Unlikely

There are three exceptions to the above:

- *Apus pacificus* (fork-tailed swift)
- *Charadrius veredus* (Oriental plover)
- *Merops ornatus* (rainbow bee-eater)

Apus pacificus (fork-tailed swift) is unlikely to be affected by the project as its habitat is the low to very high airspace.

Habitat for both *Charadrius veredus* (Oriental plover) and *Merops ornatus* (rainbow bee-eater) is difficult to avoid with this project, however, the project is unlikely to impact significantly on the habitat of these species due to the size of the project area relative to the large areas of available habitat and the mobility of the species. Both species are not considered to be globally threatened.

Table 26 Significant Impact Assessment – *Apus pacificus* fork-tailed swift

Criteria	Significant Impact Assessment *Apus pacificus* fork-tailed swift
Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species	Unlikely
Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species, or	Unlikely
Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species.	Unlikely

Table 27 Significant Impact Assessment – *Charadrius veredus* Oriental plover

Criteria	Significant Impact Assessment *Charadrius veredus* Oriental plover
Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species	Unlikely
Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species, or	Unlikely
Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species.	Unlikely

Table 28 Significant Impact Assessment – *Merops ornatus* rainbow bee-eater

Criteria	Significant Impact Assessment *Merops ornatus* rainbow bee-eater
Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species	Unlikely
Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species, or	Unlikely
Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species.	Unlikely

6. Conclusions

A desktop and field assessment was carried out to identify and assess the ecological values along approximately 180 km of proposed pipeline for the NT Link Project from the Queensland/Northern Territory border to Mount Isa with a buffer of 500 m either side of the alignment. A five day post-wet season (autumn) fauna and flora survey was carried out along the proposed alignment (dated 22 April 2015 - this alignment is in close proximity, less than 300 m at most distant point, to the Indicative Alignment Rev 1, the basis for the IAS submission) between 27 April and 2 May 2015 to:

- assess flora, including endangered, vulnerable and near threatened species listed under the Queensland NC Act and Commonwealth EPBC Act;
- assess fauna, including endangered, vulnerable and near threatened species listed under the NC Act and EPBC Act and their breeding places;
- assess pest fauna and flora (weed) species;
- assess vegetation communities and remnant REs; and
- ground-truth mapped areas of high ecological significance including, but not necessarily limited to, riparian areas, nationally threatened ecological communities, large tracts of remnant vegetation, corridors and special biodiversity areas.

This report presents the results of desktop investigations, field survey methods, survey limitations and findings. A significant impact self-assessment for species listed under the EPBC Act is also provided. The information presented by this report will inform the Initial Advice Statement (IAS) and form the basis for any EPBC Act Referral.

The proposed pipeline crosses 30 watercourses that are mapped by the Queensland Government at a scale of 1:100,000. These 30 watercourses appear on Vegetation Management Watercourse Maps and as such are defined as MSES. The majority of watercourses crossed by the pipeline are small ephemeral streams.

The proposed pipeline passes through Royton Timber Reserve, a protected area under the NC Act.

All of the 24 mapped remnant Regional Ecosystems are classed as Least Concern under the provisions of the VM Act.

Three declared pest plant species have previously been recorded within the search area: **Cascabela thevetia* (C3), **Parkinsonia aculeata* (C2, WONS),**Tamarix aphylla* (C3, WONS). One C2 declared animal species has also previously been recorded within the search area: **Sus scrofa* (feral pig). **Parkinsonia aculeata* (C2, WONS), **Sus scrofa* (feral pig) (C2) and **Felis catus* (feral cat) were detected during the survey.

Matters of National Environmental Significance

Within the study area there are:

- no world heritage properties or wetlands of international importance;
- no commonwealth lands, commonwealth or national heritage places, critical habitats, nationally important wetlands or commonwealth reserves;
- no commonwealth marine areas or Great Barrier Reef marine; and
- no listed Threatened Ecological Communities.

An assessment of the likelihood of occurrence, based on a combination of desktop searches and site data, of species protected under the EPBC Act indicates that 28 listed migratory or marine species and six EPBC Act listed threatened species are at least moderately likely to occur within the study area. Three of these

species are priority species listed in the Desert Channels NRM region Back on Track report (Department of Environment and Resource Management 2010b) and two of these species are priority species listed in the Southern Gulf NRM region Back on Track report (Department of Environment and Resource Management 2010a).

No EPBC Act listed flora or fauna species were detected during the survey.

No migratory or listed marine species were observed during the survey.

The alignment and corridor contains potential habitat for six threatened species as well as migratory birds:

- Australian painted snipe (*Rostratula australis*)
- Carpentarian antechinus (*Pseudantechinus mimulus*)
- Gouldian finch (*Erythrura gouldiae*)
- greater bilby (*Macrotis lagotis*)
- plains death adder (*Acanthophis hawkei*)
- red goshawk (*Erythrotriorchis radiatus*)

There is potential habitat for 28 migratory bird species within the study area:

- Australian reed-warbler (*Acrocephalus australis*)
- bar-tailed godwit (*Limosa lapponica*)
- black-tailed godwit (*Limosa limosa*)
- Caspian tern (*Hydroprogne caspia*)
- cattle egret (*Ardea ibis*)
- common greenshank (*Tringa nebularia*)
- common sandpiper (*Actitis hypoleucos*)
- curlew sandpiper (*Calidris ferruginea*)
- eastern osprey, osprey (*Pandion cristatus, Pandion haliaetus*)
- glossy ibis (*Plegadis falcinellus*)
- great egret, eastern great egret (*Ardea alba, Ardea modesta*)
- Latham's snipe (*Gallinago hardwickii*)
- little curlew (*Numenius minutus*)
- long-toed stint (*Calidris subminuta*)
- marsh sandpiper (*Tringa stagnatilis*)
- oriental pratincole (*Glareola maldivarum*)
- pacific golden plover (*Pluvialis fulva*)
- red-necked stint (*Calidris ruficollis*)
- sharp-tailed sandpiper (*Calidris acuminata*)
- Swinhoe's snipe (*Gallinago megala*)
- terek sandpiper (*Xenus cinereus*)
- white-bellied sea-eagle (*Haliaeetus leucogaster*)
- white-winged black tern (*Chlidonias leucopterus*)
- wood sandpiper (*Tringa glareola*)
- yellow wagtail species (*Motacilla flava*)
- fork-tailed swift (*Apus pacificus*)
- oriental Plover (*Charadrius veredus*)
- rainbow bee-eater (*Merops ornatus*)

The significant impact self-assessment for species listed under the EPBC Act has been carried out under the assumption that the project will be based upon construction methods, timing and mitigation measures as specified within this report. On this basis, the assessment indicates that these species are unlikely to be significantly impacted upon provided that the following species-specific mitigation measures are implemented:

- associated infrastructure is located away from wetland areas with construction completed in these areas during the dry season;
- there are no significant changes to hydrology, nutrient cycling, fire regimes or invasive species as a result of the project;
- there are no significant long-term changes to grass species composition within areas adjoining the construction corridor through preferred Gouldian finch habitat, and preferentially avoiding nesting trees within Gouldian finch habitat (preferred habitat locations to be determined during the project's environmental impact assessment);
- significant clearance or disturbance to rocky areas supporting Carpentarian antechinus is avoided (targeted surveys to be carried out during the project's environmental impact assessment); and
- the felling of potential red-goshawk nesting trees along waterways is preferentially avoided.

Matters of State Environmental Significance

There are a series of mapped MSES wetlands between KP 449 and KP 456. MSES waterways associated with Buckley River, Nottingham Creek, Mingera Creek, Templeton River and Mica Creek will be crossed by the alignment.

An assessment of the likelihood of occurrence, based on a combination of desktop searches and site data, of species protected under the NC Act indicates that 12 NC Act listed threatened species are at least moderately likely to occur within the study area. Seven of these species are priority species listed in the Desert Channels NRM region Back on Track report (Department of Environment and Resource Management 2010b) and six of these species are priority species listed in the Southern Gulf NRM region Back on Track report (Department of Environment and Resource Management 2010a).

One threatened species, purple-necked rock wallaby (*Petrogale purpureicollis*), listed as Vulnerable under the NC Act, was observed at Camp 2 (z54 E:329568, N:7704653) near Mount Isa. Areas identified as Essential Habitat for purple-necked rock-wallaby (*Petrogale purpureicollis*) have been mapped over the study area within lot 575 on CP857742.

No NC Act listed flora species were detected during the survey.

There is potential habitat for 12 threatened species within the study area:

- *Ptilotus maconochiei*
- Australian painted snipe (*Rostratula australis*)
- Carpentarian grasswren (*Amytornis dorotheae*)
- ghost bat (*Macroderma gigas*)
- Gouldian finch (*Erythrura gouldiae*)
- greater bilby (*Macrotis lagotis*)
- grey falcon (*Falco hypoleucos*)
- northern leaf-nosed bat (*Hipposideros stenotis*)
- orange leaf-nosed bat (*Rhinonicteris aurantia*)
- painted honeyeater (*Grantiella picta*)
- purple-necked rock-wallaby (*Petrogale purpureicollis*)

- red goshawk (*Erythrotriorchis radiatus*)

Alignment Suitability

The assessed alignment is appropriate in terms of minimising the number of waterway crossings and avoiding rocky outcrops, cliffs, and boulder piles on the eastern side of the study area. With the adoption of the alignment revision requested by O2 Ecology on 22 June 2015 (Attachment K), the alignment avoids MSES wetlands mapped between KP 449 and KP 456. Subject to the results of further studies, the assessed alignment is appropriate in terms of minimising potential impacts to ecological values.

Further ecological studies will be undertaken as required to meet the project's Terms of Reference for its environmental impact assessment.

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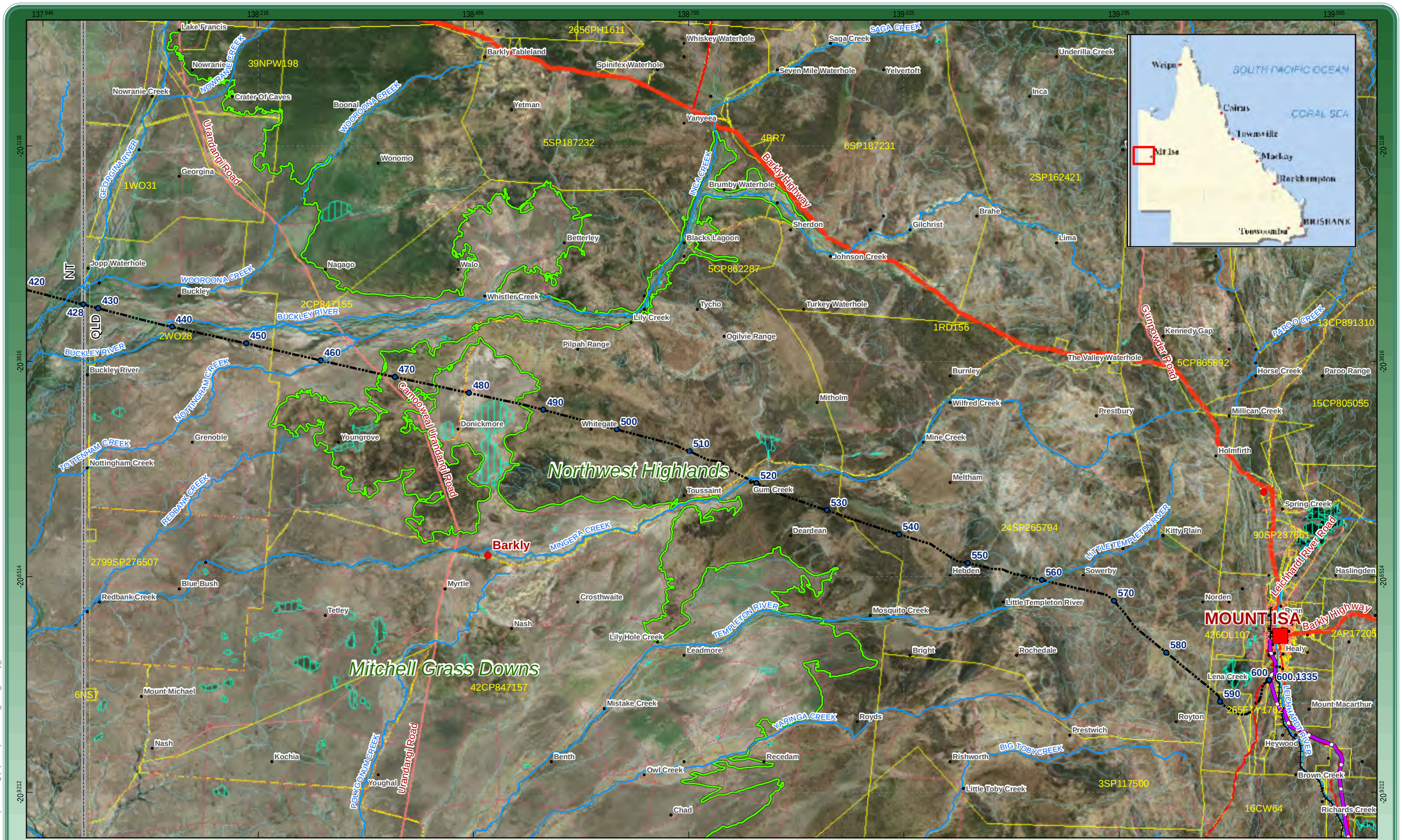
Appendix A Maps

List of figures contained in this appendix:



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N W E S

0 4 8 12 16 20
Kilometers

1:485,000 at A3

Horizontal Datum: GDA 1994
Grid: GCS GDA 1994

Legend

- KP's (10km)
- Town, Locality
- Carpentaria (Qld) Gas Pipeline
- Railway
- Major Watercourse
- Watercourse
- State Boundary
- APA Alignment
- Bioregion
- Water body
- Lake, Reservoir
- DCDB

Road Network

- Highway
- Main Road
- Secondary Road
- Local Road
- Vehicular Road
- Private Road
- Proposed Road
- Unconstructed Road

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Regional Location

Figure 5

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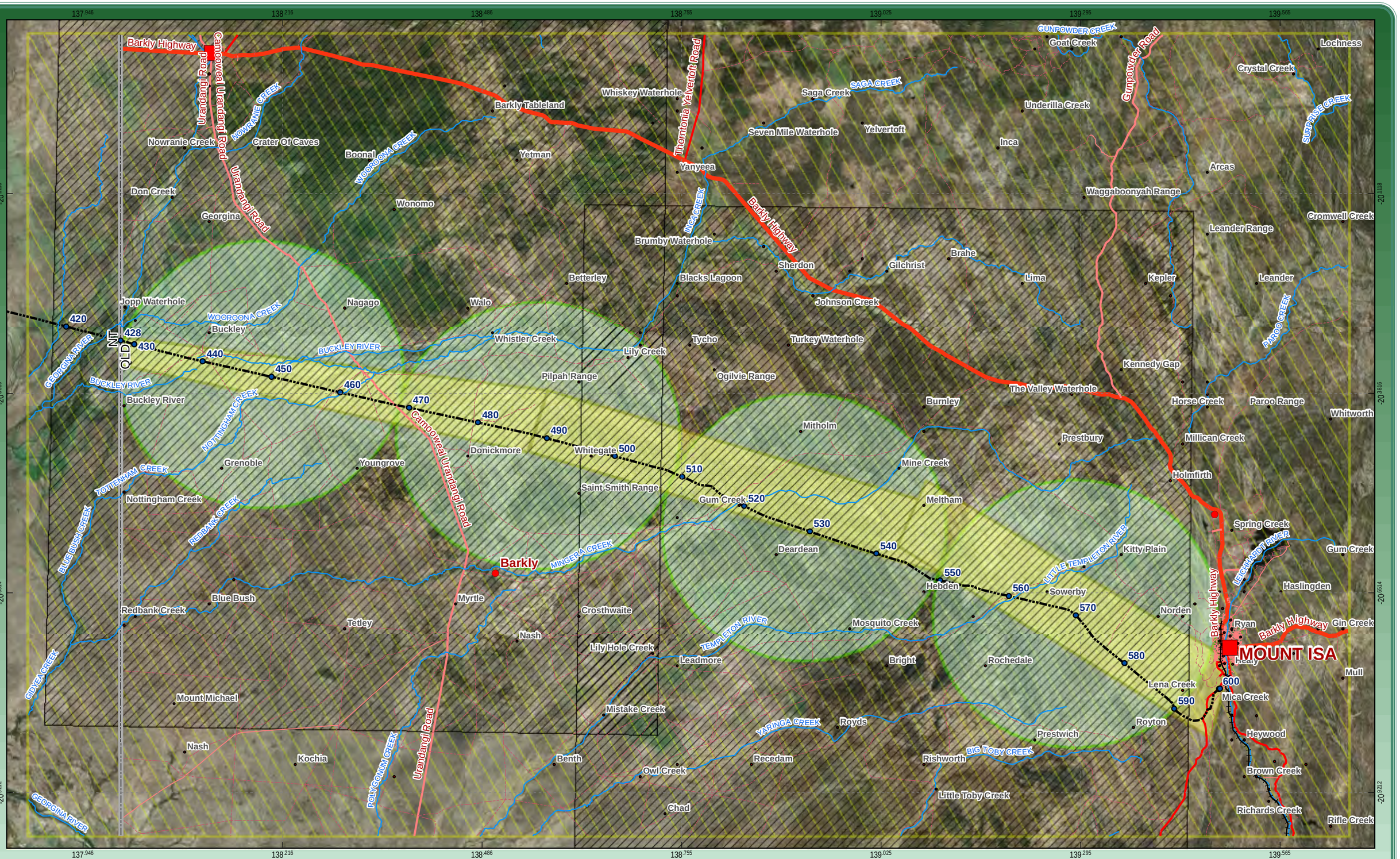

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N W E S

0 5 10 15 20 25
Kilometers

1:530,000 at A3

Horizontal Datum: GDA 1994
Grid: GCS GDA 1994

Legend

- KP's (10km)
- Town, Locality
- Railway
- Major Watercourse
- State Boundary
- APA Alignment
- **Road Network**
- Highway
- Main Road
- Secondary Road
- Local Road
- Vehicular Road

Database Search Areas

- Birdlife Australia Search Area
- PMST Seach Areas
- Wildlife Online Search Areas
- ALA Seach Area

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Database Search Areas

Figure 6

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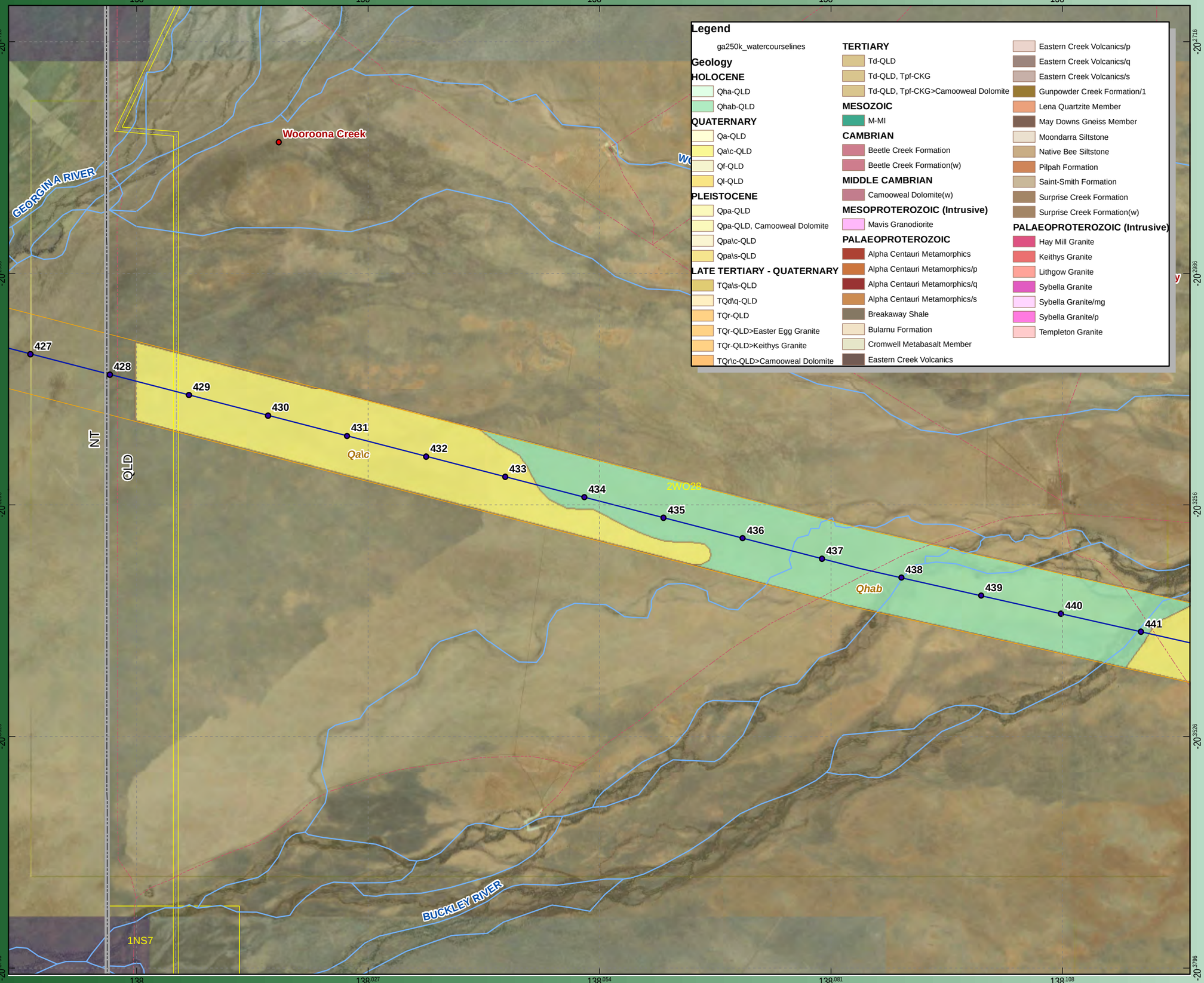

Legend

ga250k_watercourselines

Geology

HOLOCENE
- Qha-QLD
- Qhab-QLD

QUATERNARY
- Qa-QLD
- Qa\c-QLD
- Qf-QLD
- Ql-QLD

PLEISTOCENE
- Qpa-QLD
- Qpa-QLD, Camooweal Dolomite
- Qpa\c-QLD
- Qpa\s-QLD

LATE TERTIARY - QUATERNARY
- TQa\s-QLD
- TQd\q-QLD
- TQr-QLD
- TQr-QLD>Easter Egg Granite
- TQr-QLD>Keithys Granite
- TQr\c-QLD>Camooweal Dolomite

TERTIARY
- Td-QLD
- Td-QLD, Tpf-CKG
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MESOZOIC
- M-MI

CAMBRIAN
- Beetle Creek Formation
- Beetle Creek Formation(w)

MIDDLE CAMBRIAN
- Camooweal Dolomite(w)

MESOPROTEROZOIC (Intrusive)
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PALAEOPROTEROZOIC
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- Surprise Creek Formation
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N W E S

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Horizontal Datum: GDA 1994
Grid: GCS GDA 1994

Legend
- Town, Locality
- APA Alignment KPs
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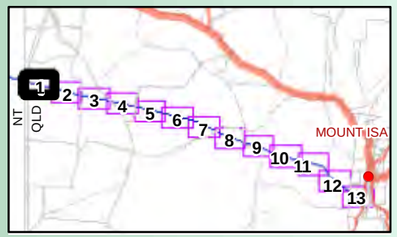

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Major surface geologies mapped over the study area

Figure 7 -1

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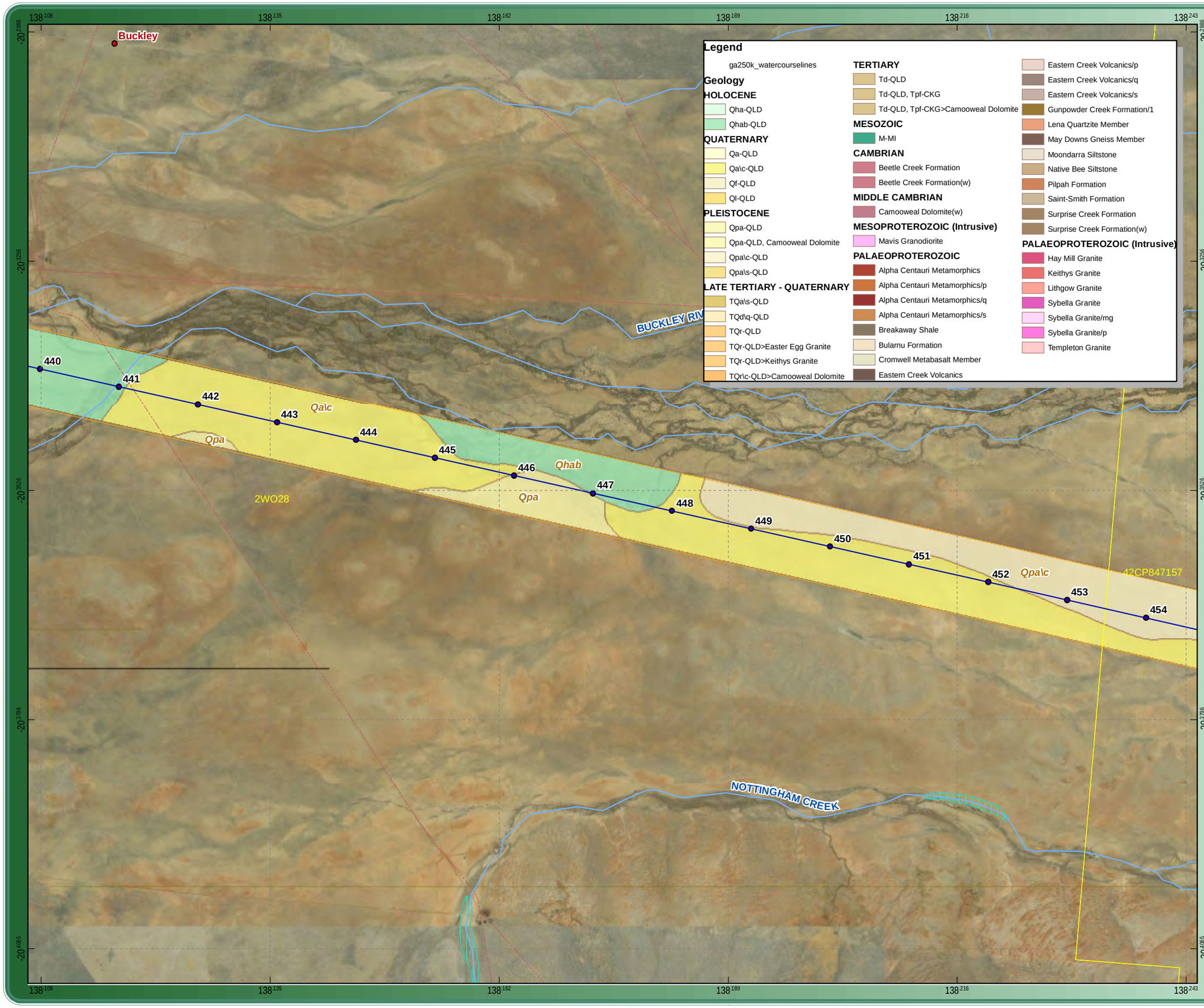

Legend

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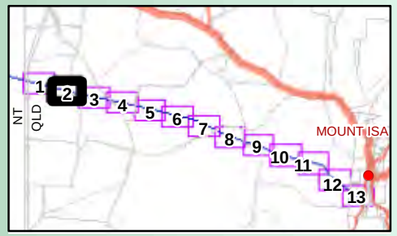

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Major surface geologies mapped over the study area

Figure 7 - 2

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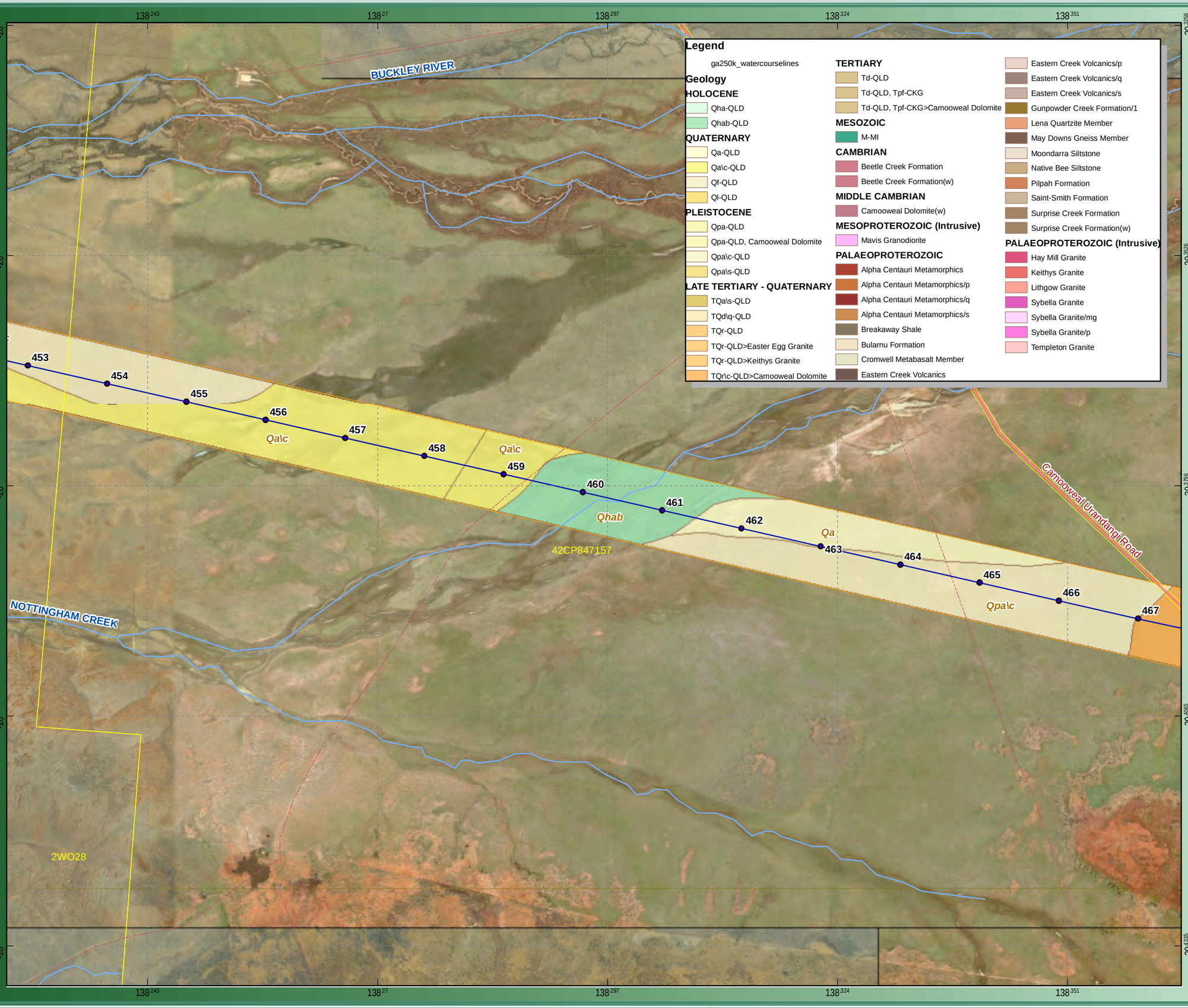

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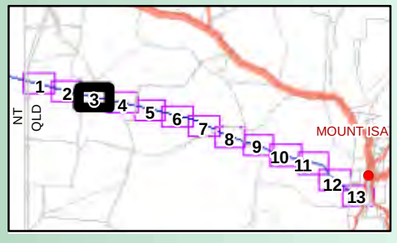

Flora and Fauna Assessment Report
NT Link (Queensland Portion)
CNC Project Management

Major surface geologies mapped over the study area

Figure 7 -3

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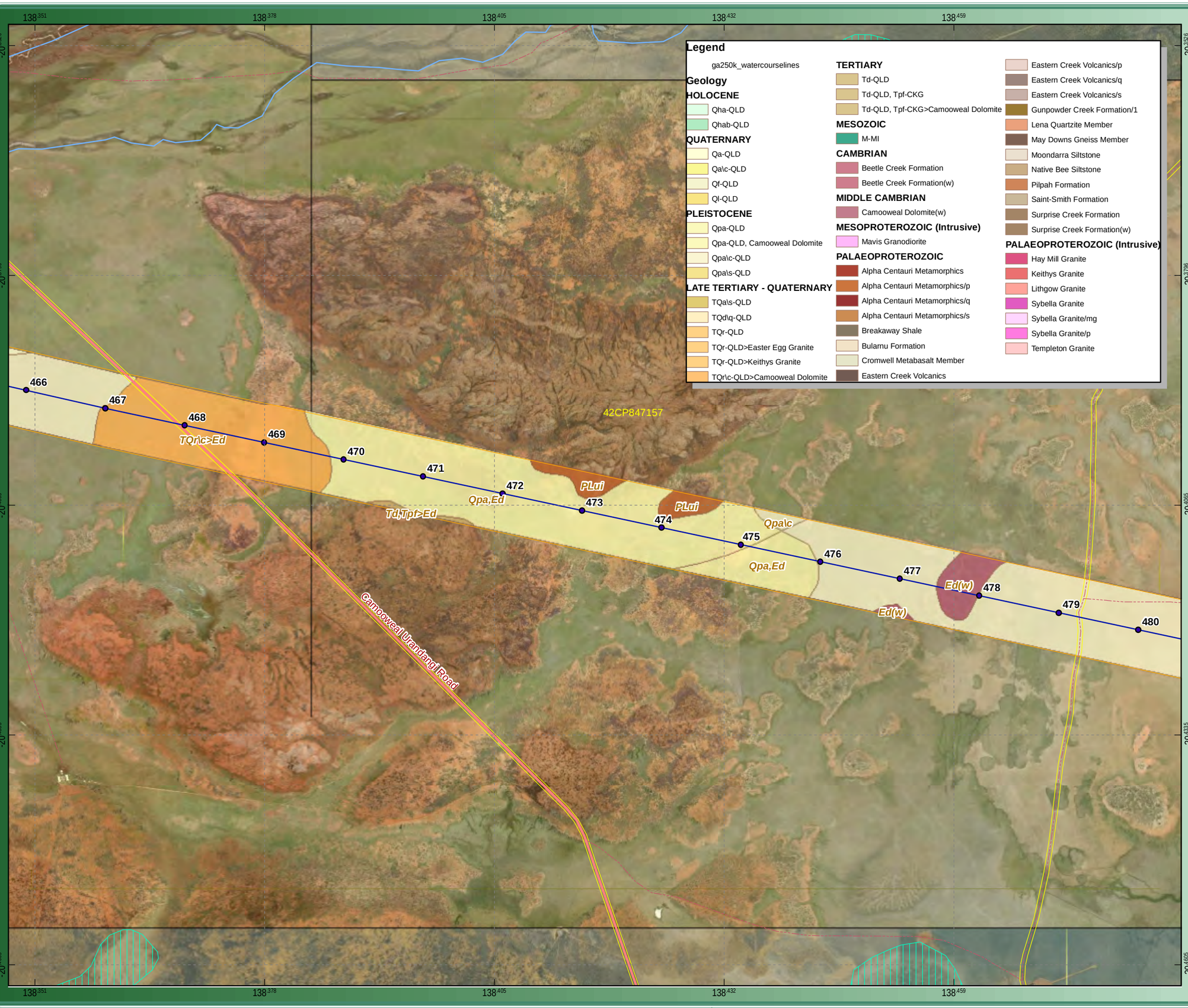
Data source: DNRM: Vegetation management watercourse map (1:100000 and 1:250000) - version 1.3, Coastline and State Border (July 2014), Cadastre., Geological Survey of QLD: Detailed Geology Mt Isa 2011. GooglePro: Imagery. All other data supplied by CNC Project Management. © State of Queensland (DNRM)



Legend

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- Mavis Granodiorite

PALAEOPROTEROZOIC
- Alpha Centauri Metamorphics
- Alpha Centauri Metamorphics/p
- Alpha Centauri Metamorphics/q
- Alpha Centauri Metamorphics/s
- Breakaway Shale
- Bularnu Formation
- Cromwell Metabasalt Member
- Eastern Creek Volcanics
- Eastern Creek Volcanics/p
- Eastern Creek Volcanics/q
- Eastern Creek Volcanics/s
- Gunpowder Creek Formation/1
- Lena Quartzite Member
- May Downs Gneiss Member
- Moondarra Siltstone
- Native Bee Siltstone
- Pilpah Formation
- Saint-Smith Formation
- Surprise Creek Formation
- Surprise Creek Formation(w)

PALAEOPROTEROZOIC (Intrusive)
- Hay Mill Granite
- Keithys Granite
- Lithgow Granite
- Sybella Granite
- Sybella Granite/mg
- Sybella Granite/p
- Templeton Granite

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N W E S

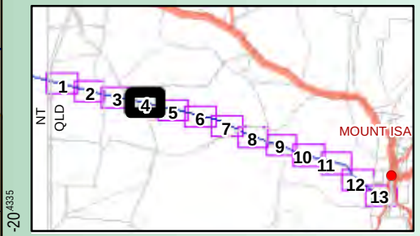
0 500 1,000 1,500 2,000 Metres

1:47,500 at A3

Horizontal Datum: GDA 1994
Grid: GCS GDA 1994

Legend
- Town, Locality
- APA Alignment KPs
- State Boundary
- Watercourse
- APA Alignment
- Alignment 500m buffer
- Water body
- DCDB

Road Network
- Highway
- Main Road
- Secondary Road
- Local Road
- Vehicular Road
- Private Road
- Proposed Road
- Unconstructed Road

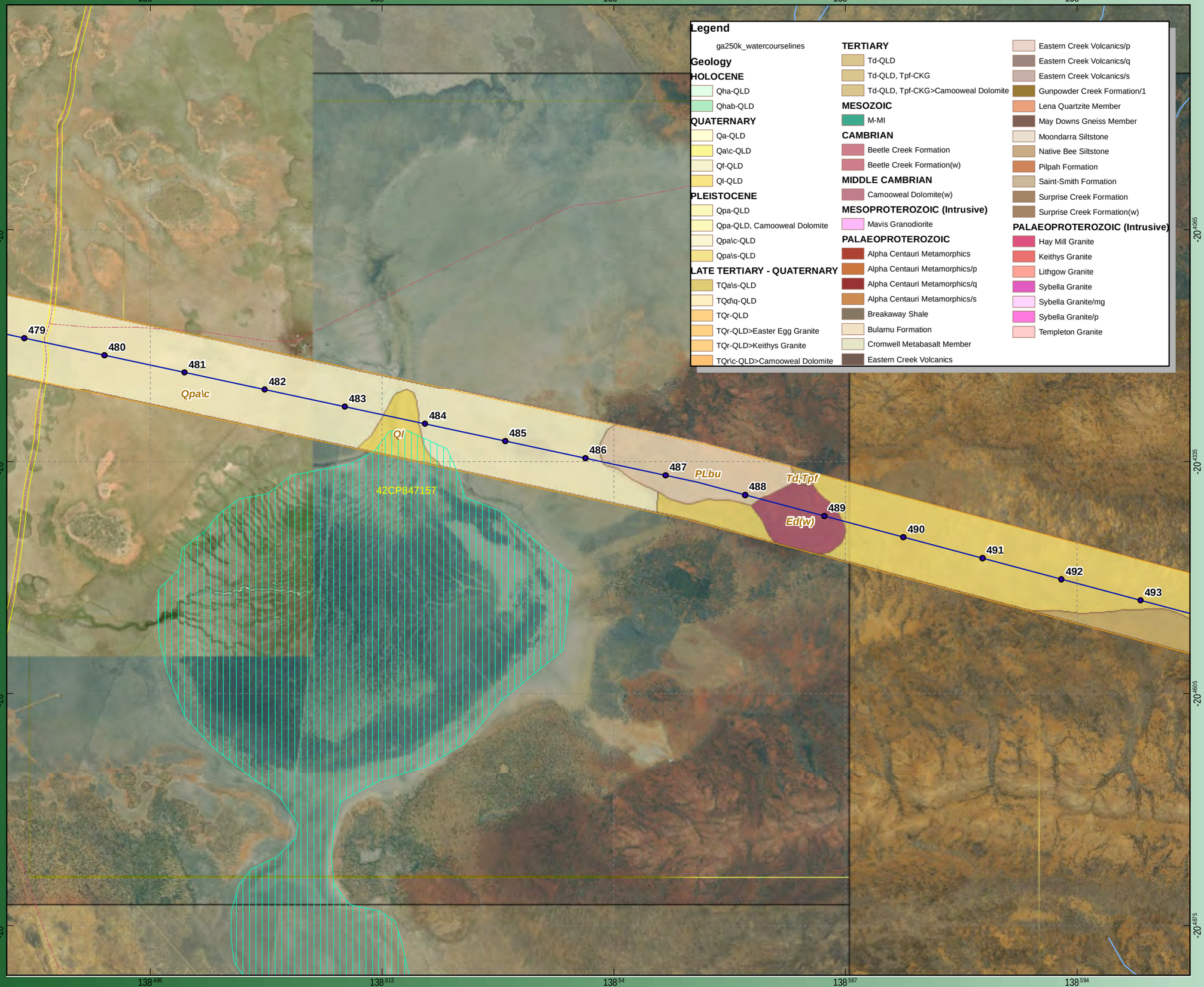


Flora and Fauna Assessment Report
NT Link (Queensland Portion)
CNC Project Management

Major surface geologies mapped over the study area

Figure 7 -4

15 Jun 2015 Z:\GIS\EC015_0002\GIS\Maps\Working (Optional)\v3\EC015_0002_geology_07.mxd



Legend

ga250k_watercourselines

Geology

HOLOCENE
- Qha-QLD
- Qhab-QLD

QUATERNARY
- Qa-QLD
- Qa\c-QLD
- Qf-QLD
- Ql-QLD

PLEISTOCENE
- Qpa-QLD
- Qpa-QLD, Camooweal Dolomite
- Qpa\c-QLD
- Qpa\s-QLD

LATE TERTIARY - QUATERNARY
- TQa\s-QLD
- TQd\q-QLD
- TQr-QLD
- TQr-QLD>Easter Egg Granite
- TQr-QLD>Keithys Granite
- TQr\c-QLD>Camooweal Dolomite

TERTIARY
- Td-QLD
- Td-QLD, Tpf-CKG
- Td-QLD, Tpf-CKG>Camooweal Dolomite

MESOZOIC
- M-MI

CAMBRIAN
- Beetle Creek Formation
- Beetle Creek Formation(w)

MIDDLE CAMBRIAN
- Camooweal Dolomite(w)

MESOPROTEROZOIC (Intrusive)
- Mavis Granodiorite

PALAEOPROTEROZOIC
- Alpha Centauri Metamorphics
- Alpha Centauri Metamorphics/p
- Alpha Centauri Metamorphics/q
- Alpha Centauri Metamorphics/s
- Breakaway Shale
- Bularnu Formation
- Cromwell Metabasalt Member
- Eastern Creek Volcanics
- Eastern Creek Volcanics/p
- Eastern Creek Volcanics/q
- Eastern Creek Volcanics/s
- Gunpowder Creek Formation/1
- Lena Quartzite Member
- May Downs Gneiss Member
- Moondarra Siltstone
- Native Bee Siltstone
- Pilpah Formation
- Saint-Smith Formation
- Surprise Creek Formation
- Surprise Creek Formation(w)

PALAEOPROTEROZOIC (Intrusive)
- Hay Mill Granite
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- Sybella Granite/mg
- Sybella Granite/p
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N W E S

0 500 1,000 1,500 2,000 Metres

1:47,500 at A3

Horizontal Datum: GDA 1994
Grid: GCS GDA 1994

Legend
- Town, Locality
- APA Alignment KPs
- State Boundary
- Watercourse
- APA Alignment
- Alignment 500m buffer
- Water body
- DCDB

Road Network
- Highway
- Main Road
- Secondary Road
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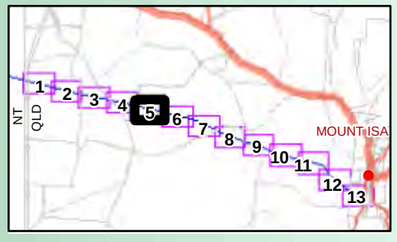
- Vehicular Road
- Private Road
- Proposed Road
- Unconstructed Road



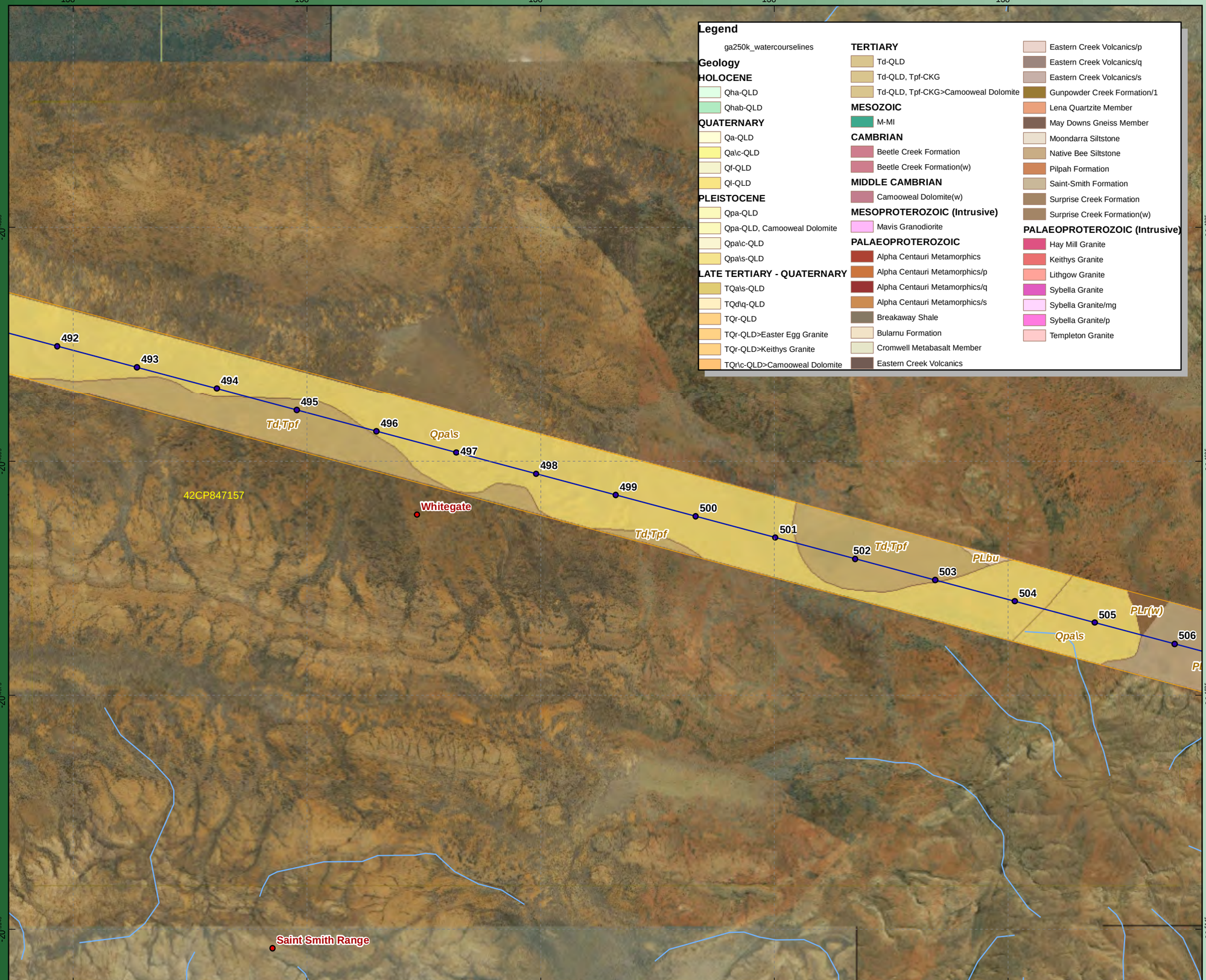
Flora and Fauna Assessment Report
NT Link (Queensland Portion)
CNC Project Management

Major surface geologies mapped over the study area

Figure 7 -5

15 Jun 2015 Z:\GIS\ECO15_0002\GIS\Maps\Working (Optional)\v3\ECO15_0002_geology_07.mxd

Data source: DNRM: Vegetation management watercourse map (1:100000 and 1:250000) - version 1.3, Coastline and State Border (July 2014), Cadastre., Geological Survey of QLD: Detailed Geology Mt Isa 2011. GooglePro: Imagery. All other data supplied by CNC Project Management. © State of Queensland (DNRM)



Legend

ga250k_watercourselines

Geology

HOLOCENE
- Qha-QLD
- Qhab-QLD

QUATERNARY
- Qa-QLD
- Qa\c-QLD
- Qf-QLD
- Ql-QLD

PLEISTOCENE
- Qpa-QLD
- Qpa-QLD, Camooweal Dolomite
- Qpa\c-QLD
- Qpa\s-QLD

LATE TERTIARY - QUATERNARY
- TQa\s-QLD
- TQd\q-QLD
- TQr-QLD
- TQr-QLD>Easter Egg Granite
- TQr-QLD>Keithys Granite
- TQr\c-QLD>Camooweal Dolomite

TERTIARY
- Td-QLD
- Td-QLD, Tpf-CKG
- Td-QLD, Tpf-CKG>Camooweal Dolomite

MESOZOIC
- M-MI

CAMBRIAN
- Beetle Creek Formation
- Beetle Creek Formation(w)

MIDDLE CAMBRIAN
- Camooweal Dolomite(w)

MESOPROTEROZOIC (Intrusive)
- Mavis Granodiorite

PALAEOPROTEROZOIC
- Alpha Centauri Metamorphics
- Alpha Centauri Metamorphics/p
- Alpha Centauri Metamorphics/q
- Alpha Centauri Metamorphics/s
- Breakaway Shale
- Bularnu Formation
- Cromwell Metabasalt Member
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- Eastern Creek Volcanics/p
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- Lena Quartzite Member
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- Moondarra Siltstone
- Native Bee Siltstone
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- Surprise Creek Formation
- Surprise Creek Formation(w)

PALAEOPROTEROZOIC (Intrusive)
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N W E S

0 500 1,000 1,500 2,000 Metres

1:47,500 at A3

Horizontal Datum: GDA 1994
Grid: GCS GDA 1994

Legend
- Town, Locality
- APA Alignment KPs
- State Boundary
- Watercourse
- APA Alignment
- Alignment 500m buffer
- Water body
- DCDB

Road Network
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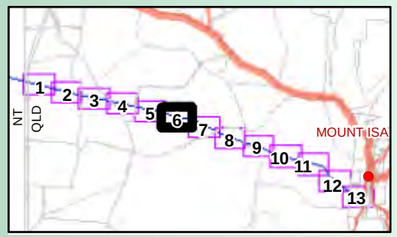

Flora and Fauna Assessment Report
NT Link (Queensland Portion)
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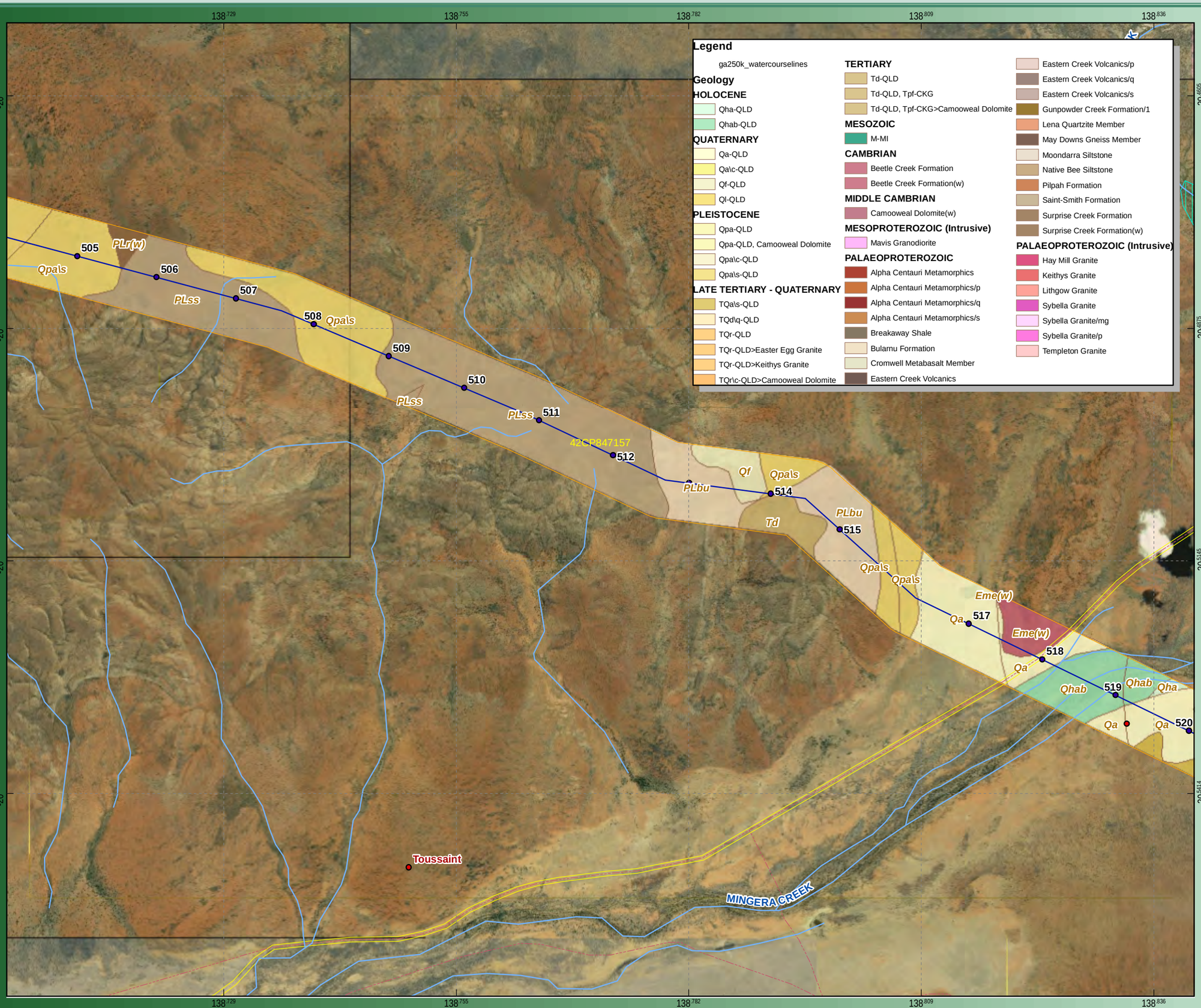
Major surface geologies mapped over the study area

Figure 7 - 6

15 Jun 2015 Z:\GIS\ECO15_0002\GIS\Maps\Working (Optional)\v3\ECO15_0002_geology_07.mxd



Legend

ga250k_watercourselines

Geology

HOLOCENE
- Qha-QLD
- Qhab-QLD

QUATERNARY
- Qa-QLD
- Qa\c-QLD
- Qf-QLD
- Ql-QLD

PLEISTOCENE
- Qpa-QLD
- Qpa-QLD, Camooweal Dolomite
- Qpa\c-QLD
- Qpa\s-QLD

LATE TERTIARY - QUATERNARY
- TQa\s-QLD
- TQd\q-QLD
- TQr-QLD
- TQr-QLD>Easter Egg Granite
- TQr-QLD>Keithys Granite
- TQr\c-QLD>Camooweal Dolomite

TERTIARY
- Td-QLD
- Td-QLD, Tpf-CKG
- Td-QLD, Tpf-CKG>Camooweal Dolomite

MESOZOIC
- M-MI

CAMBRIAN
- Beetle Creek Formation
- Beetle Creek Formation(w)

MIDDLE CAMBRIAN
- Camooweal Dolomite(w)

MESOPROTEROZOIC (Intrusive)
- Mavis Granodiorite

PALAEOPROTEROZOIC
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- Alpha Centauri Metamorphics/q
- Alpha Centauri Metamorphics/s
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- Eastern Creek Volcanics/s
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- Lena Quartzite Member
- May Downs Gneiss Member
- Moondarra Siltstone
- Native Bee Siltstone
- Pilpah Formation
- Saint-Smith Formation
- Surprise Creek Formation
- Surprise Creek Formation(w)

PALAEOPROTEROZOIC (Intrusive)
- Hay Mill Granite
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- Sybella Granite/mg
- Sybella Granite/p
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N W E S

0 500 1,000 1,500 2,000 Metres

1:47,500 at A3

Horizontal Datum: GDA 1994
Grid: GCS GDA 1994

Legend
- Town, Locality
- APA Alignment KPs
- State Boundary
- Watercourse
- APA Alignment
- Alignment 500m buffer
- Water body
- DCDB

Road Network
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- Vehicular Road
- Private Road
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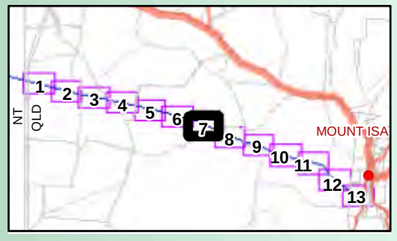
- Unconstructed Road



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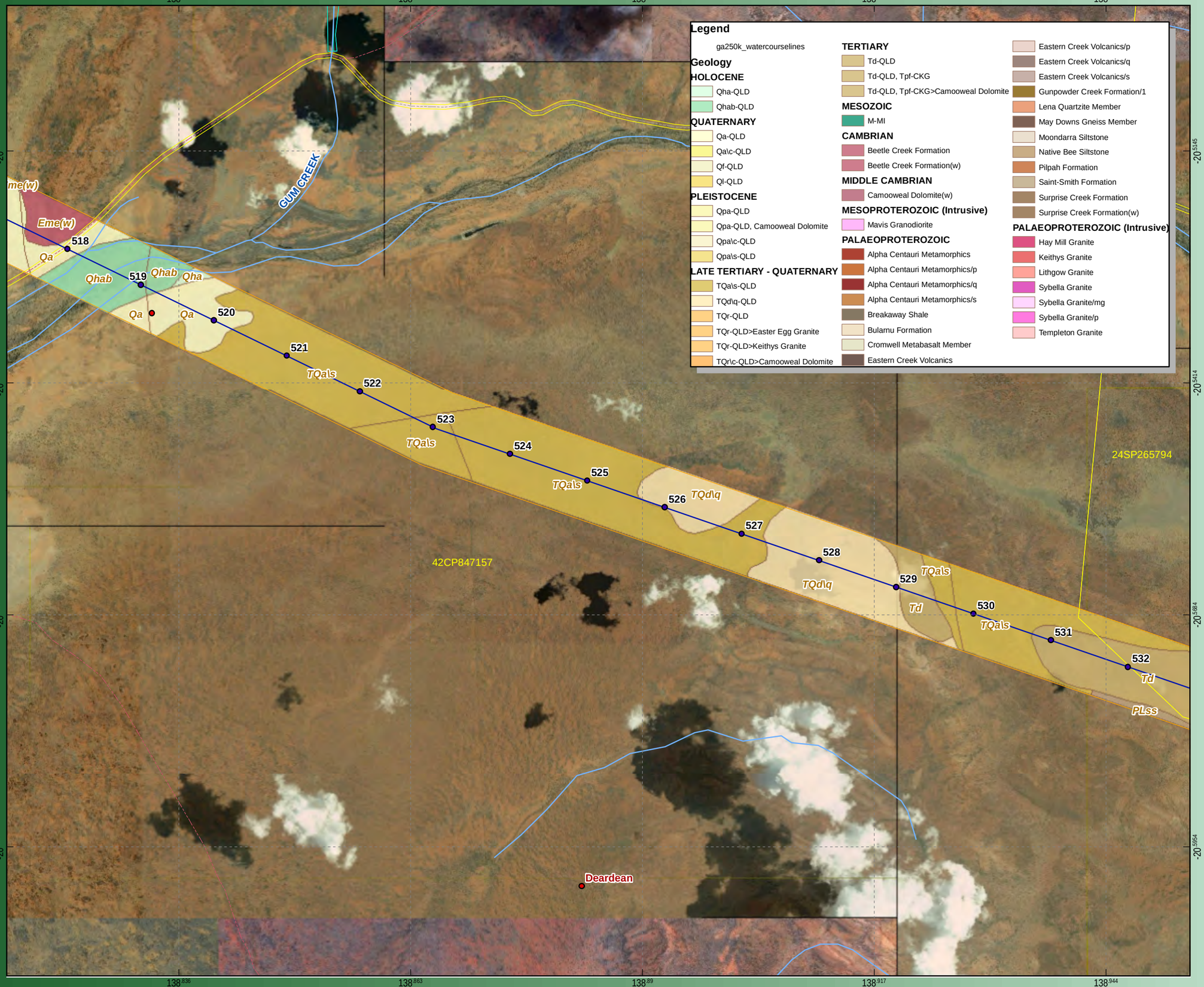
Major surface geologies mapped over the study area

Figure 7 -7

15 Jun 2015 Z:\GIS\EC015_0002\GIS\Maps\Working (Optional)\v3\EC015_0002_geology_07.mxd

Data source: DNRM: Vegetation management watercourse map (1:100000 and 1:250000) - version 1.3, Coastline and State Border (July 2014), Cadastre., Geological Survey of QLD: Detailed Geology Mt Isa 2011. GooglePro: Imagery. All other data supplied by CNC Project Management. © State of Queensland (DNRM)



Legend

ga250k_watercourselines

Geology

HOLOCENE
- Qha-QLD
- Qhab-QLD

QUATERNARY
- Qa-QLD
- Qa\c-QLD
- Qf-QLD
- Ql-QLD

PLEISTOCENE
- Qpa-QLD
- Qpa-QLD, Camooweal Dolomite
- Qpa\c-QLD
- Qpa\s-QLD

LATE TERTIARY - QUATERNARY
- TQa\s-QLD
- TQd\q-QLD
- TQr-QLD
- TQr-QLD>Easter Egg Granite
- TQr-QLD>Keithys Granite
- TQr\c-QLD>Camooweal Dolomite

TERTIARY
- Td-QLD
- Td-QLD, Tpf-CKG
- Td-QLD, Tpf-CKG>Camooweal Dolomite

MESOZOIC
- M-MI

CAMBRIAN
- Beetle Creek Formation
- Beetle Creek Formation(w)

MIDDLE CAMBRIAN
- Camooweal Dolomite(w)

MESOPROTEROZOIC (Intrusive)
- Mavis Granodiorite

PALAEOPROTEROZOIC
- Alpha Centauri Metamorphics
- Alpha Centauri Metamorphics/p
- Alpha Centauri Metamorphics/q
- Alpha Centauri Metamorphics/s
- Breakaway Shale
- Bularnu Formation
- Cromwell Metabasalt Member
- Eastern Creek Volcanics
- Eastern Creek Volcanics/p
- Eastern Creek Volcanics/q
- Eastern Creek Volcanics/s
- Gunpowder Creek Formation/1
- Lena Quartzite Member
- May Downs Gneiss Member
- Moondarra Siltstone
- Native Bee Siltstone
- Pilpah Formation
- Saint-Smith Formation
- Surprise Creek Formation
- Surprise Creek Formation(w)

PALAEOPROTEROZOIC (Intrusive)
- Hay Mill Granite
- Keithys Granite
- Lithgow Granite
- Sybella Granite
- Sybella Granite/mg
- Sybella Granite/p
- Templeton Granite

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N W E S

0 500 1,000 1,500 2,000 Metres

1:47,500 at A3

Horizontal Datum: GDA 1994
Grid: GCS GDA 1994

Legend

- Town, Locality
- APA Alignment KPs
- State Boundary
- Watercourse
- APA Alignment
- Alignment 500m buffer
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- DCDB

Road Network

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- Private Road
- Proposed Road
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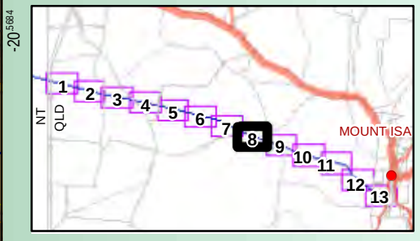
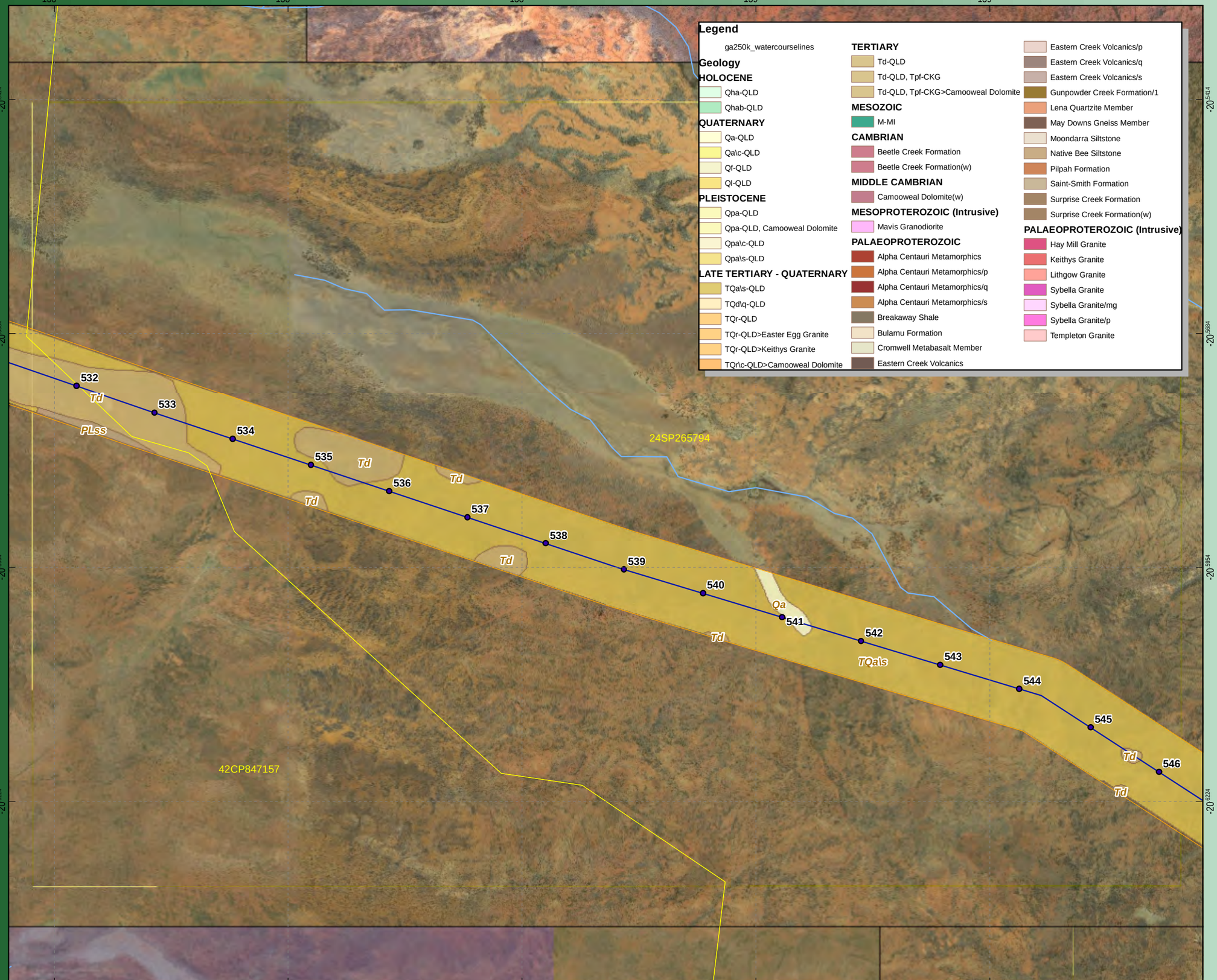


Flora and Fauna Assessment Report
NT Link (Queensland Portion)
CNC Project Management

Major surface geologies mapped over the study area

Figure 7 - 8

15 Jun 2015 Z:\GIS\ECO15_0002\GIS\Maps\Working (Optional)\v3\ECO15_0002_geology_07.mxd



Legend

ga250k_watercourselines

Geology

HOLOCENE
- Qha-QLD
- Qhab-QLD

QUATERNARY
- Qa-QLD
- Qa\c-QLD
- Qf-QLD
- Ql-QLD

PLEISTOCENE
- Qpa-QLD
- Qpa-QLD, Camooweal Dolomite
- Qpa\c-QLD
- Qpa\s-QLD

LATE TERTIARY - QUATERNARY
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- TQr-QLD>Easter Egg Granite
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- TQr\c-QLD>Camooweal Dolomite

TERTIARY
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- Td-QLD, Tpf-CKG
- Td-QLD, Tpf-CKG>Camooweal Dolomite

MESOZOIC
- M-MI

CAMBRIAN
- Beetle Creek Formation
- Beetle Creek Formation(w)

MIDDLE CAMBRIAN
- Camooweal Dolomite(w)

MESOPROTEROZOIC (Intrusive)
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PALAEOPROTEROZOIC
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N W E S

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1:47,500 at A3

Horizontal Datum: GDA 1994
Grid: GCS GDA 1994

Legend

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- DCDB

Road Network

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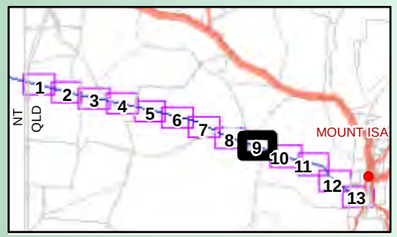
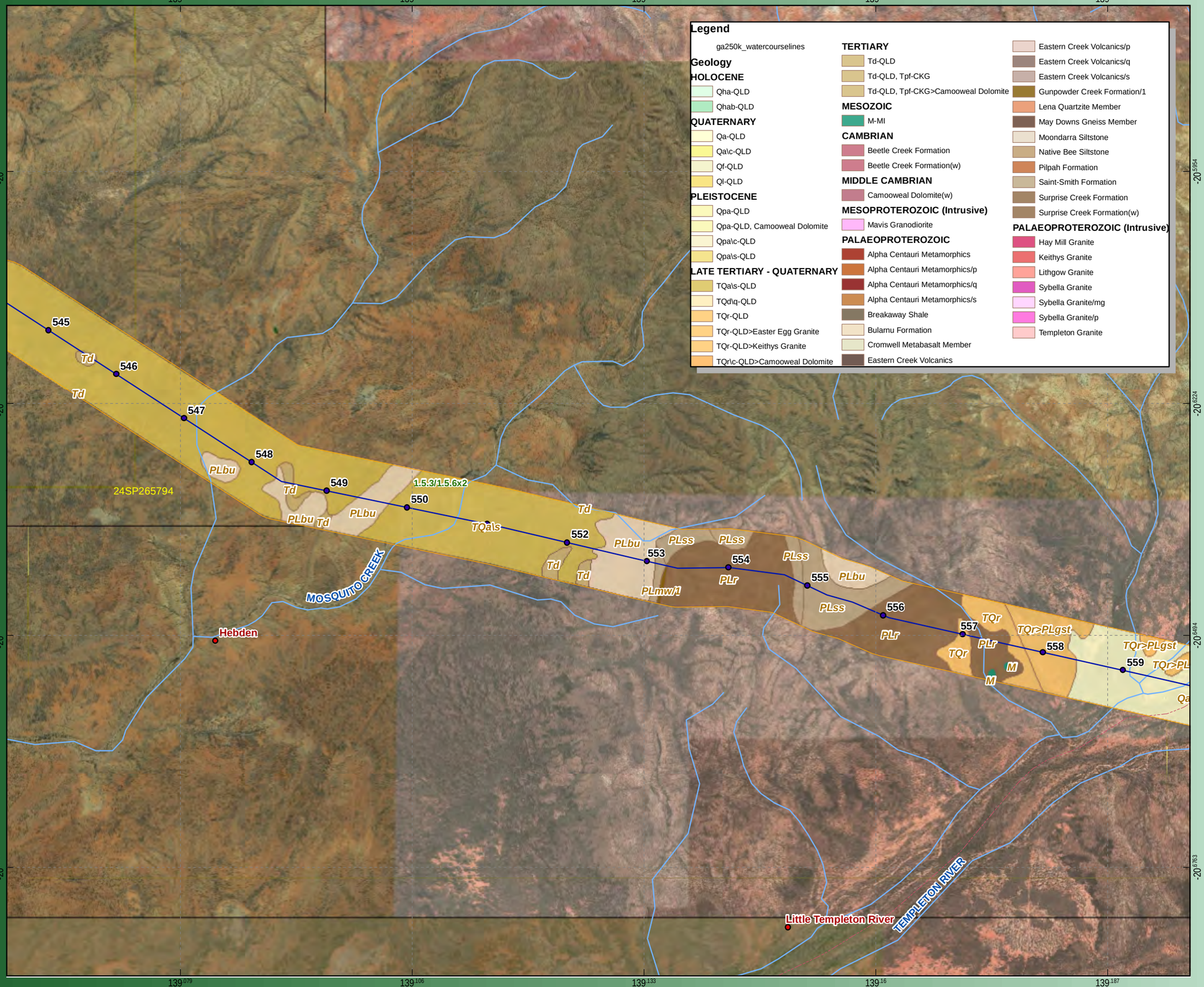


Flora and Fauna Assessment Report
NT Link (Queensland Portion)
CNC Project Management

Major surface geologies mapped over the study area

Figure 7 -9

15 Jun 2015 Z:\GIS\ECO15_0002\GIS\Maps\Working (Optional)\v3\ECO15_0002_geology_07.mxd



Legend

ga250k_watercourselines

Geology

HOLOCENE
- Qha-QLD
- Qhab-QLD

QUATERNARY
- Qa-QLD
- Qa\c-QLD
- Qf-QLD
- Ql-QLD

PLEISTOCENE
- Qpa-QLD
- Qpa-QLD, Camooweal Dolomite
- Qpa\c-QLD
- Qpa\s-QLD

LATE TERTIARY - QUATERNARY
- TQa\s-QLD
- TQd\q-QLD
- TQr-QLD
- TQr-QLD>Easter Egg Granite
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- TQr\c-QLD>Camooweal Dolomite

TERTIARY
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- Td-QLD, Tpf-CKG
- Td-QLD, Tpf-CKG>Camooweal Dolomite

MESOZOIC
- M-MI

CAMBRIAN
- Beetle Creek Formation
- Beetle Creek Formation(w)

MIDDLE CAMBRIAN
- Camooweal Dolomite(w)

MESOPROTEROZOIC (Intrusive)
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- Alpha Centauri Metamorphics/p
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- Surprise Creek Formation
- Surprise Creek Formation(w)

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N W E S

0 500 1,000 1,500 2,000 Metres

1:47,500 at A3

Horizontal Datum: GDA 1994
Grid: GCS GDA 1994

Legend
- Town, Locality
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- APA Alignment
- Alignment 500m buffer
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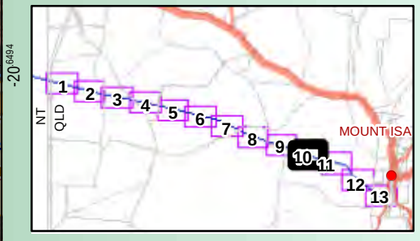

Flora and Fauna Assessment Report
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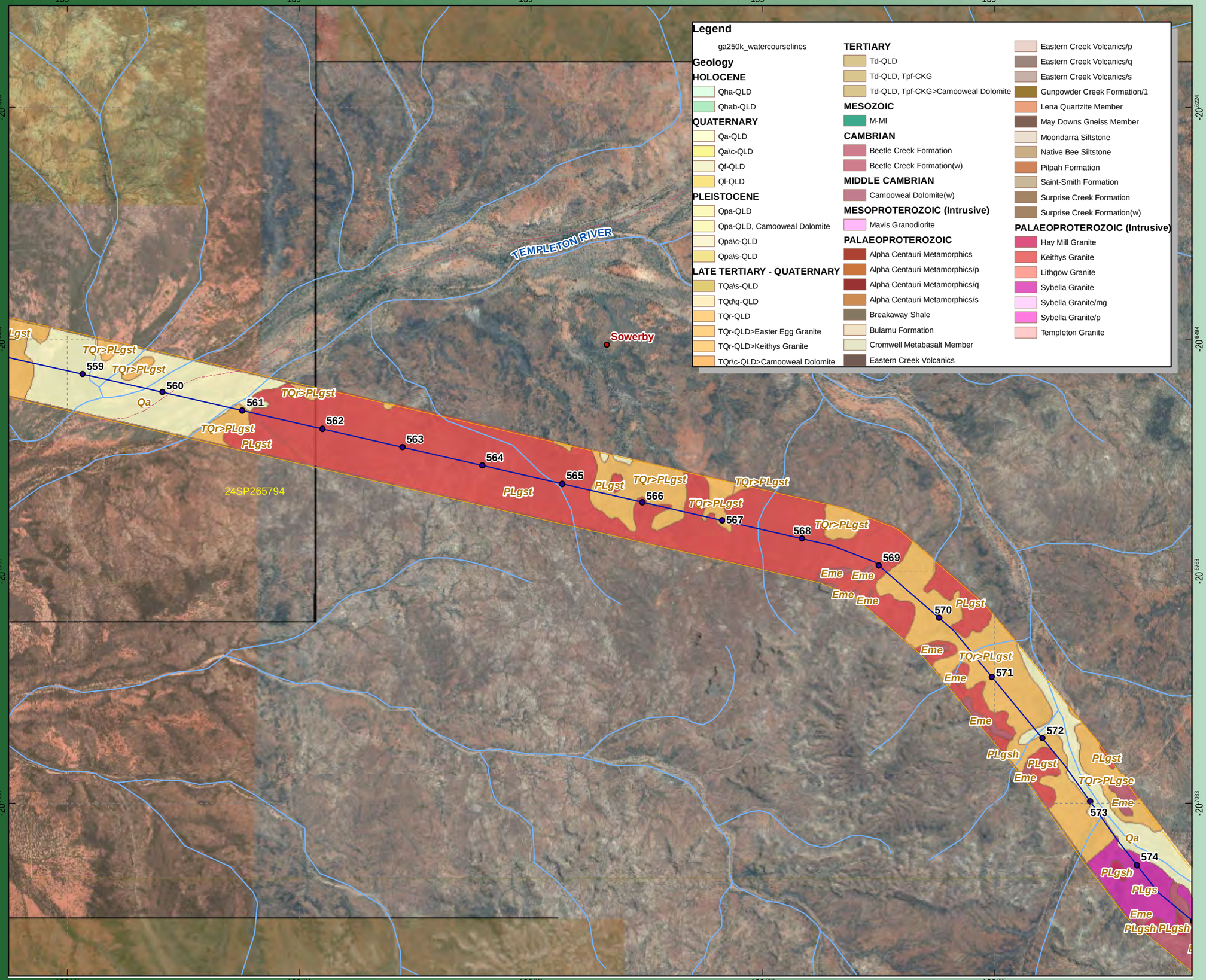
CNC Project Management

Major surface geologies mapped over the study area

Figure 7 - 10

15 Jun 2015 Z:\GIS\ECO15_0002\GIS\Maps\Working (Optional)\v3\ECO15_0002_geology_07.mxd

Data source: DNRM: Vegetation management watercourse map (1:100000 and 1:250000) - version 1.3, Coastline and State Border (July 2014), Cadastre., Geological Survey of QLD: Detailed Geology Mt Isa 2011. GooglePro: Imagery. All other data supplied by CNC Project Management. © State of Queensland (DNRM)



Legend

ga250k_watercourselines

Geology

HOLOCENE
- Qha-QLD
- Qhab-QLD

QUATERNARY
- Qa-QLD
- Qa\c-QLD
- Qf-QLD
- Ql-QLD

PLEISTOCENE
- Qpa-QLD
- Qpa-QLD, Camooweal Dolomite
- Qpa\c-QLD
- Qpa\s-QLD

LATE TERTIARY - QUATERNARY
- TQa\s-QLD
- TQd\q-QLD
- TQr-QLD
- TQr-QLD>Easter Egg Granite
- TQr-QLD>Keithys Granite
- TQr\c-QLD>Camooweal Dolomite

TERTIARY
- Td-QLD
- Td-QLD, Tpf-CKG
- Td-QLD, Tpf-CKG>Camooweal Dolomite

MESOZOIC
- M-MI

CAMBRIAN
- Beetle Creek Formation
- Beetle Creek Formation(w)

MIDDLE CAMBRIAN
- Camooweal Dolomite(w)

MESOPROTEROZOIC (Intrusive)
- Mavis Granodiorite

PALAEOPROTEROZOIC
- Alpha Centauri Metamorphics
- Alpha Centauri Metamorphics/p
- Alpha Centauri Metamorphics/q
- Alpha Centauri Metamorphics/s
- Breakaway Shale
- Bularnu Formation
- Cromwell Metabasalt Member
- Eastern Creek Volcanics
- Eastern Creek Volcanics/p
- Eastern Creek Volcanics/q
- Eastern Creek Volcanics/s
- Gunpowder Creek Formation/1
- Lena Quartzite Member
- May Downs Gneiss Member
- Moondarra Siltstone
- Native Bee Siltstone
- Pilpah Formation
- Saint-Smith Formation
- Surprise Creek Formation
- Surprise Creek Formation(w)

PALAEOPROTEROZOIC (Intrusive)
- Hay Mill Granite
- Keithys Granite
- Lithgow Granite
- Sybella Granite
- Sybella Granite/mg
- Sybella Granite/p
- Templeton Granite

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N W E S

0 500 1,000 1,500 2,000 Metres

1:47,500 at A3

Horizontal Datum: GDA 1994
Grid: GCS GDA 1994

Legend

- Town, Locality
- APA Alignment KPs
- State Boundary
- Watercourse
- APA Alignment
- Alignment 500m buffer
- Water body
- DCDB

Road Network

- Highway
- Main Road
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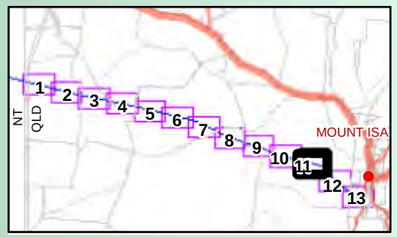

Flora and Fauna Assessment Report
NT Link (Queensland Portion)
CNC Project Management

Major surface geologies mapped over the study area

Figure 7 - 11

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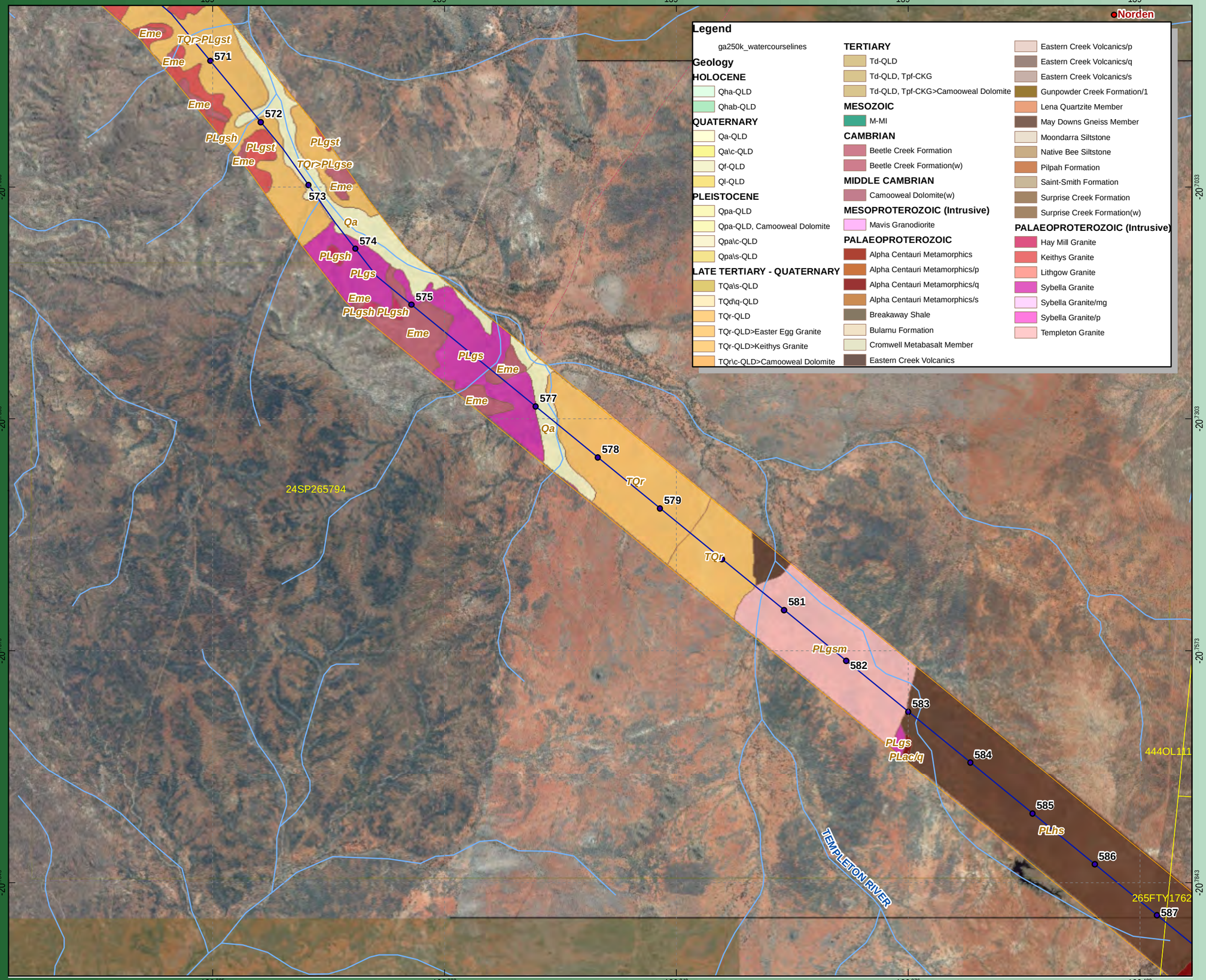

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1:47,500 at A3

Horizontal Datum: GDA 1994
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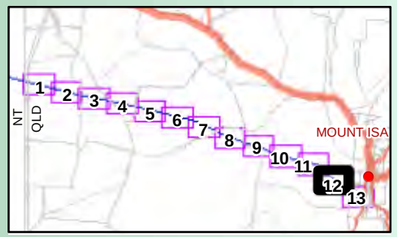

Flora and Fauna Assessment Report
NT Link (Queensland Portion)
CNC Project Management

Major surface geologies mapped over the study area

Figure 7 -12

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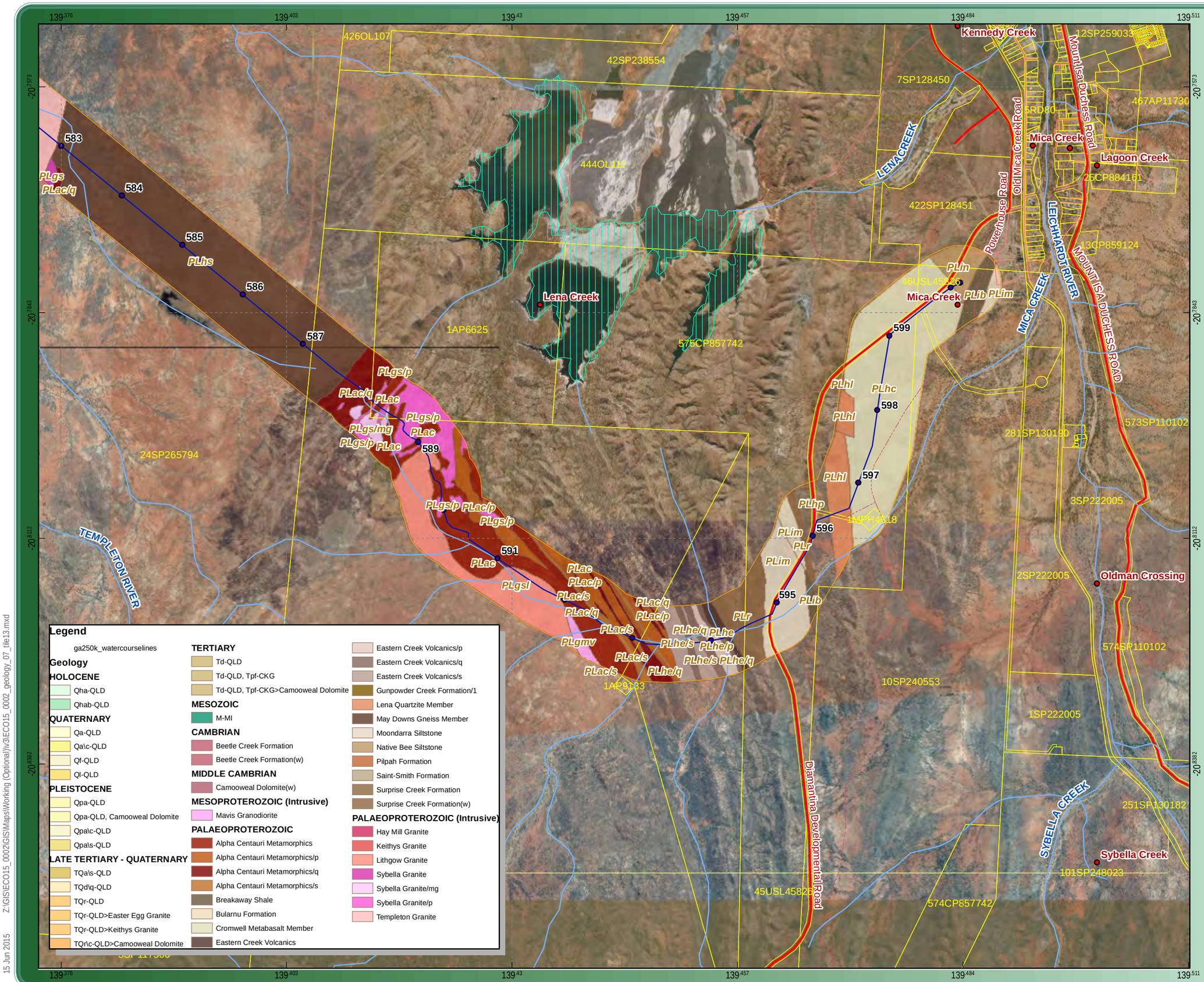

Legend

ga250k_watercourselines

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- Qa\c-QLD
- Qf-QLD
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1:47,500 at A3

Horizontal Datum: GDA 1994
Grid: GCS GDA 1994

Legend
- Town, Locality
- APA Alignment KPs
- State Boundary
- Watercourse
- APA Alignment
- Alignment 500m buffer
- Water body
- DCDB

Road Network
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- Main Road
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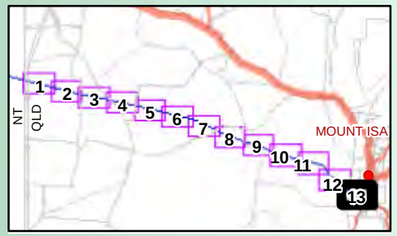

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NT Link (Queensland Portion)
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Major surface geologies mapped over the study area

Figure 7 - 13

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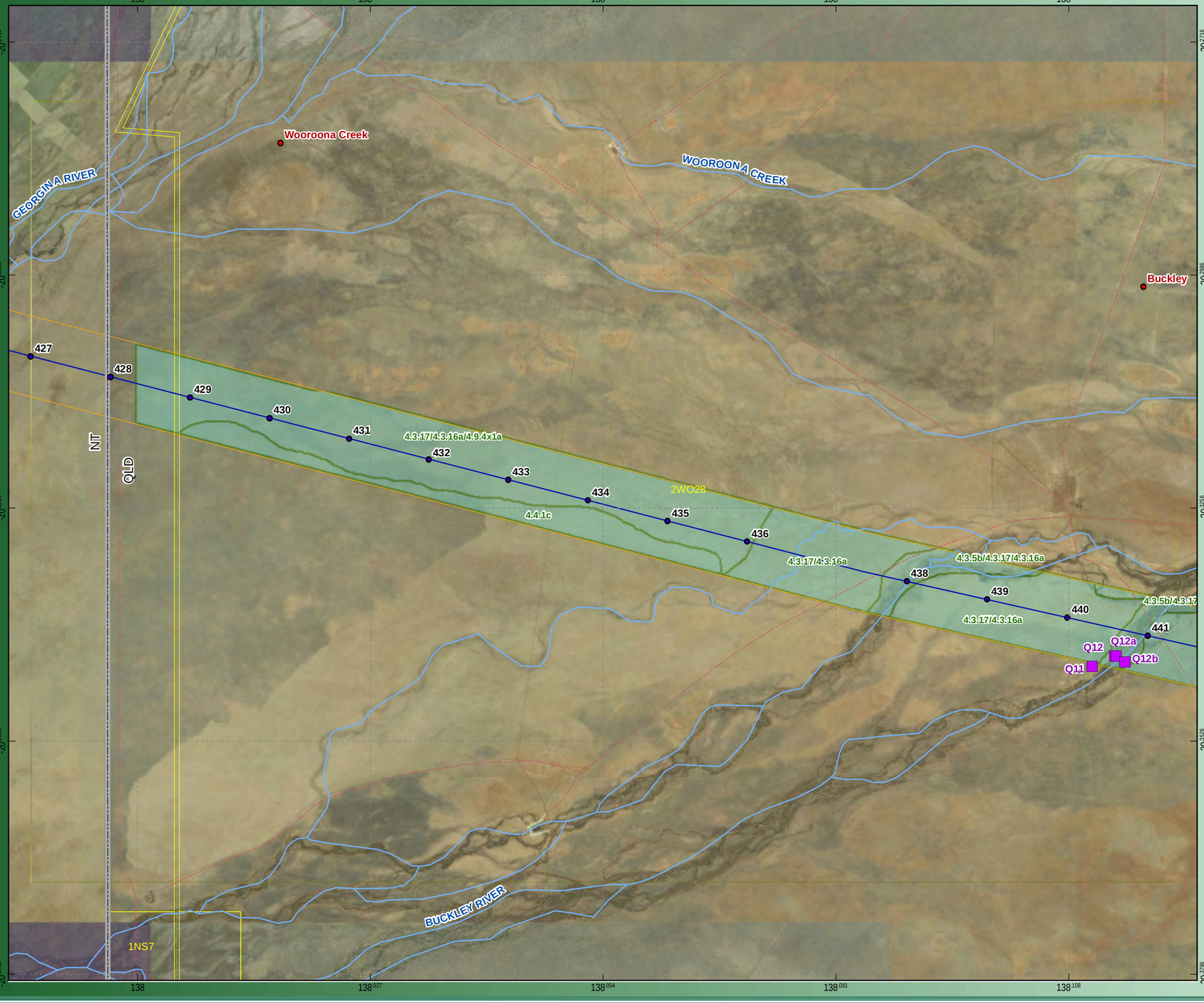

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Metres

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Horizontal Datum: GDA 1994
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Legend

- Town, Locality
- Flora Site
- APA Alignment KPs
- State Boundary
- APA Alignment
- Alignment 500m buffer
- Watercourse
- Water body

RE (VM status)

- Least Concern RE
- Water

Road Network

- Highway
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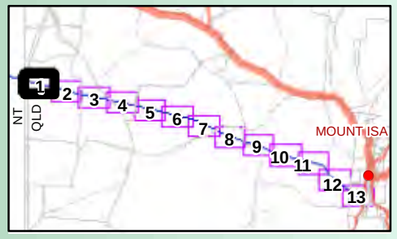
- Local Road
- Vehicular Road
- Private Road
- Proposed Road
- Unconstructed Road
- DCDB



Flora and Fauna Assessment Report
NT Link (Queensland Portion)
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Flora, Vegetation and BioCondition survey sites

Figure 8 - 1

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Grid: GCS GDA 1994

Legend

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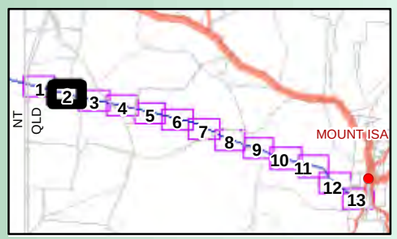
- DCDB

RE (VM status)

- Least Concern RE
- Water



Flora and Fauna Assessment Report
NT Link (Queensland Portion)
CNC Project Management

Flora, Vegetation and BioCondition survey sites

Figure 8 - 2

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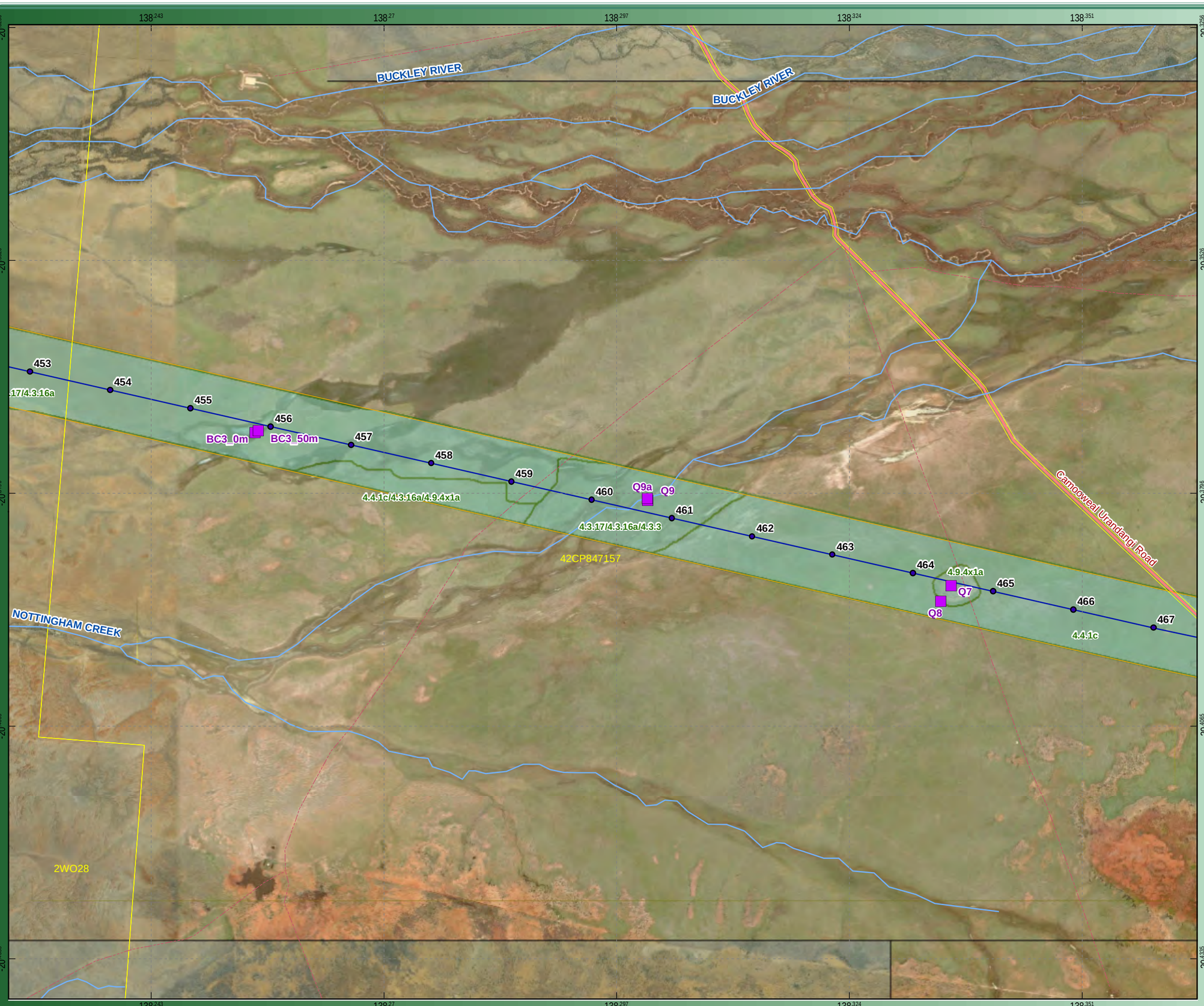

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0 500 1,000 1,500 2,000
Metres

1:47,500 at A3

Horizontal Datum: GDA 1994
Grid: GCS GDA 1994

Legend

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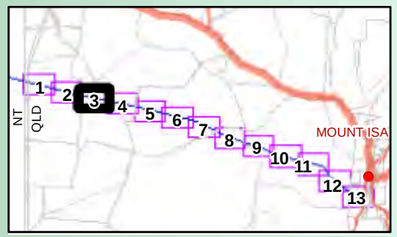

Flora and Fauna Assessment Report
NT Link (Queensland Portion)
CNC Project Management

Flora, Vegetation and BioCondition survey sites

Figure 8 - 3

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0 500 1,000 1,500 2,000
Metres

1:47,500 at A3

Horizontal Datum: GDA 1994
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Legend

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RE (VM status)

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Road Network

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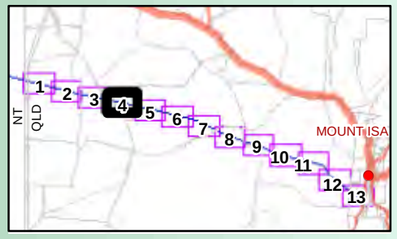

Flora and Fauna Assessment Report
NT Link (Queensland Portion)
CNC Project Management

Flora, Vegetation and BioCondition survey sites

Figure 8 - 4

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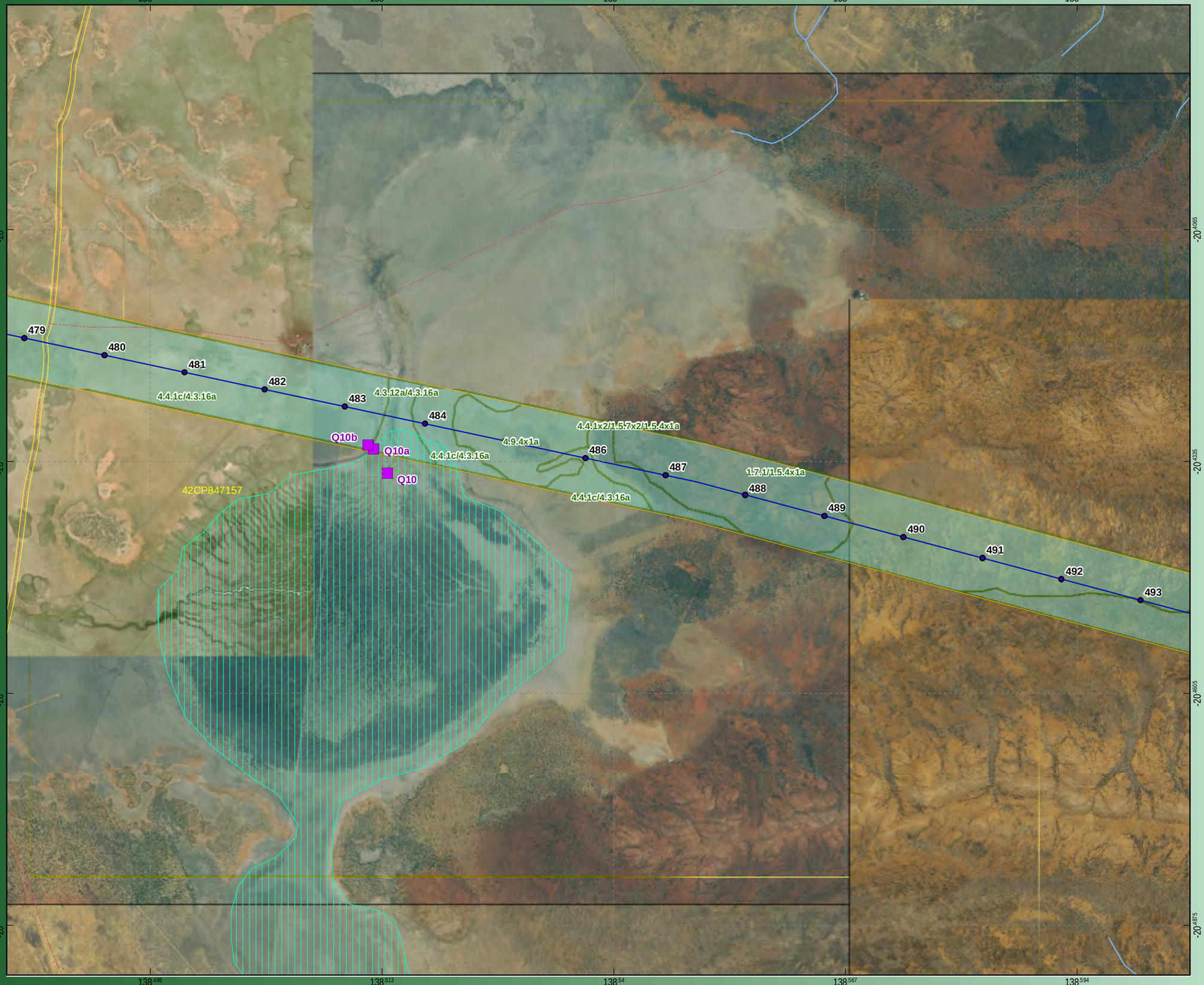

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N W E S

0 500 1,000 1,500 2,000 Metres

1:47,500 at A3

Horizontal Datum: GDA 1994
Grid: GCS GDA 1994

Legend

- Town, Locality
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RE (VM status)

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Road Network

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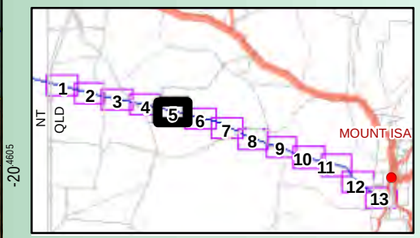

Flora and Fauna Assessment Report
NT Link (Queensland Portion)
CNC Project Management

Flora, Vegetation and BioCondition survey sites

Figure 8 - 5

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0 500 1,000 1,500 2,000
Metres

1:47,500 at A3

Horizontal Datum: GDA 1994
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Legend

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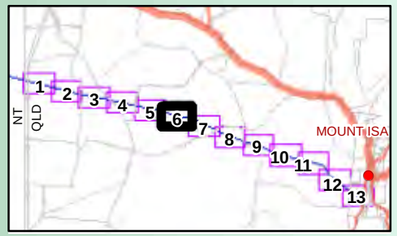

Flora and Fauna Assessment Report
NT Link (Queensland Portion)
CNC Project Management

Flora, Vegetation and BioCondition survey sites

Figure 8 - 6

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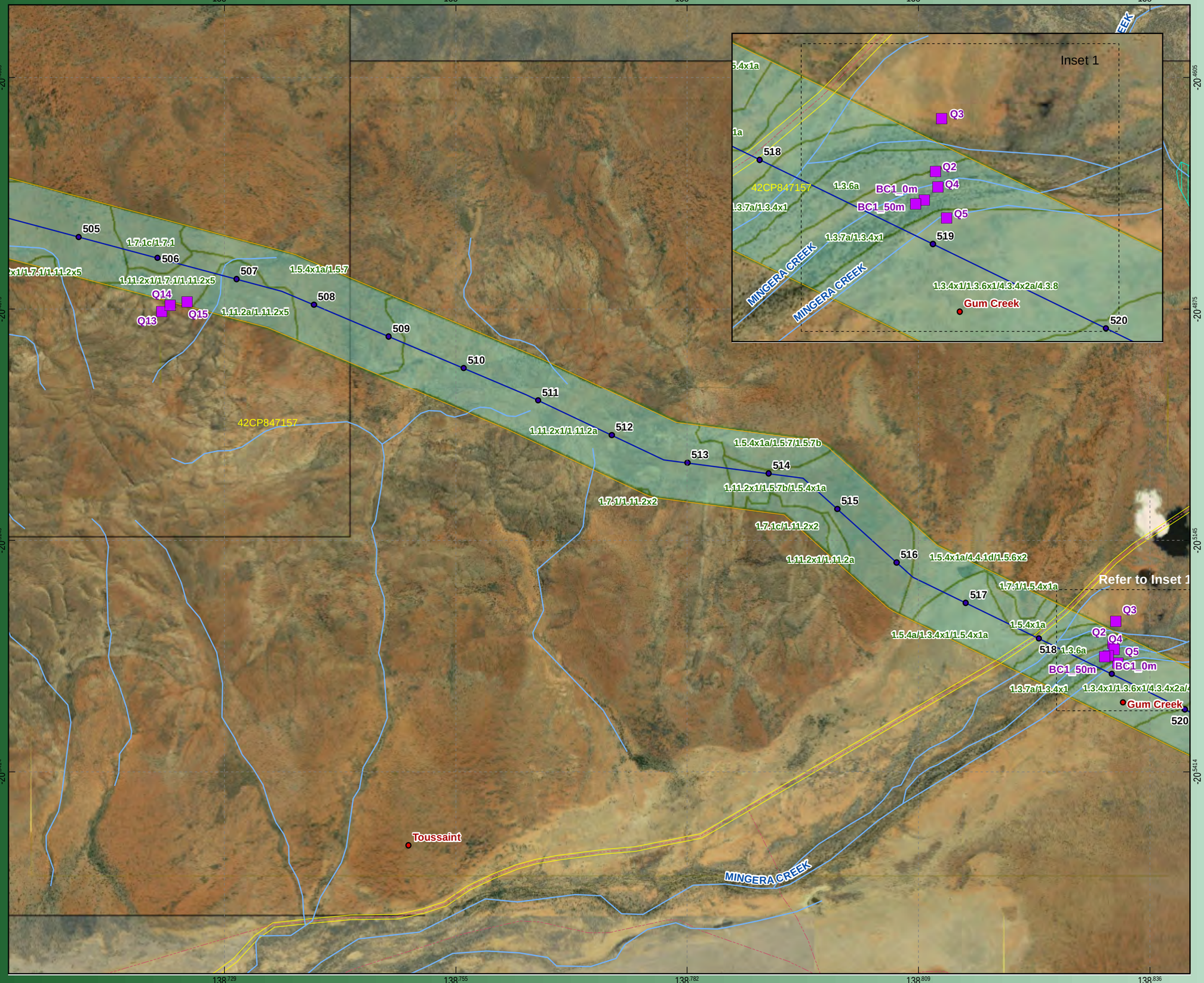

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N W E S

0 500 1,000 1,500 2,000 Metres

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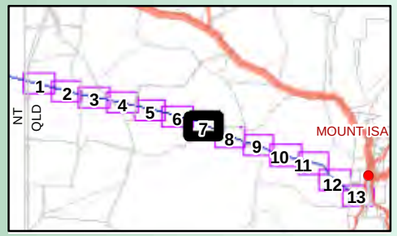

Flora and Fauna Assessment Report
NT Link (Queensland Portion)
CNC Project Management

Flora, vegetation and BioCondition survey sites

Figure 8 - 7

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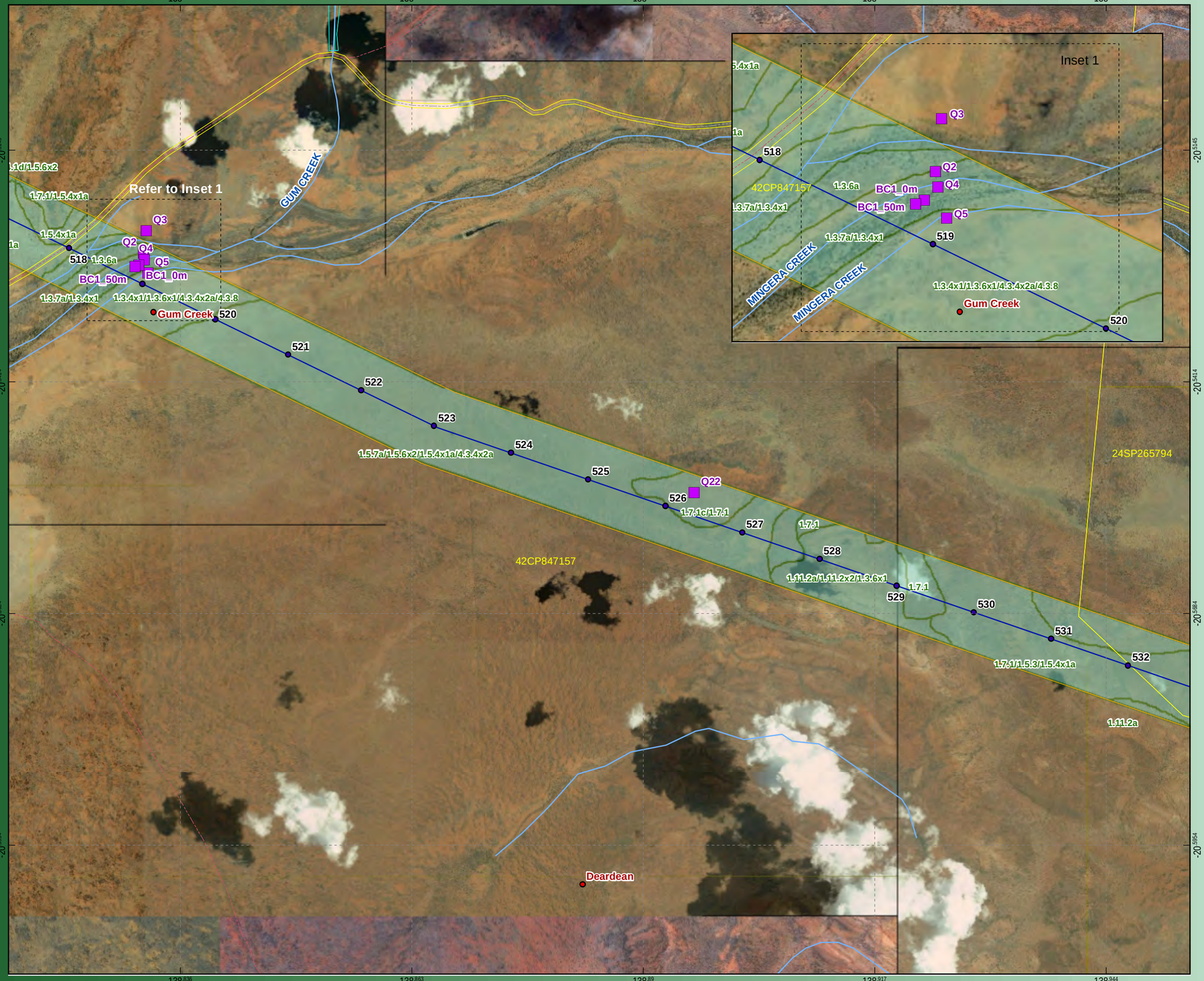

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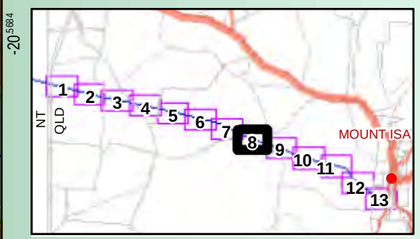
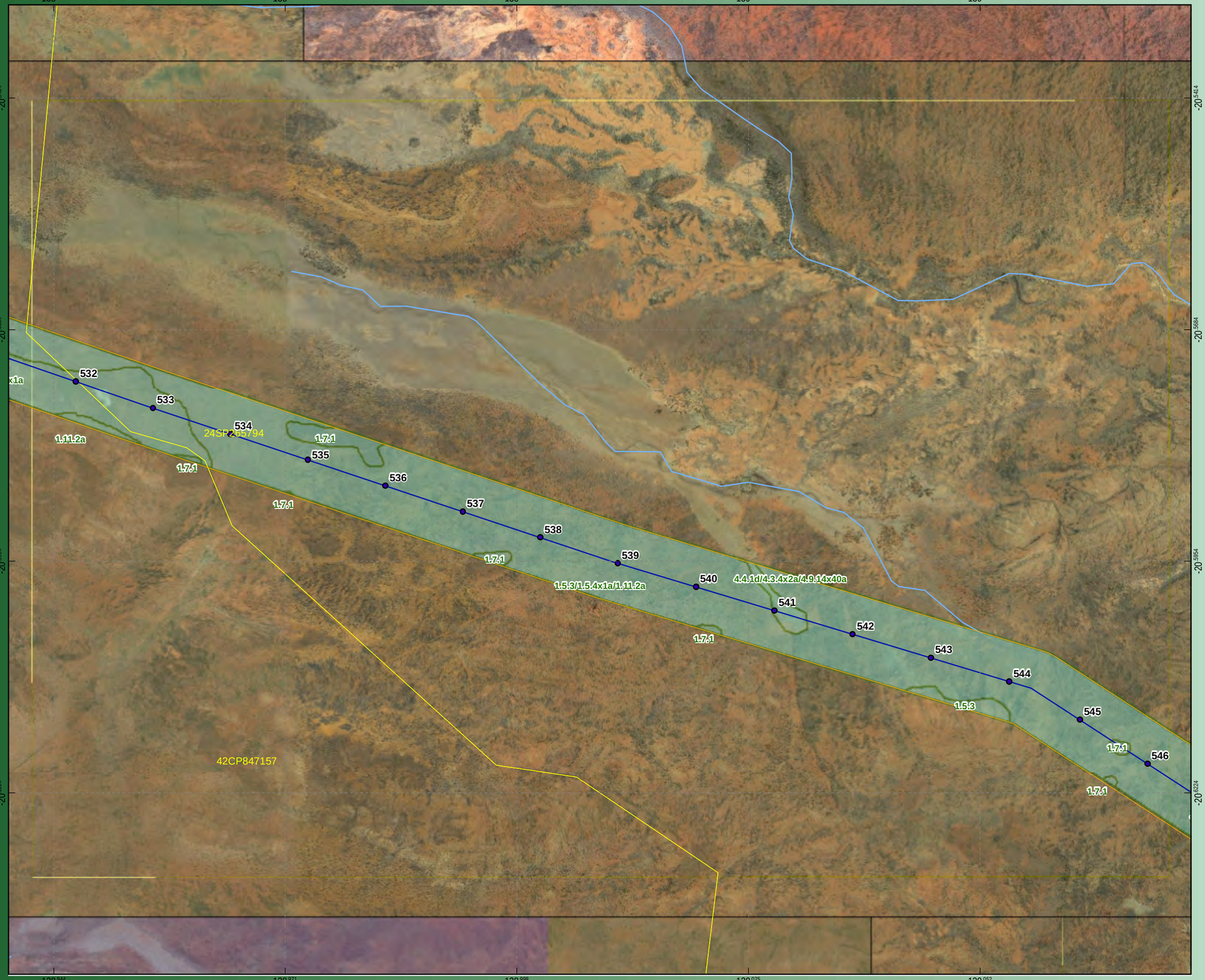


Flora and Fauna Assessment Report
NT Link (Queensland Portion)
CNC Project Management

Flora, vegetation and BioCondition survey sites

Figure 8 - 8

15 Jun 2015 Z:\GIS\ECO15_0002\GIS\Maps\Working (Optional)\v3\ECO15_0002_flora_08_tile7_8.mxd



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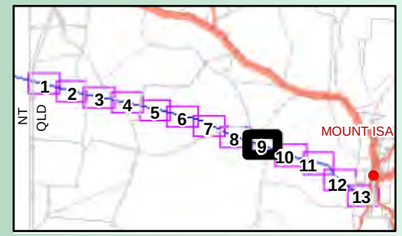

Flora and Fauna Assessment Report
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Flora, Vegetation and BioCondition survey sites

Figure 8 - 9

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Grid: GCS GDA 1994

Legend

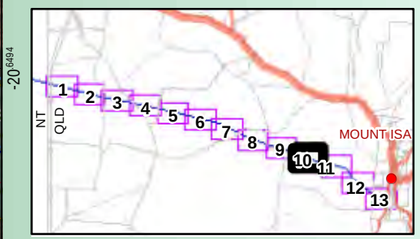
- Town, Locality
- Flora Site
- APA Alignment KPs
- State Boundary
- APA Alignment
- Alignment 500m buffer
- Watercourse
- Water body

RE (VM status)

- Least Concern RE
- Water

Road Network

- Highway
- Main Road
- Secondary Road
- Local Road
- Vehicular Road
- Private Road
- Proposed Road
- Unconstructed Road
- DCDB



Flora and Fauna Assessment Report
NT Link (Queensland Portion)
CNC Project Management

Flora, Vegetation and BioCondition survey sites

Figure 8 - 10

15 Jun 2015 Z:\GIS\ECO15_0002\GIS\Maps\Working (Optional)\v3\ECO15_0002_flora_08.mxd

Data source: DNRM: Vegetation management watercourse map (1:100000 and 1:250000) - version 1.3, Coastline and State Border (July 2014), Cadastre. DEHP: Biodiversity status of pre-clearing and remnant regional ecosystems - version 9.0 - 2013 - North West Qld, O2Ecology: Flora and Fauna Sites, GooglePro: Imagery. All other data supplied by CNC Project Management.

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ACN: 98 153 475 382 ABN: 153 475 382
www.o2ecology.com.au

N
W E
S

0 500 1,000 1,500 2,000
Metres

1:47,500 at A3

Horizontal Datum: GDA 1994
Grid: GCS GDA 1994

Legend

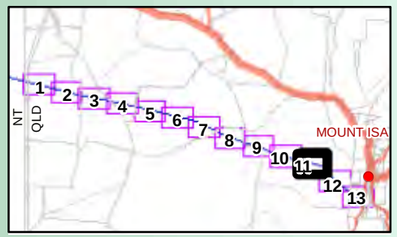
- Town, Locality
- Flora Site
- APA Alignment KPs
- State Boundary
- APA Alignment
- Alignment 500m buffer
- Watercourse
- Water body

RE (VM status)

- Least Concern RE
- Water

Road Network

- Highway
- Main Road
- Secondary Road
- Local Road
- Vehicular Road
- Private Road
- Proposed Road
- Unconstructed Road
- DCDB

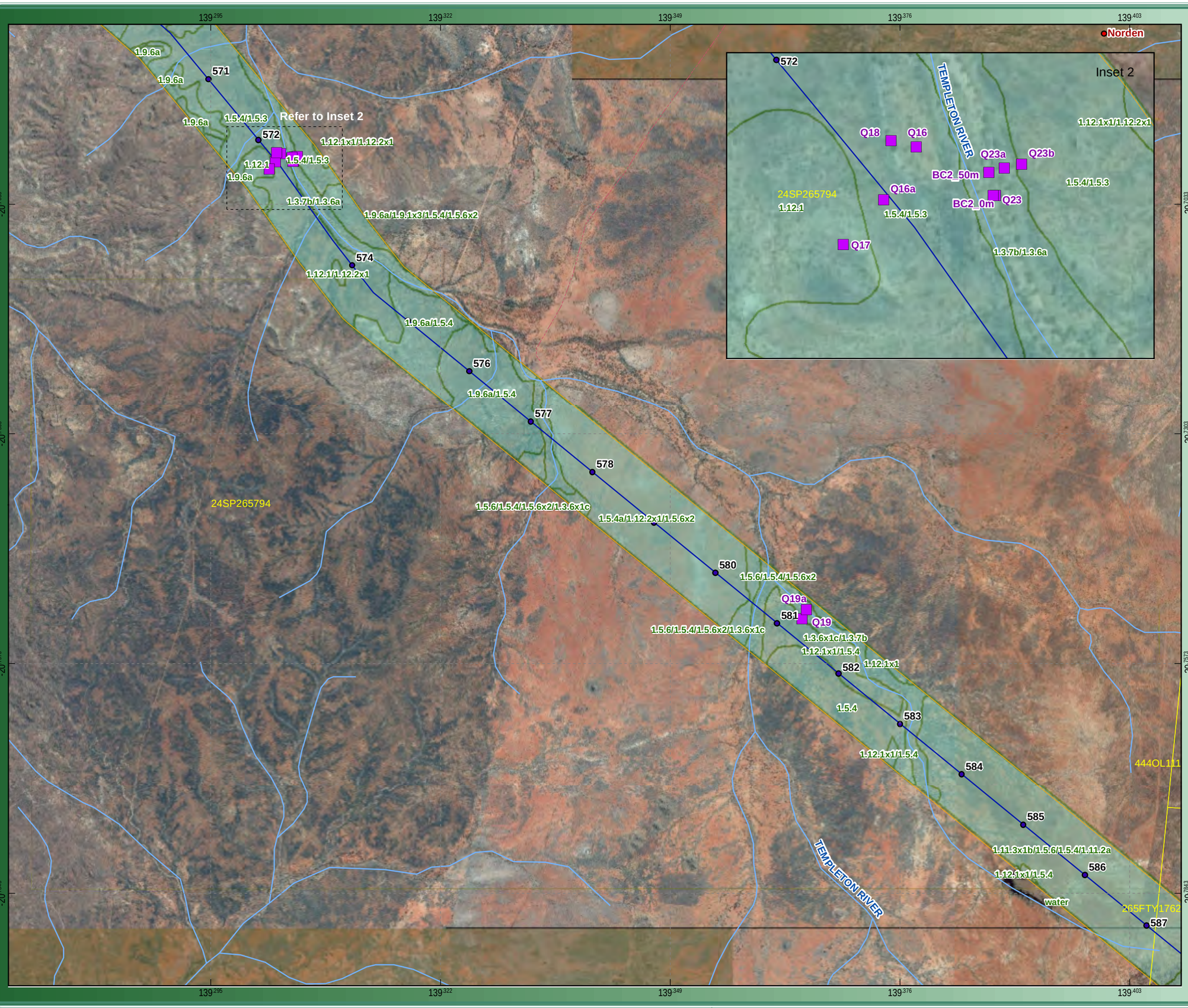


Flora and Fauna Assessment Report
NT Link (Queensland Portion)
CNC Project Managemen

Flora, vegetation and BioCondition survey sites

Figure 8 - 11

15 Jun 2015 Z:\GIS\ECO15_0002\GIS\Maps\Working (Optional)\v3\ECO15_0002_flora_08_tile11_12.mxd



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W E
S

0 500 1,000 1,500 2,000
Metres

1:47,500 at A3

Horizontal Datum: GDA 1994
Grid: GCS GDA 1994

Legend

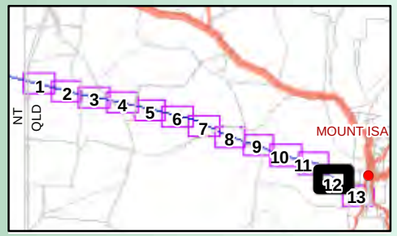
- Town, Locality
- Flora Site
- APA Alignment KPs
- State Boundary
- APA Alignment
- Alignment 500m buffer
- Watercourse
- Water body

RE (VM status)

- Least Concern RE
- Water

Road Network

- Highway
- Main Road
- Secondary Road
- Local Road
- Vehicular Road
- Private Road
- Proposed Road
- Unconstructed Road
- DCDB

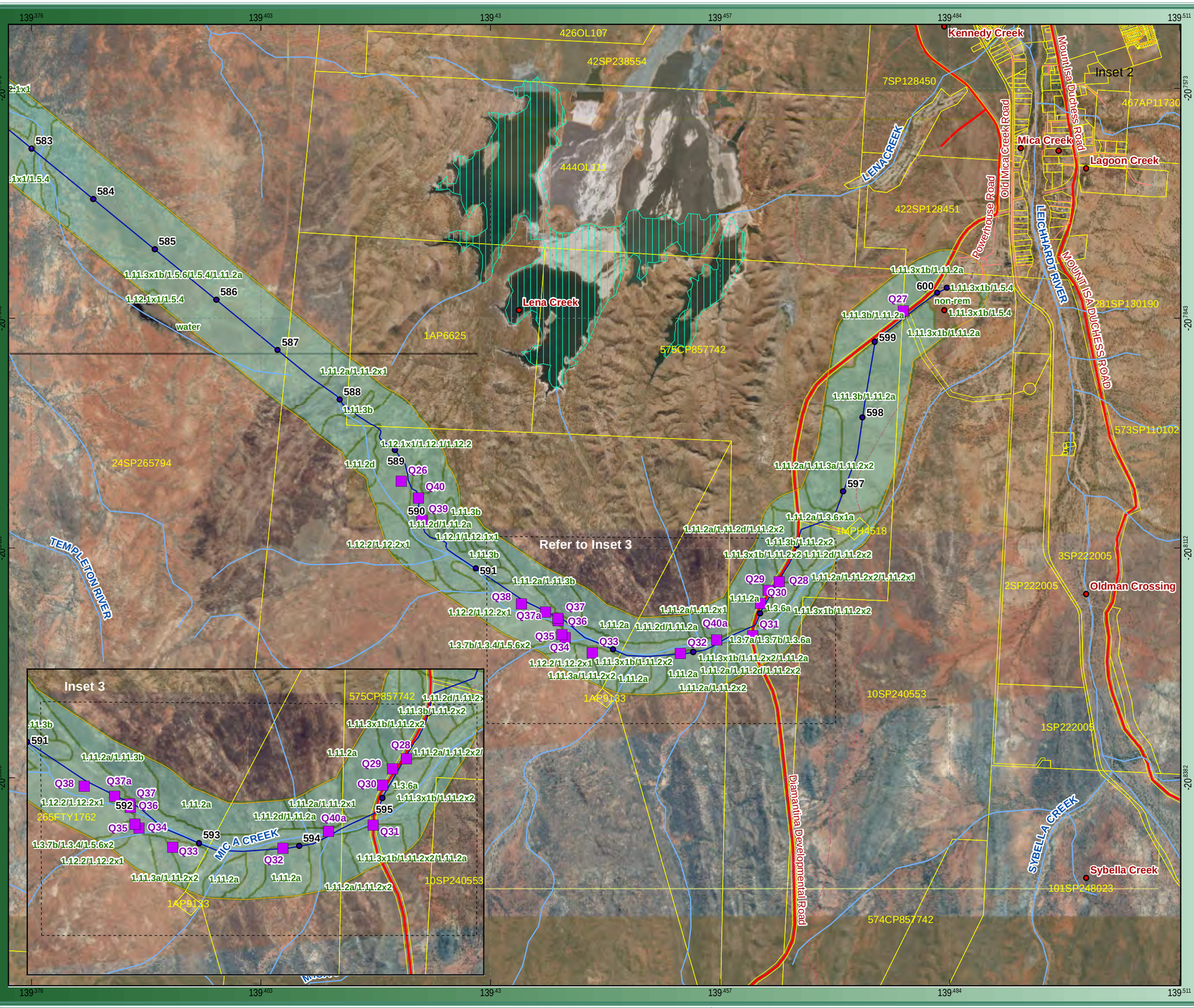


Flora and Fauna Assessment Report
NT Link (Queensland Portion)
CNC Project Management

Flora, vegetation and BioCondition survey sites

Figure 8 - 12

15 Jun 2015 Z:\GIS\EC015_0002\GIS\Maps\Working (Optional)\v3\EC015_0002_flora_08_tile11_12.mxd



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N W E S

0 500 1,000 1,500 2,000 Metres

1:47,500 at A3

Horizontal Datum: GDA 1994
Grid: GCS GDA 1994

Legend

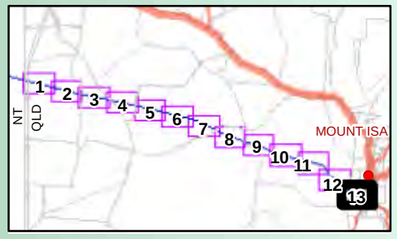
- Town, Locality
- Flora Site
- APA Alignment KPs
- State Boundary
- APA Alignment
- Alignment 500m buffer
- Watercourse
- Water body

RE (VM status)

- Least Concern RE
- Water

Road Network

- Highway
- Main Road
- Secondary Road
- Local Road
- Vehicular Road
- Private Road
- Proposed Road
- Unconstructed Road
- DCDB

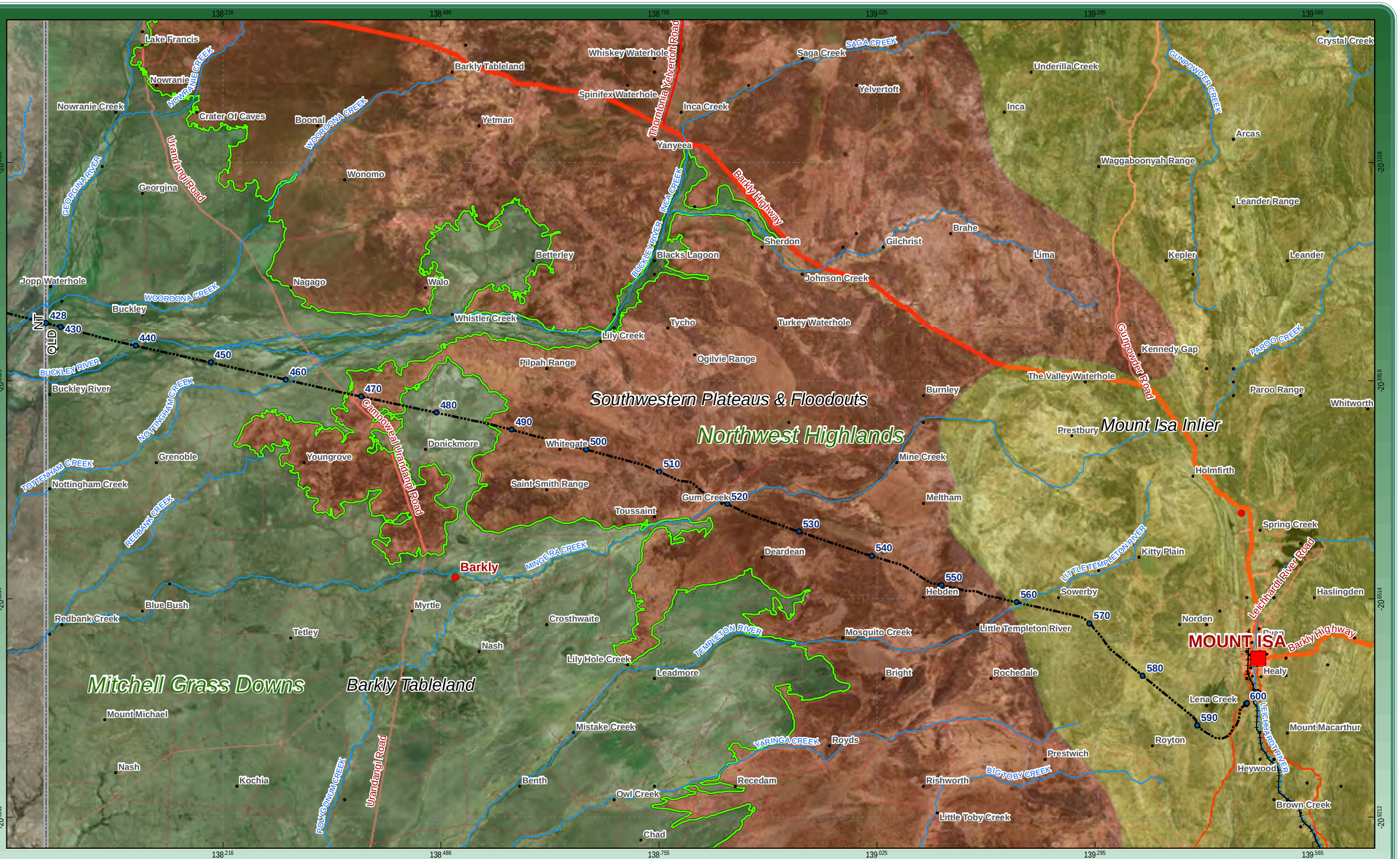


Flora and Fauna Assessment Report
NT Link (Queensland Portion)
CNC Project Management

Flora, vegetation and BioCondition survey sites

Figure 8 -13

15 Jun 2015 Z:\GIS\ECO15_0002\GIS\Maps\Working (Optional)\v3\ECO15_0002_flora_08_tile13.mxd



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0 4 8 12 16 20
Kilometers

1:485,000 at A3

Horizontal Datum: GDA 1994
Grid: GCS GDA 1994

Legend

- KP's (10km)
- Town, Locality
- Railway
- Major Watercourse
- State Boundary
- APA Alignment
- Bioregion

Qld Biosubregions

- Barkly Tableland
- Mount Isa Inlier
- Southwestern Plateaus & Floodouts

Road Network

- Highway
- Main Road
- Secondary Road
- Local Road
- Vehicular Road

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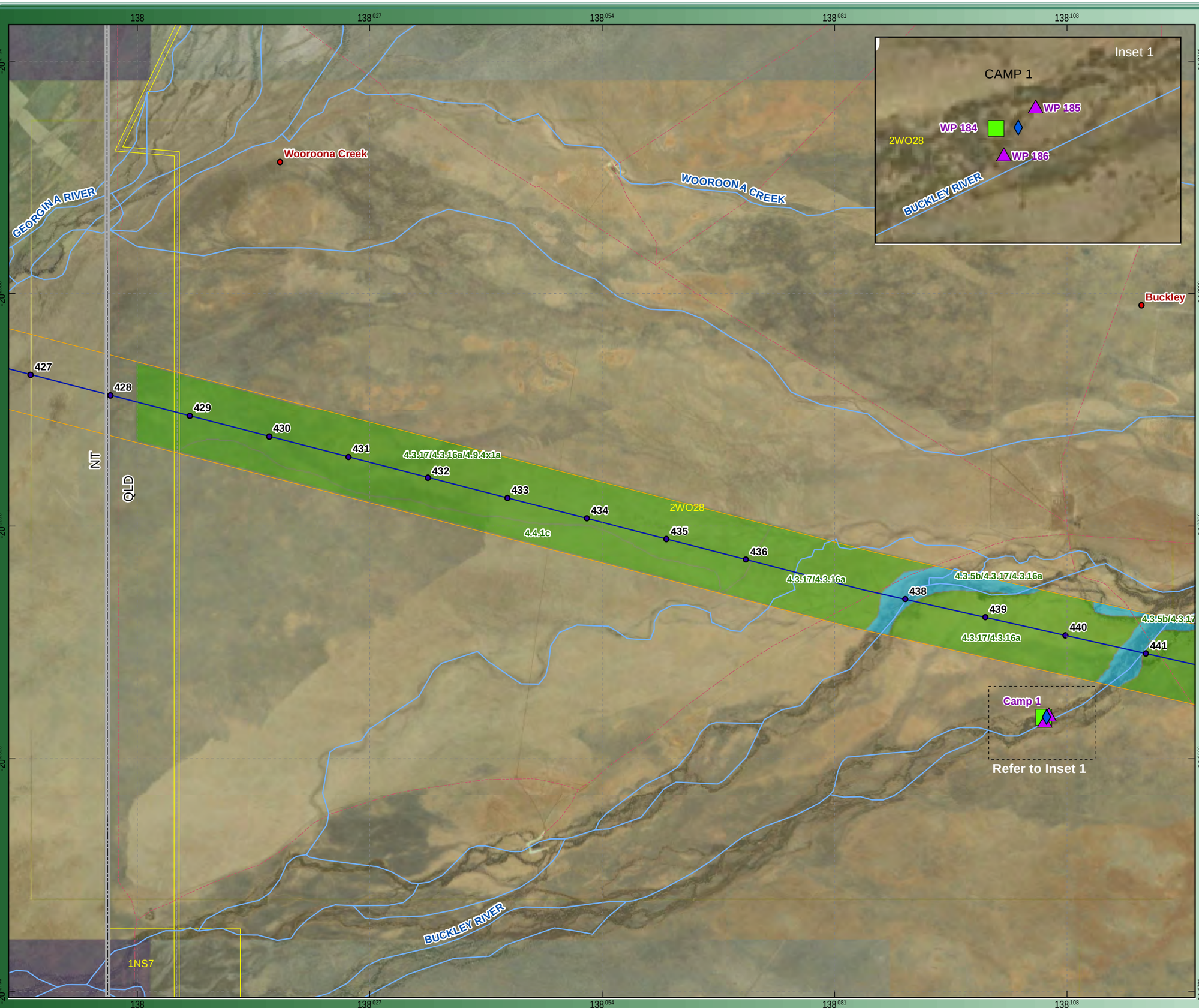
NT Link (Queensland Portion)
CNC Project Management

Qld Bioregions

Figure 9

15 Jun 2015 Z:\GIS\ECO15_0002\GIS\Maps\Working (Optional)\v3\ECO15_0002_bioregions_09.mxd



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N W E S

0 500 1,000 1,500 2,000 Metres

1:47,500 at A3

Horizontal Datum: GDA 1994
Grid: GCS GDA 1994

Legend

- Town, Locality
- APA Alignment KPs

Fauna Site

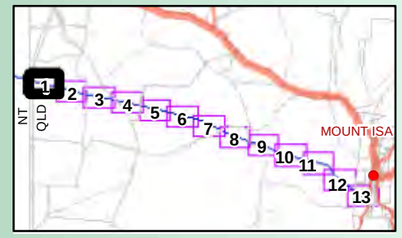
- Aquatic Sampling
- Anabat
- Trap Location
- Song Meter
- Camera
- Opportunistic
- State Boundary
- APA Alignment
- Alignment 500m buffer
- Watercourse
- Water body
- DCDB

Road Network

- Highway
- Main Road
- Secondary Road
- Local Road
- Vehicular Road
- Private Road
- Proposed Road
- Unconstructed Road

Habitat Type or Feature

- Ephemeral Waterway and Riparian Vegetation
- Hummock Grassland
- Palustrine Wetland
- Tussock Grassland
- Water
- Woodland or Shrubland
- Boulder Piles, Rocky Slope, Stoney Hills and Rock Outcrops



Flora and Fauna Assessment Report
NT Link (Queensland Portion)
CNC Project Management

Fauna
survey sites

Figure 10 - 1

22 Jun 2015 Z:\GIS\ECO15_0002\GIS\Maps\Working (Optional)\v4\ECO15_0002_fauna_10_tile1.mxd

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N W E S

0 500 1,000 1,500 2,000 Metres

1:47,500 at A3

Horizontal Datum: GDA 1994
Grid: GCS GDA 1994

Legend

- Town, Locality
- APA Alignment KPs

Fauna Site

- Aquatic Sampling
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Habitat Type or Feature

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- Hummock Grassland
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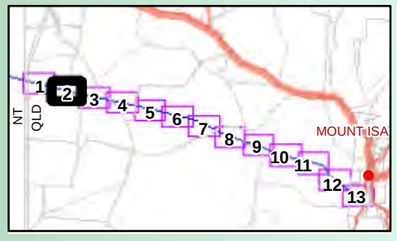
- Water
- Woodland or Shrubland
- Boulder Piles, Rocky Slope, Stoney Hills and Rock Outcrops



Flora and Fauna Assessment Report
NT Link (Queensland Portion)
CNC Project Management

Fauna
survey sites

Figure 10 - 2

22 Jun 2015 Z:\GIS\ECO15_0002\GIS\Maps\Working (Optional)\w4\ECO15_0002_fauna_10.mxd

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N
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0 500 1,000 1,500 2,000
Metres

1:47,500 at A3

Horizontal Datum: GDA 1994
Grid: GCS GDA 1994

Legend

- Town, Locality
- APA Alignment KPs

Fauna Site

- Aquatic Sampling
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Habitat Type or Feature

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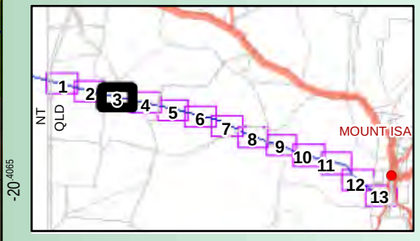

Flora and Fauna Assessment Report
NT Link (Queensland Portion)
CNC Project Management

Fauna
survey sites

Figure 10 - 3

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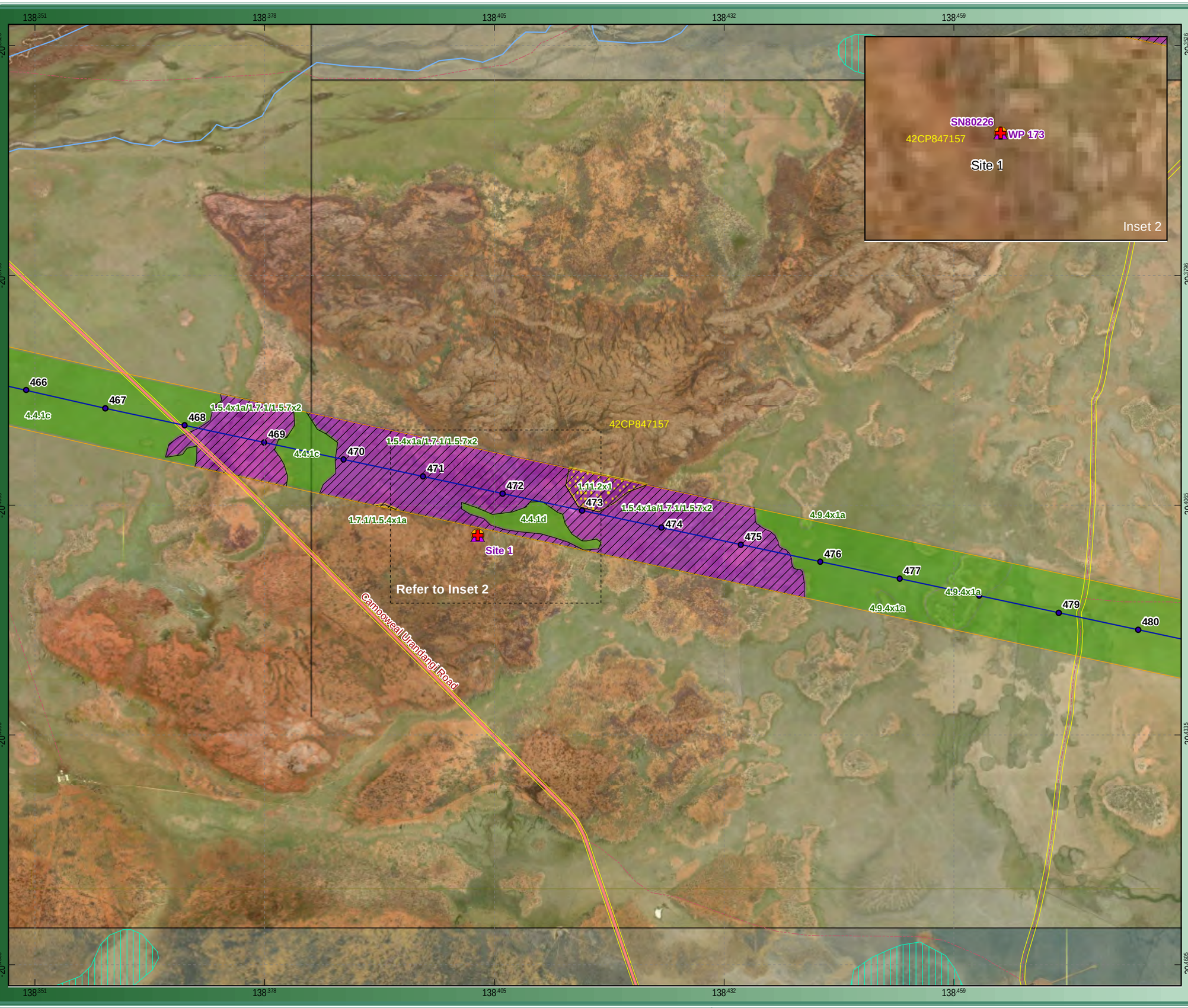
22 Jun 2015



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N W E S

0 500 1,000 1,500 2,000 Metres

1:47,500 at A3

Horizontal Datum: GDA 1994
Grid: GCS GDA 1994

Legend

- Town, Locality
- APA Alignment KPs

Fauna Site

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Habitat Type or Feature

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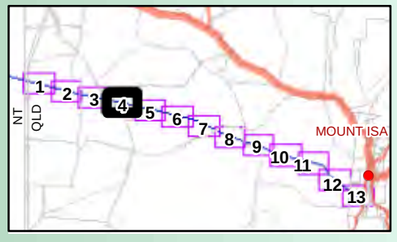
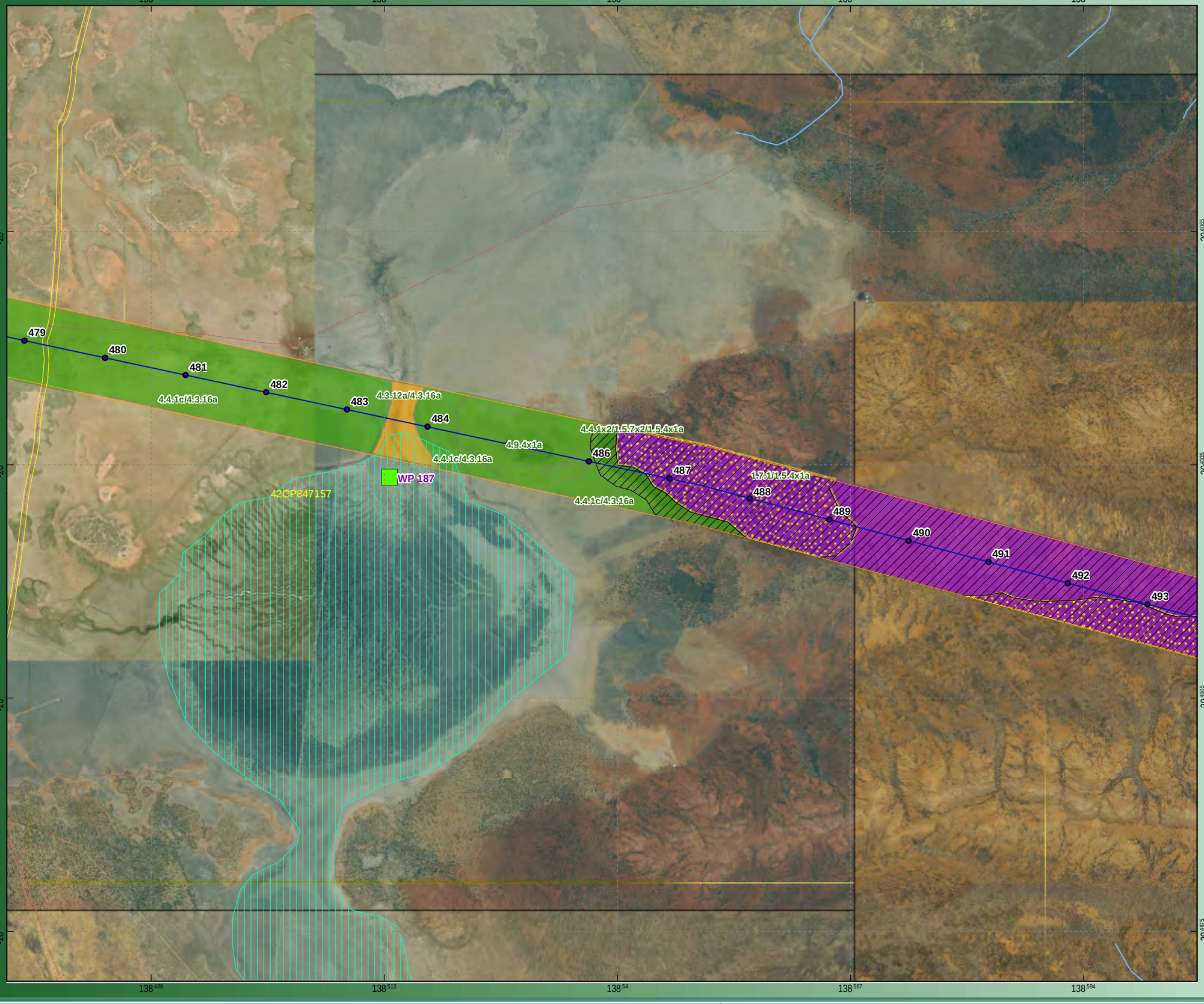


Flora and Fauna Assessment Report
NT Link (Queensland Portion)
CNC Project Management

Fauna
survey sites

Figure 10 - 4

22 Jun 2015 Z:\GIS\ECO15_0002\GIS\Maps\Working (Optional)\v4\ECO15_0002_fauna_10_tile4.mxd



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N W E S

0 500 1,000 1,500 2,000 Metres

1:47,500 at A3

Horizontal Datum: GDA 1994
Grid: GCS GDA 1994

Legend

- Town, Locality
- APA Alignment KPs

Fauna Site

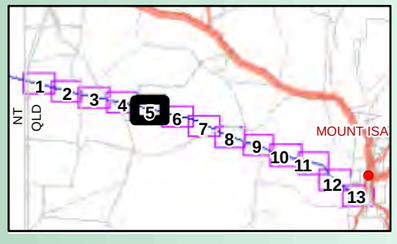
- Aquatic Sampling
- Anabat
- Trap Location
- Song Meter
- Camera
- Opportunistic
- State Boundary
- APA Alignment
- Alignment 500m buffer
- Watercourse
- Water body
- DCDB

Road Network

- Highway
- Main Road
- Secondary Road
- Local Road
- Vehicular Road
- Private Road
- Proposed Road
- Unconstructed Road

Habitat Type or Feature

- Ephemeral Waterway and Riparian Vegetation
- Hummock Grassland
- Palustrine Wetland
- Tussock Grassland
- Water
- Woodland or Shrubland
- Boulder Piles, Rocky Slope, Stoney Hills and Rock Outcrops



Flora and Fauna Assessment Report
NT Link (Queensland Portion)
CNC Project Management

Fauna
survey sites

Figure 10 - 5

22 Jun 2015 Z:\GIS\ECO15_0002\GIS\Maps\Working (Optional)\v4\ECO15_0002_fauna_10.mxd

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N W E S

0 500 1,000 1,500 2,000 Metres

1:47,500 at A3

Horizontal Datum: GDA 1994
Grid: GCS GDA 1994

Legend

- Town, Locality
- APA Alignment KPs

Fauna Site

- Aquatic Sampling
- Anabat
- Trap Location
- Song Meter
- Camera
- Opportunistic
- State Boundary
- APA Alignment
- Alignment 500m buffer
- Watercourse
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Road Network

- Highway
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- Unconstructed Road

Habitat Type or Feature

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- Hummock Grassland
- Palustrine Wetland
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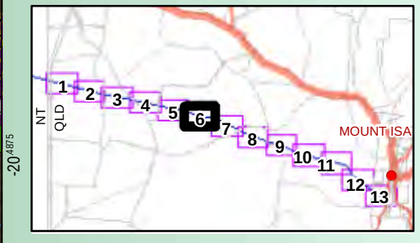
- Water
- Woodland or Shrubland
- Boulder Piles, Rocky Slope, Stoney Hills and Rock Outcrops



Flora and Fauna Assessment Report
NT Link (Queensland Portion)
CNC Project Management

Fauna
survey sites

Figure 10 - 6

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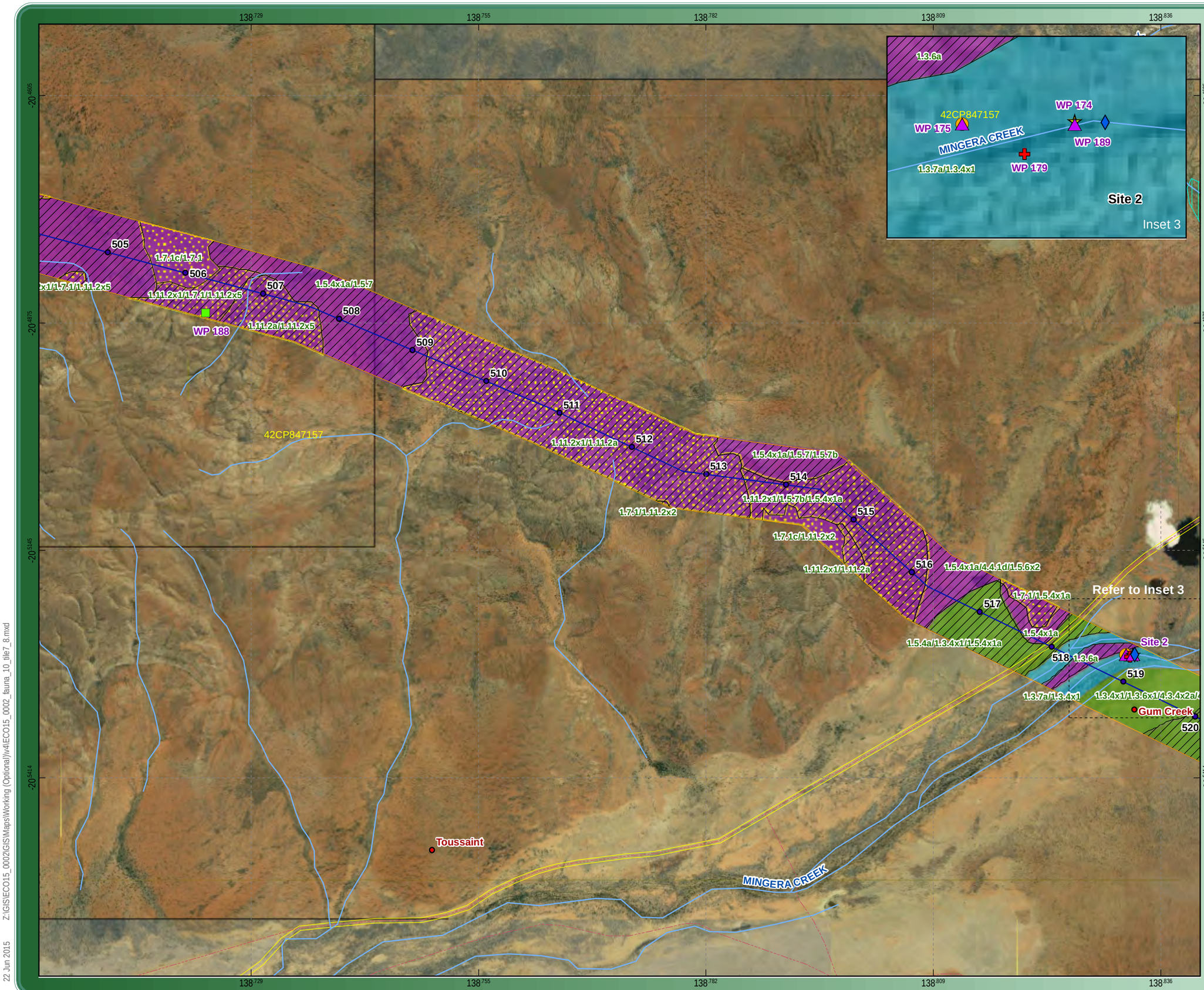
22 Jun 2015



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www.o2ecology.com.au

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0 500 1,000 1,500 2,000
Metres

1:47,500 at A3

Horizontal Datum: GDA 1994
Grid: GCS GDA 1994

Legend

- Town, Locality
- APA Alignment KPs

Fauna Site

- Aquatic Sampling
- Anabat
- Trap Location
- Song Meter
- Camera
- Opportunistic
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- Watercourse
- Water body
- DCDB

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Habitat Type or Feature

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- Hummock Grassland
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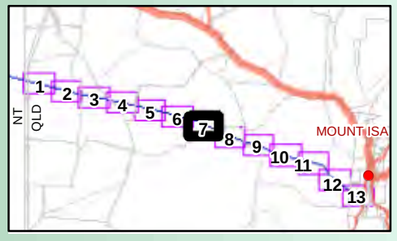

Flora and Fauna Assessment Report
NT Link (Queensland Portion)
CNC Project Management

Fauna
survey sites

Figure 10 - 7

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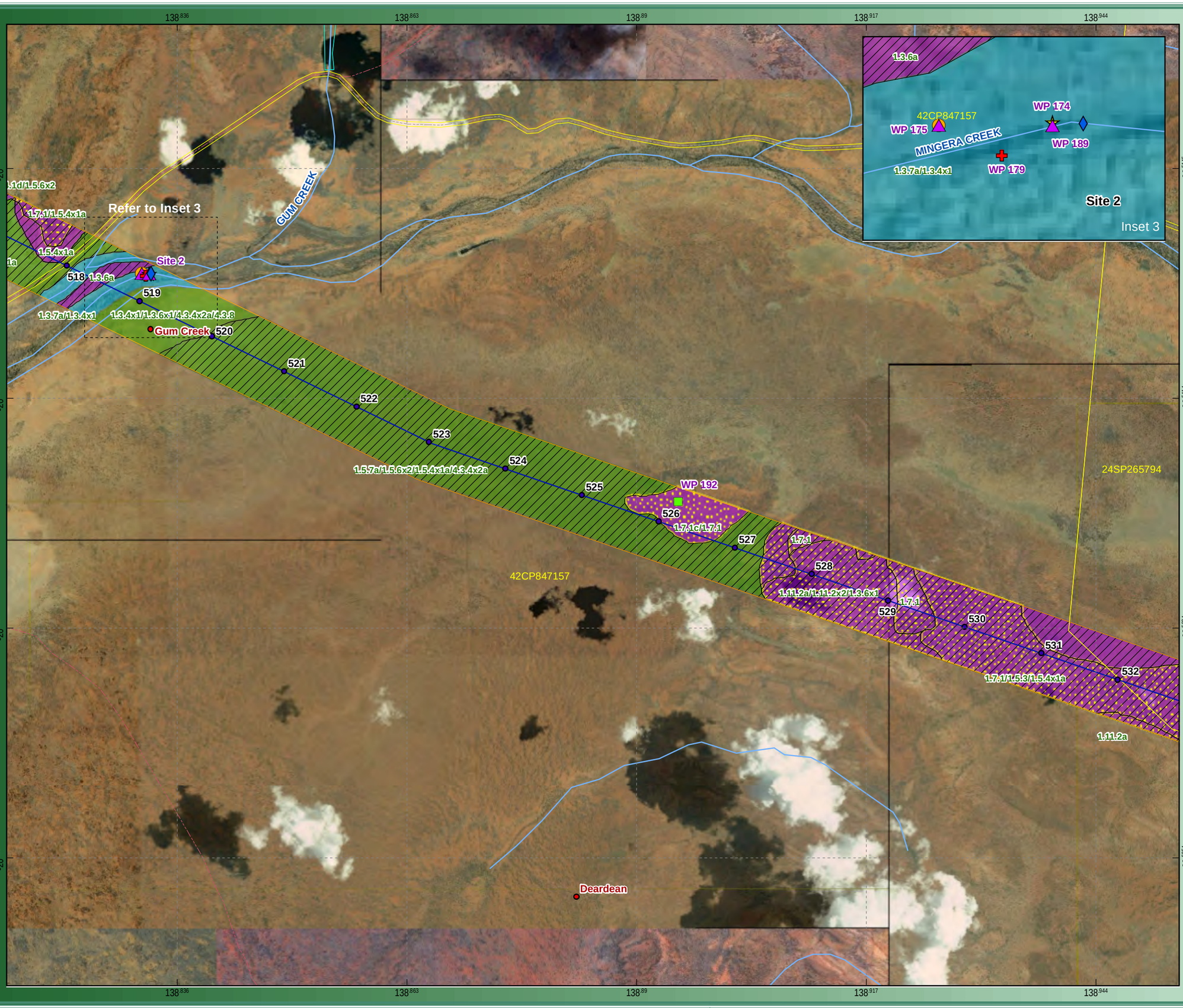
22 Jun 2015



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ACN: 98 153 475 382 ABN: 153 475 382
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N
W E
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0 500 1,000 1,500 2,000
Metres

1:47,500 at A3

Horizontal Datum: GDA 1994
Grid: GCS GDA 1994

Legend

- Town, Locality
- APA Alignment KPs

Fauna Site

- Aquatic Sampling
- Anabat
- Trap Location
- Song Meter
- Camera
- Opportunistic
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- APA Alignment
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- Watercourse
- Water body
- DCDB

Road Network

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- Vehicular Road
- Private Road
- Proposed Road
- Unconstructed Road

Habitat Type or Feature

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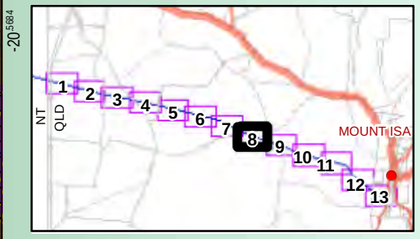
- Boulder Piles, Rocky Slope, Stoney Hills and Rock Outcrops



Flora and Fauna Assessment Report
NT Link (Queensland Portion)
CNC Project Management

Fauna
survey sites

Figure 10 - 8

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N W E S

0 500 1,000 1,500 2,000 Metres

1:47,500 at A3

Horizontal Datum: GDA 1994
Grid: GCS GDA 1994

Legend

- Town, Locality
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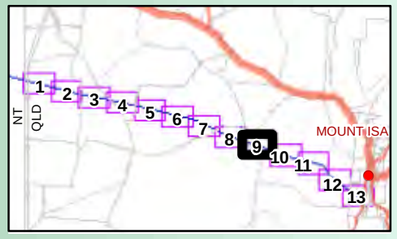

Flora and Fauna Assessment Report
NT Link (Queensland Portion)
CNC Project Management

Fauna survey sites

Figure 10 - 9

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t (07) 5448 3288
ACN: 98 153 475 382 ABN: 153 475 382
www.o2ecology.com.au

N W E S

0 500 1,000 1,500 2,000 Metres

1:47,500 at A3

Horizontal Datum: GDA 1994
Grid: GCS GDA 1994

Legend

- Town, Locality
- APA Alignment KPs

Fauna Site

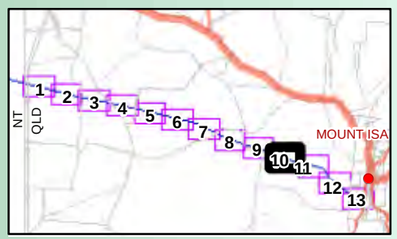
- Aquatic Sampling
- Anabat
- Trap Location
- Song Meter
- Camera
- Opportunistic
- State Boundary
- APA Alignment
- Alignment 500m buffer
- Watercourse
- Water body
- DCDB

Road Network

- Highway
- Main Road
- Secondary Road
- Local Road
- Vehicular Road
- Private Road
- Proposed Road
- Unconstructed Road

Habitat Type or Feature

- Ephemeral Waterway and Riparian Vegetation
- Hummock Grassland
- Palustrine Wetland
- Tussock Grassland
- Water
- Woodland or Shrubland
- Boulder Piles, Rocky Slope, Stoney Hills and Rock Outcrops

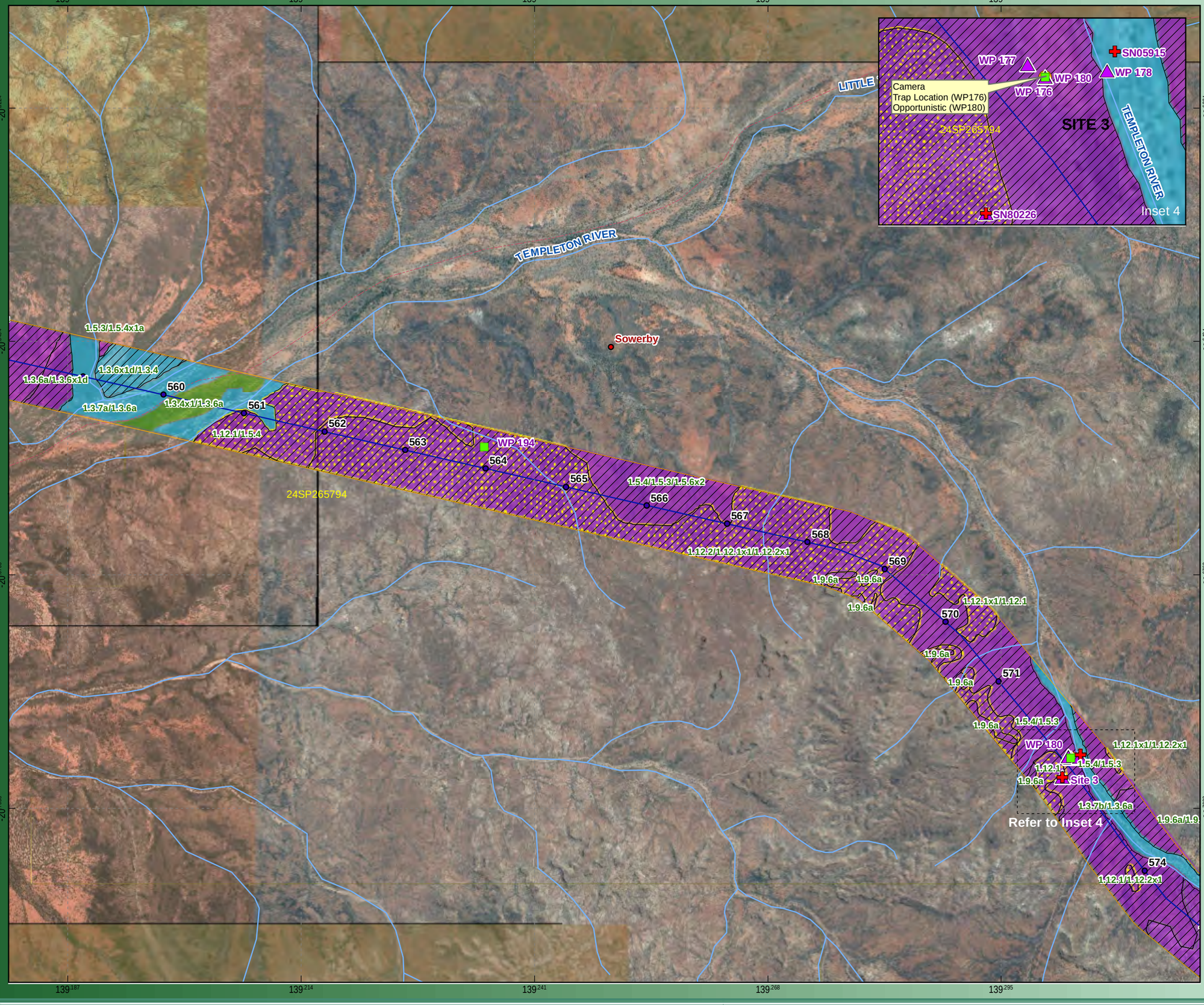


Flora and Fauna Assessment Report
NT Link (Queensland Portion)
CNC Project Management

Fauna
survey sites

Figure 10 - 10

22 Jun 2015 Z:\GIS\EC015_0002\GIS\Maps\Working (Optional)\w4\EC015_0002_fauna_10.mxd



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N W E S

0 500 1,000 1,500 2,000 Metres

1:47,500 at A3

Horizontal Datum: GDA 1994
Grid: GCS GDA 1994

Legend

- Town, Locality
- APA Alignment KPs

Fauna Site

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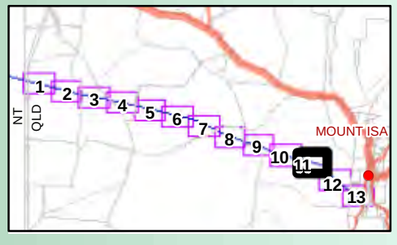
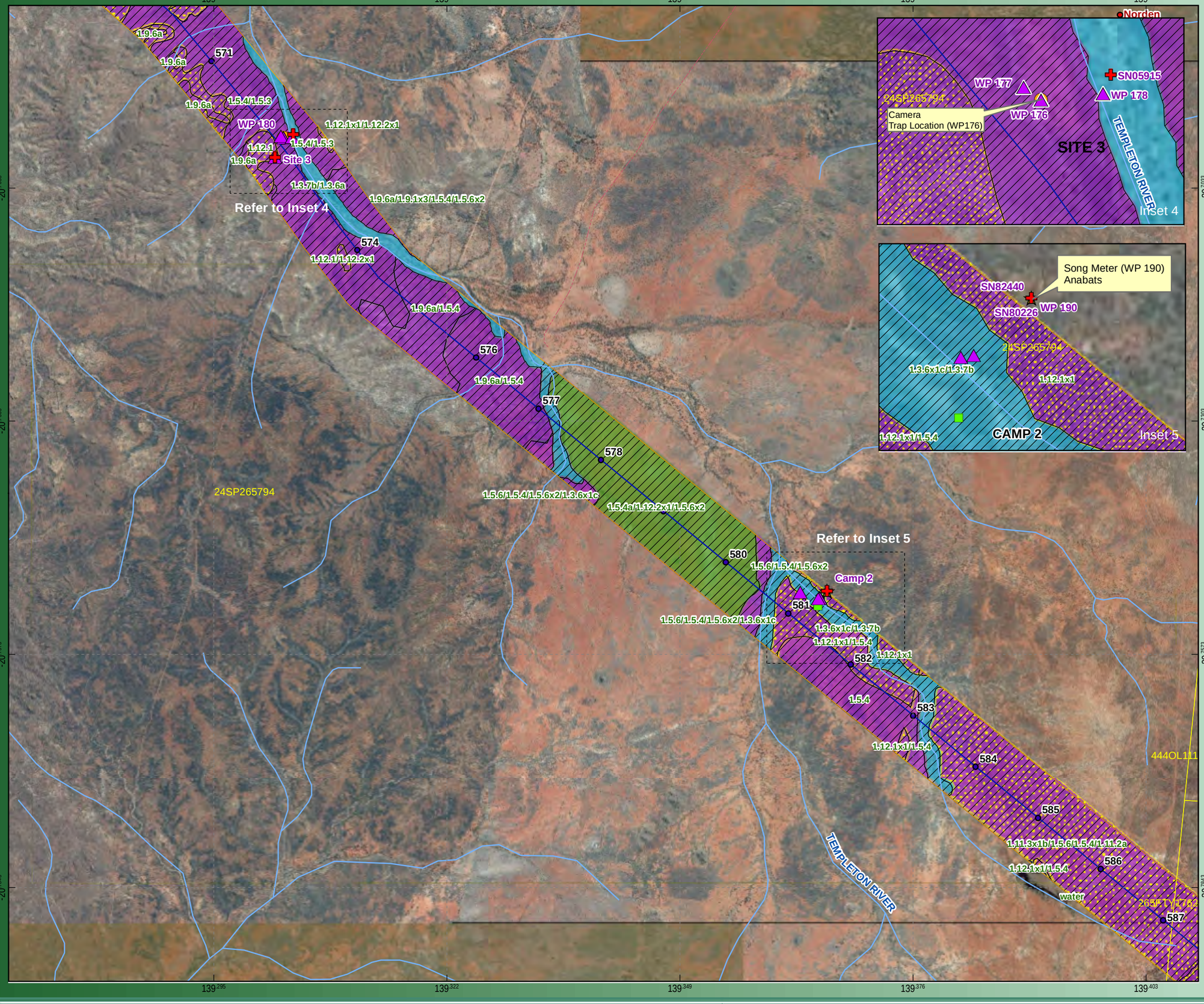


Flora and Fauna Assessment Report
NT Link (Queensland Portion)
CNC Project Management

Fauna
survey sites

Figure 10 - 11

22 Jun 2015 Z:\GIS\EC015_0002\GIS\Maps\Working (Optional)\v4\EC015_0002_fauna_10_tile11.mxd



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N
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0 500 1,000 1,500 2,000
Metres

1:47,500 at A3

Horizontal Datum: GDA 1994
Grid: GCS GDA 1994

Legend

- Town, Locality
- APA Alignment KPs

Fauna Site

- Aquatic Sampling
- Anabat
- Trap Location
- Song Meter
- Camera
- Opportunistic
- State Boundary
- APA Alignment
- Alignment 500m buffer
- Watercourse
- Water body
- DCDB

Road Network

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- Private Road
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- Unconstructed Road

Habitat Type or Feature

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- Hummock Grassland
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- Tussock Grassland
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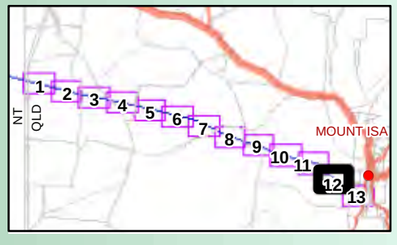
- Woodland or Shrubland
- Boulder Piles, Rocky Slope, Stoney Hills and Rock Outcrops

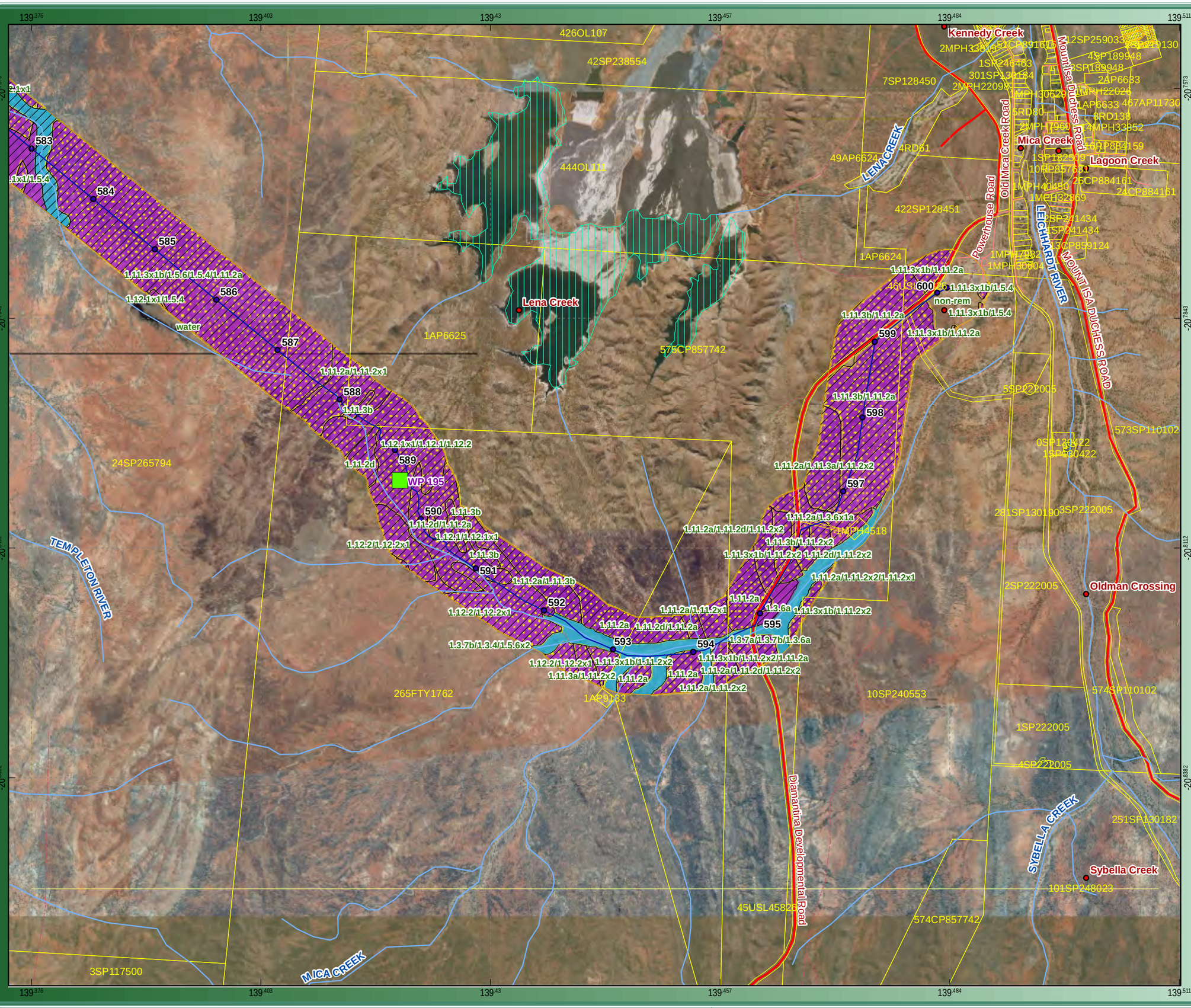


Flora and Fauna Assessment Report
NT Link (Queensland Portion)
CNC Project Management

Fauna
survey sites

Figure 10 -12

22 Jun 2015 Z:\GIS\EC015_0002\GIS\Maps\Working (Optional)\v4\EC015_0002_fauna_10_tile12.mxd



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N W E S

0 500 1,000 1,500 2,000 Metres

1:47,500 at A3

Horizontal Datum: GDA 1994
Grid: GCS GDA 1994

Legend

- Town, Locality
- APA Alignment KPs

Fauna Site

- Aquatic Sampling
- Anabat
- Trap Location
- Song Meter
- Camera
- Opportunistic

- State Boundary
- APA Alignment
- Alignment 500m buffer
- Watercourse
- Water body
- DCDB

Road Network

- Highway
- Main Road
- Secondary Road
- Local Road
- Vehicular Road
- Private Road
- Proposed Road
- Unconstructed Road

Habitat Type or Feature

- Ephemeral Waterway and Riparian Vegetation
- Hummock Grassland
- Palustrine Wetland
- Tussock Grassland
- Water
- Woodland or Shrubland
- Boulder Piles, Rocky Slope, Stoney Hills and Rock Outcrops

Flora and Fauna Assessment Report
NT Link (Queensland Portion)
CNC Project Management

Fauna
survey sites

Figure 10 - 13

22 Jun 2015 Z:\GIS\EC015_0002\GIS\Maps\Working (Optional)\v4\EC015_0002_fauna_10.mxd

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0 4 8 12 16 20
Kilometers

1:485,000 at A3

Horizontal Datum: GDA 1994
Grid: GCS GDA 1994

Legend

- KP's (10km)
- Town, Locality
- Railway
- State Boundary
- APA Alignment

Road Network

- Highway
- Main Road
- Secondary Road
- Local Road
- Vehicular Road
- DCDB

Matters of State Environmental Significance

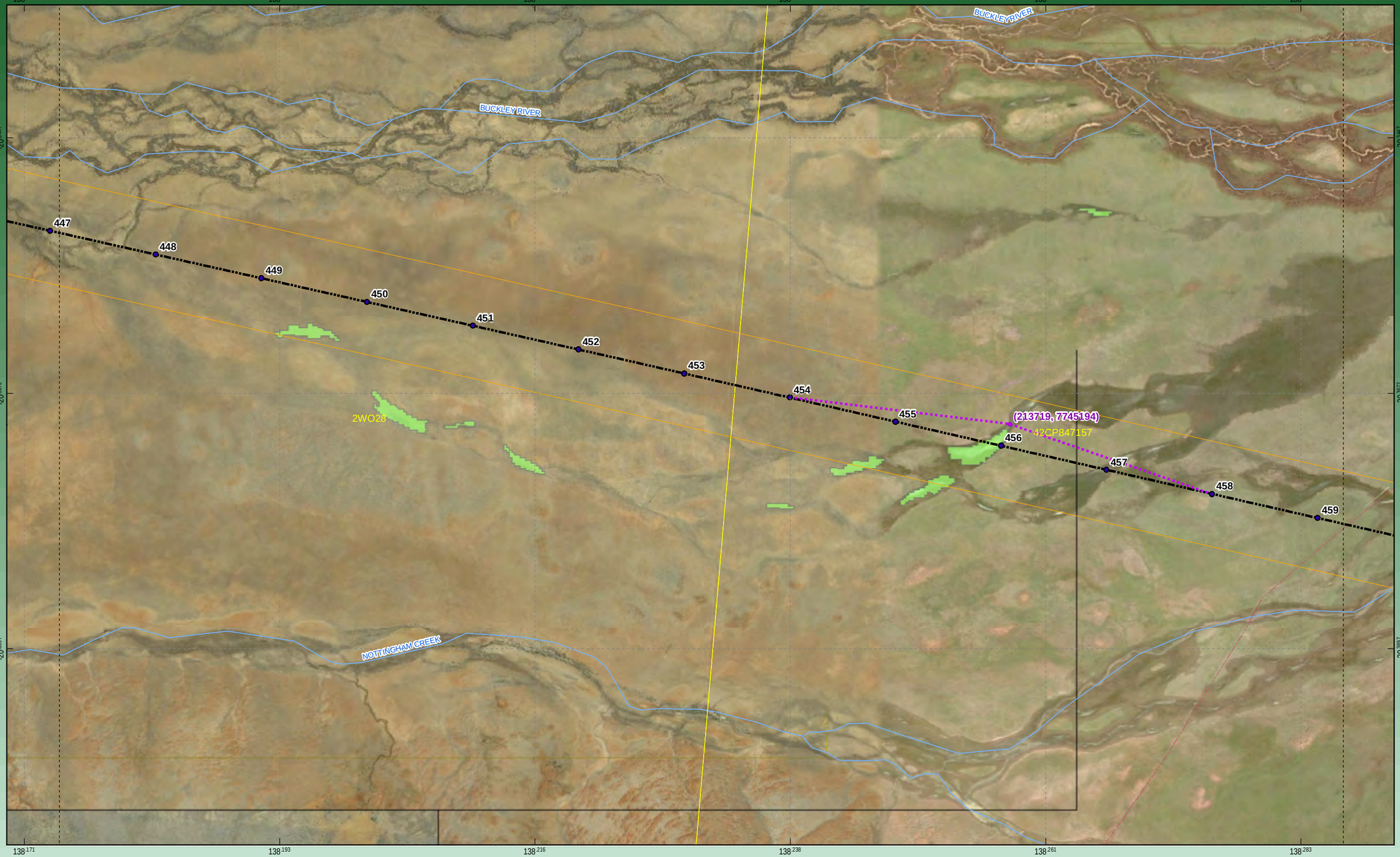
- MSES - Regulated vegetation (intersecting a watercourse)
- Protected Areas
- Essential Habitat
- MSES - Regulated vegetation (VM wetlands)

Flora and Fauna Assessment Report
NT Link (Queensland Portion)
CNC Project Management

Matters of State Environmental Significance

Figure 11

15 Jun 2015 Z:\GIS\ECO15_0002\GIS\Maps\Working (Optional)\v3\ECO15_0002_mses_11.mxd



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N
W E
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0 0.3 0.6 0.9 1.2 1.5
Kilometers

1:35,000 at A3

Horizontal Datum: GDA 1994
Grid: GCS GDA 1994

Legend

- Town, Locality
- Railway
- State Boundary
- APA Alignment
- Realignment
- Alignment 500m buffer

Road Network

- Highway
- Main Road
- Secondary Road
- Local Road
- Vehicular Road
- DCDB

Matters of State Environmental Significance

- MSES - Regulated vegetation (intersecting a watercourse)
- Protected Areas
- Essential Habitat
- MSES - Regulated vegetation (VM wetlands)

Preliminary Ecological Surveys (QLD) NT Link
CNC Project Management

Alignment Revision
Request to Avoid MSES Wetland 22 June 2015

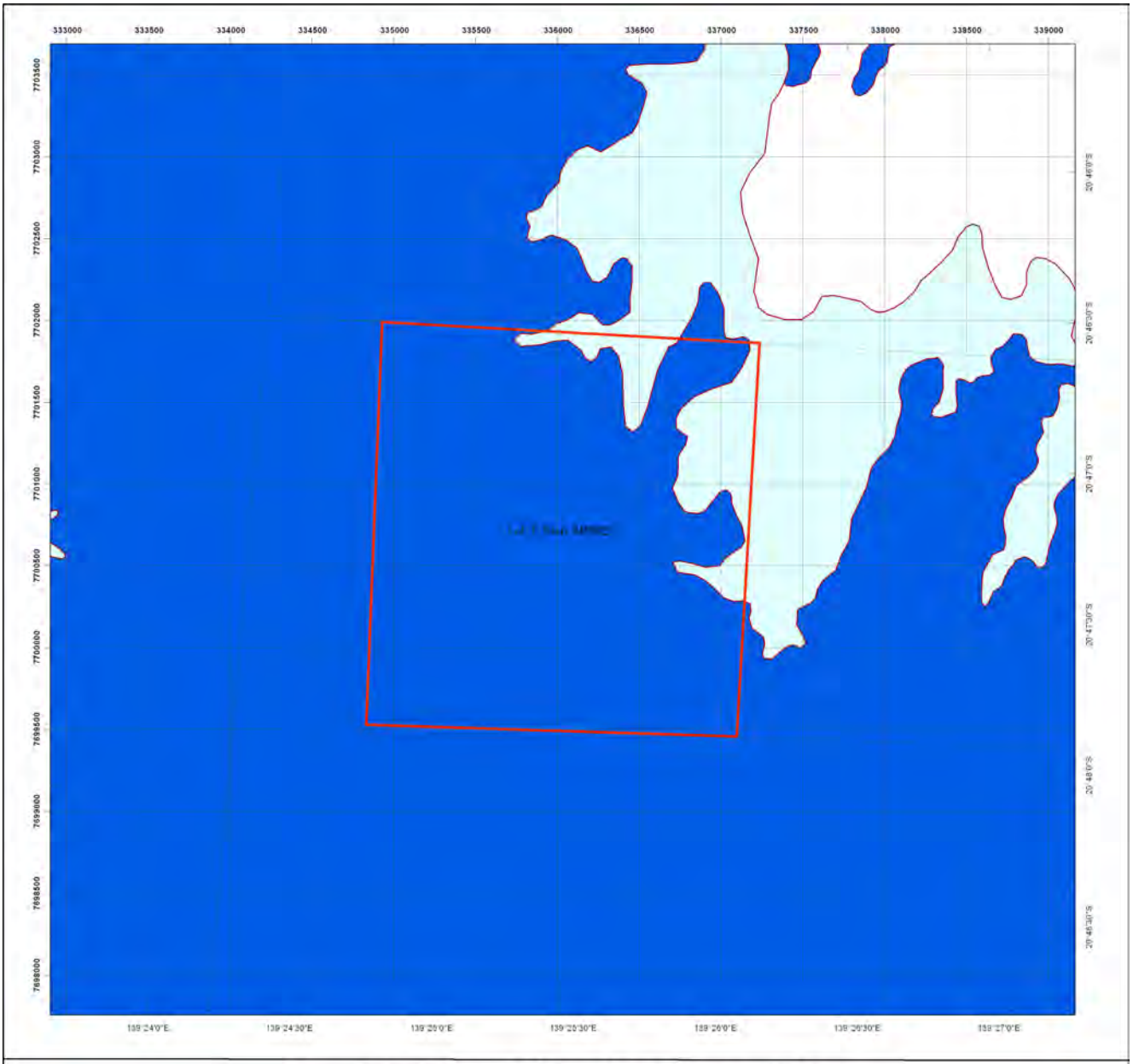
Figure 12

24 Jun 2015 Z:\GIS\ECO15_0002\GIS\Maps\Working (Optional)\v4\ECO15_0002_realignment_12.mxd

Appendix B Desktop Search Results

Bird list for one degree square containing the point 138.31678, -20.3407			
Bird list for one degree square containing the point 139.02848, -20.62864			
Common Name	**Scientific Name**	**Common Name**	**Scientific Name**
Spiny-cheeked Honeyeater	Acanthagenys rufogularis	Torresian Crow	Corvus orru
Inland Thornbill	Acanthiza apicalis	Stubble Quail	Coturnix pectoralis
Yellow-rumped Thornbill	Acanthiza chrysorrhoa	Brown Quail	Coturnix ypsilophora
Tasmanian Thornbill	Acanthiza ewingii	Pied Butcherbird	Cracticus nigrogularis
Collared Sparrowhawk	Accipiter cirrocephalus	Australian Magpie	Cracticus tibicen
Brown Goshawk	Accipiter fasciatus	Grey Butcherbird	Cracticus torquatus
Australian Reed-Warbler	Acrocephalus australis	Black Swan	Cygnus atratus
Common Sandpiper	Actitis hypoleucos	Blue-winged Kookaburra	Dacelo leachii
Australian Owlet-nightjar	Aegotheles cristatus	Varied Sittella	Daphoenositta chrysoptera
Kalkadoon Grasswren	Amytornis ballarae	Wandering Whistling-Duck	Dendrocygna arcuata
Carpentarian Grasswren	Amytornis dorotheae	Plumed Whistling-Duck	Dendrocygna eytoni
Chestnut Teal	Anas castanea	Mistletoebird	Dicaeum hirundinaceum
Grey Teal	Anas gracilis	Emu	Dromaius novaehollandiae
Australasian Shoveler	Anas rhynchotis	Little Egret	Egretta garzetta
Pacific Black Duck	Anas superciliosa	White-faced Heron	Egretta novaehollandiae
Australasian Darter	Anhinga novaehollandiae	Black-shouldered Kite	Elanus axillaris
Magpie Goose	Anseranas semipalmata	Black-fronted Dotterel	Elseyornis melanops
Australasian Pipit	Anthus novaeseelandiae	Painted Finch	Emblema pictum
Red-winged Parrot	Aprosmictus erythropterus	Blue-faced Honeyeater	Entomyzon cyanotis
Wedge-tailed Eagle	Aquila audax	Galah	Eolophus roseicapillus
Cattle Egret	Ardea ibis	Black-necked Stork	Ephippiorhynchus asiaticus
Intermediate Egret	Ardea intermedia	Orange Chat	Epthianura aurifrons
Eastern Great Egret	Ardea modesta	Yellow Chat	Epthianura crocea
White-necked Heron	Ardea pacifica	Crimson Chat	Epthianura tricolor
Australian Bustard	Ardeotis australis	Spinifexbird	Eremiornis carteri
Black-faced Woodswallow	Artamus cinereus	Red-kneed Dotterel	Erythrogonys cinctus
White-breasted Woodswallow	Artamus leucorynchus	Gouldian Finch	Erythrura gouldiae
Little Woodswallow	Artamus minor	Eastern Koel	Eudynamys orientalis
Masked Woodswallow	Artamus personatus	Spotted Nightjar	Eurostopodus argus
White-browed Woodswallow	Artamus superciliosus	Dollarbird	Eurystomus orientalis
Hardhead	Aythya australis	Brown Falcon	Falco berigora
Australian Ringneck	Barnardius zonarius	Nankeen Kestrel	Falco cenchroides
Musk Duck	Biziura lobata	Grey Falcon	Falco hypoleucos
Bush Stone-curlew	Burhinus grallarius	Australian Hobby	Falco longipennis
Sulphur-crested Cockatoo	Cacatua galerita	Peregrine Falcon	Falco peregrinus
Little Corella	Cacatua sanguinea	Black Falcon	Falco subniger
Pallid Cuckoo	Cacomantis pallidus	Eurasian Coot	Fulica atra
Brush Cuckoo	Cacomantis variolosus	Latham's Snipe	Gallinago hardwickii
Sharp-tailed Sandpiper	Calidris acuminata	Swinhoe's Snipe	Gallinago megala
Curlew Sandpiper	Calidris ferruginea	Dusky Moorhen	Gallinula tenebrosa
Red-necked Stint	Calidris ruficollis	Buff-banded Rail	Gallirallus philippensis
Long-toed Stint	Calidris subminuta	Gull-billed Tern	Gelochelidon nilotica
Red-tailed Black-Cockatoo	Calyptorhynchus banksii	Diamond Dove	Geopelia cuneata
Pheasant Coucal	Centropus phasianinus	Bar-shouldered Dove	Geopelia humeralis
Pied Honeyeater	Certhionyx variegatus	Peaceful Dove	Geopelia striata
Azure Kingfisher	Ceyx azureus	Spinifex Pigeon	Geophaps plumifera
Horsfield's Bronze-Cuckoo	Chalcites basalis	Western Gerygone	Gerygone fusca
Black-eared Cuckoo	Chalcites osculans	Magpie-lark	Grallina cyanoleuca
Red-capped Plover	Charadrius ruficapillus	Painted Honeyeater	Grantiella picta
Oriental Plover	Charadrius veredus	Brolga	Grus rubicunda
Australian Wood Duck	Chenonetta jubata	White-bellied Sea-Eagle	Haliaeetus leucogaster
Whiskered Tern	Chlidonias hybrida	Whistling Kite	Haliastur sphenurus
White-winged Black Tern	Chlidonias leucopterus	Black-breasted Buzzard	Hamirostra melanosternon
Silver Gull	Chroicocephalus novaehollandiae	Pictorella Mannikin	Heteromunia pectoralis
Brown Songlark	Cincloramphus cruralis	Little Eagle	Hieraaetus morphnoides
Rufous Songlark	Cincloramphus mathewsi	Black-winged Stilt	Himantopus himantopus
Swamp Harrier	Circus approximans	Welcome Swallow	Hirundo neoxena
Spotted Harrier	Circus assimilis	Caspian Tern	Hydroprogne caspia
Banded Honeyeater	Cissomela pectoralis	Comb-crested Jacana	Irediparra gallinacea
Golden-headed Cisticola	Cisticola exilis	Black Bittern	Ixobrychus flavicollis
Black-tailed Treecreeper	Climacteris melanura	White-winged Triller	Lalage sueurii
Grey Shrike-thrush	Colluricincla harmonica	Yellow-tinted Honeyeater	Lichenostomus flavescens
Rock Dove	Columba livia	Grey-headed Honeyeater	Lichenostomus keartlandi
Rufous-throated Honeyeater	Conopophila rufogularis	White-plumed Honeyeater	Lichenostomus penicillatus
Ground Cuckoo-shrike	Coracina maxima	Grey-fronted Honeyeater	Lichenostomus plumulus
Black-faced Cuckoo-shrike	Coracina novaehollandiae	White-gaped Honeyeater	Lichenostomus unicolor
White-bellied Cuckoo-shrike	Coracina papuensis	Singing Honeyeater	Lichenostomus virescens
Little Crow	Corvus bennetti	Brown Honeyeater	Lichmera indistincta
Australian Raven	Corvus coronoides	Black-tailed Godwit	Limosa limosa

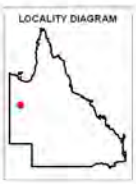
Common Name	Scientific Name	Common Name	Scientific Name
Chestnut-breasted Mannikin	Lonchura castaneothorax	Tawny Frogmouth	Podargus strigoides
Square-tailed Kite	Lophoictinia isura	Great Crested Grebe	Podiceps cristatus
Pink-eared Duck	Malacorhynchus membranaceus	Long-tailed Finch	Poephila acuticauda
Variegated Fairy-wren	Malurus lamberti	Hoary-headed Grebe	Poliocephalus poliocephalus
White-winged Fairy-wren	Malurus leucopterus	Grey-crowned Babbler	Pomatostomus temporalis
Red-backed Fairy-wren	Malurus melanocephalus	Purple Swamphen	Porphyrio porphyrio
Yellow-throated Miner	Manorina flavigula	Australian Spotted Crake	Porzana fluminea
Little Grassbird	Megalurus gramineus	Baillon's Crake	Porzana pusilla
Hooded Robin	Melanodryas cucullata	Spotless Crake	Porzana tabuensis
White-throated Honeyeater	Melithreptus albogularis	Varied Lorikeet	Psitteuteles versicolor
Black-chinned Honeyeater	Melithreptus gularis	Spotted Bowerbird	Ptilonorhynchus maculatus
Budgerigar	Melopsittacus undulatus	Great Bowerbird	Ptilonorhynchus nuchalis
Rainbow Bee-eater	Merops ornatus	Red-necked Avocet	Recurvirostra novaehollandiae
Little Pied Cormorant	Microcarbo melanoleucos	Grey Fantail	Rhipidura albiscapa
Jacky Winter	Microeca fascinans	Willie Wagtail	Rhipidura leucophrys
Black Kite	Milvus migrans	Australian Painted Snipe	Rostratula australis
Horsfield's Bushlark	Mirafra javanica	Channel-billed Cuckoo	Scythrops novaehollandiae
Yellow Wagtail species	Motacilla flava	Weebill	Smicrornis brevirostris
Restless Flycatcher	Myiagra inquieta	Freckled Duck	Stictonetta naevosa
Crimson Finch	Neochmia phaeton	Australian Pratincole	Stiltia isabella
Star Finch	Neochmia ruficauda	Rufous-crowned Emu-wren	Stipiturus ruficeps
Cotton Pygmy-goose	Nettapus coromandelianus	Spotted Dove	Streptopelia chinensis
Green Pygmy-goose	Nettapus pulchellus	Apostlebird	Struthidea cinerea
Barking Owl	Ninox connivens	Black Honeyeater	Sugomel niger
Southern Boobook	Ninox novaeseelandiae	Australasian Grebe	Tachybaptus novaehollandiae
Little Curlew	Numenius minutus	Double-barred Finch	Taeniopygia bichenovii
Nankeen Night-Heron	Nycticorax caledonicus	Zebra Finch	Taeniopygia guttata
Cockatiel	Nymphicus hollandicus	Australian White Ibis	Threskiornis molucca
Crested Pigeon	Ocyphaps lophotes	Straw-necked Ibis	Threskiornis spinicollis
Crested Bellbird	Oreoica gutturalis	Red-backed Kingfisher	Todiramphus pyrrhopygius
Olive-backed Oriole	Oriolus sagittatus	Sacred Kingfisher	Todiramphus sanctus
Rufous Whistler	Pachycephala rufiventris	Black-tailed Native-hen	Tribonyx ventralis
Eastern Osprey	Pandion cristatus	Rainbow Lorikeet	Trichoglossus haematodus
Red-browed Pardalote	Pardalotus rubricatus	Wood Sandpiper	Tringa glareola
Striated Pardalote	Pardalotus striatus	Common Greenshank	Tringa nebularia
House Sparrow	Passer domesticus	Marsh Sandpiper	Tringa stagnatilis
Indian Peafowl	Pavo cristatus	Red-chested Button-quail	Turnix pyrrhothorax
Australian Pelican	Pelecanus conspicillatus	Little Button-quail	Turnix velox
Fairy Martin	Petrochelidon ariel	Eastern Barn Owl	Tyto javanica
Tree Martin	Petrochelidon nigricans	Masked Lapwing	Vanellus miles
Red-capped Robin	Petroica goodenovii	Banded Lapwing	Vanellus tricolor
Great Cormorant	Phalacrocorax carbo	Terek Sandpiper	Xenus cinereus
Little Black Cormorant	Phalacrocorax sulcirostris	Domestic Goose	
Pied Cormorant	Phalacrocorax varius	Greylag Goose	
Common Bronzewing	Phaps chalcoptera	Domestic/Feral Duck	
Silver-crowned Friarbird	Philemon argenticeps	Crow & Raven species	
Little Friarbird	Philemon citreogularis		
Yellow-billed Spoonbill	Platalea flavipes		
Royal Spoonbill	Platalea regia		
Pale-headed Rosella	Platycercus adscitus		
Glossy Ibis	Plegadis falcinellus		
Pacific Golden Plover	Pluvialis fulva		



Regulated Vegetation Management Map

Legend

- Lot and Plan
- Category A area (Vegetation offsets/compliance notices/VDecs)
- Category B area (Remnant vegetation)
- Category C area (High-value regrowth vegetation)
- Category R area (Reef regrowth watercourse vegetation)
- Category X area (Vegetation not regulated under the VMA)
- Water
- Area not categorised
- Cadastral line
  Property boundaries shown are provided as a locational aid only



Additional information required for the assessment of vegetation values is provided in the accompanying "Vegetation Management Supporting map". For further information go to the web site: www.dnrm.qld.gov.au or contact the Department of Natural Resources and Mines.

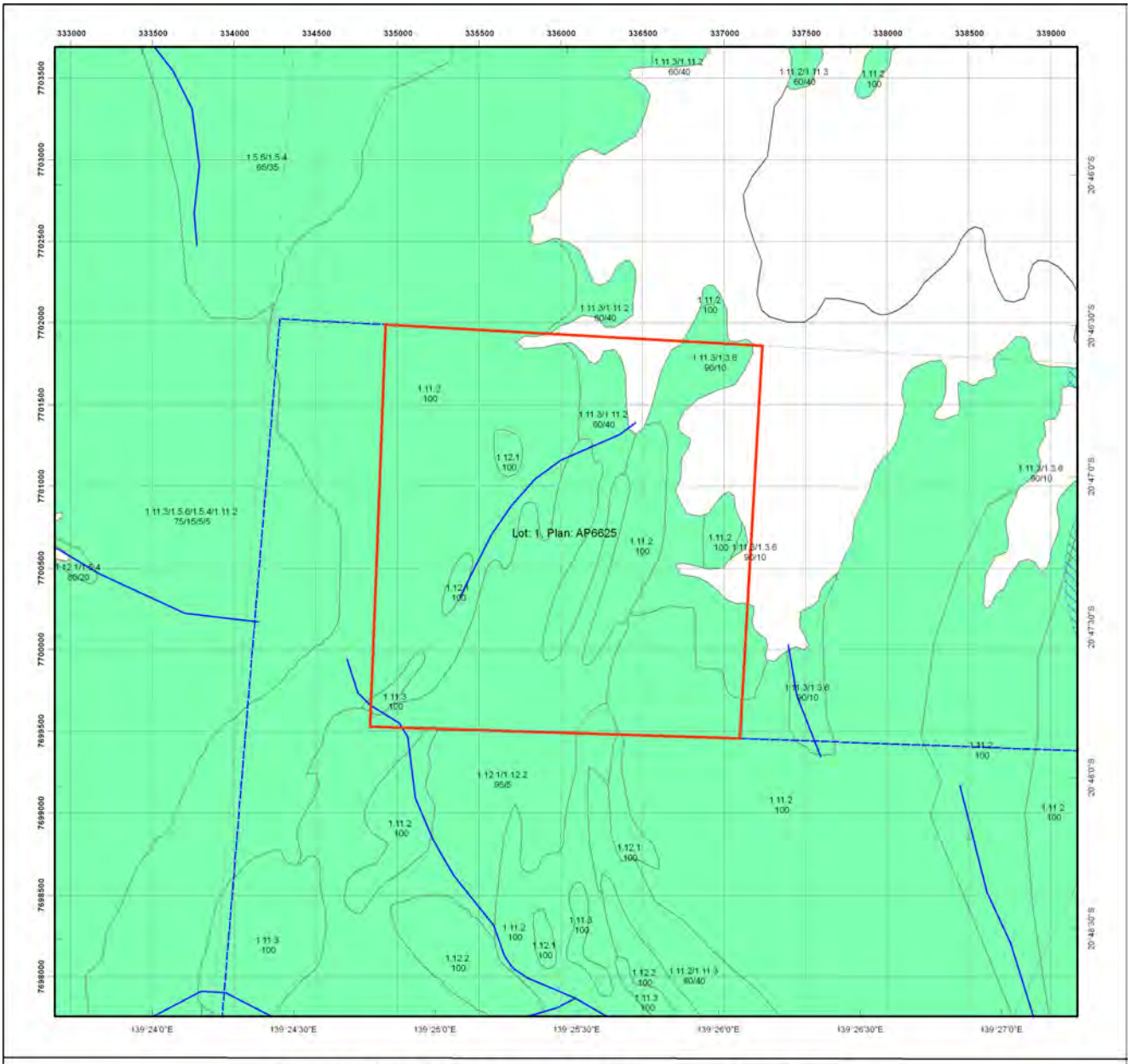
Digital data for the regulated vegetation management map is available from the Queensland Spatial Portal at http://www.information.qld.gov.au/

This map is updated on a monthly basis to ensure new PMAVs are included as they are approved.

N

0 340 680 1,020 1,360 1,700 m

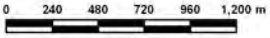
This product is projected into:
GDA 1994 MGA Zone 54



Vegetation Management Supporting Map

Legend

- Lot and Plan
- Category A or B area containing endangered regional ecosystems
- Category A or B area containing of concern regional ecosystems
- Category A or B area that is a least concern regional ecosystem
- Category A or B area containing remnant vegetation
- Category A or B area under Section 20AH
  These areas are edged in yellow and filled with the remnant RE Status
- Category C area containing endangered regional ecosystems
- Category C area containing of concern regional ecosystems
- Category C area that is a least concern regional ecosystem
- Category C area containing high value regrowth vegetation
- Category C area under Section 20AI
  These areas are edged in purple and filled with the remnant RE Status
- Non Remnant
- Water
- Wetland on the vegetation management wetlands map
- Essential habitat on the essential habitat map
- Essential habitat species record
- Watercourse on the vegetation management watercourse map
  (Stream order shown as black number against stream where available)
- Roads
  © Pitney Bowes Software Pty Ltd
- National Parks, State Forest and other reserves
- Cadastral line
  Property boundaries shown are provided as a locational aid only



This product is projected into:
GDA 1994 MGA Zone 54

Labels for Essential Habitat are centred on the area of enquiry.

Regional ecosystem linework has been compiled at a scale of 1:100 000, except in designated areas where a compilation scale of 1:50 000 is available. Linework should be used as a guide only. The positional accuracy of RE data mapped at a scale of 1:100 000 is +/- 100 metres.

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While every care is taken to ensure the accuracy of this product, the Department of Natural Resources and Mines and Pitney Bowes Software, makes no representations or warranties about its accuracy, reliability, completeness or suitability or any particular purpose and disclaims all responsibility and all liability (including without limitation, liability in negligence) for all expenses, losses, damages (including indirect or consequential damage) and costs which you might incurr as a result of the product being inaccurate or incomplete in any way and for any reason.

Additional information may be required for the purposes of land clearing or assessment of a regional ecosystem map or PMAV applications. For further information go to the web site: www.dnrm.qld.gov.au or contact the Department of Natural Resources and Mines.

Digital data for the vegetation management watercourse map, vegetation management wetlands map, essential habitat map and the vegetation management remnant and regional ecosystem map are available from the Queensland Spatial Portal at http://www.information.qld.gov.au/

Vegetation Management Act 1999 - Extract from the essential habitat database

Essential habitat is required for assessment under the:

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Essential habitat in Category A and B (Remnant vegetation species record) areas:1100m Species Information

(no results)

Essential habitat in Category A and B (Remnant vegetation species record) areas:1100m Regional Ecosystems Information

(no results)

Essential habitat in Category A and B (Remnant vegetation) areas:1100m Species Information

(no results)

Essential habitat in Category A and B (Remnant vegetation) areas:1100m Regional Ecosystems Information

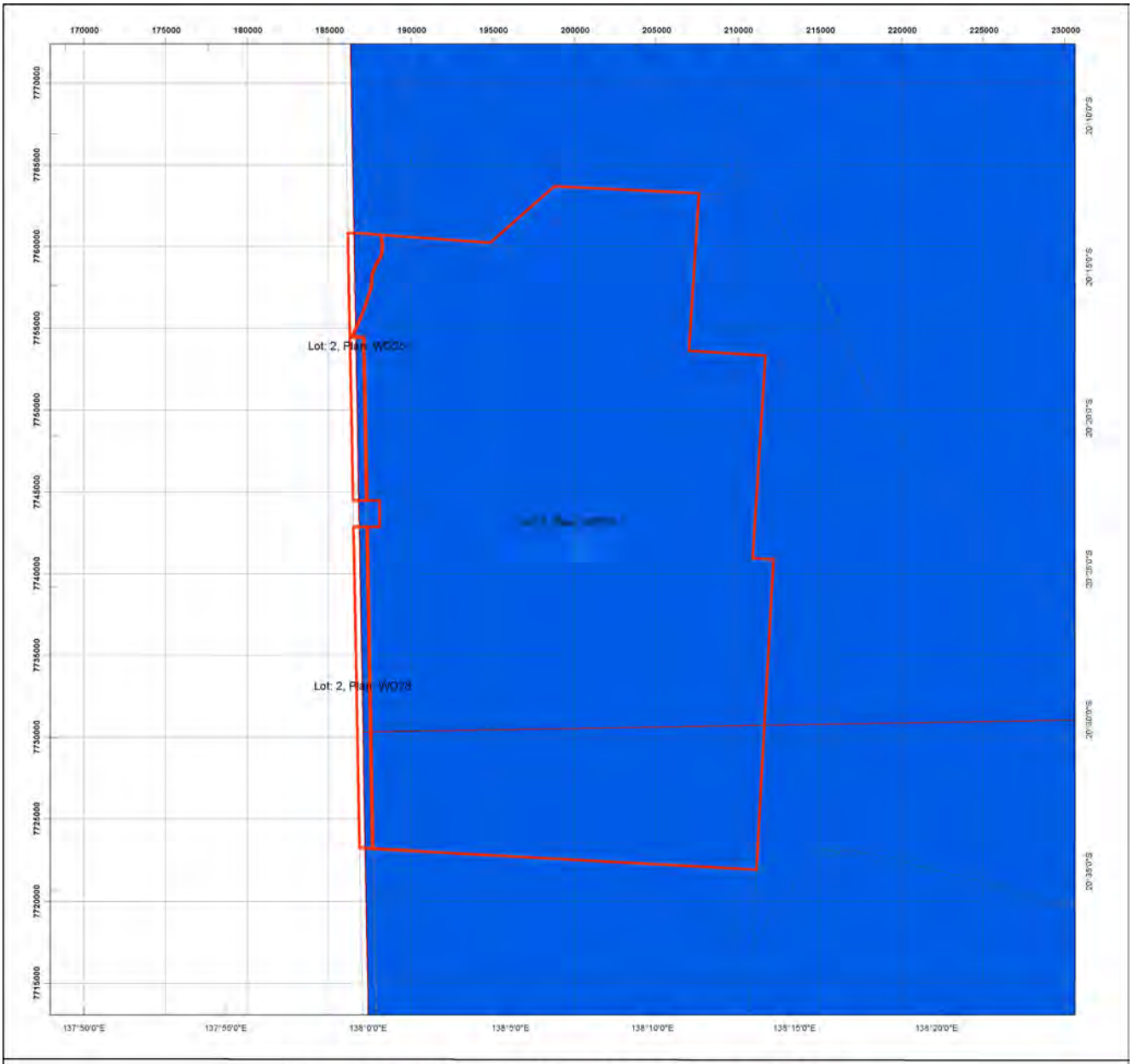
(no results)

Essential habitat in Category C (High value regrowth vegetation) areas:1100m Species Information

(no results)

Essential habitat in Category C (High value regrowth vegetation) areas:1100m Regional Ecosystems Information

(no results)

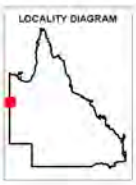


Regulated Vegetation Management Map

Legend

- Lot and Plan
- Category A area (Vegetation offsets/compliance notices/VDecs)
- Category B area (Remnant vegetation)
- Category C area (High-value regrowth vegetation)
- Category R area (Reef regrowth watercourse vegetation)
- Category X area (Vegetation not regulated under the VMA)
- Water
- Area not categorised
- Cadastral line
  Property boundaries shown are provided as a locational aid only

LOCALITY DIAGRAM



N

0 3,300 6,600 9,900 13,200 16,500 m

This product is projected into:
GDA 1994 MGA Zone 54

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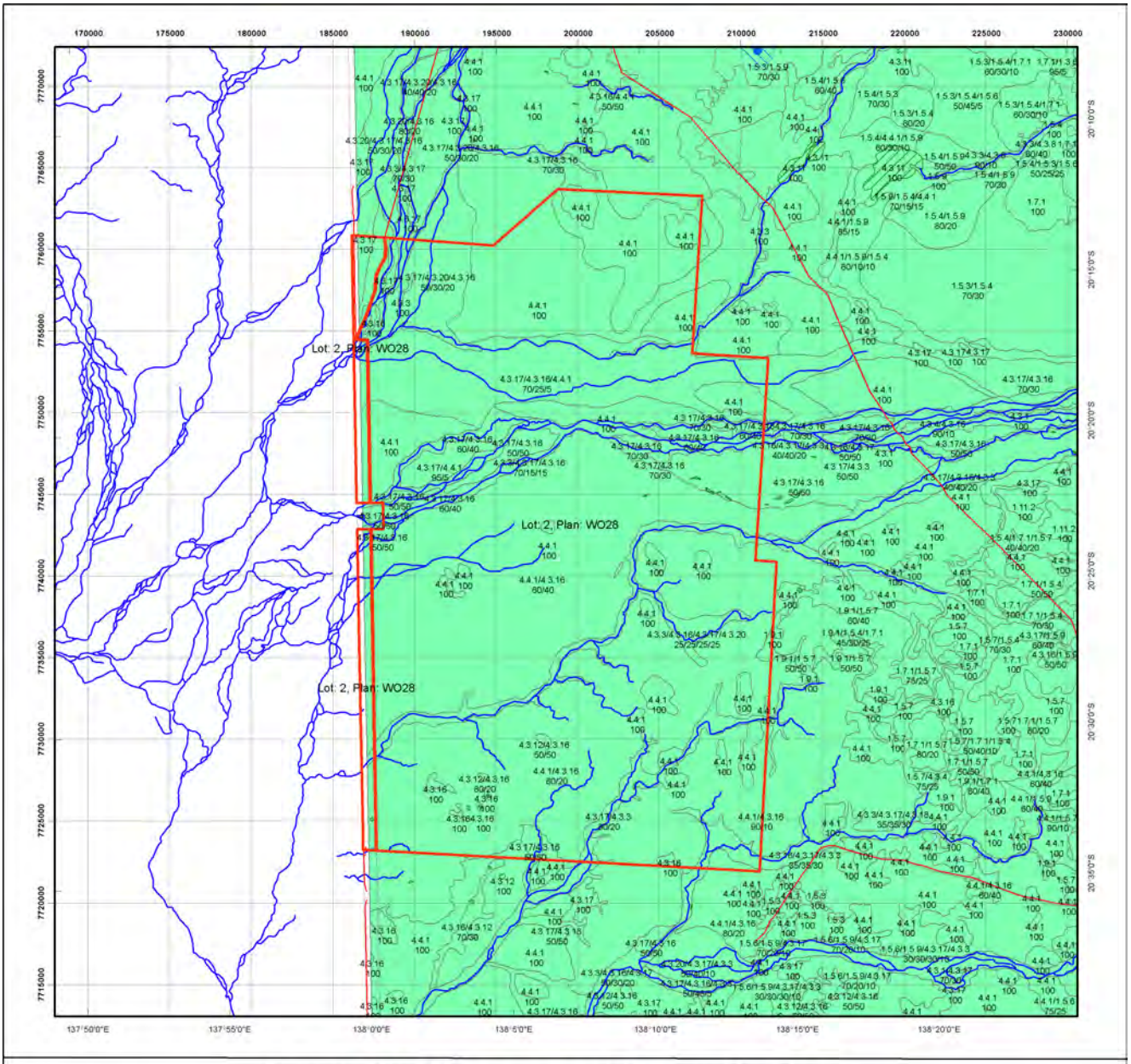

Vegetation Management Supporting Map

Legend

- Lot and Plan
- Category A or B area containing endangered regional ecosystems
- Category A or B area containing of concern regional ecosystems
- Category A or B area that is a least concern regional ecosystem
- Category A or B area containing remnant vegetation
- Category A or B area under Section 20AH
  These areas are edged in yellow and filled with the remnant RE Status
- Category C area containing endangered regional ecosystems
- Category C area containing of concern regional ecosystems
- Category C area that is a least concern regional ecosystem
- Category C area containing high value regrowth vegetation
- Category C area under Section 20AI
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- Non Remnant
- Water
- Wetland on the vegetation management wetlands map
- Essential habitat on the essential habitat map
- Essential habitat species record
- Watercourse on the vegetation management watercourse map
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  © Pitney Bowes Software Pty Ltd
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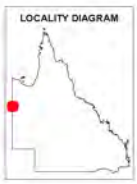

N

0 2,400 4,800 7,200 9,600 12,000 m

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(no results)

Essential habitat in Category A and B (Remnant vegetation species record) areas:1100m Regional Ecosystems Information

(no results)

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(no results)

Essential habitat in Category A and B (Remnant vegetation) areas:1100m Regional Ecosystems Information

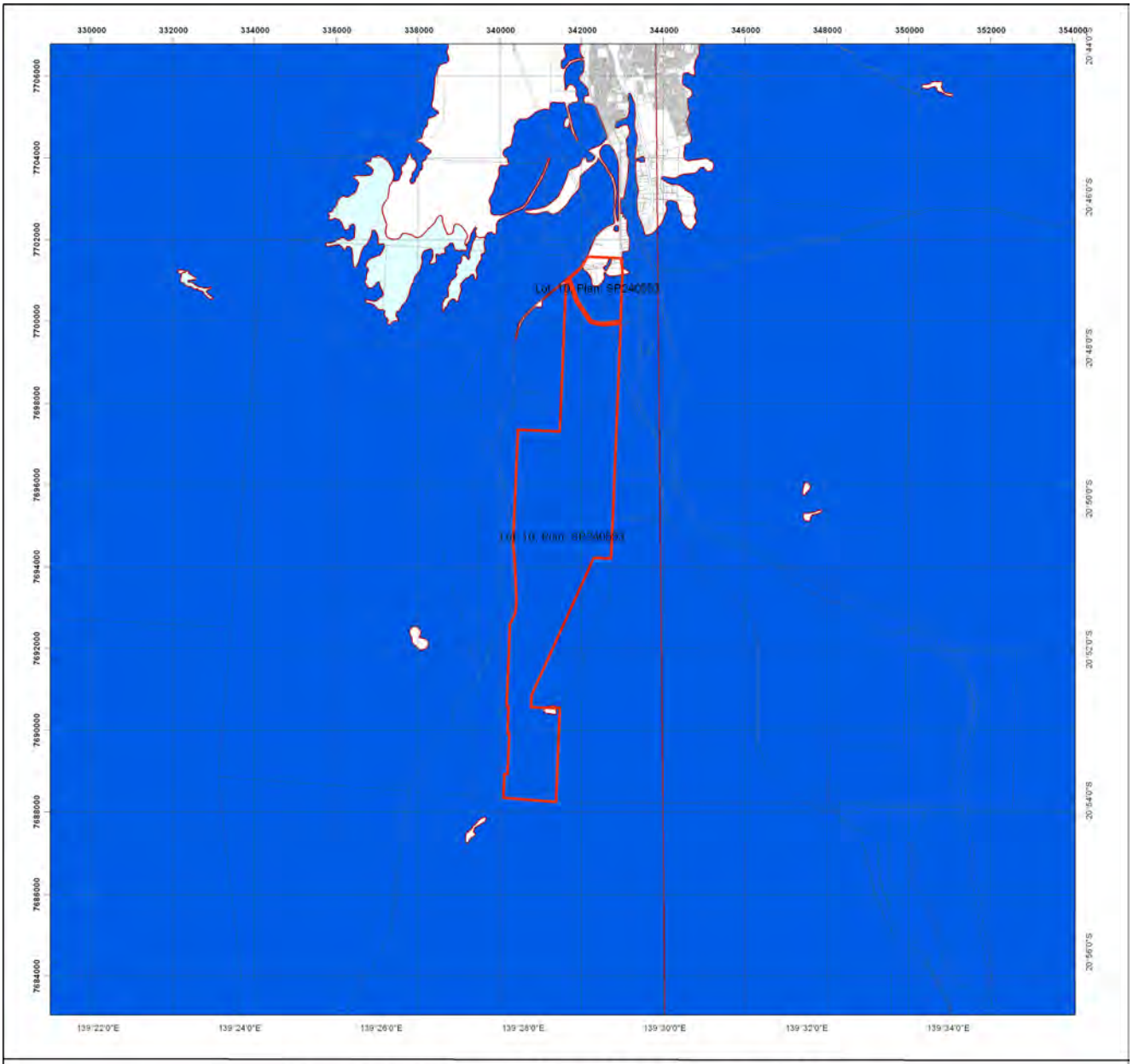
(no results)

Essential habitat in Category C (High value regrowth vegetation) areas:1100m Species Information

(no results)

Essential habitat in Category C (High value regrowth vegetation) areas:1100m Regional Ecosystems Information

(no results)



Regulated Vegetation Management Map

Legend

- Lot and Plan
- Category A area (Vegetation offsets/compliance notices/VDecs)
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- Area not categorised
- Cadastral line
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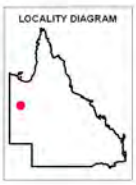
Queensland Government

LOCALITY DIAGRAM



N

0 1,300 2,600 3,900 5,200 6,500 m

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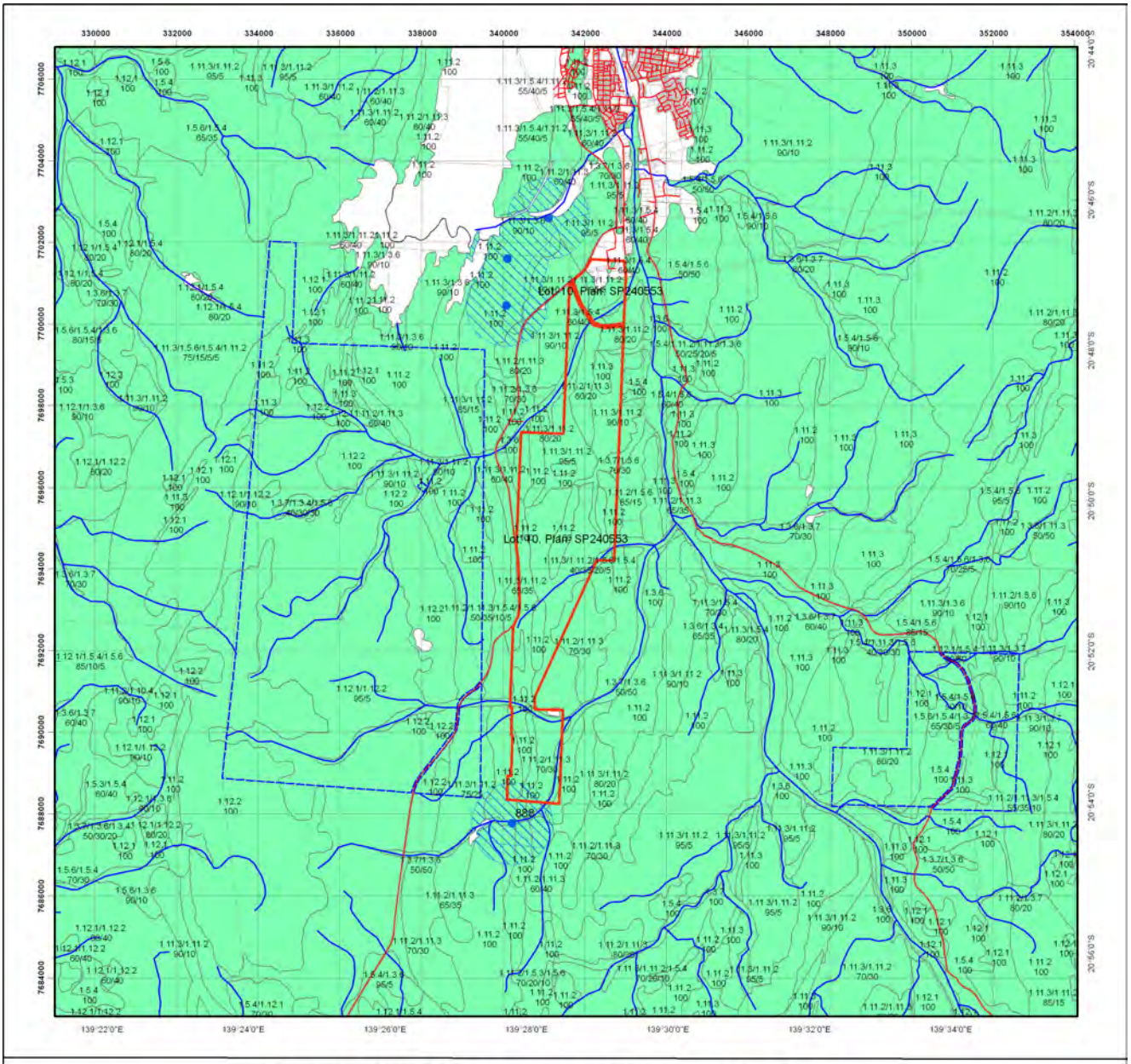

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- Essential habitat species record
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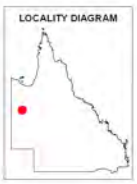

N

0 980 1,960 2,940 3,920 4,900 m

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Essential habitat in Category A and B (Remnant vegetation species record) areas:1100m Species Information

Label	Scientific Name	Common Name	NCA Status	Vegetation Community	Altitude	Soils	Position in Landscape
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Essential habitat in Category A and B (Remnant vegetation species record) areas:1100m Regional Ecosystems Information

Label	Regional Ecosystem (this is a mandatory essential habitat factor, unless otherwise stated)
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Essential habitat in Category A and B (Remnant vegetation) areas:1100m Species Information

(no results)

Essential habitat in Category A and B (Remnant vegetation) areas:1100m Regional Ecosystems Information

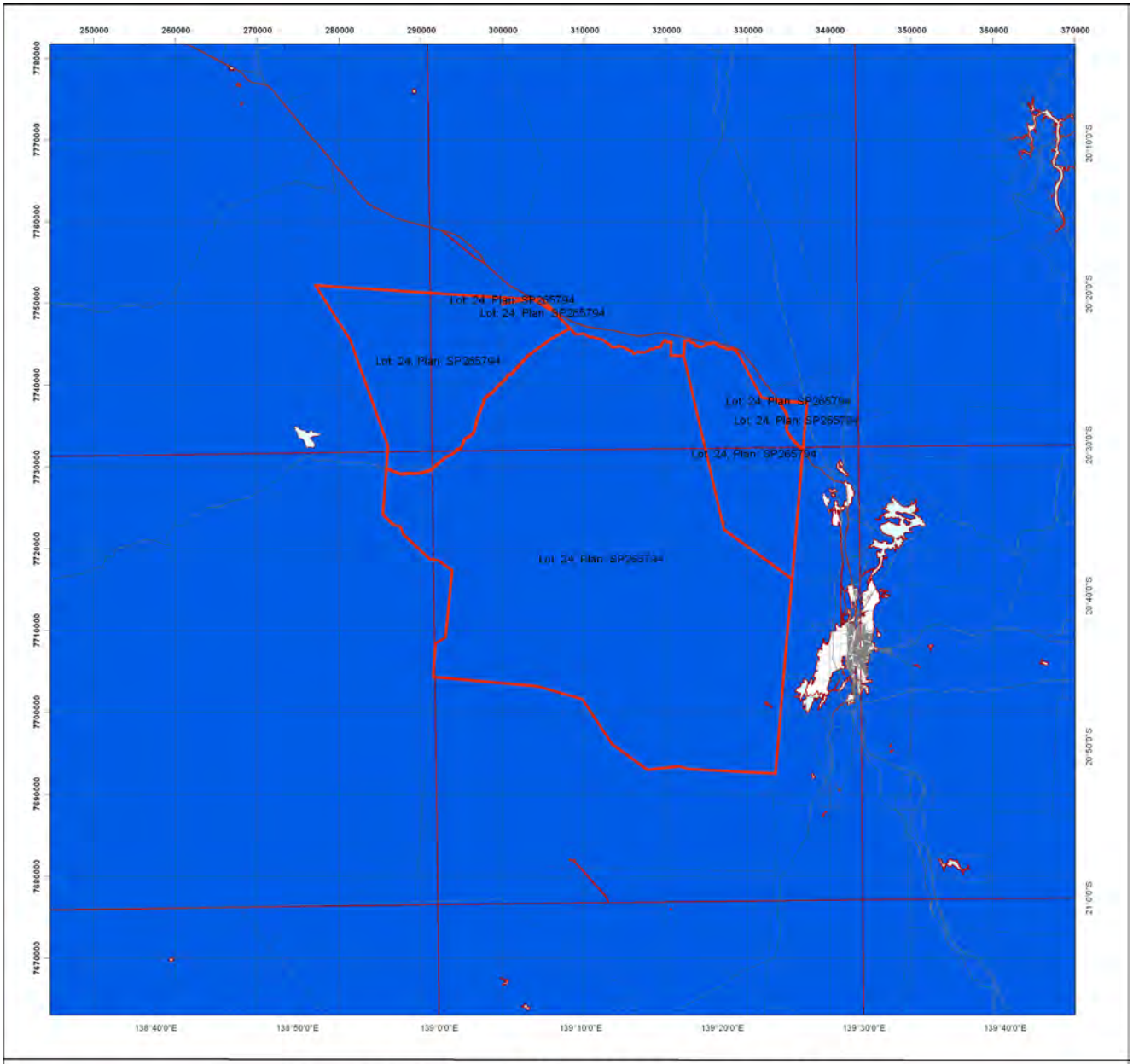
(no results)

Essential habitat in Category C (High value regrowth vegetation) areas:1100m Species Information

(no results)

Essential habitat in Category C (High value regrowth vegetation) areas:1100m Regional Ecosystems Information

(no results)



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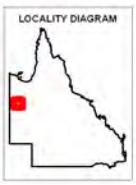

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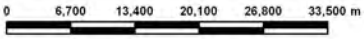

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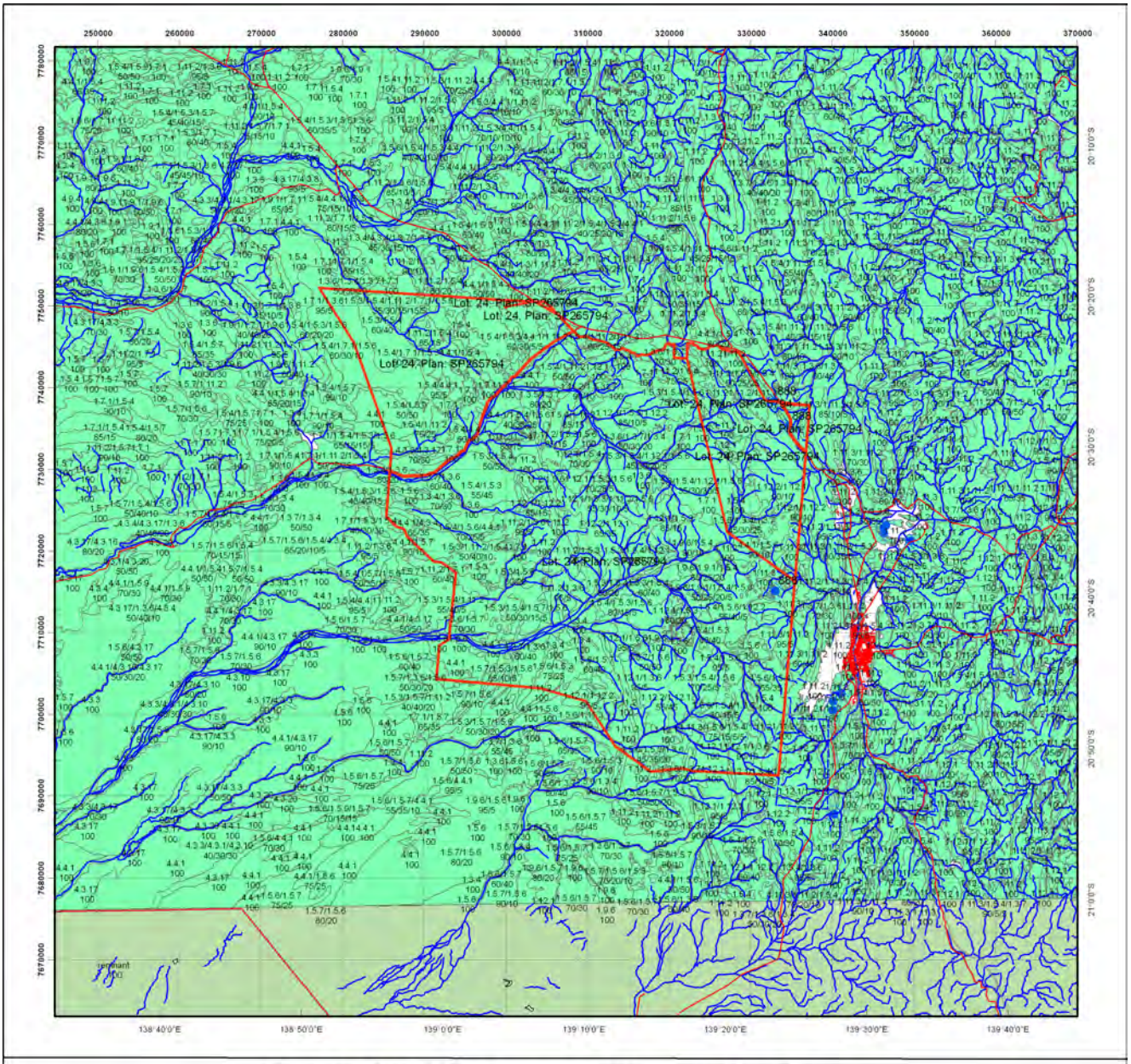

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Essential habitat in Category A and B (Remnant vegetation) areas:1100m Species Information

(no results)

Essential habitat in Category A and B (Remnant vegetation) areas:1100m Regional Ecosystems Information

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Essential habitat in Category C (High value regrowth vegetation) areas:1100m Species Information

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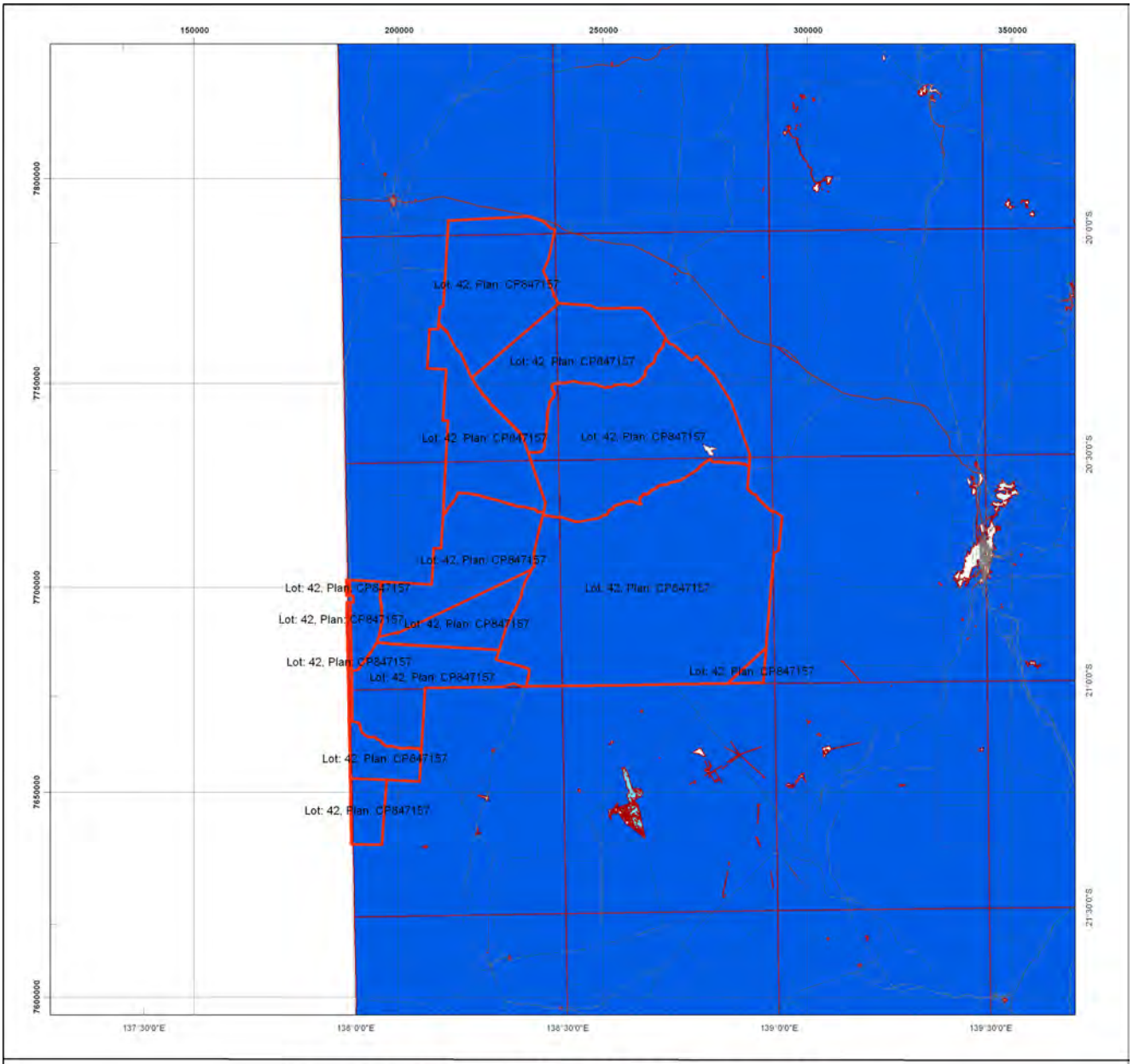
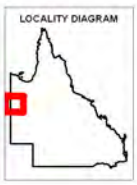


Regulated Vegetation Management Map

Legend

- Lot and Plan
- Category A area (Vegetation offsets/compliance notices/VDecs)
- Category B area (Remnant vegetation)
- Category C area (High-value regrowth vegetation)
- Category R area (Reef regrowth watercourse vegetation)
- Category X area (Vegetation not regulated under the VMA)
- Water
- Area not categorised
- Cadastral line
- Property boundaries shown are provided as a locational aid only

LOCALITY DIAGRAM



N

0 13,000 26,000 39,000 52,000 65,000 m

This product is projected into:
GDA 1994 MGA Zone 54

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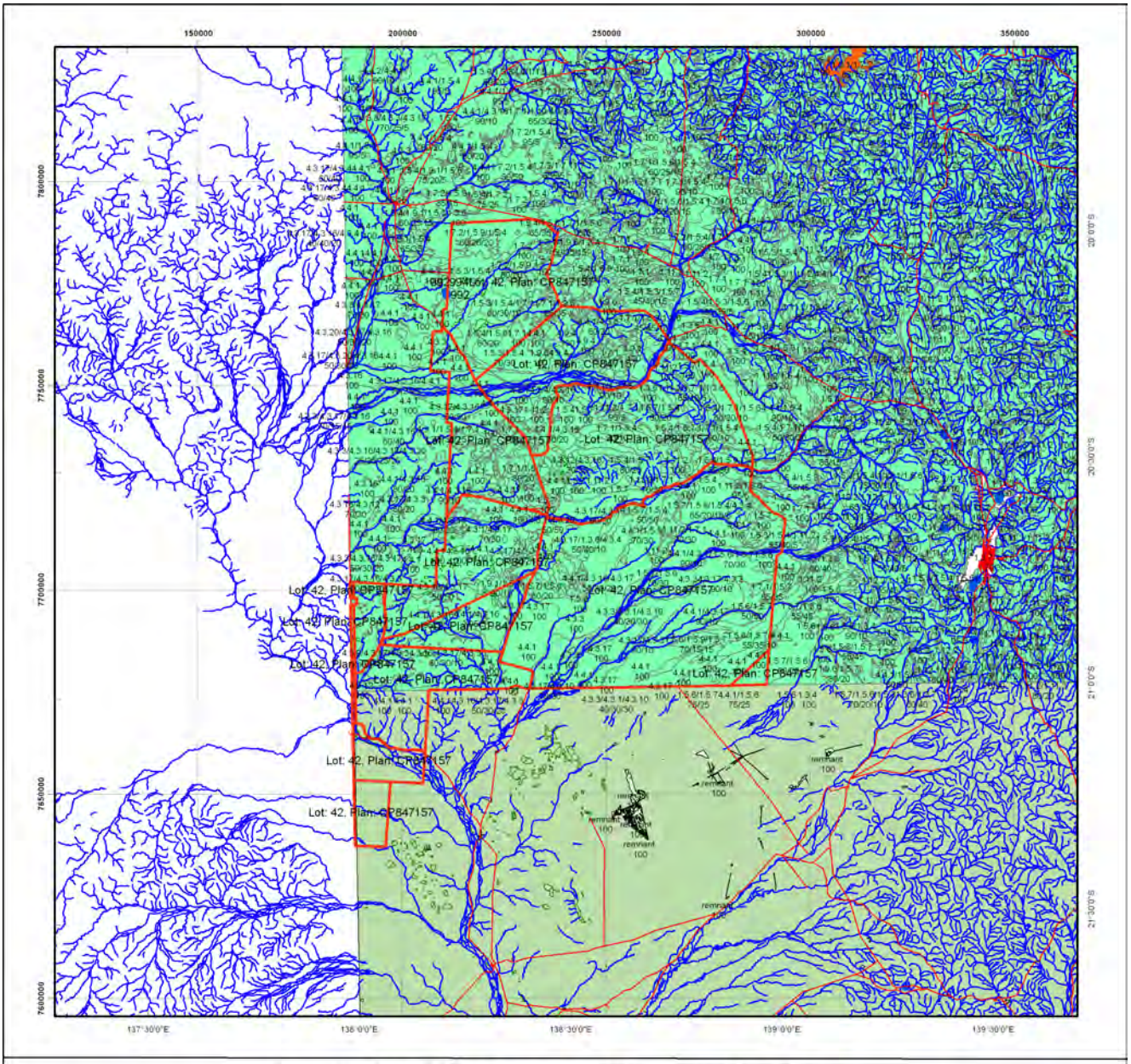

Vegetation Management Supporting Map

Legend

- Lot and Plan
- Category A or B area containing endangered regional ecosystems
- Category A or B area containing of concern regional ecosystems
- Category A or B area that is a least concern regional ecosystem
- Category A or B area containing remnant vegetation
- Category A or B area under Section 20AH
  These areas are edged in yellow and filled with the remnant RE Status
- Category C area containing endangered regional ecosystems
- Category C area containing of concern regional ecosystems
- Category C area that is a least concern regional ecosystem
- Category C area containing high value regrowth vegetation
- Category C area under Section 20AI
  These areas are edged in purple and filled with the remnant RE Status
- Non Remnant
- Water
- Wetland on the vegetation management wetlands map
- Essential habitat on the essential habitat map
- Essential habitat species record
- Watercourse on the vegetation management watercourse map
  (Stream order shown as black number against stream where available)
- Roads
  © Pitney Bowes Software Pty Ltd
- National Parks, State Forest and other reserves
- Cadastral line
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LOCALITY DIAGRAM

N

0 9,700 19,400 29,100 38,800 48,500 m

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Labels for Essential Habitat are centred on the area of enquiry.

Regional ecosystem linework has been compiled at a scale of 1:100 000, except in designated areas where a compilation scale of 1:50 000 is available. Linework should be used as a guide only. The positional accuracy of RE data mapped at a scale of 1:100 000 is +/- 100 metres.

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Vegetation Management Act 1999 - Extract from the essential habitat database

Essential habitat is required for assessment under the:

- State Development Assessment Provisions - Module 8: Native vegetation clearing which sets out the matters of interest to the state for development assessment under the *Sustainable Planning Act 2009*; and
- Self-assessable vegetation clearing codes made under the *Vegetation Management Act 1999*

Essential habitat for one or more of the following species is found on and within 1.1 km of the identified subject lot/s or on and within 2.2 km of an identified coordinate on the accompanying essential habitat map.

This report identifies essential habitat in Category A, B and Category C areas.

The numeric labels on the essential habitat map can be cross referenced with the database below to determine which essential habitat factors might exist for a particular species.

Essential habitat is compiled from a combination of species habitat models and buffered species records.

The Department of Natural Resources and Mines website (http://www.dnrm.qld.gov.au) has more information on how the layer is applied under the State Development Assessment Provisions - Module 8: Native vegetation clearing and the *Vegetation Management Act 1999*.

Regional ecosystem is a mandatory essential habitat factor, unless otherwise stated.

Essential habitat, for protected wildlife, means a category A area, a category B area or category C area shown on the regulated vegetation management map-

1) (a) that has at least 3 essential habitat factors for the protected wildlife that must include any essential habitat factors that are stated as mandatory for the protected wildlife in the essential habitat database; or

2) (b) in which the protected wildlife, at any stage of its life cycle, is located.

Essential habitat identifies endangered or vulnerable native wildlife prescribed under the *Nature Conservation Act 1994*.

Essential habitat in Category A and B (Remnant vegetation species record) areas:1100m Species Information

Label	Scientific Name	Common Name	NCA Status	Vegetation Community	Altitude	Soils	Position in Landscape
992	Rhinonicteris aurantia	Orange Horseshoe Bat	V	Areas close to home cave including spinifex grassland with scattered Eucalyptus camaldulensis, sclerophyll forest and open woodland, mangroves, deciduous vine thickets/riparian palm forest and possibly open blacksoil plains with tussock grassland; use of deep caves or mines with highly specific microclimate (28-32oC and 85-100% relative humidity) during dry season limits its distibution.	None	Limestone and sandstone substrates.	None
994	Macroderma gigas	Ghost Bat	V	Open forest, woodland, arid scrubs, spinifex hillsides, blacksoil grassland and rainforest (semi-deciduous mesophyll vine forest, dry gallery rainforest) with suitable cave roost sites with specific microclimate (> 25o C & > 60-70% relative humidity). Roosts by day in complete darkness of large caves, rock shelters, deep rock fissures and disused mines; maternity roosts often deep caves/mines in sedimentary remnants or granite rockpiles, transient roosts include shallow caves and rock crevices.	Sea level to 300m.	no soil information	None

Essential habitat in Category A and B (Remnant vegetation species record) areas:1100m Regional Ecosystems Information

Label	Regional Ecosystem (this is a mandatory essential habitat factor, unless otherwise stated)
992	1.3.1, 1.3.2, 1.3.4, 1.3.5, 1.3.6, 1.3.7, 1.3.8, 1.3.9, 1.5.1, 1.5.2, 1.5.3, 1.5.4, 1.5.5, 1.5.6, 1.5.7, 1.5.8, 1.5.9, 1.7.1, 1.7.2, 1.9.1, 1.9.2, 1.9.3, 1.9.4, 1.9.6, 1.9.7, 1.10.1, 1.10.2, 1.10.3, 1.10.4, 1.10.5, 1.10.6, 1.10.7, 1.10.8, 1.11.1, 1.11.2, 1.11.3, 1.11.4, 1.12.1, 1.12.2, 2.2.1, 2.2.2, 2.3.1, 2.3.2, 2.3.3, 2.3.4, 2.3.5, 2.3.6, 2.3.7, 2.3.8, 2.3.9, 2.3.10, 2.3.11, 2.3.1, 2.3.11, 2.3.12, 2.3.15, 2.3.17, 2.3.18, 2.3.19, 2.3.20, 2.3.21, 2.3.22, 2.3.23, 2.3.24, 2.3.25, 2.3.26, 2.3.27, 2.3.28, 2.3.30, 2.3.32, 2.3.33, 2.3.34, 2.3.35, 2.3.37, 2.3.4, 2.5.1, 2.5.2, 2.5.3, 2.5.4, 2.5.5, 2.5.6, 2.5.7, 2.5.8, 2.5.9, 2.5.10, 2.5.1, 2.5.11, 2.5.12, 2.5.13, 2.5.14, 2.5.15, 2.5.5, 2.7.1, 2.7.2, 2.7.3, 2.7.4, 2.7.5, 2.8.1, 2.9.1, 2.9.2, 2.9.3, 2.9.4, 2.9.6, 2.9.7, 2.10.1, 2.10.2, 2.10.3, 2.10.5, 2.10.7, 2.11.1, 2.12.1, 4.3.1, 4.3.2, 4.3.3, 4.3.4, 4.3.5, 4.3.6, 4.3.8, 4.3.10, 4.3.11, 4.3.13, 4.3.14, 4.3.15, 4.3.16, 4.3.17, 4.3.18, 4.3.19, 4.3.20, 4.3.21, 4.4.1, 4.5.4, 4.5.5, 4.5.8, 4.5.9, 4.7.2, 4.7.3, 4.7.4, 4.9.1, 4.9.2, 4.9.3, 4.9.4, 4.9.5, 4.9.6, 4.9.7, 4.9.8, 4.9.9, 4.9.12, 4.9.14, 4.9.18
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Essential habitat in Category A and B (Remnant vegetation) areas:1100m Species Information

(no results)

Essential habitat in Category A and B (Remnant vegetation) areas:1100m Regional Ecosystems Information

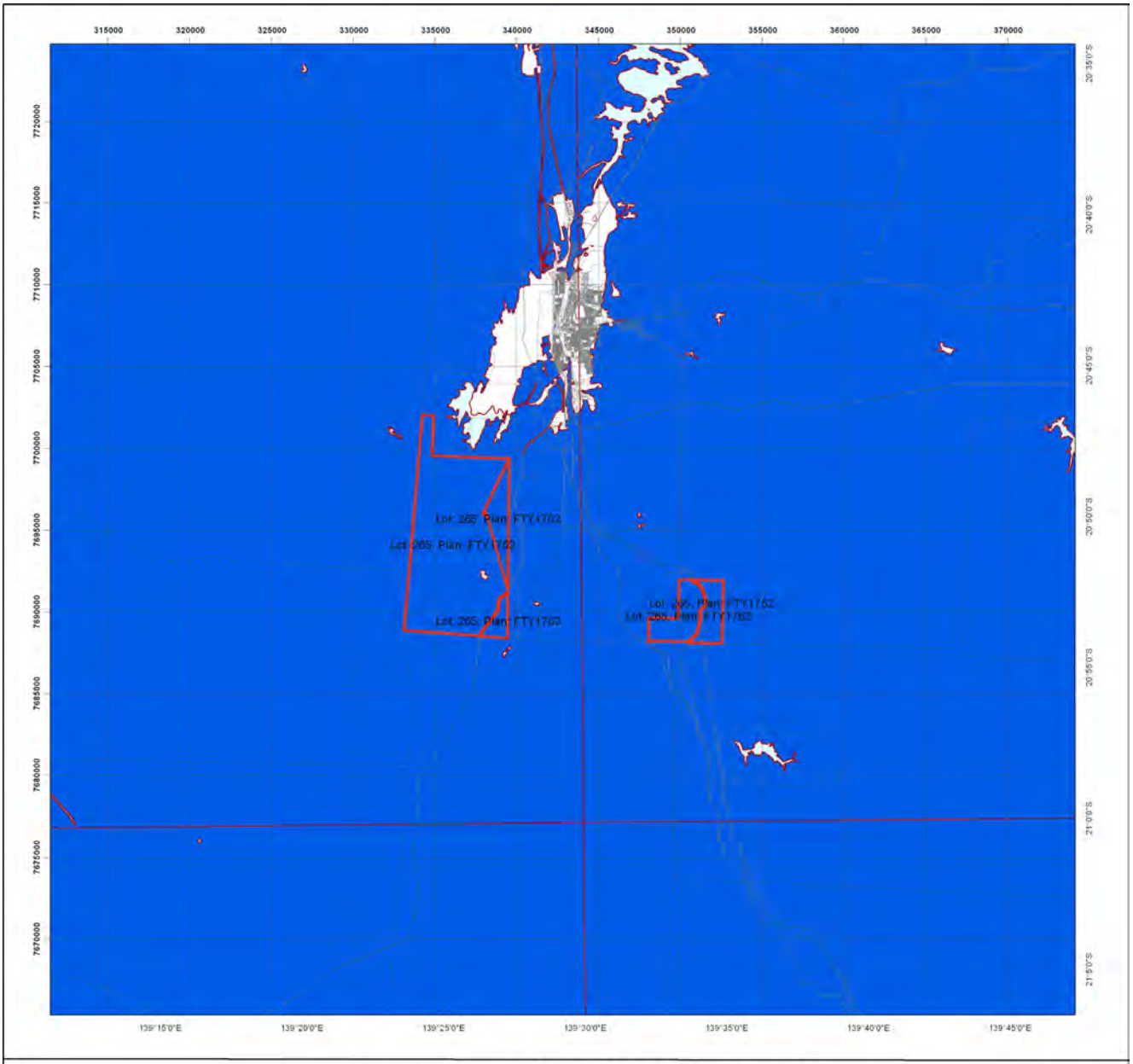
(no results)

Essential habitat in Category C (High value regrowth vegetation) areas:1100m Species Information

(no results)

Essential habitat in Category C (High value regrowth vegetation) areas:1100m Regional Ecosystems Information

(no results)



Regulated Vegetation Management Map

Legend

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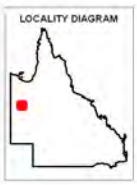

N

0 3,300 6,600 9,900 13,200 16,500 m

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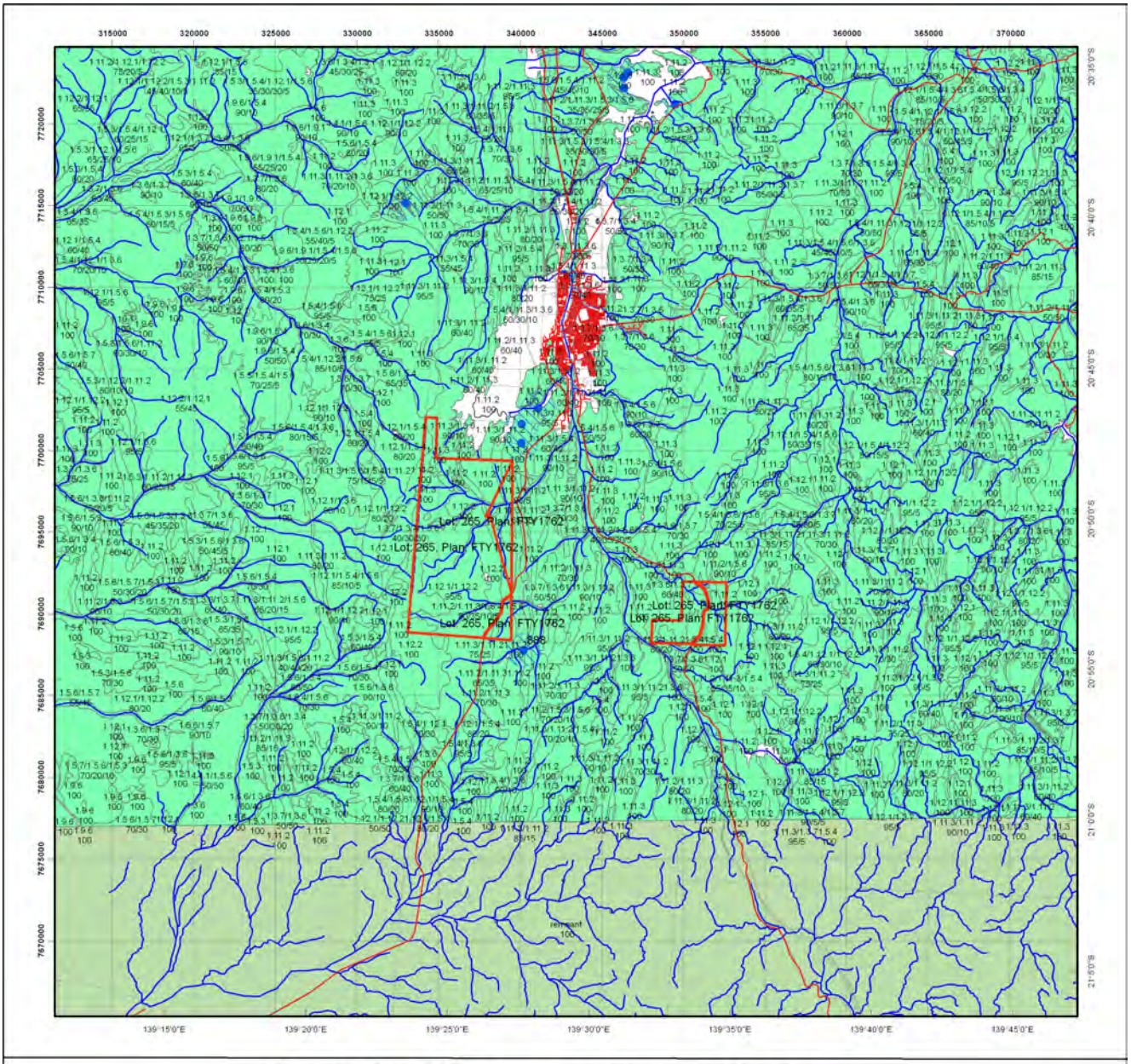

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- Category C area that is a least concern regional ecosystem
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  © Pitney Bowes Software Pty Ltd
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N

0 2,400 4,800 7,200 9,600 12,000 m

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- State Development Assessment Provisions - Module 8: Native vegetation clearing which sets out the matters of interest to the state for development assessment under the *Sustainable Planning Act 2009*; and
- Self-assessable vegetation clearing codes made under the *Vegetation Management Act 1999*

Essential habitat for one or more of the following species is found on and within 1.1 km of the identified subject lot/s or on and within 2.2 km of an identified coordinate on the accompanying essential habitat map.

This report identifies essential habitat in Category A, B and Category C areas.

The numeric labels on the essential habitat map can be cross referenced with the database below to determine which essential habitat factors might exist for a particular species.

Essential habitat is compiled from a combination of species habitat models and buffered species records.

The Department of Natural Resources and Mines website (http://www.dnrm.qld.gov.au) has more information on how the layer is applied under the State Development Assessment Provisions - Module 8: Native vegetation clearing and the *Vegetation Management Act 1999*.

Regional ecosystem is a mandatory essential habitat factor, unless otherwise stated.

Essential habitat, for protected wildlife, means a category A area, a category B area or category C area shown on the regulated vegetation management map-

1) (a) that has at least 3 essential habitat factors for the protected wildlife that must include any essential habitat factors that are stated as mandatory for the protected wildlife in the essential habitat database; or
2) (b) in which the protected wildlife, at any stage of its life cycle, is located.

Essential habitat identifies endangered or vulnerable native wildlife prescribed under the *Nature Conservation Act 1994*.

Essential habitat in Category A and B (Remnant vegetation species record) areas:1100m Species Information

Label	Scientific Name	Common Name	NCA Status	Vegetation Community	Altitude	Soils	Position in Landscape
888	Petrogale purpureicollis	Purple-necked Rock-wallaby	V	Boulder-strewn ridges of rocky ranges/gorges/rock outcrops, within sparse eucalypt or acacia (mulga) woodlands generally associated with spinifex (Triodia).	100-450m.	Limestone, laterite and granite substrates.	Rocky areas.

Essential habitat in Category A and B (Remnant vegetation species record) areas:1100m Regional Ecosystems Information

Label	Regional Ecosystem (this is a mandatory essential habitat factor, unless otherwise stated)
888	1.3.2, 1.3.4, 1.3.5, 1.3.6, 1.3.7, 1.3.8, 1.3.9, 1.5.1, 1.5.2, 1.5.3, 1.5.4, 1.5.5, 1.5.6, 1.5.7, 1.5.8, 1.5.9, 1.7.1, 1.7.2, 1.9.1, 1.9.2, 1.9.3, 1.9.4, 1.9.6, 1.9.7, 1.10.1, 1.10.2, 1.10.3, 1.10.4, 1.10.7, 1.10.8, 1.11.1, 1.11.2, 1.11.3, 1.11.4, 1.12.1, 1.12.2, 4.3.1, 4.3.2, 4.3.3, 4.3.4, 4.3.5, 4.3.6, 4.3.8, 4.3.10, 4.3.11, 4.3.21, 4.4.1, 4.5.4, 4.5.5, 4.5.9, 4.7.2, 4.7.3, 4.7.4, 4.9.1, 4.9.6, 4.9.12, 4.9.14, 4.9.18, 5.3.1, 5.3.2, 5.3.3, 5.3.4, 5.3.5, 5.3.6, 5.3.7, 5.3.8, 5.3.9, 5.3.10, 5.3.20, 5.5.6, 5.7.4, 5.7.8

Essential habitat in Category A and B (Remnant vegetation) areas:1100m Species Information

(no results)

Essential habitat in Category A and B (Remnant vegetation) areas:1100m Regional Ecosystems Information

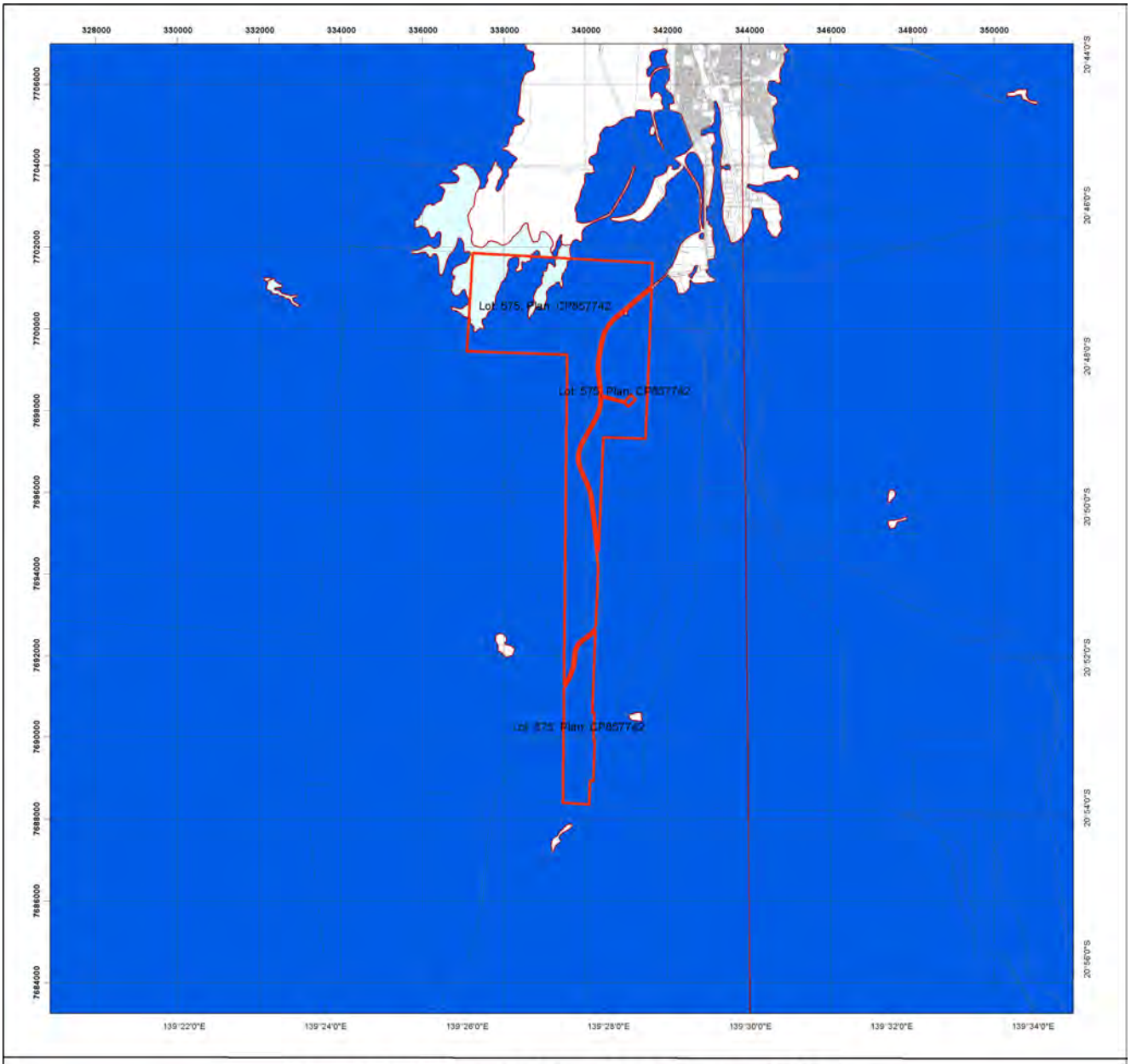
(no results)

Essential habitat in Category C (High value regrowth vegetation) areas:1100m Species Information

(no results)

Essential habitat in Category C (High value regrowth vegetation) areas:1100m Regional Ecosystems Information

(no results)



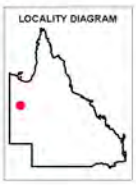
Regulated Vegetation Management Map

Legend

- Lot and Plan
- Category A area (Vegetation offsets/compliance notices/VDecs)
- Category B area (Remnant vegetation)
- Category C area (High-value regrowth vegetation)
- Category R area (Reef regrowth watercourse vegetation)
- Category X area (Vegetation not regulated under the VMA)
- Water
- Area not categorised
- Cadastral line
  Property boundaries shown are provided as a locational aid only

Queensland Government

LOCALITY DIAGRAM



N

0 1,300 2,600 3,900 5,200 6,500 m

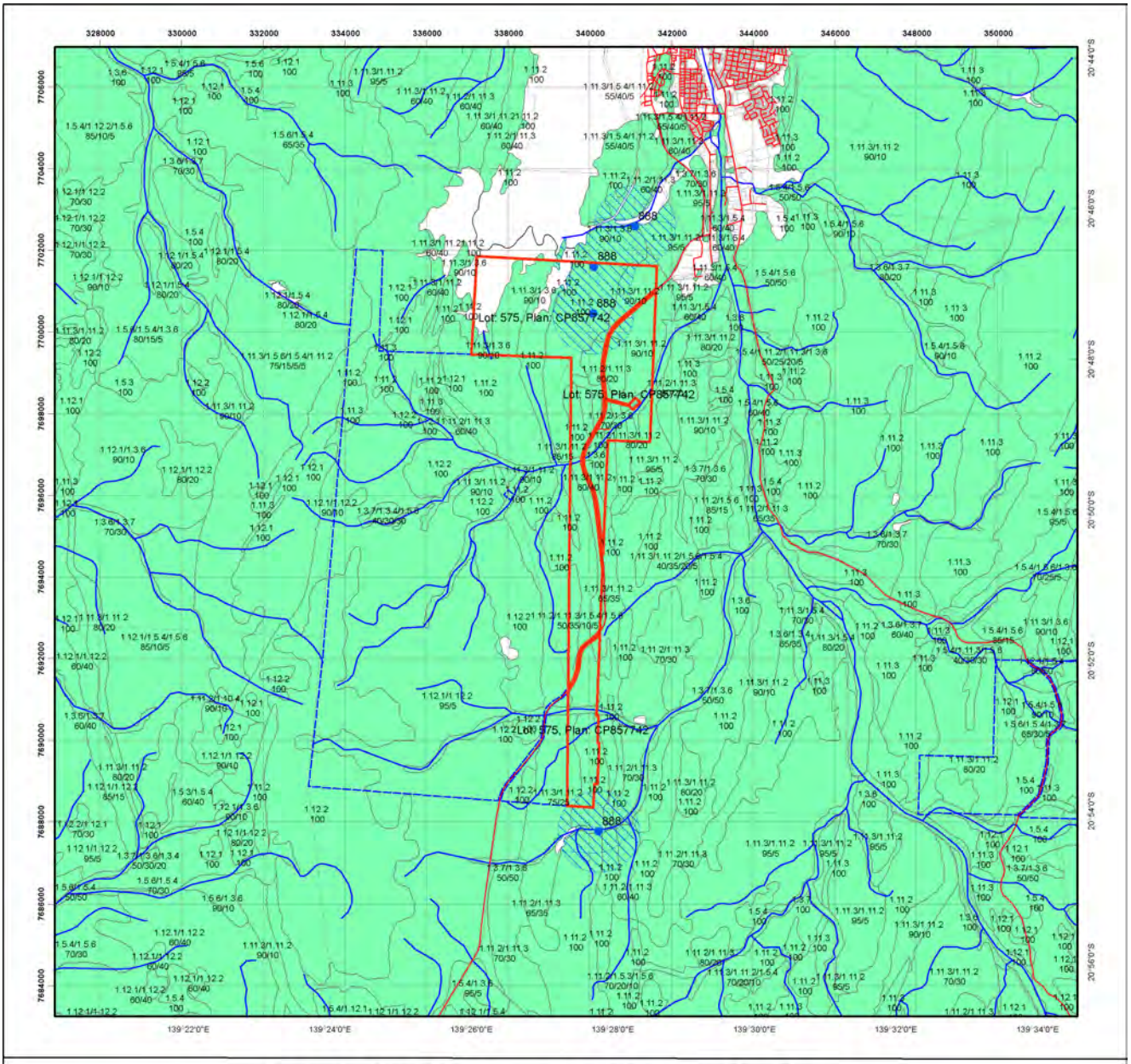
This product is projected into:
GDA 1994 MGA Zone 54

Disclaimer:
While every care is taken to ensure the accuracy of this product, the Department of Natural Resources and Mines makes no representations or warranties about its accuracy, reliability, completeness or suitability or any particular purpose and disclaims all responsibility and all liability (including without limitation, liability in negligence) for all expenses, losses, damages (including indirect or consequential damage) and costs which you might incurr as a result of the product being inaccurate or incomplete in any way and for any reason.

Additional information required for the assessment of vegetation values is provided in the accompanying "Vegetation Management Supporting map". For further information go to the web site: www.dnrm.qld.gov.au or contact the Department of Natural Resources and Mines.

Digital data for the regulated vegetation management map is available from the Queensland Spatial Portal at http://www.information.qld.gov.au/

This map is updated on a monthly basis to ensure new PMAVs are included as they are approved.

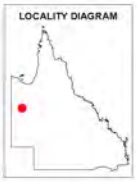


Vegetation Management Supporting Map

Legend

- Lot and Plan
- Category A or B area containing endangered regional ecosystems
- Category A or B area containing of concern regional ecosystems
- Category A or B area that is a least concern regional ecosystem
- Category A or B area containing remnant vegetation
- Category A or B area under Section 20AH
  These areas are edged in yellow and filled with the remnant RE Status
- Category C area containing endangered regional ecosystems
- Category C area containing of concern regional ecosystems
- Category C area that is a least concern regional ecosystem
- Category C area containing high value regrowth vegetation
- Category C area under Section 20AI
  These areas are edged in purple and filled with the remnant RE Status
- Non Remnant
- Water
- Wetland on the vegetation management wetlands map
- Essential habitat on the essential habitat map
- Essential habitat species record
- Watercourse on the vegetation management watercourse map
  (Stream order shown as black number against stream where available)
- Roads
  © Pitney Bowes Software Pty Ltd
- National Parks, State Forest and other reserves
- Cadastral line
  Property boundaries shown are provided as a locational aid only

LOCALITY DIAGRAM



N

0 980 1,960 2,940 3,920 4,900 m

This product is projected into:
GDA 1994 MGA Zone 54

Labels for Essential Habitat are centred on the area of enquiry.

Regional ecosystem linework has been compiled at a scale of 1:100 000, except in designated areas where a compilation scale of 1:50 000 is available. Linework should be used as a guide only. The positional accuracy of RE data mapped at a scale of 1:100 000 is +/- 100 metres.

Disclaimer:
While every care is taken to ensure the accuracy of this product, the Department of Natural Resources and Mines and Pitney Bowes Software, makes no representations or warranties about its accuracy, reliability, completeness or suitability or any particular purpose and disclaims all responsibility and all liability (including without limitation, liability in negligence) for all expenses, losses, damages (including indirect or consequential damage) and costs which you might incurr as a result of the product being inaccurate or incomplete in any way and for any reason.

Additional information may be required for the purposes of land clearing or assessment of a regional ecosystem map or PMAV applications. For further information go to the web site: www.dnrm.qld.gov.au or contact the Department of Natural Resources and Mines.

Digital data for the vegetation management watercourse map, vegetation management wetlands map, essential habitat map and the vegetation management remnant and regional ecosystem map are available from the Queensland Spatial Portal at http://www.information.qld.gov.au/

Vegetation Management Act 1999 - Extract from the essential habitat database

Essential habitat is required for assessment under the:

- State Development Assessment Provisions - Module 8: Native vegetation clearing which sets out the matters of interest to the state for development assessment under the *Sustainable Planning Act 2009*; and
- Self-assessable vegetation clearing codes made under the *Vegetation Management Act 1999*

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Essential habitat identifies endangered or vulnerable native wildlife prescribed under the *Nature Conservation Act 1994*.

Essential habitat in Category A and B (Remnant vegetation species record) areas:1100m Species Information

Label	Scientific Name	Common Name	NCA Status	Vegetation Community	Altitude	Soils	Position in Landscape
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Essential habitat in Category A and B (Remnant vegetation species record) areas:1100m Regional Ecosystems Information

Label	Regional Ecosystem (this is a mandatory essential habitat factor, unless otherwise stated)
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Essential habitat in Category A and B (Remnant vegetation) areas:1100m Species Information

(no results)

Essential habitat in Category A and B (Remnant vegetation) areas:1100m Regional Ecosystems Information

(no results)

Essential habitat in Category C (High value regrowth vegetation) areas:1100m Species Information

(no results)

Essential habitat in Category C (High value regrowth vegetation) areas:1100m Regional Ecosystems Information

(no results)

Australian Government
Department of the Environment

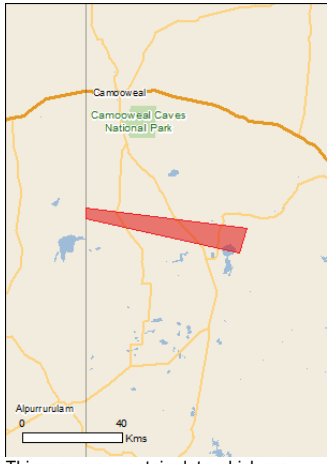
EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about Environment Assessments and the EPBC Act including significance guidelines, forms and application process details.

Report created: 18/06/15 12:20:00



Coordinates
Buffer: 0.0Km

Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	None
Listed Threatened Species:	5
Listed Migratory Species:	7

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at http://www.environment.gov.au/heritage/index.html

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Land:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	7
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Commonwealth Reserves Marine:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

State and Territory Reserves:	None
Regional Forest Agreements:	None
Invasive Species:	15
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Listed Threatened Species		[Resource Information]
Name	Status	Type of Presence
Birds		
Erythrotriorchis radiatus		
Red Goshawk [942]	Vulnerable	Species or species habitat may occur within area
Rostratula australis		
Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within area
Mammals		
Macrotis lagotis		
Greater Bilby [282]	Vulnerable	Species or species habitat likely to occur within area
Pseudantechinus mimulus		
Carpentarian Antechinus [59283]	Vulnerable	Species or species habitat likely to occur within area
Reptiles		
Acanthophis hawkei		
Plains Death Adder [83821]	Vulnerable	Species or species habitat known to occur within area

Listed Migratory Species		[Resource Information]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Migratory Marine Birds		
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		
Merops ornatus		
Rainbow Bee-eater [670]		Species or species habitat may occur within area
Migratory Wetlands Species		
Ardea alba		
Great Egret, White Egret [59541]		Species or species habitat likely to occur within area
Ardea ibis		
Cattle Egret [59542]		Species or species habitat may occur within area
Charadrius veredus		
Oriental Plover, Oriental Dotterel [882]		Species or species habitat may occur within area
Glareola maldivarum		
Oriental Pratincole [840]		Species or species habitat may occur within area
Rostratula benghalensis (sensu lato)		
Painted Snipe [889]	Endangered*	Species or species habitat may occur within area

Other Matters Protected by the EPBC Act

Listed Marine Species		[Resource Information]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Birds		
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba		
Great Egret, White Egret [59541]		Species or species habitat likely to occur within area
Ardea ibis		
Cattle Egret [59542]		Species or species habitat may occur within area
Charadrius veredus		
Oriental Plover, Oriental Dotterel [882]		Species or species habitat may occur within area
Glareola maldivarum		
Oriental Pratincole [840]		Species or species habitat may occur within area
Merops ornatus		
Rainbow Bee-eater [670]		Species or species habitat may occur within area
Rostratula benghalensis (sensu lato)		
Painted Snipe [889]	Endangered*	Species or species habitat may occur within area

Extra Information

Invasive Species [Resource Information]

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 Resouces Audit, 2001.

Name	Status	Type of Presence
Birds		
Passer domesticus House Sparrow [405]		Species or species habitat likely to occur within area
Frogs		
Rhinella marina Cane Toad [83218]		Species or species habitat likely to occur within area
Mammals		
Camelus dromedarius Dromedary, Camel [7]		Species or species habitat likely to occur within area
Equus caballus Horse [5]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Sus scrofa Pig [6]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Acacia nilotica subsp. indica Prickly Acacia [6196]		Species or species habitat may occur within area
Cenchrus ciliaris Buffel-grass, Black Buffel-grass [20213]		Species or species habitat likely to occur within area
Parkinsonia aculeata Parkinsonia, Jerusalem Thorn, Jelly Bean Tree, Horse Bean [12301]		Species or species habitat likely to occur within area
Parthenium hysterophorus Parthenium Weed, Bitter Weed, Carrot Grass, False Ragweed [19566]		Species or species habitat likely to occur within area
Prosopis spp. Mesquite, Algaroba [68407]		Species or species habitat likely to occur within area
Tamarix aphylla Athel Pine, Athel Tree, Tamarisk, Athel Tamarisk, Athel Tamarix, Desert Tamarisk, Flowering		Species or species habitat likely to occur
Cypress, Salt Cedar [16018]		within area
Vachellia nilotica Prickly Acacia, Blackthorn, Prickly Mimosa, Black Piquant, Babul [84351]		Species or species habitat likely to occur within area

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World and National Heritage properties, Wetlands of International and National Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

For species where the distributions are well known, maps are digitised from sources such as recovery plans and detailed habitat studies. Where appropriate, core breeding, foraging and roosting areas are indicated under 'type of presence'. For species whose distributions are less well known, point locations are collated from government wildlife authorities, museums, and non-government organisations; bioclimatic distribution models are generated and these validated by experts. In some cases, the distribution maps are based solely on expert knowledge.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Coordinates

-20.34496 137.99669,-20.46138 138.54616,-20.37902 138.57362,-20.30825 137.99737,-20.34496 137.99669

Acknowledgements

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

-Department of Environment, Climate Change and Water, New South Wales
-Department of Sustainability and Environment, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment and Natural Resources, South Australia
-Parks and Wildlife Service NT, NT Dept of Natural Resources, Environment and the Arts
-Environmental and Resource Management, Queensland
-Department of Environment and Conservation, Western Australia
-Department of the Environment, Climate Change, Energy and Water
-Birds Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-SA Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-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
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
-State Forests of NSW
-Geoscience Australia
-CSIRO
-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the Contact Us page.

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Canberra ACT 2601 Australia
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Australian Government
Department of the Environment

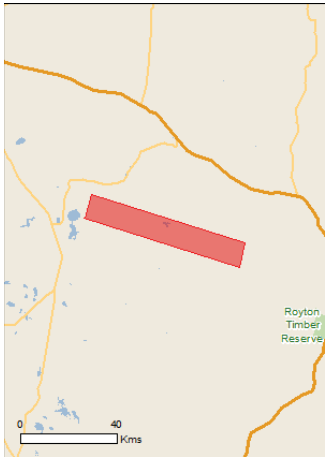
EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about Environment Assessments and the EPBC Act including significance guidelines, forms and application process details.

Report created: 22/04/15 08:17:58



Coordinates
Buffer: 0.0Km

Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	None
Listed Threatened Species:	5
Listed Migratory Species:	9

Other Matters Protected by the EPBC Act

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A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Land:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	9
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Commonwealth Reserves Marine:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

State and Territory Reserves:	None
Regional Forest Agreements:	None
Invasive Species:	19
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Listed Threatened Species		[Resource Information]
Name	Status	Type of Presence
Birds		
Erythrotriorchis radiatus Red Goshawk [942]	Vulnerable	Species or species habitat may occur within area
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Acanthophis hawkei Plains Death Adder [83821]	Vulnerable	Species or species habitat likely to occur within area

Listed Migratory Species		[Resource Information]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Migratory Marine Birds		
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat may occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Migratory Wetlands Species		
Ardea alba Great Egret, White Egret [59541]		Species or species habitat likely to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
Charadrius veredus Oriental Plover, Oriental Dotterel [882]		Species or species habitat may occur within area
Glareola maldivarum Oriental Pratincole [840]		Species or species habitat may occur within area
Pandion cristatus Eastern Osprey [82411]		Species or species habitat may occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat may occur within area

Other Matters Protected by the EPBC Act

Listed Marine Species		[Resource Information]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Birds		
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba Great Egret, White Egret [59541]		Species or species habitat likely to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
Charadrius veredus Oriental Plover, Oriental Dotterel [882]		Species or species habitat may occur within area
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Pandion haliaetus Osprey [952]		Species or species habitat may occur within area
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Extra Information

Invasive Species [Resource Information]

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 Resouces Audit, 2001.

Name	Status	Type of Presence
Birds		
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Passer domesticus House Sparrow [405]		Species or species habitat likely to occur within area
Frogs		
Rhinella marina Cane Toad [83218]		Species or species habitat likely to occur within area
Mammals		
Bos taurus Domestic Cattle [16]		Species or species habitat likely to occur within area
Camelus dromedarius Dromedary, Camel [7]		Species or species habitat likely to occur within area
Equus caballus Horse [5]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Rattus rattus Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
Sus scrofa Pig [6]		Species or species habitat likely to occur
Plants		
Acacia nilotica subsp. indica Prickly Acacia [6196]		Species or species habitat may occur within area
Cenchrus ciliaris Buffel-grass, Black Buffel-grass [20213]		Species or species habitat likely to occur within area
Jatropha gossypifolia Cotton-leaved Physic-Nut, Bellyache Bush, Cotton-leaf Physic Nut, Cotton-leaf Jatropha, Black Physic Nut [7507]		Species or species habitat likely to occur within area
Lantana camara Lantana, Common Lantana, Kamara Lantana, Large-leaf Lantana, Pink Flowered Lantana, Red Flowered Lantana, Red-Flowered Sage, White Sage, Wild Sage [10892]		Species or species habitat likely to occur within area
Parkinsonia aculeata Parkinsonia, Jerusalem Thorn, Jelly Bean Tree, Horse Bean [12301]		Species or species habitat likely to occur within area
Parthenium hysterophorus Parthenium Weed, Bitter Weed, Carrot Grass, False Ragweed [19566]		Species or species habitat likely to occur within area
Prosopis spp. Mesquite, Algaroba [68407]		Species or species habitat likely to occur within area
Tamarix aphylla Athel Pine, Athel Tree, Tamarisk, Athel Tamarisk, Athel Tamarix, Desert Tamarisk, Flowering Cypress, Salt Cedar [16018]		Species or species habitat likely to occur within area
Reptiles		
Hemidactylus frenatus Asian House Gecko [1708]		Species or species habitat likely to occur within area

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World and National Heritage properties, Wetlands of International and National Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

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Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
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- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Coordinates

-20.461383 138.546158,-20.461383 138.548904,-20.379016 138.573624,-20.546278 139.144913,-20.631126 139.125687,-20.461383 138.546158

Acknowledgements

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-Parks and Wildlife Service NT, NT Dept of Natural Resources, Environment and the Arts
-Environmental and Resource Management, Queensland
-Department of Environment and Conservation, Western Australia
-Department of the Environment, Climate Change, Energy and Water
-Birds Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-SA Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-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
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
-State Forests of NSW
-Geoscience Australia
-CSIRO
-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the Contact Us page.

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Australian Government
Department of the Environment

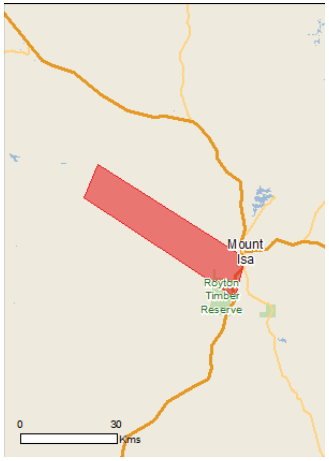
EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about Environment Assessments and the EPBC Act including significance guidelines, forms and application process details.

Report created: 22/04/15 08:18:44



This map may contain data which are ©Commonwealth of Australia (Geoscience Australia), ©PSMA 2010

Coordinates
Buffer: 0.0Km

Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	None
Listed Threatened Species:	8
Listed Migratory Species:	9

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at http://www.environment.gov.au/heritage/index.html

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Land:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	10
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Commonwealth Reserves Marine:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

State and Territory Reserves:	None
Regional Forest Agreements:	None
Invasive Species:	20
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Listed Threatened Species [Resource Information]

Name	Status	Type of Presence
Birds		
Erythrotriorchis radiatus Red Goshawk [942]	Vulnerable	Species or species habitat may occur within area
Erythrura gouldiae Gouldian Finch [413]	Endangered	Species or species habitat known to occur within area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area
Mammals		
Macrotis lagotis Greater Bilby [282]	Vulnerable	Species or species habitat likely to occur within area
Pseudantechinus mimulus Carpentarian Antechinus [59283]	Vulnerable	Species or species habitat likely to occur within area
Reptiles		
Acanthophis hawkei Plains Death Adder [83821]	Vulnerable	Species or species habitat known to occur within area
Elseya lavarackorum Gulf Snapping Turtle [67197]	Endangered	Species or species habitat known to occur within area
Sharks		
Pristis pristis Largetooth Sawfish, Freshwater Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756]	Vulnerable	Species or species habitat likely to occur within area

Listed Migratory Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Migratory Marine Birds		
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Migratory Wetlands Species		
Ardea alba Great Egret, White Egret [59541]		Species or species habitat known to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
Charadrius veredus Oriental Plover, Oriental Dotterel [882]		Species or species habitat may occur within area
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Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat likely to occur within area

Other Matters Protected by the EPBC Act

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Birds		
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Pandion haliaetus Osprey [952]		Species or species habitat known to occur within area

Name	Threatened	Type of Presence
Rostratula benghalensis (sensu lato)		
Painted Snipe [889]	Endangered*	Species or species habitat likely to occur within area
Reptiles		
Crocodylus johnstoni		
Freshwater Crocodile, Johnston's Crocodile, Johnston's River Crocodile [1773]		Species or species habitat may occur within area

Extra Information

Invasive Species [Resource Information]

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 Resouces Audit, 2001.

Name	Status	Type of Presence
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Pig [6]		Species or species habitat likely to occur within area
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Acacia nilotica subsp. indica		
Prickly Acacia [6196]		Species or species habitat may occur within area
Cenchrus ciliaris		
Buffel-grass, Black Buffel-grass [20213]		Species or species habitat likely to occur within area
Cryptostegia grandiflora		
Rubber Vine, Rubbervine, India Rubber Vine, India Rubbervine, Palay Rubbervine, Purple Allamanda [18913]		Species or species habitat likely to occur within area
Jatropha gossypifolia		
Cotton-leaved Physic-Nut, Bellyache Bush, Cotton-leaf Physic Nut, Cotton-leaf Jatropha, Black Physic Nut [7507]		Species or species habitat likely to occur within area
Lantana camara		
Lantana, Common Lantana, Kamara Lantana, Large-leaf Lantana, Pink Flowered Lantana, Red Flowered Lantana, Red-Flowered Sage, White Sage, Wild Sage [10892]		Species or species habitat likely to occur within area
Parkinsonia aculeata		
Parkinsonia, Jerusalem Thorn, Jelly Bean Tree, Horse Bean [12301]		Species or species habitat likely to occur within area
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Asian House Gecko [1708]		Species or species habitat likely to occur within area

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-20.499978 139.084488,-20.499978 139.084488,-20.744184 139.496475,-20.84689 139.469009,-20.587423 139.046036,-20.499978 139.084488

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Queensland Government

Wildlife Online Extract

Search Criteria: Species List for a Specified Point
Species: All
Type: All
Status: All
Records: All
Date: Since 1980
Latitude: -20.3557
Longitude: 138.1875
Distance: 20
Email: paul.fox@o2ecology.com.au
Date submitted: Wednesday 22 Apr 2015 07:02:02
Date extracted: Wednesday 22 Apr 2015 07:10:03

The number of records retrieved = 46

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
animals	birds	Cacatuidae	*Nymphicus hollandicus*	cockatiel		C		1
animals	birds	Cacatuidae	*Cacatua galerita*	sulphur-crested cockatoo		C		1
animals	birds	Campephagidae	*Coracina novaehollandiae*	black-faced cuckoo-shrike		C		1
animals	birds	Climacteridae	*Climacteris melanura*	black-tailed treecreeper		C		1
animals	birds	Maluridae	*Amytornis ballarae*	Kalkadoon grasswren		C		1
animals	birds	Meliphagidae	*Ptilotula plumulus*	grey-fronted honeyeater		C		1
animals	birds	Meliphagidae	*Ptilotula keartlandi*	grey-headed honeyeater		C		1
animals	birds	Meliphagidae	*Ptilotula penicillatus*	white-plumed honeyeater		C		2
animals	birds	Meliphagidae	*Manorina flavigula*	yellow-throated miner		C		2
animals	birds	Monarchidae	*Grallina cyanoleuca*	magpie-lark		C		1
animals	birds	Pachycephalidae	*Pachycephala rufiventris*	rufous whistler		C		1
animals	birds	Psittacidae	*Melopsittacus undulatus*	budgerigar		C		1
animals	birds	Rhipiduridae	*Rhipidura leucophrys*	willie wagtail		C		1
plants	ferns	Marsileaceae	*Marsilea exarata*	sway-back nardoo		C		1/1
plants	higher dicots	Amaranthaceae	*Alternanthera sp. (Mt Isa R.L.Specht+ 49)*			C		1/1
plants	higher dicots	Asteraceae	*Blumea diffusa*			C		1/1
plants	higher dicots	Boraginaceae	*Ehretia saligna*			C		1/1
plants	higher dicots	Byttneriaceae	*Keraudrenia nephrosperma*			C		1/1
plants	higher dicots	Convolvulaceae	*Convolvulus clementii*			C		1/1
plants	higher dicots	Cucurbitaceae	*Cucumis melo*			C		1/1
plants	higher dicots	Elatinaceae	*Bergia trimera*			C		1/1
plants	higher dicots	Euphorbiaceae	*Euphorbia papillata var. papillata*			C		1/1
plants	higher dicots	Fabaceae	*Alysicarpus muelleri*			C		1/1
plants	higher dicots	Fabaceae	*Swainsona campylantha*			C		1/1
plants	higher dicots	Fabaceae	*Sesbania chippendalei*			C		1/1
plants	higher dicots	Fabaceae	*Rhynchosia minima var. minima*			C		1/1
plants	higher dicots	Fabaceae	*Crotalaria montana var. exserta*			C		1/1
plants	higher dicots	Fabaceae	*Crotalaria novae-hollandiae subsp. novae-hollandiae*			C		1/1
plants	higher dicots	Fabaceae	*Tephrosia benthamii*			C		1/1
plants	higher dicots	Fabaceae	*Mirbelia viminalis*			C		1/1
plants	higher dicots	Goodeniaceae	*Scaevola*			C		1/1
plants	higher dicots	Malvaceae	*Gossypium bickii*			C		1/1
plants	higher dicots	Malvaceae	*Abutilon malvifolium*	bastard marshmallow		C		1/1
plants	higher dicots	Malvaceae	*Sida argillacea*			C		1/1
plants	higher dicots	Mimosaceae	*Acacia adsurgens*			C		1/1
plants	higher dicots	Mimosaceae	*Neptunia monosperma*			C		1/1
plants	higher dicots	Myrtaceae	*Eucalyptus odontocarpa*			C		1/1
plants	higher dicots	Myrtaceae	*Eucalyptus pruinosa subsp. pruinosa*			C		1/1
plants	higher dicots	Myrtaceae	*Eucalyptus microtheca*	coolibah		C		1/1
plants	higher dicots	Phyllanthaceae	*Phyllanthus lacunarius*			C		1/1
plants	higher dicots	Phyllanthaceae	*Flueggea virosa subsp. melanthesoides*			C		1/1
plants	higher dicots	Portulacaceae	*Portulaca oligosperma*			C		1/1
plants	higher dicots	Scrophulariaceae	*Eremophila longifolia*	berrigan		C		1/1
plants	monocots	Poaceae	*Iseilema membranaceum*	small flinders grass		C		1/1
plants	monocots	Poaceae	*Dichanthium fecundum*	curly bluegrass		C		1/1
plants	monocots	Poaceae	*Echinochloa colona*	awnless barnyard grass	Y			1/1

CODES

I - Y indicates that the taxon is introduced to Queensland and has naturalised.

Q - Indicates the Queensland conservation status of each taxon under the *Nature Conservation Act 1992.* The codes are Extinct in the Wild (PE), Endangered (E), Vulnerable (V), Near Threatened (NT), Least Concern (C) or Not Protected ( ).

A - Indicates the Australian conservation status of each taxon under the *Environment Protection and Biodiversity Conservation Act 1999.* The values of EPBC are Conservation Dependent (CD), Critically Endangered (CE), Endangered (E), Extinct (EX), Extinct in the Wild (XW) and Vulnerable (V).

Records – The first number indicates the total number of records of the taxon for the record option selected (i.e. All, Confirmed or Specimens).
This number is output as 99999 if it equals or exceeds this value. The second number located after the / indicates the number of specimen records for the taxon.
This number is output as 999 if it equals or exceeds this value.

Queensland Government

Wildlife Online Extract

Search Criteria: Species List for a Specified Point
Species: All
Type: All
Status: All
Records: All
Date: Since 1980
Latitude: -20.4379
Longitude: 138.5608
Distance: 20
Email: paul.fox@o2ecology.com.au
Date submitted: Wednesday 22 Apr 2015 07:04:19
Date extracted: Wednesday 22 Apr 2015 07:10:07

The number of records retrieved = 177

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
animals	birds	Accipitridae	*Accipiter cirrocephalus*	collared sparrowhawk		C		1
animals	birds	Accipitridae	*Haliastur sphenurus*	whistling kite		C		1
animals	birds	Accipitridae	*Milvus migrans*	black kite		C		1
animals	birds	Anatidae	*Malacorhynchus membranaceus*	pink-eared duck		C		1
animals	birds	Anatidae	*Chenonetta jubata*	Australian wood duck		C		1
animals	birds	Anatidae	*Aythya australis*	hardhead		C		2
animals	birds	Anatidae	*Cygnus atratus*	black swan		C		1
animals	birds	Anatidae	*Anas superciliosa*	Pacific black duck		C		2
animals	birds	Anatidae	*Anas gracilis*	grey teal		C		1
animals	birds	Anhingidae	*Anhinga novaehollandiae*	Australasian darter		C		1
animals	birds	Ardeidae	*Egretta novaehollandiae*	white-faced heron		C		1
animals	birds	Ardeidae	*Ardea pacifica*	white-necked heron		C		1
animals	birds	Ardeidae	*Ardea modesta*	eastern great egret		SL		1
animals	birds	Ardeidae	*Ardea intermedia*	intermediate egret		C		1
animals	birds	Artamidae	*Artamus cinereus*	black-faced woodswallow		C		3
animals	birds	Artamidae	*Cracticus tibicen*	Australian magpie		C		1
animals	birds	Artamidae	*Cracticus nigrogularis*	pied butcherbird		C		1
animals	birds	Cacatuidae	*Cacatua sanguinea*	little corella		C		2
animals	birds	Cacatuidae	*Eolophus roseicapillus*	galah		C		3
animals	birds	Campephagidae	*Coracina maxima*	ground cuckoo-shrike		C		1
animals	birds	Casuariidae	*Dromaius novaehollandiae*	emu		C		1
animals	birds	Charadriidae	*Elseyornis melanops*	black-fronted dotterel		C		1
animals	birds	Charadriidae	*Vanellus miles*	masked lapwing		C		1
animals	birds	Columbidae	*Ocyphaps lophotes*	crested pigeon		C		2
animals	birds	Columbidae	*Geopelia cuneata*	diamond dove		C		2
animals	birds	Corvidae	*Corvus sp.*					2
animals	birds	Corvidae	*Corvus coronoides*	Australian raven		C		3
animals	birds	Estrildidae	*Taeniopygia guttata*	zebra finch		C		2
animals	birds	Falconidae	*Falco berigora*	brown falcon		C		1
animals	birds	Gruidae	*Grus rubicunda*	brolga		C		1
animals	birds	Hirundinidae	*Hirundo neoxena*	welcome swallow		C		1
animals	birds	Hirundinidae	*Petrochelidon nigricans*	tree martin		C		1
animals	birds	Meliphagidae	*Ptilotula penicillatus*	white-plumed honeyeater		C		1
animals	birds	Meliphagidae	*Ptilotula keartlandi*	grey-headed honeyeater		C		1
animals	birds	Meliphagidae	*Manorina flavigula*	yellow-throated miner		C		1
animals	birds	Monarchidae	*Grallina cyanoleuca*	magpie-lark		C		1
animals	birds	Pelecanidae	*Pelecanus conspicillatus*	Australian pelican		C		1
animals	birds	Petroicidae	*Microeca fascinans*	jacky winter		C		1
animals	birds	Phalacrocoracidae	*Phalacrocorax sulcirostris*	little black cormorant		C		1
animals	birds	Phalacrocoracidae	*Microcarbo melanoleucos*	little pied cormorant		C		1
animals	birds	Podicipedidae	*Tachybaptus novaehollandiae*	Australasian grebe		C		1
animals	birds	Podicipedidae	*Podiceps cristatus*	great crested grebe		C		1
animals	birds	Psittacidae	*Melopsittacus undulatus*	budgerigar		C		1
animals	birds	Rallidae	*Fulica atra*	Eurasian coot		C		1
animals	birds	Recurvirostridae	*Himantopus himantopus*	black-winged stilt		C		1
animals	birds	Rhipiduridae	*Rhipidura leucophrys*	willie wagtail		C		2

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
animals	birds	Threskiornithidae	*Threskiornis spinicollis*	straw-necked ibis		C		1
plants	ferns	Marsileaceae	*Marsilea drummondii*	common nardoo		C		1/1
plants	higher dicots	Aizoaceae	*Trianthema pilosa*			C		4/4
plants	higher dicots	Amaranthaceae	*Alternanthera sp. (Mt Isa R.L.Specht+ 49)*			C		1/1
plants	higher dicots	Amaranthaceae	*Ptilotus polystachyus*			C		3/3
plants	higher dicots	Asteraceae	*Pterocaulon sphacelatum*	applebush		C		2/2
plants	higher dicots	Asteraceae	*Pterocaulon serrulatum var. velutinum*			C		2/2
plants	higher dicots	Asteraceae	*Streptoglossa odora*			C		1/1
plants	higher dicots	Asteraceae	*Pluchea rubelliflora*			C		1/1
plants	higher dicots	Boraginaceae	*Heliotropium styotrichum*			C		3/3
plants	higher dicots	Boraginaceae	*Heliotropium glabellum*			C		2/2
plants	higher dicots	Boraginaceae	*Heliotropium tenuifolium*			C		1/1
plants	higher dicots	Boraginaceae	*Heliotropium cunninghamii*			C		1/1
plants	higher dicots	Boraginaceae	*Heliotropium haesum*			C		1/1
plants	higher dicots	Byttneriaceae	*Waltheria indica*			C		1/1
plants	higher dicots	Caesalpiniaceae	*Chamaecrista symonii*			C		4/4
plants	higher dicots	Caesalpiniaceae	*Senna oligoclada*			C		1/1
plants	higher dicots	Caesalpiniaceae	*Senna costata*			C		1/1
plants	higher dicots	Caesalpiniaceae	*Senna*			C		1/1
plants	higher dicots	Capparaceae	*Capparis umbonata*			C		1/1
plants	higher dicots	Caryophyllaceae	*Polycarpaea corymbosa*			C		1/1
plants	higher dicots	Chenopodiaceae	*Maireana villosa*			C		1/1
plants	higher dicots	Convolvulaceae	*Evolvulus alsinoides var. villosicalyx*			C		1/1
plants	higher dicots	Convolvulaceae	*Polymeria ambigua*			C		1/1
plants	higher dicots	Convolvulaceae	*Evolvulus alsinoides var. decumbens*			C		1/1
plants	higher dicots	Convolvulaceae	*Davenportia davenportii*			C		4/4
plants	higher dicots	Convolvulaceae	*Bonamia multiflora*			C		1/1
plants	higher dicots	Cucurbitaceae	*Citrullus colocynthis*	colocynth	Y			1/1
plants	higher dicots	Cucurbitaceae	*Cucumis melo*			C		2/2
plants	higher dicots	Droseraceae	*Drosera finlaysoniana*			C		1/1
plants	higher dicots	Elatinaceae	*Bergia trimera*			C		1/1
plants	higher dicots	Euphorbiaceae	*Euphorbia papillata var. papillata*			C		2/2
plants	higher dicots	Euphorbiaceae	*Adriana tomentosa var. hookeri*			C		1/1
plants	higher dicots	Euphorbiaceae	*Microstachys chamaelea*			C		2/2
plants	higher dicots	Euphorbiaceae	*Euphorbia tannensis subsp. eremophila*			C		1/1
plants	higher dicots	Euphorbiaceae	*Euphorbia petala*			C		2/2
plants	higher dicots	Euphorbiaceae	*Croton aridus*			C		1/1
plants	higher dicots	Euphorbiaceae	*Euphorbia australis var. subtomentosa*			C		1/1
plants	higher dicots	Euphorbiaceae	*Adriana tomentosa*			C		1/1
plants	higher dicots	Fabaceae	*Crotalaria novae-hollandiae subsp. lasiophylla*			C		3/3
plants	higher dicots	Fabaceae	*Crotalaria novae-hollandiae subsp. novae-hollandiae*			C		1/1
plants	higher dicots	Fabaceae	*Tephrosia virens*			C		2/2
plants	higher dicots	Fabaceae	*Zornia albiflora*			C		1/1
plants	higher dicots	Fabaceae	*Cullen pustulatum*			C		2/2
plants	higher dicots	Fabaceae	*Cajanus marmoratus*			C		2/2
plants	higher dicots	Fabaceae	*Tephrosia stuartii*			C		1/1

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
plants	higher dicots	Fabaceae	*Tephrosia conspicua*			C		1/1
plants	higher dicots	Fabaceae	*Tephrosia lasiochlaena*			C		1/1
plants	higher dicots	Fabaceae	*Gastrolobium grandiflorum*			C		1/1
plants	higher dicots	Fabaceae	*Galactia tenuiflora var. macrantha*			C		1/1
plants	higher dicots	Fabaceae	*Galactia sp. (Andoom A.Morton 1149)*			C		1/1
plants	higher dicots	Fabaceae	*Tephrosia brachyodon var. longifolia*			C		2/2
plants	higher dicots	Fabaceae	*Tephrosia sp. (Barkly Downs S.L.Everist 3384)*			C		3/3
plants	higher dicots	Goodeniaceae	*Scaevola parvifolia subsp. parvifolia*			C		3/3
plants	higher dicots	Goodeniaceae	*Scaevola*			C		1/1
plants	higher dicots	Goodeniaceae	*Goodenia vilmoriniae*			C		1/1
plants	higher dicots	Goodeniaceae	*Goodenia lamprosperma*			C		2/2
plants	higher dicots	Goodeniaceae	*Goodenia strangfordii*			C		1/1
plants	higher dicots	Goodeniaceae	*Scaevola browniana subsp. browniana*			C		1/1
plants	higher dicots	Gyrostemonaceae	*Gyrostemon tepperi*			C		1/1
plants	higher dicots	Haloragaceae	*Haloragis glauca forma glauca*			C		1/1
plants	higher dicots	Lamiaceae	*Teucrium integrifolium*			C		1/1
plants	higher dicots	Loranthaceae	*Lysiana subfalcata*			C		1/1
plants	higher dicots	Malvaceae	*Sida arenicola*			C		1/1
plants	higher dicots	Malvaceae	*Abutilon macrum*			C		1/1
plants	higher dicots	Malvaceae	*Sida sp. (Jericho E.J.Thompson+ JER117)*			C		1/1
plants	higher dicots	Malvaceae	*Sida rohlenae subsp. occidentalis*			C		2/2
plants	higher dicots	Malvaceae	*Hibiscus brachychlaenus*			C		3/3
plants	higher dicots	Malvaceae	*Gossypium australe*			C		1/1
plants	higher dicots	Mimosaceae	*Acacia asperulacea*			C		1/1
plants	higher dicots	Mimosaceae	*Acacia sp. (Urandangi L.Pedley 2025)*			C		1/1
plants	higher dicots	Mimosaceae	*Acacia drepanocarpa subsp. latifolia*			C		1/1
plants	higher dicots	Mimosaceae	*Acacia tenuissima*			C		1/1
plants	higher dicots	Mimosaceae	*Acacia stipuligera*			C		6/6
plants	higher dicots	Mimosaceae	*Acacia sericophylla*			C		1/1
plants	higher dicots	Mimosaceae	*Acacia ancistrocarpa*			C		1/1
plants	higher dicots	Mimosaceae	*Neptunia dimorphantha*			C		1/1
plants	higher dicots	Mimosaceae	*Acacia melleodora*			C		2/2
plants	higher dicots	Mimosaceae	*Acacia hilliana*			C		1/1
plants	higher dicots	Mimosaceae	*Acacia adsurgens*			C		1/1
plants	higher dicots	Mimosaceae	*Acacia hammondii*			C		1/1
plants	higher dicots	Mimosaceae	*Acacia retivenea subsp. retivenea*			C		1/1
plants	higher dicots	Mimosaceae	*Acacia lysiphloia*			C		1/1
plants	higher dicots	Mimosaceae	*Acacia monticola*			C		1/1
plants	higher dicots	Molluginaceae	*Glinus lotoides*	hairy carpet weed		C		1/1
plants	higher dicots	Myrtaceae	*Melaleuca viridiflora var. viridiflora*			C		1/1
plants	higher dicots	Myrtaceae	*Eucalyptus odontocarpa*			C		1/1
plants	higher dicots	Myrtaceae	*Eucalyptus microtheca*	coolibah		C		3/3
plants	higher dicots	Myrtaceae	*Corymbia capricornia*			C		2/2
plants	higher dicots	Myrtaceae	*Melaleuca lasiandra*			C		1/1
plants	higher dicots	Myrtaceae	*Melaleuca argentea*	silver tea-tree		C		1/1
plants	higher dicots	Myrtaceae	*Eucalyptus herbertiana*	kalumburu gum		C		3/3

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
plants	higher dicots	Orobanchaceae	*Striga squamigera*			C		1/1
plants	higher dicots	Pentapetaceae	*Melhania oblongifolia*			C		2/2
plants	higher dicots	Phyllanthaceae	*Phyllanthus minutiflorus*			C		1/1
plants	higher dicots	Phyllanthaceae	*Phyllanthus carpentariae*			C		1/1
plants	higher dicots	Plantaginaceae	*Stemodia lathraia*			C		1/1
plants	higher dicots	Polygonaceae	*Duma florulenta*			C		1/1
plants	higher dicots	Proteaceae	*Grevillea dryandri subsp. dryandri*			C		1/1
plants	higher dicots	Proteaceae	*Hakea chordophylla*			C		1/1
plants	higher dicots	Rubiaceae	*Spermacoce auriculata*			C		3/3
plants	higher dicots	Sapindaceae	*Dodonaea coriacea*			C		2/2
plants	higher dicots	Sapindaceae	*Dodonaea barklyana*			C		1/1
plants	higher dicots	Solanaceae	*Solanum succosum*			C		2/2
plants	higher dicots	Stylidiaceae	*Stylidium floodii*			C		2/2
plants	higher dicots	Zygophyllaceae	*Tribulopis angustifolia*			C		1/1
plants	monocots	Cyperaceae	*Cyperus conicus var. conicus*			C		1/1
plants	monocots	Cyperaceae	*Fimbristylis bisumbellata*			C		1/1
plants	monocots	Cyperaceae	*Fimbristylis caespitosa*			C		1/1
plants	monocots	Cyperaceae	*Fimbristylis neilsonii*			C		1/1
plants	monocots	Cyperaceae	*Bulbostylis barbata*			C		1/1
plants	monocots	Cyperaceae	*Cyperus dactylotes*			C		1/1
plants	monocots	Cyperaceae	*Cyperus blakeanus*			C		1/1
plants	monocots	Johnsoniaceae	*Corynotheca micrantha var. divaricata*	sand lily		C		1/1
plants	monocots	Poaceae	*Eragrostis xerophila*			C		1/1
plants	monocots	Poaceae	*Eragrostis leptocarpa*	drooping lovegrass		C		1/1
plants	monocots	Poaceae	*Bothriochloa ewartiana*	desert bluegrass		C		1/1
plants	monocots	Poaceae	*Echinochloa turneriana*	channel millet		C		1/1
plants	monocots	Poaceae	*Enneapogon robustissimus*			C		2/2
plants	monocots	Poaceae	*Yakirra australiensis var. australiensis*			C		1/1
plants	monocots	Poaceae	*Eriachne mucronata forma (Alpha C.E.Hubbard 7882)*			C		1/1
plants	monocots	Poaceae	*Eragrostis speciosa*			C		1/1
plants	monocots	Poaceae	*Echinochloa colona*	awnless barnyard grass	Y			1/1
plants	monocots	Poaceae	*Aristida latifolia*	feathertop wiregrass		C		1/1
plants	monocots	Poaceae	*Iseilema convexum*			C		1/1
plants	monocots	Poaceae	*Eragrostis fallax*			C		1/1
plants	monocots	Poaceae	*Spathia neurosa*			C		1/1
plants	monocots	Poaceae	*Sarga timorense*			C		1/1
plants	monocots	Poaceae	*Chloris virgata*	feathertop rhodes grass	Y			1/1
plants	monocots	Poaceae	*Eriachne obtusa*			C		2/2
plants		Phrymaceae	*Mimulus gracilis*	slender monkey flower		C		1/1

CODES

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A - Indicates the Australian conservation status of each taxon under the *Environment Protection and Biodiversity Conservation Act 1999.* The values of EPBC are Conservation Dependent (CD), Critically Endangered (CE), Endangered (E), Extinct (EX), Extinct in the Wild (XW) and Vulnerable (V).

Records – The first number indicates the total number of records of the taxon for the record option selected (i.e. All, Confirmed or Specimens).
This number is output as 99999 if it equals or exceeds this value. The second number located after the / indicates the number of specimen records for the taxon.
This number is output as 999 if it equals or exceeds this value.

Queensland Government

Wildlife Online Extract

Search Criteria: Species List for a Specified Point
Species: All
Type: All
Status: All
Records: All
Date: Since 1980
Latitude: -20.5640
Longitude: 138.9201
Distance: 20
Email: paul.fox@o2ecology.com.au
Date submitted: Wednesday 22 Apr 2015 07:15:03
Date extracted: Wednesday 22 Apr 2015 07:20:03

The number of records retrieved = 257

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
animals	birds	Acanthizidae	*Smicrornis brevirostris*	weebill		C		3
animals	birds	Accipitridae	*Haliastur sphenurus*	whistling kite		C		1
animals	birds	Accipitridae	*Accipiter fasciatus*	brown goshawk		C		1
animals	birds	Aegothelidae	*Aegotheles cristatus*	Australian owlet-nightjar		C		1
animals	birds	Alaudidae	*Mirafra javanica*	Horsfield's bushlark		C		1
animals	birds	Anatidae	*Anas superciliosa*	Pacific black duck		C		1
animals	birds	Artamidae	*Cracticus tibicen*	Australian magpie		C		4
animals	birds	Artamidae	*Artamus cinereus*	black-faced woodswallow		C		3
animals	birds	Artamidae	*Artamus minor*	little woodswallow		C		2
animals	birds	Artamidae	*Cracticus nigrogularis*	pied butcherbird		C		4
animals	birds	Cacatuidae	*Nymphicus hollandicus*	cockatiel		C		1
animals	birds	Cacatuidae	*Cacatua sanguinea*	little corella		C		3
animals	birds	Cacatuidae	*Eolophus roseicapillus*	galah		C		6
animals	birds	Cacatuidae	*Cacatua galerita*	sulphur-crested cockatoo		C		2
animals	birds	Campephagidae	*Coracina novaehollandiae*	black-faced cuckoo-shrike		C		1
animals	birds	Casuariidae	*Dromaius novaehollandiae*	emu		C		3
animals	birds	Climacteridae	*Climacteris melanura*	black-tailed treecreeper		C		2
animals	birds	Columbidae	*Geopelia striata*	peaceful dove		C		4
animals	birds	Columbidae	*Ocyphaps lophotes*	crested pigeon		C		4
animals	birds	Columbidae	*Phaps chalcoptera*	common bronzewing		C		1
animals	birds	Columbidae	*Geopelia cuneata*	diamond dove		C		3
animals	birds	Columbidae	*Geophaps plumifera*	spinifex pigeon		C		2
animals	birds	Coraciidae	*Eurystomus orientalis*	dollarbird		C		1
animals	birds	Corvidae	*Corvus orru*	Torresian crow		C		1
animals	birds	Corvidae	*Corvus coronoides*	Australian raven		C		3
animals	birds	Estrildidae	*Taeniopygia guttata*	zebra finch		C		1
animals	birds	Falconidae	*Falco cenchroides*	Nankeen kestrel		C		1
animals	birds	Halcyonidae	*Dacelo leachii*	blue-winged kookaburra		C		2
animals	birds	Maluridae	*Malurus lamberti*	variegated fairy-wren		C		1
animals	birds	Maluridae	*Amytornis dorotheae*	Carpentarian grasswren		NT		1
animals	birds	Megaluridae	*Eremiornis carteri*	spinifexbird		C		1
animals	birds	Meliphagidae	*Conopophila rufogularis*	rufous-throated honeyeater		C		1
animals	birds	Meliphagidae	*Ptilotula penicillatus*	white-plumed honeyeater		C		5
animals	birds	Meliphagidae	*Cissomela pectoralis*	banded honeyeater		C		1
animals	birds	Meliphagidae	*Epthianura tricolor*	crimson chat		C		1
animals	birds	Meliphagidae	*Ptilotula plumulus*	grey-fronted honeyeater		C		1
animals	birds	Meliphagidae	*Manorina flavigula*	yellow-throated miner		C		4
animals	birds	Meropidae	*Merops ornatus*	rainbow bee-eater		SL		2
animals	birds	Monarchidae	*Grallina cyanoleuca*	magpie-lark		C		2
animals	birds	Oriolidae	*Oriolus sagittatus*	olive-backed oriole		C		1
animals	birds	Pachycephalidae	*Colluricincla harmonica*	grey shrike-thrush		C		1
animals	birds	Pardalotidae	*Pardalotus striatus*	striated pardalote		C		2
animals	birds	Pardalotidae	*Pardalotus rubricatus*	red-browed pardalote		C		2
animals	birds	Petroicidae	*Microeca fascinans*	jacky winter		C		1
animals	birds	Phalacrocoracidae	*Microcarbo melanoleucos*	little pied cormorant		C		1
animals	birds	Pomatostomidae	*Pomatostomus temporalis*	grey-crowned babbler		C		3

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
animals	birds	Psittacidae	*Psitteuteles versicolor*	varied lorikeet		C		4
animals	birds	Psittacidae	*Barnardius zonarius*	Australian ringneck		C		1
animals	birds	Psittacidae	*Aprosmictus erythropterus*	red-winged parrot		C		2
animals	birds	Psittacidae	*Barnardius zonarius macgillivrayi*	Cloncurry parrot		C		2
animals	birds	Rhipiduridae	*Rhipidura leucophrys*	willie wagtail		C		7
animals	birds	Strigidae	*Ninox boobook*	southern boobook		C		1
animals	birds	Turnicidae	*Turnix velox*	little button-quail		C		1
animals	mammals	Macropodidae	*Macropus rufus*	red kangaroo		C		1
animals	mammals	Suidae	*Sus scrofa*	pig	Y			1
plants	ferns	Marsileaceae	*Marsilea exarata*	sway-back nardoo		C		1/1
plants	ferns	Marsileaceae	*Marsilea hirsuta*	hairy nardoo		C		1/1
plants	higher dicots	Amaranthaceae	*Alternanthera sp. (Mt Isa R.L.Specht+ 49)*			C		2/2
plants	higher dicots	Amaranthaceae	*Alternanthera angustifolia*			C		1/1
plants	higher dicots	Amaranthaceae	*Ptilotus macrocephalus*	green pussytails		C		2/2
plants	higher dicots	Amaranthaceae	*Gomphrena breviflora*			C		3/3
plants	higher dicots	Amaranthaceae	*Ptilotus schwartzii*			C		2/2
plants	higher dicots	Amaranthaceae	*Ptilotus fusiformis*			C		1/1
plants	higher dicots	Amaranthaceae	*Ptilotus spicatus*			C		1/1
plants	higher dicots	Amaranthaceae	*Gomphrena lanata*			C		1/1
plants	higher dicots	Amaranthaceae	*Alternanthera denticulata var. micrantha*			C		1/1
plants	higher dicots	Asteraceae	*Sphaeromorphaea littoralis*			C		1/1
plants	higher dicots	Asteraceae	*Xanthium occidentale*		Y			2/2
plants	higher dicots	Asteraceae	*Streptoglossa bubakii*			C		1/1
plants	higher dicots	Asteraceae	*Acanthospermum hispidum*	star burr	Y			1/1
plants	higher dicots	Asteraceae	*Pterocaulon serrulatum var. velutinum*			C		1/1
plants	higher dicots	Asteraceae	*Flaveria trinervia*		Y			2/2
plants	higher dicots	Asteraceae	*Pterocaulon sphacelatum*	applebush		C		2/2
plants	higher dicots	Boraginaceae	*Heliotropium cunninghamii*			C		2/2
plants	higher dicots	Boraginaceae	*Heliotropium tenuifolium*			C		1/1
plants	higher dicots	Boraginaceae	*Heliotropium styotrichum*			C		3/3
plants	higher dicots	Byttneriaceae	*Waltheria indica*			C		1/1
plants	higher dicots	Caesalpiniaceae	*Petalostylis cassioides*			C		2/2
plants	higher dicots	Caesalpiniaceae	*Petalostylis labicheoides*			C		1/1
plants	higher dicots	Caesalpiniaceae	*Parkinsonia aculeata*	parkinsonia	Y			1/1
plants	higher dicots	Caesalpiniaceae	*Senna oligoclada*			C		1/1
plants	higher dicots	Chenopodiaceae	*Sclerolaena cornishiana*			C		1/1
plants	higher dicots	Chenopodiaceae	*Chenopodium auricomum*			C		1/1
plants	higher dicots	Chenopodiaceae	*Maireana villosa*			C		2/2
plants	higher dicots	Cleomaceae	*Cleome viscosa*	tick-weed		C		1/1
plants	higher dicots	Convolvulaceae	*Polymeria ambigua*			C		1/1
plants	higher dicots	Convolvulaceae	*Evolvulus alsinoides var. villosicalyx*			C		3/3
plants	higher dicots	Convolvulaceae	*Evolvulus alsinoides var. decumbens*			C		2/2
plants	higher dicots	Convolvulaceae	*Bonamia media var. media*			C		1/1
plants	higher dicots	Convolvulaceae	*Operculina aequisepala*			C		1/1
plants	higher dicots	Convolvulaceae	*Ipomoea diamantinensis*	desert cowvine		C		1/1
plants	higher dicots	Convolvulaceae	*Ipomoea lonchophylla*			C		3/3

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
plants	higher dicots	Convolvulaceae	*Polymeria*			C		1/1
plants	higher dicots	Convolvulaceae	*Ipomoea coptica*			C		2/2
plants	higher dicots	Convolvulaceae	*Ipomoea costata*			C		1/1
plants	higher dicots	Convolvulaceae	*Ipomoea muelleri*	poison morning-glory		C		2/2
plants	higher dicots	Convolvulaceae	*Bonamia multiflora*			C		1/1
plants	higher dicots	Convolvulaceae	*Ipomoea argillicola*			C		2/2
plants	higher dicots	Elatinaceae	*Bergia diacheiron*			C		2/2
plants	higher dicots	Euphorbiaceae	*Euphorbia bifida*			C		1/1
plants	higher dicots	Euphorbiaceae	*Euphorbia stevenii*	bottle tree spurge		C		1/1
plants	higher dicots	Euphorbiaceae	*Euphorbia hirta*		Y			1/1
plants	higher dicots	Euphorbiaceae	*Euphorbia coghlanii*			C		1/1
plants	higher dicots	Euphorbiaceae	*Euphorbia papillata var. papillata*			C		3/3
plants	higher dicots	Euphorbiaceae	*Euphorbia papillata var. laevicaulis*			C		1/1
plants	higher dicots	Fabaceae	*Galactia*			C		1/1
plants	higher dicots	Fabaceae	*Tephrosia*			C		1/1
plants	higher dicots	Fabaceae	*Cullen cinereum*			C		1/1
plants	higher dicots	Fabaceae	*Indigofera trita*			C		1/1
plants	higher dicots	Fabaceae	*Tephrosia supina*			C		1/1
plants	higher dicots	Fabaceae	*Desmodium muelleri*			C		1/1
plants	higher dicots	Fabaceae	*Indigofera colutea*	sticky indigo		C		1/1
plants	higher dicots	Fabaceae	*Tephrosia stuartii*			C		3/3
plants	higher dicots	Fabaceae	*Aeschynomene indica*	budda pea		C		1/1
plants	higher dicots	Fabaceae	*Cajanus lanuginosus*			C		1/1
plants	higher dicots	Fabaceae	*Cullen australasicum*			C		1/1
plants	higher dicots	Fabaceae	*Indigofera ewartiana*			C		2/2
plants	higher dicots	Fabaceae	*Indigofera linifolia*			C		1/1
plants	higher dicots	Fabaceae	*Jacksonia lateritica*			C		1/1
plants	higher dicots	Fabaceae	*Swainsona campylantha*			C		1/1
plants	higher dicots	Fabaceae	*Tephrosia lasiochlaena*			C		1/1
plants	higher dicots	Fabaceae	*Desmodium campylocaulon*			C		1/1
plants	higher dicots	Fabaceae	*Galactia tenuiflora var. lucida*			C		1/1
plants	higher dicots	Fabaceae	*Vigna lanceolata var. latifolia*			C		1/1
plants	higher dicots	Fabaceae	*Rhynchosia minima var. australis*			C		2/2
plants	higher dicots	Fabaceae	*Zornia muriculata subsp. angustata*			C		1/1
plants	higher dicots	Fabaceae	*Crotalaria medicaginea var. neglecta*			C		1/1
plants	higher dicots	Fabaceae	*Tephrosia brachyodon var. longifolia*			C		2/2
plants	higher dicots	Fabaceae	*Crotalaria dissitiflora subsp. rugosa*			C		1/1
plants	higher dicots	Fabaceae	*Tephrosia sp. (Barkly Downs S.L.Everist 3384)*			C		3/3
plants	higher dicots	Fabaceae	*Crotalaria novae-hollandiae subsp. lasiophylla*			C		1/1
plants	higher dicots	Goodeniaceae	*Scaevola browniana subsp. browniana*			C		1/1
plants	higher dicots	Goodeniaceae	*Goodenia lunata*			C		1/1
plants	higher dicots	Goodeniaceae	*Scaevola amblyanthera var. amblyanthera*			C		1/1
plants	higher dicots	Lythraceae	*Ammannia multiflora*	jerry-jerry		C		1/1
plants	higher dicots	Malvaceae	*Sida fibulifera*			C		4/4
plants	higher dicots	Malvaceae	*Sida goniocarpa*			C		1/1
plants	higher dicots	Malvaceae	*Sida platycalyx*	lifesaver burr		C		1/1

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
plants	higher dicots	Malvaceae	*Sida trichopoda*			C		1/1
plants	higher dicots	Malvaceae	*Sida cleisocalyx*			C		1/1
plants	higher dicots	Malvaceae	*Hibiscus burtonii*			C		1/1
plants	higher dicots	Malvaceae	*Abutilon arenarium*			C		1/1
plants	higher dicots	Malvaceae	*Abutilon otocarpum*			C		2/2
plants	higher dicots	Malvaceae	*Gossypium australe*			C		2/2
plants	higher dicots	Malvaceae	*Abutilon malvifolium*	bastard marshmallow		C		1/1
plants	higher dicots	Malvaceae	*Hibiscus meraukensis*	Merauke hibiscus		C		1/1
plants	higher dicots	Malvaceae	*Hibiscus verdcourtii*			C		1/1
plants	higher dicots	Malvaceae	*Abutilon leucopetalum*			C		2/2
plants	higher dicots	Malvaceae	*Hibiscus brachychlaenus*			C		1/1
plants	higher dicots	Malvaceae	*Sida rohlenae subsp. rohlenae*			C		2/2
plants	higher dicots	Malvaceae	*Abutilon fraseri subsp. fraseri*			C		1/1
plants	higher dicots	Malvaceae	*Malvastrum americanum var. americanum*		Y			2/2
plants	higher dicots	Malvaceae	*Sida brachypoda*			C		1/1
plants	higher dicots	Malvaceae	*Abutilon hannii*			C		1/1
plants	higher dicots	Malvaceae	*Sida macropoda*			C		1/1
plants	higher dicots	Malvaceae	*Sida spinosa*	spiny sida	Y			4/4
plants	higher dicots	Malvaceae	*Hibiscus sturtii var. grandiflorus*			C		1/1
plants	higher dicots	Mimosaceae	*Acacia retivenea subsp. retivenea*			C		1/1
plants	higher dicots	Mimosaceae	*Neptunia dimorphantha*			C		2/2
plants	higher dicots	Mimosaceae	*Acacia ancistrocarpa*			C		1/1
plants	higher dicots	Mimosaceae	*Acacia tenuissima*			C		2/2
plants	higher dicots	Mimosaceae	*Acacia elachantha*			C		1/1
plants	higher dicots	Mimosaceae	*Acacia sp. (Coolullah M.Lazarides 3988)*			C		1/1
plants	higher dicots	Mimosaceae	*Acacia limbata*			C		1/1
plants	higher dicots	Mimosaceae	*Acacia adsurgens*			C		5/5
plants	higher dicots	Mimosaceae	*Acacia hammondii*			C		1/1
plants	higher dicots	Moraceae	*Ficus opposita*			C		1/1
plants	higher dicots	Myrtaceae	*Melaleuca nervosa*			C		1/1
plants	higher dicots	Myrtaceae	*Eucalyptus leucophloia subsp. euroa*			C		1/1
plants	higher dicots	Myrtaceae	*Corymbia aparrerinja*			C		1/1
plants	higher dicots	Myrtaceae	*Corymbia capricornia*			C		2/2
plants	higher dicots	Myrtaceae	*Eucalyptus odontocarpa*			C		1/1
plants	higher dicots	Nyctaginaceae	*Boerhavia*			C		1/1
plants	higher dicots	Nyctaginaceae	*Boerhavia paludosa*			C		1/1
plants	higher dicots	Pentapetaceae	*Melhania ovata*			C		1/1
plants	higher dicots	Pentapetaceae	*Melhania oblongifolia*			C		2/2
plants	higher dicots	Phyllanthaceae	*Flueggea virosa subsp. melanthesoides*			C		1/1
plants	higher dicots	Phyllanthaceae	*Phyllanthus maderaspatensis*			C		2/2
plants	higher dicots	Phyllanthaceae	*Phyllanthus carpentariae*			C		1/1
plants	higher dicots	Phyllanthaceae	*Phyllanthus lacunarius*			C		1/1
plants	higher dicots	Phyllanthaceae	*Phyllanthus*			C		2/2
plants	higher dicots	Plantaginaceae	*Stemodia glabella*			C		1/1
plants	higher dicots	Portulacaceae	*Portulaca*			C		1/1
plants	higher dicots	Portulacaceae	*Portulaca oleracea*	pigweed	Y			1/1

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
plants	higher dicots	Proteaceae	*Grevillea dryandri subsp. dryandri*			C		1/1
plants	higher dicots	Proteaceae	*Hakea chordophylla*			C		2/2
plants	higher dicots	Proteaceae	*Grevillea wickhamii subsp. aprica*			C		1/1
plants	higher dicots	Rubiaceae	*Spermacoce argillacea*			C		1/1
plants	higher dicots	Rubiaceae	*Spermacoce brachystema*			C		1/1
plants	higher dicots	Sapindaceae	*Dodonaea barklyana*			C		1/1
plants	higher dicots	Scrophulariaceae	*Eremophila hispida*			C		1/1
plants	higher dicots	Solanaceae	*Solanum succosum*			C		1/1
plants	higher dicots	Sparrmanniaceae	*Corchorus sidoides subsp. vermicularis*			C		1/1
plants	higher dicots	Sparrmanniaceae	*Corchorus pumilio*			C		1/1
plants	higher dicots	Sparrmanniaceae	*Corchorus tridens*			C		1/1
plants	higher dicots	Sparrmanniaceae	*Corchorus trilocularis*			C		1/1
plants	higher dicots	Zygophyllaceae	*Tribulopis angustifolia*			C		1/1
plants	monocots	Commelinaceae	*Commelina ensifolia*	scurvy grass		C		1/1
plants	monocots	Cyperaceae	*Lipocarpha microcephala*			C		1/1
plants	monocots	Cyperaceae	*Fimbristylis caespitosa*			C		1/1
plants	monocots	Cyperaceae	*Fimbristylis dichotoma*	common fringe-rush		C		1/1
plants	monocots	Cyperaceae	*Bulbostylis turbinata*			C		1/1
plants	monocots	Cyperaceae	*Fimbristylis corynocarya*			C		1/1
plants	monocots	Cyperaceae	*Bulbostylis barbata*			C		1/1
plants	monocots	Cyperaceae	*Eleocharis pallens*	pale spikerush		C		1/1
plants	monocots	Cyperaceae	*Cyperus difformis*	rice sedge		C		1/1
plants	monocots	Cyperaceae	*Cyperus carinatus*			C		1/1
plants	monocots	Cyperaceae	*Cyperus fulvus*			C		1/1
plants	monocots	Cyperaceae	*Cyperus iria*			C		1/1
plants	monocots	Johnsoniaceae	*Caesia chlorantha*			C		1/1
plants	monocots	Poaceae	*Iseilema windersii*			C		1/1
plants	monocots	Poaceae	*Eragrostis cumingii*			C		1/1
plants	monocots	Poaceae	*Eragrostis elongata*			C		3/3
plants	monocots	Poaceae	*Eragrostis eriopoda*			C		1/1
plants	monocots	Poaceae	*Tragus australianus*	small burr grass		C		1/1
plants	monocots	Poaceae	*Dichanthium fecundum*	curly bluegrass		C		2/2
plants	monocots	Poaceae	*Enneapogon truncatus*			C		1/1
plants	monocots	Poaceae	*Eragrostis setifolia*			C		1/1
plants	monocots	Poaceae	*Eragrostis xerophila*			C		2/2
plants	monocots	Poaceae	*Iseilema macratherum*			C		2/2
plants	monocots	Poaceae	*Tripogon loliiformis*	five minute grass		C		1/1
plants	monocots	Poaceae	*Alloteropsis cimicina*			C		1/1
plants	monocots	Poaceae	*Aristida helicophylla*			C		1/1
plants	monocots	Poaceae	*Cymbopogon bombycinus*	silky oilgrass		C		1/1
plants	monocots	Poaceae	*Elytrophorus spicatus*			C		1/1
plants	monocots	Poaceae	*Iseilema membranaceum*	small flinders grass		C		1/1
plants	monocots	Poaceae	*Paspalidium retiglume*			C		3/3
plants	monocots	Poaceae	*Aristida inaequiglumis*			C		1/1
plants	monocots	Poaceae	*Bothriochloa ewartiana*	desert bluegrass		C		3/3
plants	monocots	Poaceae	*Brachyachne convergens*	common native couch		C		1/1

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
plants	monocots	Poaceae	*Echinochloa turneriana*	channel millet		C		1/1
plants	monocots	Poaceae	*Enneapogon polyphyllus*	leafy nineawn		C		1/1
plants	monocots	Poaceae	*Paraneurachne muelleri*			C		1/1
plants	monocots	Poaceae	*Dactyloctenium radulans*	button grass		C		1/1
plants	monocots	Poaceae	*Enneapogon purpurascens*			C		1/1
plants	monocots	Poaceae	*Sporobolus australasicus*			C		1/1
plants	monocots	Poaceae	*Austrochloris dichanthioides*			C		1/1
plants	monocots	Poaceae	*Aristida holathera var. holathera*			C		1/1
plants	monocots	Poaceae	*Panicum decompositum var. tenuius*			C		1/1
plants	monocots	Poaceae	*Dichanthium sericeum subsp. polystachyum*			C		3/3
plants	monocots	Poaceae	*Bothriochloa decipiens var. cloncurrensis*			C		1/1
plants	monocots	Poaceae	*Eriachne sp. (Dugald River B.K.Simon+ 3007)*			C		1/1
plants	monocots	Poaceae	*Echinochloa colona*	awnless barnyard grass	Y			2/2
plants	monocots	Poaceae	*Astrebla squarrosa*	bull mitchell grass		C		1/1
plants	monocots	Poaceae	*Astrebla pectinata*	barley mitchell grass		C		1/1
plants	monocots	Poaceae	*Astrebla elymoides*	hoop mitchell grass		C		1/1
plants	monocots	Poaceae	*Sporobolus caroli*	fairy grass		C		2/2
plants	monocots	Poaceae	*Paspalidium rarum*			C		1/1
plants	monocots	Poaceae	*Panicum laevinode*	pepper grass		C		1/1
plants	monocots	Poaceae	*Digitaria brownii*			C		2/2
plants	monocots	Poaceae	*Chloris pectinata*	comb chloris		C		1/1
plants	monocots	Poaceae	*Themeda triandra*	kangaroo grass		C		1/1
plants	monocots	Poaceae	*Themeda avenacea*			C		1/1
plants	monocots	Poaceae	*Eriachne armitii*			C		1/1
plants	monocots	Poaceae	*Eulalia aurea*	silky browntop		C		2/2
plants	monocots	Poaceae	*Triodia pungens*			C		1/1
plants	monocots	Pontederiaceae	*Monochoria cyanea*			C		1/1

CODES

I - Y indicates that the taxon is introduced to Queensland and has naturalised.

Q - Indicates the Queensland conservation status of each taxon under the *Nature Conservation Act 1992.* The codes are Extinct in the Wild (PE), Endangered (E), Vulnerable (V), Near Threatened (NT), Least Concern (C) or Not Protected ( ).

A - Indicates the Australian conservation status of each taxon under the *Environment Protection and Biodiversity Conservation Act 1999.* The values of EPBC are Conservation Dependent (CD), Critically Endangered (CE), Endangered (E), Extinct (EX), Extinct in the Wild (XW) and Vulnerable (V).

Records – The first number indicates the total number of records of the taxon for the record option selected (i.e. All, Confirmed or Specimens).
This number is output as 99999 if it equals or exceeds this value. The second number located after the / indicates the number of specimen records for the taxon.
This number is output as 999 if it equals or exceeds this value.

Queensland Government

Wildlife Online Extract

Search Criteria: Species List for a Specified Point
Species: All
Type: All
Status: All
Records: All
Date: Since 1980
Latitude: -20.6797
Longitude: 139.2859
Distance: 20
Email: paul.fox@o2ecology.com.au
Date submitted: Wednesday 22 Apr 2015 07:17:30
Date extracted: Wednesday 22 Apr 2015 07:20:15

The number of records retrieved = 516

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
animals	birds	Acanthizidae	*Acanthiza apicalis*	inland thornbill		C		1
animals	birds	Acanthizidae	*Smicrornis brevirostris*	weebill		C		66
animals	birds	Acanthizidae	*Acanthiza chrysorrhoa*	yellow-rumped thornbill		C		5
animals	birds	Accipitridae	*Circus assimilis*	spotted harrier		C		1
animals	birds	Accipitridae	*Hamirostra melanosternon*	black-breasted buzzard		C		1
animals	birds	Accipitridae	*Aquila audax*	wedge-tailed eagle		C		8
animals	birds	Accipitridae	*Milvus migrans*	black kite		C		27
animals	birds	Accipitridae	*Accipiter fasciatus*	brown goshawk		C		5
animals	birds	Accipitridae	*Haliastur sphenurus*	whistling kite		C		6
animals	birds	Accipitridae	*Hieraaetus morphnoides*	little eagle		C		2
animals	birds	Accipitridae	*Accipiter cirrocephalus*	collared sparrowhawk		C		6
animals	birds	Acrocephalidae	*Acrocephalus australis*	Australian reed-warbler		SL		3
animals	birds	Aegothelidae	*Aegotheles cristatus*	Australian owlet-nightjar		C		2
animals	birds	Anatidae	*Cygnus atratus*	black swan		C		1
animals	birds	Anatidae	*Anas gracilis*	grey teal		C		4
animals	birds	Anatidae	*Aythya australis*	hardhead		C		3
animals	birds	Anatidae	*Malacorhynchus membranaceus*	pink-eared duck		C		3
animals	birds	Anatidae	*Dendrocygna eytoni*	plumed whistling-duck		C		2
animals	birds	Anatidae	*Chenonetta jubata*	Australian wood duck		C		2
animals	birds	Anatidae	*Anas superciliosa*	Pacific black duck		C		2
animals	birds	Anhingidae	*Anhinga novaehollandiae*	Australasian darter		C		3
animals	birds	Ardeidae	*Egretta novaehollandiae*	white-faced heron		C		1
animals	birds	Ardeidae	*Nycticorax caledonicus*	Nankeen night-heron		C		2
animals	birds	Ardeidae	*Ardea pacifica*	white-necked heron		C		6
animals	birds	Ardeidae	*Ardea modesta*	eastern great egret		SL		1
animals	birds	Ardeidae	*Ardea ibis*	cattle egret		SL		2
animals	birds	Artamidae	*Cracticus tibicen*	Australian magpie		C		19
animals	birds	Artamidae	*Artamus personatus*	masked woodswallow		C		6
animals	birds	Artamidae	*Artamus superciliosus*	white-browed woodswallow		C		6
animals	birds	Artamidae	*Cracticus nigrogularis*	pied butcherbird		C		23
animals	birds	Artamidae	*Artamus cinereus*	black-faced woodswallow		C		15
animals	birds	Artamidae	*Artamus minor*	little woodswallow		C		6
animals	birds	Burhinidae	*Burhinus grallarius*	bush stone-curlew		C		1
animals	birds	Cacatuidae	*Cacatua sanguinea*	little corella		C		5/1
animals	birds	Cacatuidae	*Nymphicus hollandicus*	cockatiel		C		9
animals	birds	Cacatuidae	*Eolophus roseicapillus*	galah		C		17
animals	birds	Cacatuidae	*Cacatua galerita*	sulphur-crested cockatoo		C		4
animals	birds	Campephagidae	*Lalage sueurii*	white-winged triller		C		13
animals	birds	Campephagidae	*Coracina novaehollandiae*	black-faced cuckoo-shrike		C		33
animals	birds	Casuariidae	*Dromaius novaehollandiae*	emu		C		2
animals	birds	Charadriidae	*Erythrogonys cinctus*	red-kneed dotterel		C		2
animals	birds	Charadriidae	*Elseyornis melanops*	black-fronted dotterel		C		2
animals	birds	Charadriidae	*Vanellus miles*	masked lapwing		C		3
animals	birds	Charadriidae	*Charadrius ruficapillus*	red-capped plover		C		1
animals	birds	Ciconiidae	*Ephippiorhynchus asiaticus*	black-necked stork		C		2
animals	birds	Climacteridae	*Climacteris melanura*	black-tailed treecreeper		C		16

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
animals	birds	Columbidae	*Geophaps plumifera*	spinifex pigeon		C		14
animals	birds	Columbidae	*Phaps chalcoptera*	common bronzewing		C		11
animals	birds	Columbidae	*Ocyphaps lophotes*	crested pigeon		C		30
animals	birds	Columbidae	*Geopelia striata*	peaceful dove		C		26
animals	birds	Columbidae	*Geopelia cuneata*	diamond dove		C		21
animals	birds	Corcoracidae	*Struthidea cinerea*	apostlebird		C		2
animals	birds	Corvidae	*Corvus sp.*					1
animals	birds	Corvidae	*Corvus orru*	Torresian crow		C		1
animals	birds	Corvidae	*Corvus coronoides*	Australian raven		C		33
animals	birds	Cuculidae	*Chalcites osculans*	black-eared cuckoo		C		1
animals	birds	Cuculidae	*Cacomantis pallidus*	pallid cuckoo		C		2
animals	birds	Cuculidae	*Scythrops novaehollandiae*	channel-billed cuckoo		C		1
animals	birds	Estrildidae	*Taeniopygia guttata*	zebra finch		C		45
animals	birds	Estrildidae	*Emblema pictum*	painted finch		C		10
animals	birds	Estrildidae	*Lonchura castaneothorax*	chestnut-breasted mannikin		C		1
animals	birds	Estrildidae	*Heteromunia pectoralis*	pictorella mannikin		C		2
animals	birds	Estrildidae	*Taeniopygia bichenovii*	double-barred finch		C		4
animals	birds	Eurostopodidae	*Eurostopodus argus*	spotted nightjar		C		3
animals	birds	Falconidae	*Falco berigora*	brown falcon		C		8
animals	birds	Falconidae	*Falco cenchroides*	Nankeen kestrel		C		3
animals	birds	Falconidae	*Falco subniger*	black falcon		C		1
animals	birds	Glareolidae	*Stiltia isabella*	Australian pratincole		C		1
animals	birds	Gruidae	*Grus rubicunda*	brolga		C		1
animals	birds	Halcyonidae	*Dacelo leachii*	blue-winged kookaburra		C		4
animals	birds	Halcyonidae	*Todiramphus pyrrhopygius*	red-backed kingfisher		C		11
animals	birds	Hirundinidae	*Petrochelidon ariel*	fairy martin		C		7
animals	birds	Laridae	*Chlidonias hybrida*	whiskered tern		C		1
animals	birds	Laridae	*Chroicocephalus novaehollandiae*	silver gull		C		2
animals	birds	Laridae	*Hydroprogne caspia*	Caspian tern		SL		1
animals	birds	Maluridae	*Amytornis sp.*					1
animals	birds	Maluridae	*Malurus melanocephalus*	red-backed fairy-wren		C		1
animals	birds	Maluridae	*Amytornis ballarae*	Kalkadoon grasswren		C		33/6
animals	birds	Maluridae	*Malurus lamberti*	variegated fairy-wren		C		30
animals	birds	Megaluridae	*Eremiornis carteri*	spinifexbird		C		14
animals	birds	Megaluridae	*Cincloramphus cruralis*	brown songlark		C		1
animals	birds	Megaluridae	*Cincloramphus mathewsi*	rufous songlark		C		3
animals	birds	Meliphagidae	*Acanthagenys rufogularis*	spiny-cheeked honeyeater		C		18
animals	birds	Meliphagidae	*Sugomel niger*	black honeyeater		C		1
animals	birds	Meliphagidae	*Ptilotula penicillatus*	white-plumed honeyeater		C		53
animals	birds	Meliphagidae	*Philemon citreogularis*	little friarbird		C		24
animals	birds	Meliphagidae	*Certhionyx variegatus*	pied honeyeater		C		1
animals	birds	Meliphagidae	*Ptilotula keartlandi*	grey-headed honeyeater		C		48
animals	birds	Meliphagidae	*Ptilotula flavescens*	yellow-tinted honeyeater		C		5
animals	birds	Meliphagidae	*Philemon argenticeps*	silver-crowned friarbird		C		3
animals	birds	Meliphagidae	*Melithreptus gularis*	black-chinned honeyeater		C		17
animals	birds	Meliphagidae	*Lichmera indistincta*	brown honeyeater		C		33

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
animals	birds	Meliphagidae	*Epthianura aurifrons*	orange chat		C		1
animals	birds	Meliphagidae	*Cissomela pectoralis*	banded honeyeater		C		1
animals	birds	Meliphagidae	*Gavicalis virescens*	singing honeyeater		C		8
animals	birds	Meliphagidae	*Epthianura tricolor*	crimson chat		C		6
animals	birds	Meliphagidae	*Ptilotula plumulus*	grey-fronted honeyeater		C		54
animals	birds	Meliphagidae	*Manorina flavigula*	yellow-throated miner		C		36
animals	birds	Meliphagidae	*Grantiella picta*	painted honeyeater		V		1
animals	birds	Meliphagidae	*Conopophila rufogularis*	rufous-throated honeyeater		C		10
animals	birds	Meropidae	*Merops ornatus*	rainbow bee-eater		SL		41
animals	birds	Monarchidae	*Grallina cyanoleuca*	magpie-lark		C		34
animals	birds	Motacillidae	*Anthus novaeseelandiae*	Australasian pipit		C		2
animals	birds	Nectariniidae	*Dicaeum hirundinaceum*	mistletoebird		C		45
animals	birds	Neosittidae	*Daphoenositta chrysoptera*	varied sittella		C		1
animals	birds	Oriolidae	*Oriolus sagittatus*	olive-backed oriole		C		4
animals	birds	Pachycephalidae	*Oreoica gutturalis*	crested bellbird		C		5
animals	birds	Pachycephalidae	*Colluricincla harmonica*	grey shrike-thrush		C		22
animals	birds	Pachycephalidae	*Pachycephala rufiventris*	rufous whistler		C		18
animals	birds	Pardalotidae	*Pardalotus striatus*	striated pardalote		C		22
animals	birds	Pardalotidae	*Pardalotus rubricatus*	red-browed pardalote		C		14
animals	birds	Passeridae	*Passer domesticus*	house sparrow	Y			3
animals	birds	Pelecanidae	*Pelecanus conspicillatus*	Australian pelican		C		1
animals	birds	Petroicidae	*Petroica goodenovii*	red-capped robin		C		3
animals	birds	Petroicidae	*Melanodryas cucullata*	hooded robin		C		10
animals	birds	Petroicidae	*Microeca fascinans*	jacky winter		C		13
animals	birds	Phalacrocoracidae	*Phalacrocorax carbo*	great cormorant		C		2
animals	birds	Phalacrocoracidae	*Phalacrocorax varius*	pied cormorant		C		3
animals	birds	Phalacrocoracidae	*Phalacrocorax sulcirostris*	little black cormorant		C		3
animals	birds	Phalacrocoracidae	*Microcarbo melanoleucos*	little pied cormorant		C		1
animals	birds	Podicipedidae	*Poliocephalus poliocephalus*	hoary-headed grebe		C		2
animals	birds	Podicipedidae	*Tachybaptus novaehollandiae*	Australasian grebe		C		3
animals	birds	Podicipedidae	*Podiceps cristatus*	great crested grebe		C		1
animals	birds	Pomatostomidae	*Pomatostomus temporalis*	grey-crowned babbler		C		35
animals	birds	Psittacidae	*Barnardius zonarius*	Australian ringneck		C		22
animals	birds	Psittacidae	*Melopsittacus undulatus*	budgerigar		C		12
animals	birds	Psittacidae	*Barnardius zonarius macgillivrayi*	Cloncurry parrot		C		1
animals	birds	Psittacidae	*Platycercus adscitus*	pale-headed rosella		C		1
animals	birds	Psittacidae	*Psitteuteles versicolor*	varied lorikeet		C		7
animals	birds	Psittacidae	*Aprosmictus erythropterus*	red-winged parrot		C		15
animals	birds	Ptilonorhynchidae	*Ptilonorhynchus maculatus*	spotted bowerbird		C		18
animals	birds	Rallidae	*Fulica atra*	Eurasian coot		C		3
animals	birds	Rallidae	*Tribonyx ventralis*	black-tailed native-hen		C		2
animals	birds	Rallidae	*Porzana fluminea*	Australian spotted crake		C		1
animals	birds	Rallidae	*Porzana pusilla*	Baillon's crake		C		1
animals	birds	Rallidae	*Porphyrio porphyrio*	purple swamphen		C		2
animals	birds	Recurvirostridae	*Recurvirostra novaehollandiae*	red-necked avocet		C		1
animals	birds	Recurvirostridae	*Himantopus himantopus*	black-winged stilt		C		3

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
animals	birds	Rhipiduridae	*Rhipidura leucophrys*	willie wagtail		C		40
animals	birds	Rhipiduridae	*Rhipidura albiscapa*	grey fantail		C		2
animals	birds	Scolopacidae	*Tringa stagnatilis*	marsh sandpiper		SL		1
animals	birds	Scolopacidae	*Calidris acuminata*	sharp-tailed sandpiper		SL		1
animals	birds	Scolopacidae	*Tringa glareola*	wood sandpiper		SL		1
animals	birds	Strigidae	*Ninox boobook*	southern boobook		C		1
animals	birds	Threskiornithidae	*Platalea regia*	royal spoonbill		C		1
animals	birds	Threskiornithidae	*Plegadis falcinellus*	glossy ibis		SL		2
animals	birds	Threskiornithidae	*Threskiornis spinicollis*	straw-necked ibis		C		3
animals	birds	Turnicidae	*Turnix velox*	little button-quail		C		2
animals	birds	Tytonidae	*Tyto javanica*	eastern barn owl		C		1
animals	mammals	Bovidae	*Bos taurus*	European cattle	Y			1
animals	mammals	Camelidae	*Camelus dromedarius*	one-humped camel	Y			1
animals	mammals	Emballonuridae	*Saccolaimus flaviventris*	yellow-bellied sheathtail bat		C		1
animals	mammals	Equidae	*Equus caballus*	horse	Y			1
animals	mammals	Macropodidae	*Petrogale purpureicollis*	purple-necked rock-wallaby		V		1
animals	mammals	Macropodidae	*Macropus robustus*	common wallaroo		C		1
animals	mammals	Macropodidae	*Macropus rufus*	red kangaroo		C		1
animals	mammals	Pteropodidae	*Pteropus scapulatus*	little red flying-fox		C		1
animals	reptiles	Agamidae	*Amphibolurus gilberti*	Gilbert's dragon		C		1
animals	reptiles	Agamidae	*Pogona vitticeps*			C		1
animals	reptiles	Boidae	*Aspidites melanocephalus*	black-headed python		C		1
animals	reptiles	Diplodactylidae	*Strophurus ciliaris*	spiny-tailed gecko		C		1/1
animals	reptiles	Elapidae	*Demansia quaesitor*	sombre whipsnake		C		1
animals	reptiles	Scincidae	*Carlia amax*			C		1
plants	ferns	Adiantaceae	*Cheilanthes brownii*			C		1/1
plants	ferns	Adiantaceae	*Cheilanthes nudiuscula*			C		1/1
plants	higher dicots	Acanthaceae	*Nelsonia campestris*			C		1/1
plants	higher dicots	Amaranthaceae	*Ptilotus clementii*			C		2/2
plants	higher dicots	Amaranthaceae	*Ptilotus spicatus*			C		1/1
plants	higher dicots	Amaranthaceae	*Ptilotus fusiformis*			C		1/1
plants	higher dicots	Amaranthaceae	*Ptilotus obovatus*			C		3/3
plants	higher dicots	Amaranthaceae	*Ptilotus maconochiei*			NT		3/3
plants	higher dicots	Amaranthaceae	*Amaranthus undulatus*			C		2/2
plants	higher dicots	Amaranthaceae	*Ptilotus incanus*			C		3/3
plants	higher dicots	Amaranthaceae	*Gomphrena lanata*			C		1/1
plants	higher dicots	Amaranthaceae	*Aerva javanica*		Y			1/1
plants	higher dicots	Amaranthaceae	*Gomphrena leptophylla*			C		1/1
plants	higher dicots	Amaranthaceae	*Ptilotus sessilifolius*			C		3/3
plants	higher dicots	Amaranthaceae	*Alternanthera denticulata*	lesser joyweed		C		1/1
plants	higher dicots	Amaranthaceae	*Ptilotus nobilis subsp. nobilis*			C		2/2
plants	higher dicots	Amaranthaceae	*Alternanthera sp. (Mt Isa R.L.Specht+ 49)*			C		2/2
plants	higher dicots	Apocynaceae	*Cascabela thevetia*	yellow oleander	Y			1/1
plants	higher dicots	Apocynaceae	*Marsdenia viridiflora subsp. tropica*			C		3/3
plants	higher dicots	Apocynaceae	*Sarcostemma brevipedicellatum*			C		1/1
plants	higher dicots	Apocynaceae	*Gymnanthera cunninghamii*			C		1/1

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plants	higher dicots	Apocynaceae	*Tylophora cinerascens*			C		1/1
plants	higher dicots	Apocynaceae	*Calotropis gigantea*		Y			1/1
plants	higher dicots	Apocynaceae	*Calotropis procera*		Y			1/1
plants	higher dicots	Asteraceae	*Streptoglossa decurrens*			C		3/3
plants	higher dicots	Asteraceae	*Calotis xanthosioidea*			C		1/1
plants	higher dicots	Asteraceae	*Pterocaulon redolens*			C		1/1
plants	higher dicots	Asteraceae	*Pluchea rubelliflora*			C		2/2
plants	higher dicots	Asteraceae	*Pluchea ferdinandi-muelleri*			C		2/2
plants	higher dicots	Asteraceae	*Peripleura virgata*			C		3/3
plants	higher dicots	Asteraceae	*Streptoglossa odora*			C		2/2
plants	higher dicots	Asteraceae	*Tridax procumbens*	tridax daisy	Y			1/1
plants	higher dicots	Asteraceae	*Peripleura obovata*			C		1/1
plants	higher dicots	Asteraceae	*Blumea tenella*			C		1/1
plants	higher dicots	Asteraceae	*Pluchea dentex*	bowl daisy		C		2/2
plants	higher dicots	Asteraceae	*Blumea mollis*			C		1/1
plants	higher dicots	Boraginaceae	*Trichodesma zeylanicum var. zeylanicum*			C		1/1
plants	higher dicots	Boraginaceae	*Heliotropium cunninghamii*			C		2/2
plants	higher dicots	Boraginaceae	*Trichodesma zeylanicum*			C		1/1
plants	higher dicots	Boraginaceae	*Heliotropium ballii*			C		4/4
plants	higher dicots	Boraginaceae	*Ehretia saligna*			C		1/1
plants	higher dicots	Boraginaceae	*Heliotropium tenuifolium*			C		2/2
plants	higher dicots	Brassicaceae	*Lepidium strongylophyllum*			C		1/1
plants	higher dicots	Caesalpiniaceae	*Senna*			C		1/1
plants	higher dicots	Caesalpiniaceae	*Senna glutinosa subsp. glutinosa*			C		2/2
plants	higher dicots	Caesalpiniaceae	*Senna glutinosa subsp. pruinosa*			C		1/1
plants	higher dicots	Caesalpiniaceae	*Senna venusta*			C		1/1
plants	higher dicots	Campanulaceae	*Wahlenbergia gracilis*	sprawling bluebell		C		1/1
plants	higher dicots	Campanulaceae	*Isotoma petraea*	rock isotome		C		1/1
plants	higher dicots	Capparaceae	*Capparis mitchellii*			C		1/1
plants	higher dicots	Capparaceae	*Capparis loranthifolia var. loranthifolia*			C		1/1
plants	higher dicots	Caryophyllaceae	*Polycarpaea breviflora*			C		3/3
plants	higher dicots	Caryophyllaceae	*Polycarpaea corymbosa*			C		1/1
plants	higher dicots	Caryophyllaceae	*Polycarpaea spirostylis subsp. glabra*			C		1/1
plants	higher dicots	Celastraceae	*Denhamia cunninghamii*			C		2/2
plants	higher dicots	Chenopodiaceae	*Maireana georgei*			C		3/3
plants	higher dicots	Chenopodiaceae	*Maireana villosa*			C		4/4
plants	higher dicots	Chenopodiaceae	*Maireana triptera*	three-wing bluebush		C		3/3
plants	higher dicots	Chenopodiaceae	*Sclerolaena glabra*			C		1/1
plants	higher dicots	Chenopodiaceae	*Sclerolaena cuneata*	tangled copperburr		C		1/1
plants	higher dicots	Chenopodiaceae	*Sclerolaena eriacantha*			C		1/1
plants	higher dicots	Chenopodiaceae	*Sclerolaena lanicuspis*			C		2/2
plants	higher dicots	Chenopodiaceae	*Sclerolaena cornishiana*			C		1/1
plants	higher dicots	Chenopodiaceae	*Tecticornia indica subsp. leiostachya*			C		1/1
plants	higher dicots	Chenopodiaceae	*Dysphania rhadinostachya subsp. rhadinostachya*			C		1/1
plants	higher dicots	Cleomaceae	*Cleome viscosa*	tick-weed		C		2/2
plants	higher dicots	Combretaceae	*Terminalia aridicola*			C		1/1

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plants	higher dicots	Convolvulaceae	*Ipomoea muelleri*	poison morning-glory		C		2/2
plants	higher dicots	Convolvulaceae	*Jacquemontia paniculata var. tomentosa*			C		2/2
plants	higher dicots	Convolvulaceae	*Evolvulus alsinoides var. decumbens*			C		1/1
plants	higher dicots	Convolvulaceae	*Xenostegia tridentata*			C		1/1
plants	higher dicots	Convolvulaceae	*Bonamia media*			C		1/1
plants	higher dicots	Convolvulaceae	*Polymeria ambigua*			C		1/1
plants	higher dicots	Convolvulaceae	*Bonamia multiflora*			C		1/1
plants	higher dicots	Convolvulaceae	*Ipomoea racemigera*			C		1/1
plants	higher dicots	Cucurbitaceae	*Cucumis melo*			C		1/1
plants	higher dicots	Cucurbitaceae	*Citrullus colocynthis*	colocynth	Y			2/2
plants	higher dicots	Cucurbitaceae	*Cucumis argenteus*			C		1/1
plants	higher dicots	Cucurbitaceae	*Citrullus lanatus*		Y			1/1
plants	higher dicots	Euphorbiaceae	*Euphorbia*			C		1/1
plants	higher dicots	Euphorbiaceae	*Euphorbia biconvexa*			C		1/1
plants	higher dicots	Euphorbiaceae	*Euphorbia drummondii*			C		1/1
plants	higher dicots	Euphorbiaceae	*Euphorbia tannensis subsp. eremophila*			C		2/2
plants	higher dicots	Euphorbiaceae	*Euphorbia trigonosperma*			C		3/3
plants	higher dicots	Euphorbiaceae	*Euphorbia schultzii var. comans*			C		1/1
plants	higher dicots	Euphorbiaceae	*Euphorbia australis var. subtomentosa*			C		1/1
plants	higher dicots	Euphorbiaceae	*Microstachys chamaelea*			C		2/2
plants	higher dicots	Fabaceae	*Glycine*			C		1/1
plants	higher dicots	Fabaceae	*Tephrosia phaeosperma var. (Westmoreland S.Melville 967)*			C		2/2
plants	higher dicots	Fabaceae	*Galactia*			C		2/2
plants	higher dicots	Fabaceae	*Indigofera trita*			C		3/3
plants	higher dicots	Fabaceae	*Tephrosia supina*			C		2/2
plants	higher dicots	Fabaceae	*Tephrosia virens*			C		2/2
plants	higher dicots	Fabaceae	*Cullen balsamicum*			C		2/2
plants	higher dicots	Fabaceae	*Rhynchosia minima*			C		1/1
plants	higher dicots	Fabaceae	*Glycine tomentella*	woolly glycine		C		1/1
plants	higher dicots	Fabaceae	*Indigofera linnaei*	Birdsville indigo		C		1/1
plants	higher dicots	Fabaceae	*Cajanus acutifolius*			C		4/4
plants	higher dicots	Fabaceae	*Alysicarpus muelleri*			C		1/1
plants	higher dicots	Fabaceae	*Cullen australasicum*			C		2/2
plants	higher dicots	Fabaceae	*Indigofera linifolia*			C		2/2
plants	higher dicots	Fabaceae	*Jacksonia lateritica*			C		1/1
plants	higher dicots	Fabaceae	*Sesbania benthamiana*			C		1/1
plants	higher dicots	Fabaceae	*Tephrosia delestangii*			C		1/1
plants	higher dicots	Fabaceae	*Tephrosia flagellaris*			C		2/2
plants	higher dicots	Fabaceae	*Indigofera haplophylla*			C		1/1
plants	higher dicots	Fabaceae	*Tephrosia lasiochlaena*			C		2/2
plants	higher dicots	Fabaceae	*Crotalaria novae-hollandiae*			C		1/1
plants	higher dicots	Fabaceae	*Crotalaria montana var. exserta*			C		1/1
plants	higher dicots	Fabaceae	*Vigna lanceolata var. latifolia*			C		2/2
plants	higher dicots	Fabaceae	*Rhynchosia minima var. australis*			C		1/1
plants	higher dicots	Fabaceae	*Rhynchosia minima var. tomentosa*			C		1/1

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plants	higher dicots	Fabaceae	*Vigna lanceolata var. lanceolata*			C		2/2
plants	higher dicots	Fabaceae	*Zornia muriculata subsp. angustata*			C		2/2
plants	higher dicots	Fabaceae	*Crotalaria medicaginea var. neglecta*			C		1/1
plants	higher dicots	Fabaceae	*Tephrosia brachyodon var. longifolia*			C		3/3
plants	higher dicots	Fabaceae	*Tephrosia sp. (Mt Isa P.L.Harris 277)*			C		3/3
plants	higher dicots	Fabaceae	*Tephrosia sp. (Magazine Hill P.Jones 365)*			C		5/5
plants	higher dicots	Frankeniaceae	*Frankenia serpyllifolia*			C		1/1
plants	higher dicots	Goodeniaceae	*Scaevola*			C		1/1
plants	higher dicots	Goodeniaceae	*Goodenia lunata*			C		1/1
plants	higher dicots	Goodeniaceae	*Goodenia ramelii*			C		2/2
plants	higher dicots	Goodeniaceae	*Scaevola parvifolia subsp. parvifolia*			C		1/1
plants	higher dicots	Goodeniaceae	*Goodenia grandiflora*			C		2/2
plants	higher dicots	Goodeniaceae	*Goodenia vilmoriniae*			C		1/1
plants	higher dicots	Goodeniaceae	*Goodenia triodiophila*			C		1/1
plants	higher dicots	Goodeniaceae	*Goodenia armitiana*			C		1/1
plants	higher dicots	Lamiaceae	*Ocimum caryophyllinum*			C		1/1
plants	higher dicots	Loganiaceae	*Mitrasacme pygmaea*			C		1/1
plants	higher dicots	Loganiaceae	*Mitrasacme nudicaulis var. nudicaulis*			C		1/1
plants	higher dicots	Loranthaceae	*Amyema quandang var. quandang*			C		1/1
plants	higher dicots	Loranthaceae	*Amyema sanguinea var. sanguinea*			C		2/2
plants	higher dicots	Loranthaceae	*Lysiana spathulata subsp. spathulata*			C		2/2
plants	higher dicots	Lythraceae	*Ammannia multiflora*	jerry-jerry		C		1/1
plants	higher dicots	Malvaceae	*Hibiscus*			C		2/2
plants	higher dicots	Malvaceae	*Sida sp. (Musselbrook M.B.Thomas+ MRS437)*			C		4/4
plants	higher dicots	Malvaceae	*Sida fibulifera*			C		5/5
plants	higher dicots	Malvaceae	*Sida goniocarpa*			C		1/1
plants	higher dicots	Malvaceae	*Sida nematopoda*			C		2/2
plants	higher dicots	Malvaceae	*Sida platycalyx*	lifesaver burr		C		1/1
plants	higher dicots	Malvaceae	*Abutilon lepidum*			C		6/6
plants	higher dicots	Malvaceae	*Hibiscus sturtii*			C		2/2
plants	higher dicots	Malvaceae	*Sida cleisocalyx*			C		1/1
plants	higher dicots	Malvaceae	*Sida everistiana*			C		1/1
plants	higher dicots	Malvaceae	*Sida hackettiana*			C		2/2
plants	higher dicots	Malvaceae	*Hibiscus burtonii*			C		1/1
plants	higher dicots	Malvaceae	*Abutilon arenarium*			C		2/2
plants	higher dicots	Malvaceae	*Abutilon otocarpum*			C		2/2
plants	higher dicots	Malvaceae	*Gossypium australe*			C		4/4
plants	higher dicots	Malvaceae	*Gossypium nelsonii*			C		1/1
plants	higher dicots	Malvaceae	*Hibiscus leptocladus*			C		1/1
plants	higher dicots	Malvaceae	*Hibiscus meraukensis*	Merauke hibiscus		C		1/1
plants	higher dicots	Malvaceae	*Hibiscus verdcourtii*			C		1/1
plants	higher dicots	Malvaceae	*Abutilon leucopetalum*			C		2/2
plants	higher dicots	Malvaceae	*Hibiscus sturtii var. sturtii*			C		1/1
plants	higher dicots	Malvaceae	*Abutilon fraseri subsp. fraseri*			C		2/2
plants	higher dicots	Malvaceae	*Hibiscus sturtii var. platychlamys*			C		1/1
plants	higher dicots	Malvaceae	*Hibiscus sturtii var. campylochlamys*			C		2/2

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
plants	higher dicots	Malvaceae	*Sida sp. (Jericho E.J.Thompson+ JER117)*			C		1/1
plants	higher dicots	Malvaceae	*Sida arenicola*			C		1/1
plants	higher dicots	Mimosaceae	*Acacia laccata*			C		1/1
plants	higher dicots	Mimosaceae	*Acacia bivenosa*			C		1/1
plants	higher dicots	Mimosaceae	*Acacia cowleana*			C		5/5
plants	higher dicots	Mimosaceae	*Acacia hemsleyi*			C		2/2
plants	higher dicots	Mimosaceae	*Albizia lebbeck*	Indian siris		C		1/1
plants	higher dicots	Mimosaceae	*Acacia acradenia*			C		2/2
plants	higher dicots	Mimosaceae	*Acacia adsurgens*			C		4/4
plants	higher dicots	Mimosaceae	*Acacia galioides*			C		2/2
plants	higher dicots	Mimosaceae	*Acacia hammondii*			C		1/1
plants	higher dicots	Mimosaceae	*Acacia monticola*			C		1/1
plants	higher dicots	Mimosaceae	*Acacia thomsonii*			C		1/1
plants	higher dicots	Mimosaceae	*Acacia chisholmii*			C		1/1
plants	higher dicots	Mimosaceae	*Acacia elachantha*			C		5/5
plants	higher dicots	Mimosaceae	*Acacia hemignosta*			C		4/4
plants	higher dicots	Mimosaceae	*Acacia lysiphloia*			C		2/2
plants	higher dicots	Mimosaceae	*Acacia megalantha*			C		1/1
plants	higher dicots	Mimosaceae	*Acacia melleodora*			C		5/5
plants	higher dicots	Mimosaceae	*Acacia orthocarpa*			C		2/2
plants	higher dicots	Mimosaceae	*Acacia tenuissima*			C		2/2
plants	higher dicots	Mimosaceae	*Acacia asperulacea*			C		1/1
plants	higher dicots	Mimosaceae	*Acacia holosericea*			C		1/1
plants	higher dicots	Mimosaceae	*Acacia phlebocarpa*			C		1/1
plants	higher dicots	Mimosaceae	*Acacia chippendalei*			C		10/10
plants	higher dicots	Mimosaceae	*Acacia sericophylla*			C		3/3
plants	higher dicots	Mimosaceae	*Vachellia bidwillii*			C		1/1
plants	higher dicots	Mimosaceae	*Acacia ancistrocarpa*			C		2/2
plants	higher dicots	Mimosaceae	*Acacia estrophiolata*			C		1/1
plants	higher dicots	Mimosaceae	*Neptunia dimorphantha*			C		1/1
plants	higher dicots	Mimosaceae	*Acacia colei var. colei*			C		1/1
plants	higher dicots	Mimosaceae	*Acacia aneura var. aneura*			C		1/1
plants	higher dicots	Mimosaceae	*Acacia retivenea subsp. retivenea*			C		1/1
plants	higher dicots	Mimosaceae	*Acacia sp. (Coolullah M.Lazarides 3988)*			C		1/1
plants	higher dicots	Mimosaceae	*Leucaena leucocephala subsp. leucocephala*		Y			1/1
plants	higher dicots	Moraceae	*Ficus cerasicarpa*			C		1/1
plants	higher dicots	Moraceae	*Ficus brachypoda*			C		1/1
plants	higher dicots	Moraceae	*Ficus opposita*			C		1/1
plants	higher dicots	Myrtaceae	*Eucalyptus nudicaulis*			C		1/1
plants	higher dicots	Myrtaceae	*Lophostemon grandiflorus subsp. riparius*			C		2/2
plants	higher dicots	Myrtaceae	*Eucalyptus melanophloia subsp. nana*			C		4/4
plants	higher dicots	Myrtaceae	*Eucalyptus normantonensis*	Normanton box		C		3/3
plants	higher dicots	Myrtaceae	*Eucalyptus melanophloia x E.normantonensis*			C		1/1
plants	higher dicots	Nyctaginaceae	*Boerhavia repleta*			C		1/1
plants	higher dicots	Nyctaginaceae	*Boerhavia sp. (St George A.Hill AQ399299)*			C		1/1
plants	higher dicots	Nyctaginaceae	*Boerhavia pubescens*			C		1/1

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
plants	higher dicots	Oleaceae	*Jasminum calcareum*			C		1/1
plants	higher dicots	Onagraceae	*Ludwigia octovalvis*	willow primrose		C		2/2
plants	higher dicots	Orobanchaceae	*Buchnera linearis*			C		1/1
plants	higher dicots	Phyllanthaceae	*Sauropus*			C		1/1
plants	higher dicots	Phyllanthaceae	*Flueggea leucopyrus*			C		1/1
plants	higher dicots	Phyllanthaceae	*Sauropus trachyspermus*			C		2/2
plants	higher dicots	Pittosporaceae	*Pittosporum angustifolium*			C		1/1
plants	higher dicots	Plantaginaceae	*Stemodia viscosa*			C		3/3
plants	higher dicots	Plantaginaceae	*Scoparia dulcis*	Scoparia	Y			1/1
plants	higher dicots	Plantaginaceae	*Stemodia lythrifolia*			C		1/1
plants	higher dicots	Portulacaceae	*Grahamia australiana*			C		1/1
plants	higher dicots	Portulacaceae	*Calandrinia pumila*			C		1/1
plants	higher dicots	Portulacaceae	*Portulaca filifolia*			C		1/1
plants	higher dicots	Proteaceae	*Hakea arborescens*			C		1/1
plants	higher dicots	Proteaceae	*Hakea chordophylla*			C		1/1
plants	higher dicots	Proteaceae	*Grevillea mimosoides*			C		1/1
plants	higher dicots	Proteaceae	*Hakea lorea subsp. lorea*			C		1/1
plants	higher dicots	Proteaceae	*Grevillea wickhamii subsp. aprica*			C		1/1
plants	higher dicots	Rhamnaceae	*Alphitonia excelsa*	soap tree		C		2/2
plants	higher dicots	Rubiaceae	*Oldenlandia galioides*			C		1/1
plants	higher dicots	Rubiaceae	*Spermacoce auriculata*			C		1/1
plants	higher dicots	Rubiaceae	*Spermacoce brachystema*			C		5/5
plants	higher dicots	Rubiaceae	*Synaptantha tillaeacea var. tillaeacea*			C		1/1
plants	higher dicots	Rubiaceae	*Oldenlandia mitrasacmoides subsp. mitrasacmoides*			C		1/1
plants	higher dicots	Rubiaceae	*Psydrax oleifolia*			C		3/3
plants	higher dicots	Rubiaceae	*Kohautia australiensis*			C		1/1
plants	higher dicots	Santalaceae	*Anthobolus leptomerioides*			C		2/2
plants	higher dicots	Santalaceae	*Santalum lanceolatum*			C		1/1
plants	higher dicots	Sapindaceae	*Dodonaea stenophylla*			C		1/1
plants	higher dicots	Sapindaceae	*Dodonaea barklyana*			C		3/3
plants	higher dicots	Sapindaceae	*Dodonaea lanceolata var. lanceolata*			C		1/1
plants	higher dicots	Scrophulariaceae	*Eremophila latrobei subsp. glabra*			C		1/1
plants	higher dicots	Scrophulariaceae	*Eremophila mitchellii*			C		1/1
plants	higher dicots	Scrophulariaceae	*Eremophila longifolia*	berrigan		C		2/2
plants	higher dicots	Scrophulariaceae	*Eremophila latrobei*			C		1/1
plants	higher dicots	Solanaceae	*Nicotiana benthamiana*			C		1/1
plants	higher dicots	Solanaceae	*Solanum ferocissimum*			C		1/1
plants	higher dicots	Solanaceae	*Solanum senticosum*			C		3/3
plants	higher dicots	Solanaceae	*Solanum succosum*			C		2/2
plants	higher dicots	Solanaceae	*Solanum quadriloculatum*			C		2/2
plants	higher dicots	Solanaceae	*Nicotiana megalosiphon subsp. sessilifolia*			C		1/1
plants	higher dicots	Sparrmanniaceae	*Triumfetta triandra*			C		1/1
plants	higher dicots	Sparrmanniaceae	*Corchorus sericeus subsp. densiflorus*			C		8/8
plants	higher dicots	Sparrmanniaceae	*Corchorus sericeus subsp. sericeus*			C		1/1
plants	higher dicots	Sparrmanniaceae	*Triumfetta johnstonii*			C		2/2
plants	higher dicots	Sparrmanniaceae	*Triumfetta plumigera*			C		3/3

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
plants	higher dicots	Sparrmanniaceae	*Grewia retusifolia*			C		1/1
plants	higher dicots	Sparrmanniaceae	*Corchorus tridens*			C		1/1
plants	higher dicots	Sparrmanniaceae	*Corchorus pumilio*			C		1/1
plants	higher dicots	Sparrmanniaceae	*Corchorus sidoides subsp. sidoides*			C		1/1
plants	higher dicots	Sparrmanniaceae	*Corchorus sidoides subsp. vermicularis*			C		1/1
plants	higher dicots	Stylidiaceae	*Stylidium desertorum*			C		1/1
plants	higher dicots	Stylidiaceae	*Stylidium floribundum*			C		1/1
plants	higher dicots	Tamaricaceae	*Tamarix aphylla*	athel pine	Y			3/3
plants	higher dicots	Ulmaceae	*Trema tomentosa var. tomentosa*			C		1/1
plants	higher dicots	Violaceae	*Hybanthus enneaspermus*			C		1/1
plants	higher dicots	Zygophyllaceae	*Tribulus*			C		1/1
plants	higher dicots	Zygophyllaceae	*Tribulopis pentandra*			C		3/3
plants	higher dicots	Zygophyllaceae	*Tribulus terrestris*	caltrop		C		2/2
plants	liverworts	Liverwort	*Liverwort*			C		1/1
plants	lower dicots	Lauraceae	*Cassytha glabella forma glabella*			C		1/1
plants	lower dicots	Menispermaceae	*Tinospora smilacina*	snakevine		C		2/2
plants	monocots	Cyperaceae	*Cyperus iria*			C		2/2
plants	monocots	Cyperaceae	*Cyperus microcephalus subsp. saxicola*			C		1/1
plants	monocots	Cyperaceae	*Cyperus difformis*	rice sedge		C		1/1
plants	monocots	Cyperaceae	*Cyperus vaginatus*			C		1/1
plants	monocots	Cyperaceae	*Cyperus ixiocarpus*			C		3/3
plants	monocots	Cyperaceae	*Cyperus nervulosus*			C		1/1
plants	monocots	Cyperaceae	*Cyperus squarrosus*	bearded flatsedge		C		1/1
plants	monocots	Cyperaceae	*Bulbostylis barbata*			C		4/4
plants	monocots	Cyperaceae	*Cyperus holoschoenus*			C		1/1
plants	monocots	Cyperaceae	*Fimbristylis aestivalis*			C		1/1
plants	monocots	Cyperaceae	*Fimbristylis littoralis*			C		1/1
plants	monocots	Cyperaceae	*Fimbristylis microcarya*			C		1/1
plants	monocots	Cyperaceae	*Lipocarpha microcephala*			C		2/2
plants	monocots	Cyperaceae	*Fimbristylis bisumbellata*			C		1/1
plants	monocots	Cyperaceae	*Cyperus betchei subsp. commiscens*			C		1/1
plants	monocots	Cyperaceae	*Fuirena ciliaris*			C		1/1
plants	monocots	Poaceae	*Megathyrsus maximus var. pubiglumis*		Y			1/1
plants	monocots	Poaceae	*Cynodon nlemfuensis var. nlemfuensis*		Y			3/3
plants	monocots	Poaceae	*Panicum decompositum var. decompositum*			C		1/1
plants	monocots	Poaceae	*Eriachne sp. (Dugald River B.K.Simon+ 3007)*			C		3/3
plants	monocots	Poaceae	*Eriachne mucronata forma (Alpha C.E.Hubbard 7882)*			C		1/1
plants	monocots	Poaceae	*Eriachne mucronata forma (Burnham R.W.Purdie 1370)*			C		3/3
plants	monocots	Poaceae	*Perotis rara*	comet grass		C		1/1
plants	monocots	Poaceae	*Eulalia aurea*	silky browntop		C		2/2
plants	monocots	Poaceae	*Melinis repens*	red natal grass	Y			2/2
plants	monocots	Poaceae	*Sarga plumosum*			C		1/1
plants	monocots	Poaceae	*Chloris inflata*	purpletop chloris	Y			1/1
plants	monocots	Poaceae	*Panicum effusum*			C		3/3
plants	monocots	Poaceae	*Sehima nervosum*			C		2/2
plants	monocots	Poaceae	*Triodia molesta*			C		1/1

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
plants	monocots	Poaceae	*Triodia pungens*			C		3/3
plants	monocots	Poaceae	*Eragrostis minor*	smaller stinkgrass	Y			2/2
plants	monocots	Poaceae	*Polytrias indica*		Y			1/1
plants	monocots	Poaceae	*Themeda triandra*	kangaroo grass		C		1/1
plants	monocots	Poaceae	*Yakirra muelleri*			C		1/1
plants	monocots	Poaceae	*Acrachne racemosa*			C		1/1
plants	monocots	Poaceae	*Aristida contorta*	bunched kerosene grass		C		2/2
plants	monocots	Poaceae	*Aristida pruinosa*			C		3/3
plants	monocots	Poaceae	*Chloris pectinata*	comb chloris		C		1/1
plants	monocots	Poaceae	*Digitaria brownii*			C		7/7
plants	monocots	Poaceae	*Mnesithea formosa*			C		4/4
plants	monocots	Poaceae	*Paspalidium rarum*			C		1/1
plants	monocots	Poaceae	*Triodia bitextura*			C		2/2
plants	monocots	Poaceae	*Triodia brizoides*			C		4/4
plants	monocots	Poaceae	*Triodia longiceps*	giant grey spinifex		C		1/1
plants	monocots	Poaceae	*Xerochloa barbata*			C		2/2
plants	monocots	Poaceae	*Triodia mitchellii*	buck spinifex		C		1/1
plants	monocots	Poaceae	*Yakirra pauciflora*			C		1/1
plants	monocots	Poaceae	*Cymbopogon ambiguus*	lemon grass		C		1/1
plants	monocots	Poaceae	*Cymbopogon obtectus*			C		1/1
plants	monocots	Poaceae	*Enteropogon ramosus*			C		2/2
plants	monocots	Poaceae	*Eragrostis cumingii*			C		2/2
plants	monocots	Poaceae	*Eragrostis elongata*			C		2/2
plants	monocots	Poaceae	*Eragrostis speciosa*			C		3/3
plants	monocots	Poaceae	*Leptochloa digitata*			C		1/1
plants	monocots	Poaceae	*Oxychloris scariosa*	winged chloris		C		3/3
plants	monocots	Poaceae	*Panicum larcomianum*			C		1/1
plants	monocots	Poaceae	*Tragus australianus*	small burr grass		C		2/2
plants	monocots	Poaceae	*Brachyachne ciliaris*	hairy native couch		C		1/1
plants	monocots	Poaceae	*Dichanthium fecundum*	curly bluegrass		C		1/1
plants	monocots	Poaceae	*Enneapogon avenaceus*			C		1/1
plants	monocots	Poaceae	*Eragrostis tenellula*	delicate lovegrass		C		1/1
plants	monocots	Poaceae	*Dichanthium annulatum*	sheda grass	Y			1/1
plants	monocots	Poaceae	*Eragrostis desertorum*	woollybutt		C		1/1
plants	monocots	Poaceae	*Eragrostis lanicaulis*			C		1/1
plants	monocots	Poaceae	*Eragrostis leptocarpa*	drooping lovegrass		C		1/1
plants	monocots	Poaceae	*Iseilema vaginiflorum*	red flinders grass		C		1/1
plants	monocots	Poaceae	*Schizachyrium fragile*	firegrass		C		2/2
plants	monocots	Poaceae	*Aristida inaequiglumis*			C		2/2
plants	monocots	Poaceae	*Bothriochloa ewartiana*	desert bluegrass		C		3/3
plants	monocots	Poaceae	*Enneapogon polyphyllus*	leafy nineawn		C		1/1
plants	monocots	Poaceae	*Paraneurachne muelleri*			C		2/2
plants	monocots	Poaceae	*Paspalidium basicladum*			C		2/2
plants	monocots	Poaceae	*Dactyloctenium radulans*	button grass		C		1/1
plants	monocots	Poaceae	*Sporobolus actinocladus*	katoora grass		C		1/1
plants	monocots	Poaceae	*Cenchrus pennisetiformis*		Y			3/3

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
plants	monocots	Poaceae	*Enneapogon robustissimus*			C		1/1
plants	monocots	Poaceae	*Sporobolus australasicus*			C		1/1
plants	monocots	Poaceae	*Diplachne fusca var. fusca*			C		1/1
plants	monocots	Poaceae	*Eriochloa pseudoacrotricha*			C		1/1
plants	monocots	Poaceae	*Urochloa gilesii var. gilesii*			C		3/3
plants	monocots	Poaceae	*Cynodon dactylon var. dactylon*		Y			1/1
plants	monocots	Poaceae	*Aristida holathera var. holathera*			C		3/3
plants	monocots	Poaceae	*Eriachne pulchella subsp. dominii*			C		1/1
plants	monocots	Poaceae	*Bothriochloa bladhii subsp. bladhii*			C		2/2
plants	monocots	Poaceae	*Eriachne pulchella subsp. pulchella*			C		1/1
plants	monocots	Pontederiaceae	*Monochoria cyanea*			C		1/1

CODES

I - Y indicates that the taxon is introduced to Queensland and has naturalised.

Q - Indicates the Queensland conservation status of each taxon under the *Nature Conservation Act 1992.* The codes are Extinct in the Wild (PE), Endangered (E), Vulnerable (V), Near Threatened (NT), Least Concern (C) or Not Protected ( ).

A - Indicates the Australian conservation status of each taxon under the *Environment Protection and Biodiversity Conservation Act 1999.* The values of EPBC are Conservation Dependent (CD), Critically Endangered (CE), Endangered (E), Extinct (EX), Extinct in the Wild (XW) and Vulnerable (V).

Records – The first number indicates the total number of records of the taxon for the record option selected (i.e. All, Confirmed or Specimens).
This number is output as 99999 if it equals or exceeds this value. The second number located after the / indicates the number of specimen records for the taxon.
This number is output as 999 if it equals or exceeds this value.

Appendix C Likelihood of Occurrence

Species Name	Status			Habitat Preference	Likelihood of Occurrence
	EPBC Act	NC Act	IUCN		
Dichanthium setosum Bluegrass	V	C	-	Occurs in heavy soils (predominantly cracking clays or alluvium, often in gilgai) in woodland or open woodland usually dominated by Acacia (brigalow) and/or Eucalyptus species (Department of the Environment 2015j).	**Low potential to occur** species has not been recorded in the region (no records from desktop searches) and suitable habitat is generally lacking from the study area
Livistona mariae Central Australian Cabbage Palm	V	-	LC	The entire range of this palm tree falls within Finke Gorge National Park where the species is concentrated along the Palm Valley gorge floors that are continuously fed by bicarbonate-rich spring waters (Johnson 1998; Department of Natural Resources 2008).	**Low potential to occur** species has not been recorded in the region (no records from desktop searches) and suitable habitat is generally lacking from the study area
Ptilotus maconochiei	-	NT	-	Found around the Mount Isa area, south to near Windorah and east to near Winton (Atlas of Living Australia 2015).	**High potential to occur** species has been recorded in the region (desktop searches) and suitable habitat is present at the study area

EPBC Act (species listed under the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act), Aust.): V = Vulnerable
NC Act (species listed under the Nature Conservation (Wildlife) Regulation 2006 Act (NC Act), QLD): NT = Near Threatened, C = Least Concern
IUCN (species listed under the International Union for Conservation of Nature (IUCN) Red List of Threatened Species): LC= Least Concern

Species Name	Status			Habitat Preference	Likelihood of Occurrence
	EPBC Act	NC Act	IUCN		
Acanthophis antarcticus Common Death Adder	-	NT	-	Common Death Adders inhabit a wide range of habitats ranging from grasslands, woodlands, rocky ranges and outcrops (Wilson & Swan 2013).	**Moderate potential to occur** species has not been recorded in the region (no records from desktop searches) however potentially suitable habitat occurs at the study area
Acanthophis hawkei Plains Death Adder, Barkly Tableland Death Adder	V	-	-	Found in earth fissures during the dry season and shelters under ground debris in the wet season. It is said to be confined to the Barkly Tablelands on the black soil Mitchell grass plains (Cogger 2014).	**Moderate potential to occur** species has not been recorded in the region (no records from desktop searches) however potentially suitable habitat occurs at the study area
Amytornis dorotheae Carpentarian Grasswren	-	NT	NT	Found in a limited range in the hilly parts of north-western Queensland and eastern Northern Territory (Birdlife 2015a). Habitat includes sandstone ridges, ridges broken into ledges and boulders with spinfex and sparse, stunted trees (Morcombe 2003).	**High potential to occur** species has been recorded in the region (desktop searches) and suitable habitat is present at the study area
Chalinolobus dwyeri Large-eared Pied Bat	V	V	NT	Recorded from sandstone gorges in tall open eucalypt forest, dry sclerophyll forests and woodlands, rainforest edges, wet sclerophyll forests and Callitris dominated forest (Curtis & Dennis 2012).	**Low potential to occur** the species has not been recorded in the region (no records from desktop searches) and suitable habitat is generally lacking from the study area
Elseya lavarackorum Gulf Snapping Turtle	E	V	-	A river turtle which inhabits large rivers and their associated overflow lagoons and oxbow lakes , in deeper permanent pools most often with muddy, sandy or rocky bottoms. The species is also found in the middle reaches of rivers, upstream of saline regions and downstream of escarpments, including plunge pools. Steep rocky gorges, and river reaches with intact river banks seem to be the preferred habitats (Department of the Environment 2015k; Cogger 2014).	**Low potential to occur** the species has not been recorded in the region (no records from desktop searches) and current known distribution does not encompass study area
Erythrotriorchis radiatus Red goshawk	V	E	NT	Occurs in coastal and sub-coastal areas in riverine, wooded and forested lands of tropical and warm-temperate Australia. Known to prefer forest and woodland with a mosaic of vegetation types, large prey populations (birds), and permanent water. The vegetation types include eucalypt woodland, open forest, tall open forest, gallery	**Moderate potential to occur** species has not been recorded in the region (no records from desktop searches) however potentially suitable habitat occurs at the study area

Species Name	Status			Habitat Preference	Likelihood of Occurrence
	EPBC Act	NC Act	IUCN		
				rainforest, swamp sclerophyll forest, and rainforest margins. The Red Goshawk nests in large trees, frequently the tallest and most massive in a tall stand, and nest trees are invariably within one km of permanent water (Department of the Environment 2014a).	
Erythrura gouldiae Gouldian Finch	E	E	NT	Inhabits open woodlands that are dominated by Eucalyptus trees and support a ground cover of Sorghum and other grasses. Often found in vegetation along watercourses and mangrove edges. Critical components of suitable core habitat for the Gouldian Finch include the presence of favoured annual and perennial grasses (especially Sorghum), a nearby source of surface water and, in the breeding season, unburnt hollow-bearing Eucalyptus trees (especially *E. tintinnans*, *E. brevifolia* and *E. leucophloia*) Its breeding habitat is usually confined to ridges and rocky foothills, probably due to the presence of Sorghum grasses (Department of the Environment 2015l; Morcombe 2003).	**High potential to occur** species has been recorded in the region (desktop searches) and suitable habitat is present at the study area
Falco hypoleucos Grey Falcon	-	NT	VU	Infrequently seen over much of arid and semi-arid Australia with a range covering eastern Australia, especially arid regions, and northern Australia south to approximately 26°S. Inhabits lightly timbered country, stony plains and lightly timbered acacia scrublands (Birdlife 2015c; Morcombe 2003).	**High potential to occur** species has been recorded in the region (desktop searches) and suitable habitat is present at the study area
Grantiella picta Painted Honeyeater	-	V	VU	Sparsely distributed from southern Victoria and south-eastern South Australia to far northern Queensland and eastern Northern Territory where it inhabits forests, woodlands and dry shrublands, often with abundant mistletoe (Birdlife; Morcombe, 2003)	**High potential to occur** species has been recorded in the region (desktop searches) and suitable habitat is present at the study area
Hipposideros stenotis Northern Leaf-nosed Bat	-	V	LC	The northern leaf-nosed bat forages in tall open forest, open eucalypt woodland, flood plains and spinifex covered hills, usually in close proximity to rocky outcrops and escarpments. Its habitat use and distribution is influenced by the availability of roost sites, as it only roosts in sandstone caves, boulder piles, and disused mines. The only records of northern leaf-nosed bat in Queensland are from Mt. Isa (Churchill 2008; DEHP 2015)	**Moderate potential to occur** species has not been recorded in the region (no records from desktop searches) however potentially suitable habitat occurs at the study area
Lophochroa leadbeateri	-	V	LC	Inhabits open sparsely timbered grasslands, drier farmlands with well-treed paddocks, mulga and open scrublands, callitris, casuarina and	**Low potential to occur**

Species Name	Status			Habitat Preference	Likelihood of Occurrence
	EPBC Act	NC Act	IUCN		
Major Mitchell's Cockatoo (syn. *Cacatua leadbeateri*)				open mallee country. They are very widespread across semi-arid woodland in eastern Australia (Birdlife 2015b; Morcombe 2003).	the species has not been recorded in the region (no records from desktop searches) and current known distribution does not encompass study area
Macroderma gigas Ghost Bat	-	V	VU	Known to roost in shallow sandstone caves along cliff lines, under boulders, in deep limestone caves and in abandoned mines. Distributions influenced by suitable caves and mine habitats however they are known to occupy a broad range of habitats including arid spinifex hillsides, black soil grasslands, monsoon forest, open savannah woodland, tall open forest, deciduous forest and tropical rainforest. (Churchill 2008)	**Moderate potential to occur** species has not been recorded in the region (no records from desktop searches) however potentially suitable habitat occurs at the study area
Macrotis lagotis Greater bilby	V	E	VU	The greater bilby occupies primarily the flat to gently undulating clay areas, but also some stony plains, of the Channel Country amongst a diverse range of annual and perennial grasses and forbs (Curtis & Dennis 2012). The main Queensland population mostly occurs within the Astrebla Downs National Park. Extant population of the Greater Bilby occur in a variety of habitats, usually on landforms with level to low slope topography and light to medium soils. It occupies three major vegetation types; open tussock grassland on uplands and hills, mulga woodland/shrubland growing on ridges and rises, and hummock grassland in plains and alluvial areas. Laterite and rock feature substrates are an important part of Greater Bilby habitat. These habitat support shrub species, such as *Acacia kempeana, A. hilliana* and *A. rhodophylla*, which have root-dwelling larvae that provide a constant food source for the Greater Bilby. They also contain Spinifex hummocks which are quite uniform and discrete, providing runways between hummocks, enabling easier movement and foraging. Greater bilbies occurrence is strongly associated with higher rainfalls and temperatures, particularly as these conditions may not be favoured by foxes, which are one of their main threats. (Department of the Environment 2015r)	**Moderate potential to occur** species has not been recorded in the region (no records from desktop searches) however potentially suitable habitat occurs at the study area
Petrogale lateralis lateralis Black-flanked Wallaby	V		NT (as	The habitat varies between colonies but always involves grassland feeding habitat for feeding in close proximity to cliff, rock-pile, talus or	**Low potential to occur** species has not been recorded in the region (no

Species Name	Status			Habitat Preference	Likelihood of Occurrence
	EPBC Act	NC Act	IUCN		
			Petrogale lateralis)	escarpment refuge habitat (Department of the Environment 2015u).	records from desktop searches) and current known distribution does not encompass study area
Petrogale penicillata Brush-tailed Rock-wallaby	V	V	NT	Found in rocky habitats, including loose boulder-piles, with large tumbled boulders, rocky outcrops, steep rocky slopes, cliffs, gorges and isolated rock stacks. In QLD populations of the Brush-tailed Rock-wallaby occur, or did occur, throughout the Great Dividing Range from the border with NSW to Nanango, 100 km northwest of Brisbane (Department of the Environment 2015v; Curtis & Dennis 2012) .	**Low potential to occur** species has not been recorded in the region (no records from desktop searches) and current known distribution does not encompass study area
Petrogale purpureicollis purple-necked Rock-wallaby		V	LC	Found in areas of rocky outcrops, cliffs, and boulder piles near dry forests savannas and spinifex grasslands, as well as rocky slopes and gullies within dry eucalypt and acacia woodland with spinifex understories(Curtis & Dennis 2012; McKnight 2008).	**High potential to occur** species has been recorded in the region (desktop searches) and suitable habitat is present at the study area
Pristis pristis Largetooth Sawfish, Freshwater Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish	V		CE	The preferred habitat is mud bottoms of river embayments and estuaries, but they are also found well upstream. They are not found near riparian vegetation but usually found in turbid channels of large rivers over soft mud bottoms more than 1 m deep. They will move into shallow waters when travelling upstream or while hunting prey(Department of the Environment 2015y).	**Low potential to occur** the species has not been recorded in the region (no records from desktop searches) and suitable habitat is generally lacking from the study area
Pseudantechinus mimulus Carpentarian Antechinus	V	-	EN	Inhabits rocky areas or woodlands close to rocky areas It is known from the Mt Isa area where it is found in woodland of *Eucalyptus leucophloia*, *Corymbia terminalis*, *Eucalyptus normantonensis*, *Atalaya hemiglauca* and *Acacia* spp. with *Trioda* spp. ground cover (Curtis & Dennis 2012; Department of the Environment 2015z).	**Moderate potential to occur** species has not been recorded in the region (no records from desktop searches) however potentially suitable habitat occurs at the study area
Rhinonicteris aurantia Golden Horseshoe Bat, Orange leaf-nosed bat	-	V	LC	Inhabits monsoon forests, tall open forest, open savannah woodland, black soil grassland and spinifex covered hills and is restricted to caves and horizontal mine shafts with stable, warm and humid microclimates because of their poor ability to thermoregulate and retain water (Department of the Environment 2015aa; Churchill 2008)	**Moderate potential to occur** species has not been recorded in the region (no records from desktop searches) however potentially suitable habitat occurs at the study area
Rostratula australis	E, LM,	V	EN	Variety of habitats but generally requires presence of water. Inhabits shallow terrestrial freshwater wetlands, including temporary and	**High potential to occur**

Species Name	Status EPBC Act	NC Act	IUCN	Habitat Preference	Likelihood of Occurrence
Australian painted snipe (Syn. *Rostratula benghalensis*)	MW			permanent lakes, swamps and claypans. They also use inundated or waterlogged grassland or saltmarsh, dams, rice crops, sewage farms and bore drains (Department of the Environment 2014b).	species has been recorded in the region (desktop searches) and suitable habitat is present at the study area

EPBC Act (species listed under the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act), Aust.): Ex= Extinct CE = Critically Endangered E = Endangered, V = Vulnerable, MM = Migratory Marine, MT = Migratory Terrestrial, MW = Migratory Wetlands, LM = Listed Marine MI=Listed Migratory
NC Act (species listed under the Nature Conservation (Wildlife) Regulation 2006 Act (NC Act), QLD):PE: Extinct in the Wild CE: Critically Endangered E = Endangered, V = Vulnerable, NT = Near Threatened, SLC = Special Least Concern, C = Least Concern
IUCN (species listed under the International Union for Conservation of Nature (IUCN) Red List of Threatened Species) EX= Extinct, EW= Extinct in the Wild, CR= Critically Endangered, EN= Endangered, VU= Vulnerable, NT=Near Threatened, LC=Least Concern

Species Name	Status EPBC Act	NC Act	IUCN	Habitat Preference	Likelihood of Occurrence
Acrocephalus australis Australian Reed-Warbler	M	SL	LC	It is found throughout Australia where it prefers dense vegetation alongside water, especially thick reed beds, as well as tall crops, bamboo thickets and lantana (Birdlife Australia 2015).	**Known to occur** species has been recorded on-site in the recent past (i.e. last 5-10 years) and the site provides suitable habitat for it
Actitis hypoleucos Common Sandpiper (*syn. Tringa hypoleucos*)	LM, MI	SL	LC	Inhabits coastal wetlands and some inland wetlands, with varying levels of salinity around muddy margins or rocky shores and rarely on mudflats. Has been recorded in estuaries and deltas of streams, as well as on banks farther upstream; around lakes, pools, billabongs, reservoirs, dams and claypans, and occasionally piers and jetties. The species is often associated with mangroves, and sometimes found in areas of mud littered with rocks or snags(Department of the Environment 2015a; Morcombe 2003).	**Known to occur** species has been recorded on-site in the recent past (i.e. last 5-10 years) and the site provides suitable habitat for it
Apus pacificus Fork-tailed swift	LM, MM	C	LC	Summer migrant (October – April). Occurs in low to very high airspace over variety of habitats including rainforest and semi-arid areas. Known to be most active in front of summer storm fronts (Morcombe 2003).	**Moderate potential to occur** species has not been recorded in the region (no records from desktop searches) however potentially suitable habitat occurs at the study area
Ardea alba *(Syn. A. modesta)* Great Egret, White Egret	LM, MW	C	-	Widespread in Australia. Recorded in a wide range of wetland habitats including flooded pastures, dams, estuarine mudflats, mangroves and reefs and usually frequents shallow water. (Department of the	**Known to occur** species has been recorded on-site in the recent past (i.e. last 5-10 years) and the site provides

Species Name	Status EPBC Act	NC Act	IUCN	Habitat Preference	Likelihood of Occurrence
				Environment 2015b; Morcombe 2003)	suitable habitat for it
Ardea ibis Cattle egret (Syn. *Bubulcus ibis)*	LM, MW	C	LC	Occurs in moist pastures with tall grass, shallow open wetlands and margins and also mudflats (Morcombe 2003).	**Known to occur** species has been recorded on-site in the recent past (i.e. last 5-10 years) and the site provides suitable habitat for it
Arenaria interpres Ruddy Turnstone	LM, MI	SL	LC	Inhabits beaches and coasts with exposed rock or coral reefs. Can be found on sand, coral or shell beaches, shoals, cays and dry ridges of sand or coral. It has been sighted in estuaries, harbours, bays and coastal lagoons, among low saltmarsh or on exposed beds of seagrass, around sewage ponds and on mudflats (Department of the Environment 2015c; Morcombe 2003).	**Low potential to occur** species has not been recorded in the region (no records from desktop searches) and suitable habitat is generally lacking from the study area
Calidris acuminate Sharp-tailed Sandpiper	LM, MI	SL	LC	Prefers muddy edges of shallow fresh or brackish wetlands, with low vegetation, including lagoons, swamps, coastal lakes and pools, and dams, waterholes, soaks, bore drains and bore swamps, saltpans and hypersaline salt lakes inland. They also occur in saltworks and sewage farms. They can also be found in temporary floodwaters(Department of the Environment 2015d; Morcombe 2003).	**Known to occur** species has been recorded on-site in the recent past (i.e. last 5-10 years) and the site provides suitable habitat for it
Calidris ferruginea Curlew Sandpiper	CE, LM, MI	SL	LC	Inhabits intertidal mudflats in sheltered coastal areas, such as estuaries, bays, inlets and lagoons, around non-tidal swamps, lakes and lagoons near the coast, and ponds in saltworks and sewage farms. Can be found inland, though less often, including around ephemeral and permanent lakes, dams, waterholes and bore drains, usually with bare edges of mud or sand. They occur in both fresh and brackish waters and occasionally around floodwaters(Department of the Environment 2015e; Morcombe 2003).	**Known to occur** species has been recorded on-site in the recent past (i.e. last 5-10 years) and the site provides suitable habitat for it
Calidris ruficollis Red-necked Stint	LM, MI	SL	LC	Inhabits a diverse range of environments including in sheltered inlets, bays, lagoons and estuaries with intertidal mudflats, often near spits, islets and banks and protected sandy or coralline shores. Have, occasionally, been recorded on exposed or ocean beaches, and sometimes on stony or rocky shores, reefs or shoals. Red-necked stinks also can occur in saltworks and sewage farms; saltmarsh; ephemeral or permanent shallow wetlands near the coast or inland and have occasionally been recorded on dry gibber plains, with little or no perennial vegetation(Department of the Environment 2015f; Morcombe 2003).	**Known to occur** species has been recorded on-site in the recent past (i.e. last 5-10 years) and the site provides suitable habitat for it
Calidris subminuta	LM, MI	SL	LC	Inhabits a variety of terrestrial wetlands mostly preferring shallow	**Known to occur**

Species Name	Status EPBC Act	NC Act	IUCN	Habitat Preference	Likelihood of Occurrence
Long-toed Stint				freshwater or brackish wetlands including lakes, swamps, river floodplains, streams, lagoons and sewage ponds. Can also fond of areas of muddy shoreline, growths of short grass, weeds, sedges, low or floating aquatic vegetation, reeds, rushes, and preferring low vegetation rather than open mudflats (Department of the Environment 2015g; Morcombe 2003).	species has been recorded on-site in the recent past (i.e. last 5-10 years) and the site provides suitable habitat for it
Charadrius veredus Oriental Plover, Oriental Dotterel	LM, MI	SL	LC	Arrives in Australia Sep-Nov and usually inhabits inland semi-arid regions on open grasslands Can be found in coastal habitats such as estuarine mudflats and sandbanks, on sandy or rocky ocean beaches or nearby reefs, or in near-coastal grasslands, before dispersing further inland where they usually inhabit flat, open, semi-arid or arid grasslands, or open areas that have been recently burnt(Department of the Environment 2015h; Morcombe 2003)	**Known to occur** species has been recorded on-site in the recent past (i.e. last 5-10 years) and the site provides suitable habitat for it
Chlidonias leucopterus White-winged Black Tern Syn. *Chlidonias leucoptera*	LM, MI	SL	LC	Mostly inhabits fresh, brackish or saline, and coastal or subcoastal wetlands including tidal wetlands, harbours, bays, estuaries and lagoons, an associated tidal sandflats and mudflats. They can also be found in terrestrial wetlands, including swamps, lakes, billabongs, rivers, floodplains, reservoirs, saltworks and sewage pond and do also rarely occur on inland wetlands in Australia(Department of the Environment 2015i; Morcombe 2003).	**Known to occur** species has been recorded on-site in the recent past (i.e. last 5-10 years) and the site provides suitable habitat for it
Crocodylus johnstoni Freshwater Crocodile, Johnston's Crocodile, Johnston's River Crocodile	LM	-	-	Generally confined to permanent freshwater rivers, lagoons and billabongs in far northern Australia (Cogger 2014).	**Low potential to occur** species has not been recorded in the region (no records from desktop searches) and suitable habitat is generally lacking from the study area
Gallinago hardwickii Latham's snipe, Japanese snipe	LM, MW	C	LC	Summer migrant (October – April). Occurs in low vegetation around wetlands in shallows, sedges, reeds, heaths, salt marsh and irrigated crop lands (Morcombe 2003).	**Known to occur** species has been recorded on-site in the recent past (i.e. last 5-10 years) and the site provides suitable habitat for it
Gallinago megala Swinhoe's snipe	LM, MI	SL	LC	In Australia habitats includes swamps, billabongs, river pools, small streams and sewage ponds. They are found in the dense clumps of grass and rushes round the edges of fresh and brackish wetlands. Can also be found in drying claypans (Department of the Environment 2015m; Morcombe 2003).	**Known to occur** species has been recorded on-site in the recent past (i.e. last 5-10 years) and the site provides suitable habitat for it
Glareola maldivarum Oriental Pratincole	LM, MI	SL	LC	Inhabits open plains, floodplains or short grassland, as well as near terrestrial wetlands, such as billabongs, lakes, creeks, reservoirs, saltworks	**Moderate potential to occur** species has not been recorded in the region (no

Species Name	Status EPBC Act	NC Act	IUCN	Habitat Preference	Likelihood of Occurrence
				and sewage farms. They also occur along the coast, beaches, mudflats and islands, or around coastal lagoons (Department of the Environment 2015n; Morcombe 2003).	records from desktop searches) however potentially suitable habitat occurs at the study area
Haliaeetus leucogaster White-bellied sea-eagle	LM, MT	C	LC	Occurs in predominantly coastal areas although also occurs far inland on large pools of rivers. Mostly over islands, reefs, headlands, beaches and estuaries. Known to occur on seasonally inundated swamps, lagoons and floodplains (Morcombe 2003).	**Known to occur** species has been recorded on-site in the recent past (i.e. last 5-10 years) and the site provides suitable habitat for it
Hydroprogne caspia Caspian tern	LM, MI	SL	LC	Within Australia, the Caspian Tern has a widespread occurrence and is found in both coastal and inland habitat. Occurs mostly in sheltered coastal harbours, lagoons, inlets, bays, estuaries and river deltas. Areas with sandy or muddy margins are preferred. They can also be found on near-coastal or inland terrestrial wetlands that are either fresh or saline, especially lakes, waterholes, reservoirs, rivers and creeks. They also use artificial wetlands, including reservoirs, sewage ponds and salt works (Department of the Environment 2015o).	**Known to occur** species has been recorded on-site in the recent past (i.e. last 5-10 years) and the site provides suitable habitat for it
Limosa limosa Black-tailed Godwit	LM, MI	SL	NT	Usually inhabits coastal environment including sheltered bays, estuaries and lagoons with large intertidal mudflats or sandflats, spits and banks of mud, sand or shell-grit. Can also be found in shallow and sparsely vegetated, near-coastal, wetlands; such as saltmarsh, saltflats, river pools, swamps, lagoons and floodplains. Infrequently they are found inland around shallow, freshwater and saline lakes, swamps, dams and bore-overflows, sewage farms and saltworks(Department of the Environment 2015q; Morcombe 2003).	**Known to occur** species has been recorded on-site in the recent past (i.e. last 5-10 years) and the site provides suitable habitat for it
Limosa lapponica Bar-tailed Godwit	LM, MI	SL	LC	Inhabits mainly in coastal areas such as large intertidal sandflats, banks, mudflats, estuaries, inlets, harbours, coastal lagoons and bays, around beds of seagrass, saltmarsh, coastal sewage farms and saltworks, saltlakes and brackish wetlands near coasts, sandy ocean beaches, rock platforms, and coral reef-flats. Rarely found on inland wetlands or in areas of short grass, such as farmland, paddocks and airstrips (Department of the Environment 2015p; Morcombe 2003).	**Moderate potential to occur** species has not been recorded in the region (no records from desktop searches) however potentially suitable habitat occurs at the study area
Merops ornatus Rainbow bee-eater	LM, MT	C	LC	Summer migrant (September – April) although in northern Australia they remain and breed. Occurs in open woodlands, semi-arid scrub, grasslands, clearing in heavier forests, farmlands and coastal areas. Avoids heavy forests due to hindrance to feeding (i.e. Catching insects) (Morcombe 2003).	**Known to occur** species has been recorded on-site in the recent past (i.e. last 5-10 years) and the site provides suitable habitat for it

Species Name	Status EPBC Act	NC Act	IUCN	Habitat Preference	Likelihood of Occurrence
Motacilla flava Yellow Wagtail species	LM, MI	SL	LC	Summer migrant to Australia, preferring open habitats, often near water, including swamp margins, salt marshes, sewage ponds, lawns, pastures, playing fields and surrounds (Morcombe 2003).	**Known to occur** species has been recorded on-site in the recent past (i.e. last 5-10 years) and the site provides suitable habitat for it
Numenius minutus Little Curlew, Little Whimbrel	LM, MI	SL	LC	Inhabits dry grassland and sedgeland, including dry floodplains and blacksoil plains, with scattered, shallow freshwater pools or areas that are seasonally inundated. Can be found in open woodlands with a grassy or burnt understorey, dry saltmarshes, coastal swamps, mudflats or sandflats of estuaries or beaches on sheltered coasts. Also found on similar artificial environments including mown lawns, gardens, recreational areas, ovals, racecourses and verges of roads and airstrips(Department of the Environment 2015s; Morcombe 2003).	**Known to occur** species has been recorded on-site in the recent past (i.e. last 5-10 years) and the site provides suitable habitat for it
Pandion haliaetus *(*Syn. *P. cristatus)* Eastern osprey	LM, MI	C	LC	Eastern ospreys occur in littoral and coastal habitats and terrestrial wetlands, and occasionally travel inland along major rivers. They require extensive areas of open fresh, brackish or saline water for foraging. (Department of the Environment 2015t)	**Known to occur** species has been recorded on-site in the recent past (i.e. last 5-10 years) and the site provides suitable habitat for it
Plegadis falcinellus Glossy Ibis	LM, MI	SL	LC	Found in the shallows of swamps and rivers, lagoons, flood-plains, wet meadows, reservoirs, sewage ponds, rice-fields and cultivated areas under irrigation. Occasionally found in estuaries, deltas, saltmarshes lagoons of coastal regions (Department of the Environment 2015w; Morcombe 2003).	**Known to occur** species has been recorded on-site in the recent past (i.e. last 5-10 years) and the site provides suitable habitat for it
Pluvialis fulva Pacific Golden Plover	LM, MI	SL	LC	Inhabits mainly coastal areas including beaches, mudflats and sandflats , harbours, estuaries and lagoons, and evaporation ponds in saltworks. Sometimes recorded on islands, sand and coral cays and exposed reefs and rock, less often recorded in terrestrial habitats, usually wetlands such as fresh, brackish or saline lakes, billabongs, pools, swamps and wet claypans, only very rarely far inland(Department of the Environment 2015x; Morcombe 2003).	**Known to occur** species has been recorded on-site in the recent past (i.e. last 5-10 years) and the site provides suitable habitat for it
Tringa glareola Wood Sandpiper	LM, MI	SL	LC	Inhabits freshwater wetlands, such as swamps, billabongs, lakes, pools and waterholes, inundated grasslands, floodplains and irrigated crops. They can also be found in artificial wetlands, including open sewage ponds, reservoirs, large farm dams, and bore drains. Rarely found using brackish wetlands, or dry stunted saltmarsh(Department of the Environment 2015ab; Morcombe 2003).	**Known to occur** species has been recorded on-site in the recent past (i.e. last 5-10 years) and the site provides suitable habitat for it

Species Name	Status EPBC Act	NC Act	IUCN	Habitat Preference	Likelihood of Occurrence
Tringa nebularia Common Greenshank	LM, MI	SL	LC	Widespread common migrant between Sept and April. Found in a variety of habitats including inland wetlands, sheltered coastal habitats, embayments, harbours, river estuaries, deltas and lagoons, tidal pools, rock-flats and rock platforms. Away from the coast they are found in both permanent and ephemeral terrestrial wetlands, including swamps, lakes, dams, rivers, creeks, billabongs, waterholes and inundated floodplains, claypans and saltflats as well as artificial wetlands, including sewage farms and saltworks dams, inundated rice crops and bores(Department of the Environment 2015ac; Morcombe 2003).	**Known to occur** species has been recorded on-site in the recent past (i.e. last 5-10 years) and the site provides suitable habitat for it
Tringa stagnatilis Marsh Sandpiper	LM, MI	SL	LC	Inhabits permanent or ephemeral wetlands of varying salinity, including swamps, lagoons, billabongs, saltpans, saltmarshes, estuaries, pools on inundated floodplains, intertidal mudflats, sewage farms and saltworks(Department of the Environment 2015ad; Morcombe 2003).	**Known to occur** species has been recorded on-site in the recent past (i.e. last 5-10 years) and the site provides suitable habitat for it
Xenus cinereus Terek Sandpiper Syn. *Tringa cinereus*	LM, MI	SL	LC	Inhabits coastal mudflats in sheltered estuaries, embayments, harbours or lagoons. Occasionally, on sandy beaches, on rock or coral reefs or platforms, and occasionally sighted around drying sewage ponds and saltpans if surrounded by mudflats (Department of the Environment 2015ae; Morcombe 2003).	**Known to occur** species has been recorded on-site in the recent past (i.e. last 5-10 years) and the site provides suitable habitat for it

EPBC Act (species listed under the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act), Aust.): Ex= Extinct CE = Critically Endangered E = Endangered, V = Vulnerable, MM = Migratory Marine, MT = Migratory Terrestrial, MW = Migratory Wetlands, LM = Listed Marine MI=Listed Migratory

NC Act (species listed under the Nature Conservation (Wildlife) Regulation 2006 Act (NC Act), QLD): PE: Extinct in the Wild CE: Critically Endangered E = Endangered, V = Vulnerable, NT = Near Threatened, SLC = Special Least Concern, C = Least Concern

IUCN (species listed under the International Union for Conservation of Nature (IUCN) Red List of Threatened Species) EX= Extinct, EW= Extinct in the Wild, CR= Critically Endangered, EN= Endangered, VU= Vulnerable, NT=Near Threatened, LC= Least Concern

Appendix D Flora Species Recorded

Family	EPBC Act	NC Act	Taxon	Common Name	Life Form	Sites
Mosses and Liverworts						
Fissidentaceae			*Fissidens* sp.		M	Q04
Ricciaceae		LC	*Riccia pullulans*		L	Q04, Q23
Flowering Plants						
Amaranthaceae		LC	*Alternanthera nodiflora*	common joyweed	H	Q10, BC3
Apocynaceae			**Calotropis procera*	calotrope	S	Q19, Q31
Apocynaceae		LC	*Carissa lanceolata*	conkerberry	S	Q01, Q07, Q32
Apocynaceae			*Parsonsia* sp.	monkey rope	V	Q01
Apocynaceae		LC	*Sarcostemma viminale* subsp. *australe*	caustic vine	S	Q01
Asteraceae		LC	*Pterocaulon serrulatum*	fruit-salad bush	H	Q27, Q29
Asteraceae		LC	*Sphaeranthus indicus*		H	BC3
Asteraceae			**Xanthium occidentale*	Noogoora burr	H	Q02, Q04, Q31, BC1
Boraginaceae		LC	*Trichodesma zeylanicum*	camel bush	H	Q02, Q19
Caesalpiniaceae			**Parkinsonia aculeata*	parkinsonia	ST	Q10, Q12A
Caesalpiniaceae		LC	*Senna artemisioides* subsp. *oligophylla*		S	Q01
Caesalpiniaceae		LC	*Senna notabilis*	cockroach bush	S	Q17
Caesalpiniaceae		LC	*Senna planitiicola*	pepper-leaf senna	S	Q01, Q27
Capparaceae		LC	*Capparis lasiantha*	nepine	S	Q02, Q20
Caryophyllaceae		LC	*Polycarpaea breviflora*		H	Q11
Chenopodiaceae		LC	*Chenopodium auricomum*	northern bluebush	S	BC3
Convolvulaceae		LC	*Evolvulus alsinoides.*	tropical speedwell	V	BC1

Family	EPBC Act	NC Act	Taxon	Common Name	Life Form	Sites
Convolvulaceae		LC	*Ipomoea muelleri*	native morning glory	V	BC1
Cyperaceae		LC	*Cyperus bifax*		H	Q12
Cyperaceae			*Cyperus* sp.	a sedge	H	Q02
Cyperaceae			*Fimbristylis* sp.	a sedge	H	BC1
Euphorbiaceae		LC	*Euphorbia tanarius*		S	Q01
Fabaceae		LC	*Crotalaria novae-hollandiae*	New Holland rattlepod	S	Q02
Fabaceae		LC	*Crotalaria sp.*	a rattlepod	S	Q21, Q26
Fabaceae		LC	*Cullen cinereum*		S	Q12
Fabaceae			*Indigofera* sp.		S	Q04
Fabaceae		LC	*Mirbelia viminalis*	yellow broom	S	Q24
Fabaceae		LC	*Stylosanthes humilis*	Townsville stylo	S	Q16
Malvaceae			**Malvastrum americanum*	spiked malvastrum	H	Q01
Malvaceae		LC	*Gossypium sturtianum*	Sturts Desert rose	S	Q20, Q21, Q29
Malvaceae		LC	*Sida fibulifera*	pin sida	H	Q01, Q02, Q04, Q11, Q21
Malvaceae		LC	*Sida platycalyx*	teddy-bears arsehole	H	Q02, Q16
Malvaceae			*Sida* sp.	a sida	H	Q10
Meliaceae		LC	*Owenia acidula*	emu apple	ST	Q24
Menispermaceae		LC	*Tinospora smilacina*	snake vine	V	Q23, Q34
Mimosaceae			**Vachellia farnesiana*	prickly acacia	T	Q02, Q03, Q07, Q12A, Q16, Q19A, Q23A
Mimosaceae		LC	*Acacia ancistrocarpa.*	Fitzroy wattle	S	Q01
Mimosaceae		LC	*Acacia aneura*	mulga	ST	Q01
Mimosaceae		LC	*Acacia cambagei*	gidgee	ST	Q18, Q28, Q33, Q35, Q37

Family	EPBC Act	NC Act	Taxon	Common Name	Life Form	Sites
Mimosaceae		LC	*Acacia chisholmii*		S	Q22,Q27, Q30
Mimosaceae		LC	*Acacia dictyophleba*		S	Q26, Q38
Mimosaceae		LC	*Acacia galioides*		S	Q13, Q22, Q24
Mimosaceae		LC	*Acacia holosericea*	candelabra wattle	S	Q02, Q04, Q23A, Q31, Q34, BC1
Mimosaceae		LC	*Acacia lysiphloia*	turpentine	S	Q01, Q02, Q20, Q22, Q24, Q25, Q25A, Q27, Q29, Q32, Q39
Mimosaceae		LC	*Acacia retivenea*		S	Q17
Mimosaceae			*Acacia* sp.		ST	Q13
Mimosaceae		LC	*Neptunia dimorphantha*	sensitive plant	S	Q16, Q23B
Myrtaceae		LC	*Corymbia aparrerinja*	ghost gum	T	Q02, Q27, Q32
Myrtaceae		LC	*Corymbia capricornia*		T	Q29
Myrtaceae		LC	*Corymbia terminalis*	desert bloodwood	T	Q01, Q02, Q05, Q27, Q30
Myrtaceae		LC	*Eucalyptus camaldulensis*	river red gum	T	Q04, Q19A, Q23, Q31, Q34, Q36, BC1, BC2
Myrtaceae		LC	*Eucalyptus coolabah*	coolibah	T	Q11, Q12, Q12A, Q12B
Myrtaceae		LC	*Eucalyptus leucophloia*	snappy gum	T	Q01, Q02, Q13, Q14, Q16A, Q17, Q19, Q21, Q22, Q23B, Q24, Q25, Q26, Q28, Q29, Q30, Q32, Q38, Q40, Q40A
Myrtaceae		LC	*Eucalyptus leucophylla*	Cloncurry box	T	Q16, Q17, Q19, Q21, Q23B, Q25A, Q27, Q38, Q39, Q40
Myrtaceae		LC	*Eucalyptus melanophloia* subsp. *nana*	silver-leaved ironbark	T	Q26, Q38
Myrtaceae		LC	*Eucalyptus pruinosa*	silver-leaved box	T	Q01, Q21, Q25, Q25A, Q26
Myrtaceae		LC	*Lophostemon grandiflorus* subsp. *riparius*	northern swamp box	T	Q04, Q31, BC1
Myrtaceae		LC	*Melaleuca argentea*	silver-leaved paperbark	T	Q04, Q36, BC1, BC2
Myrtaceae		LC	*Melaleuca bracteata*	black tea tree	S	Q34
Myrtaceae		LC	*Melaleuca viridiflora*	broad-leaved paperbark	T	Q04, BC1
Nyctaginaceae		LC	*Boerhavia coccinea*	tar vine	V	Q10, BC2

Family	EPBC Act	NC Act	Taxon	Common Name	Life Form	Sites
Phyllanthaceae		LC	*Phyllanthus virgatus*	creeping phyllanthus	H	BC1
Poaceae		LC	*Aristida contorta*		S	Q03
Poaceae		LC	*Aristida inaequiglumis*	curly wiregrass	G	Q21, BC1
Poaceae		LC	*Aristida latifolia*	feathertop wire grass	G	Q01
Poaceae			*Aristida* sp.	a wiregrass	G	Q02, Q03
Poaceae		LC	*Astrebla elymoides*	weeping Mitchell grass	G	Q07, Q09, Q11, BC2
Poaceae		LC	*Astrebla lappacea*	curly Mitchell grass	G	Q08, Q11
Poaceae		LC	*Astrebla pectinata*	barley Mitchell grass	G	Q06, Q08, Q10B
Poaceae		LC	*Astrebla squarrosa*			Q11
Poaceae			**Cenchrus ciliaris*	buffel grass	G	Q02, Q23, Q23A
Poaceae		LC	*Chrysopogon fallax*	golden beard grass	G	Q07, Q12A, BC1
Poaceae		LC	*Cymbopogon bombycinus*	silky oilgrass	G	Q20, Q21, Q26
Poaceae		LC	*Cymbopogon refractus*	Barbed wire grass	G	Q17
Poaceae		LC	*Enteropogon acicularis*	curly windmill grass	G	Q34
Poaceae		LC	*Eragrostis elongata*	clustered lovegrass	G	BC1
Poaceae		LC	*Eragrostis setifolia*	neverfail	G	BC1
Poaceae		LC	*Eriachne obtusa*	northern wanderrie	G	Q01, Q02, BC1
Poaceae		LC	*Eulalia aurea*	silky browntop	G	Q09, BC1
Poaceae		LC	*Heteropogon contortus*	black speargrass	G	BC1
Poaceae		LC	*Iseilema fragile*	Flinders grass	G	Q06, Q07, Q08, Q12A
Poaceae		LC	*Iseilema vaginiflorum*	red Flinders grass	G	Q09, Q09A, Q11, BC2
Poaceae		LC	*Leptochloa digitata*		G	Q12

Family	EPBC Act	NC Act	Taxon	Common Name	Life Form	Sites
Poaceae		LC	*Paspalidium jubiflorum*		G	Q12
Poaceae		LC	*Sporobolus australasicus*	Australian dropseed	G	Q01, Q03, Q04, Q06, Q29, Q33, BC1
Poaceae		LC	*Triodia bitextura*	soft spinifex	G	Q13, Q14
Poaceae		LC	*Triodia longiceps*	bull spinifex	G	Q01, Q02, Q16, Q16A, Q17, Q19, Q22
Poaceae		LC	*Triodia pungens*	soft spinifex	G	Q23B,Q24, Q25, Q25A, Q26, Q27, Q28, Q29, Q30, Q32, Q33, Q38, Q39, Q40
Poaceae			**Urochloa mosambicensis*	sabi grass	G	Q03, Q06, Q07, Q10B, Q11, BC3
Polygonaceae		LC	*Duma florulenta*	lignum	S	Q10, Q10A
Portulacaceae		LC	*Portulaca oleracea*	pigweed	H	Q10
Proteaceae		LC	*Grevillea dryandri*	Dryander's grevillea	S	Q24
Proteaceae		LC	*Grevillea striata*	beefwood	T	Q01, Q03, Q32, Q33
Proteaceae		LC	*Grevillea wickhamii*	holly-leaved grevillea	S	Q14
Proteaceae		LC	*Hakea lorea*	long-leaf corkwood	T	Q02, Q05, Q22
Rhamnaceae		LC	*Ventilago viminalis*	vine tree	T	Q07, Q12A, Q21
Sapindaceae		LC	*Alectryon oleifolius*	bulloak bush	S	Q01
Sapindaceae		LC	*Atalaya hemiglauca*	whitewood	T	Q01, Q02, Q03, Q16, Q20, Q32, Q33
Sapindaceae		LC	*Dodonaea barklyana*	hop bush	S	Q19
Scrophulariaceae		LC	*Eremophila mitchellii*	false sandalwood	T	Q01, Q02
Scrophulariaceae			*Eremophila* sp.		S	Q16
Solanaceae			*Solanum* sp.		S	Q17, Q22
Sparrmanniaceae		LC	*Corchorus sidoides*	native jute	S	Q17
Sterculiaceae		LC	*Brachychiton collinus*		T	Q19
Sterculiaceae		LC	*Keraudrenia nephrosperma*		S	Q17, Q26

Notes:
* = exotic species
EPBC Act (Australian *Environment Protection and Biodiversity Conservation Act 1999*)
NC Act (Queensland *Nature Conservation Act 1992*): LC = Least Concern
Life form: T = tree; S = Shrub; G = Grass; H = Herb/Forb; V = Vine; F = Fern; M = Moss; L = Liverwort; a = aquatic; e = epiphytic

Appendix E Fauna Species Recorded

	Family	Scientific Name	Common Name	Method of Capture	EPBC Act	NC Act	IUCN
	Mammals						
*	Bovidae	*Bos taurus*	European Cattle	opportunistic		LC	
	Dasyuridae	*Planigale ingrami*	Long-tailed Planigale	pitfall		LC	LC
	Dasyuridae	*Sminthopsis macroura*	Stripe-faced Dunnart	Elliot, funnel		LC	LC
	Emballonuridae	*Saccolaimus flaviventris*	Yellow-bellied Sheathtail-bat	SongMeter, Anabat		LC	LC
*	Felidae	*Felis catus*	cat	camera		LC	
	Macropodidae	*Macropus robustus*	Common Wallaroo	camera, opportunistic		LC	
	Macropodidae	*Petrogale purpureicollis*	Purple-necked Rock Wallaby	camera		V	LC
	Molossidae	*Chaerephon jobensis*	Northern Freetail-bat, Northern Mastiff Bat	SongMeter, Anabat		LC	LC
	Molossidae	*Mormopterus lumsdenae (Syn. M. beccarii)*	Northern Free-tailed Bat	Anabat		LC	
**	Molossidae	*Mormopterus species*	Free-tailed bat species	SongMeter, Anabat		LC	
*	Suidae	*Sus scrofa*	pig	opportunistic		LC	LC
	Vespertilionidae	*Chalinolobus gouldii*	Gould's Wattled Bat	SongMeter, Anabat		LC	LC
**	Vespertilionidae	*Chalinolobus nigrogriseus*	Hoary Wattled Bat	Anabat		LC	LC
	Vespertilionidae	*Nyctophilus sp.*	Long-eared bat species	SongMeter, Anabat		LC	
	Vespertilionidae	*Scotorepens balstoni*	Inland Broad-nosed Bat	SongMeter, Anabat		LC	LC
	Vespertilionidae	*Scotorepens greyii*	Little Broad-nosed Bat	SongMeter, Anabat		LC	LC
	Vespertilionidae	*Vespadelus baverstocki*	Inland Forest Bat	SongMeter, Anabat		LC	LC
	Vespertilionidae	*Vespadelus caurinus*	Northern Cave Bat	SongMeter, Anabat		LC	LC
	Vespertilionidae	*Vespadelus finlaysoni*	Finlayson's Cave Bat	SongMeter, Anabat		LC	LC
	Reptiles						
	Agamidae	*Ctenophorus caudicinctus*	Ring-tailed dragon	opportunistic		LC	
	Agamidae	*Ctenophorus isolepis*	Central military dragon	opportunistic, pitfall		LC	
	Agamidae	*Diporiphora magna*	Yellow-sided two-lined dragon	funnel, opportunistic, pitfall		LC	
	Agamidae	*Lophognathus gilberti*	Gilbert's dragon	camera, funnel, opportunistic		LC	LC
	Agamidae	*Tympanocryptis cephalus*	Pebble dragon	opportunistic		LC	
	Agamidae	*Tympanocryptis tetraporophora*	Eyrean earless dragon	opportunistic		LC	
	Diplodactylidae	*Diplodactylus tessellatus*	Tessellated gecko	opportunistic		LC	
	Diplodactylidae	*Strophurus taeniatus*	Phasmid striped gecko	funnel		LC	
	Elapidae	*Demansia quaesitor*	Sombre whipsnake	funnel		LC	
	Gekkonidae	*Gehyra robusta*	Robust dtella	opportunistic		LC	
	Gekkonidae	*Heteronotia binoei*	Bynoe's gecko	opportunistic		LC	
	Scincidae	*Carlia munda*	Shaded-litter rainbow-skink	funnel		LC	
	Scincidae	*Cryptoblepharus metallicus*	Metallic snake-eyed skink	opportunistic		LC	
	Scincidae	*Ctenotus lateralis*	Gravelly-soil ctenotus	funnel, opportunistic, pitfall		LC	

Family	Scientific Name	Common Name	Method of Capture	EPBC Act	NC Act	IUCN
Scincidae	*Ctenotus pantherinus*	Leopard ctenotus	camera, funnel, opportunistic		LC	
Scincidae	*Ctenotus robustus*	Robust ctenotus	funnel		LC	
Scincidae	*Ctenotus striaticeps*	Stripe-headed finesnout ctenotus	funnel, pitfall		LC	
Scincidae	*Menetia greyii*	Common dwarf skink	funnel		LC	
Varanidae	*Varanus acanthurus*	Spiny-tailed monitor	opportunistic		LC	
Birds						
Acanthizidae	*Smicrornis brevirostris*	Weebill	opportunistic		LC	LC
Accipitridae	*Accipiter cirrocephalus*	Collared sparrowhawk	survey		LC	LC
Accipitridae	*Accipiter fasciatus*	Brown goshawk	opportunistic		LC	LC
Accipitridae	*Aquila audax*	Wedge-tailed eagle	opportunistic		LC	LC
Accipitridae	*Haliastur sphenurus*	Whistling kite	opportunistic		LC	LC
Accipitridae	*Milvus migrans*	Black kite	opportunistic, survey		LC	LC
Aegothelidae	*Aegotheles cristatus*	Australian owlet-nightjar	opportunistic		LC	LC
Anatidae	*Anas superciliosa*	Pacific black duck	opportunistic		LC	LC
Ardeidae	*Ardea pacifica*	White-necked heron	camera, opportunistic		LC	LC
Ardeidae	*Egretta novaehollandiae*	White-faced heron	survey		LC	LC
Artamidae	*Artamus cinereus*	Black-faced woodswallow	opportunistic, survey		LC	LC
Artamidae	*Artamus leucorynchus*	White-breasted woodswallow	opportunistic, survey		LC	LC
Artamidae	*Artamus minor*	Little woodswallow	opportunistic		LC	LC
Artamidae	*Artamus personatus*	Masked woodswallow	survey		LC	LC
Artamidae	*Cracticus nigrogularis*	Pied butcherbird	opportunistic, survey		LC	LC
Artamidae	*Cracticus tibicen*	Australian magpie	opportunistic		LC	LC
Artamidae	*Cracticus torquatus*	Grey butcherbird	opportunistic		LC	LC
Cacatuidae	*Cacatua sanguinea*	Little corella	opportunistic		LC	LC
Cacatuidae	*Eolophus roseicapillus*	Galah	opportunistic, survey		LC	LC
Cacatuidae	*Nymphicus hollandicus*	Cockatiel	opportunistic, survey		LC	LC
Campephagidae	*Coracina novaehollandiae*	Black-faced cuckoo-shrike	opportunistic, survey		LC	LC
Columbidae	*Geopelia humeralis*	Bar-shouldered dove	opportunistic		LC	LC
Columbidae	*Geophaps plumifera*	Spinifex pigeon	opportunistic		LC	LC
Columbidae	*Ocyphaps lophotes*	Crested pigeon	opportunistic, survey		LC	LC
Columbidae	*Phaps chalcoptera*	Common bronzewing	survey		LC	LC
Corvidae	*Corvus coronoides*	Australian raven	camera, opportunistic, survey		LC	LC
Corvidae	*Corvus orru*	Torresian crow	camera, opportunistic, survey		LC	LC
Estrildidae	*Taeniopygia guttata*	Zebra finch	opportunistic, survey		LC	LC
Falconidae	*Falco berigora*	Brown falcon	opportunistic		LC	LC
Falconidae	*Falco cenchroides*	Nankeen kestrel	opportunistic		LC	LC
Gruidae	*Grus rubicunda*	Brolga	opportunistic		LC	
Halcyonidae	*Todiramphus pyrrhopygius*	Red-backed kingfisher	opportunistic, survey		LC	LC

Family	Scientific Name	Common Name	Method of Capture	EPBC Act	NC Act	IUCN
Maluridae	*Malurus lamberti*	Variegated fairy-wren	opportunistic, survey		LC	LC
Meliphagidae	*Lichenostomus keartlandi*	Grey-headed honeyeater	opportunistic, survey		LC	LC
Meliphagidae	*Lichenostomus penicillatus*	White-plumed honeyeater	opportunistic, survey		LC	LC
Meliphagidae	*Lichenostomus virescens*	Singing honeyeater	opportunistic		LC	LC
Meliphagidae	*Manorina flavigula*	Yellow-throated miner	opportunistic, survey		LC	LC
Meliphagidae	*Melithreptus albogularis*	White-throated honeyeater	opportunistic		LC	LC
Monarchidae	*Grallina cyanoleuca*	Magpie-lark	camera, opportunistic, survey		LC	LC
Nectariniidae	*Dicaeum hirundinaceum*	Mistletoebird	opportunistic, survey		LC	LC
Pachycephalidae	*Colluricincla harmonica*	Grey shrike-thrush	opportunistic		LC	LC
Pachycephalidae	*Pachycephala rufiventris*	Rufous whistler	opportunistic		LC	LC
Pardalotidae	*Pardalotus striatus*	Striated pardalote	opportunistic		LC	LC
Pomatostomidae	*Pomatostomus temporalis*	Grey-crowned babbler	opportunistic		LC	LC
Psittacidae	*Aprosmictus erythropterus*	Red-winged parrot	opportunistic		LC	LC
Psittacidae	*Barnardius zonarius*	Australian ringneck	opportunistic, survey		LC	LC
Psittacidae	*Melopsittacus undulatus*	Budgerigar	opportunistic		LC	LC
Psittacidae	*Psitteuteles versicolor*	Varied lorikeet	opportunistic		LC	LC
Ptilonorhynchidae	*Ptilonorhynchus maculatus*	Spotted bowerbird	survey		LC	LC
Rhipiduridae	*Rhipidura fuliginosa*	Grey fantail	opportunistic		LC	LC
Rhipiduridae	*Rhipidura leucophrys*	Willie wagtail	opportunistic, survey		LC	LC
		Owl	camera			

* Introduced species

** Species possibly present but not reliably identified from recorded calls

EPBC Act Australian conservation status under the Environment Protection and Biodiversity Conservation Act 1999

NC Act Queensland conservation status under the *Nature Conservation Act 1992*

LC Least Concern

IUCN species listed under the International Union for Conservation of Nature (IUCN) Red List of Threatened Species

LC Least Concern

Appendix F Bat Call Analysis

Microbat Call Identification Report

Prepared for ("Client"):	O2 Ecology
Survey location/project name:	Mt Isa
Survey dates:	28/4/2015 – 1/5/2015
Client project reference:	
Job no.:	O2E-1503
Report date:	29 May 2015

Methods

Data receipt and processing

Bat calls were recorded at four sites using three Anabat detectors (Titley Scientific, Brisbane) and a Song Meter SM2BAT detector (Wildlife Acoustics, USA). The raw data files were downloaded from the detectors by the client and converted to Anabat call sequence files (zero-crossing format).

Balance! Environmental received 2270 Anabat sequence files for analysis.

Call identification

All Anabat sequence files were viewed using *AnalookW* (Corben 2014) and a subset of files containing representative samples of all call types recorded at each survey site on each detector were selected for further analysis. Calls with fewer than four clearly-defined, non-fragmented pulses were excluded from the identification process.

Call identification was achieved manually by comparing the spectrograms of the selected calls with those of reference calls from central and northern Queensland and with reference to published call descriptions (Milne 2002; Reinhold *et al.* 2001). Species' identification was also guided by considering probability of occurrence based on habitat descriptions provided by the client, along with general distribution information (Churchill 2008; van Dyck *et al.* 2013) and/or database records obtained from Wildlife Online (http://www.ehp.qld.gov.au/wildlife/wildlife-online/index.html).

Reporting standard

The format and content of this report follows Australasian Bat Society standards for the interpretation and reporting of bat call data (Reardon 2003).

Species nomenclature follows Reardon *et al.* (2015).

Results & Discussion

Ten call types were positively identified (see Table 1). Nine of those were reliably attributed to individual species, while the other was allocated to the genus *Nyctophilus*, which cannot be reliably differentiated form call data. Three *Nyctophilus* species potentially occur in the study area: *N. arnhemensis*; *N. geoffroyi;* and *N. bifax/daedelus*.

Two other species (*Chalinolobus nigrogriseus* and a *Mormopterus* species) were also possibly present; however, their calls are similar to other species that were recorded (*Scotorepens greyii* and *Chalinolobus gouldii*, respectively) and it is possible that the calls allocated tentatively to these species were just variants of the positively identified species' calls.

The study area falls within the known range of *C. nigrogriseus*, so it is probable that this species was responsible for some calls allocated tentatively to it.

Aside from *Mormopterus eleryi* and *M. lumsdenae* (which was recorded in this surveya0, both of which have distinctly different call types to other *Mormopterus* bats, no other *Mormopterus* species are shown in the literature to occur in the vicinity of Mt Isa (Reardon *et al.* 2008; Reardon *et al.* 2014; van

Dyck *et al.* 2013). The calls tentatively allocated here are similar to those produced by species such as *M. petersi* and *M. ridei*, but the study area is well outside the known ranges of those species (van Dyck *et al.* 2013). It is likely, therefore, that the allocated calls are *C. gouldii* variants; however, because *Mormopterus* distributions remain relatively poorly known and reliable bat capture-and-identification data is rare in this region, the possibility that these calls represent a hitherto unrecorded *Mormopterus* cannot be discounted.

Some of the species that were positively identified at least once were only tentatively identified at some sites due to similarities in call features between several species. Where calls could not be reliably attributed to a single species, they were allocated to species pairs and both species listed as possibly present. These like-species pairs included:

- *Scotorepens greyii* and *Vespadelus baverstocki*; and
- *Vespadelus caurinus* and *V. finlaysoni*.

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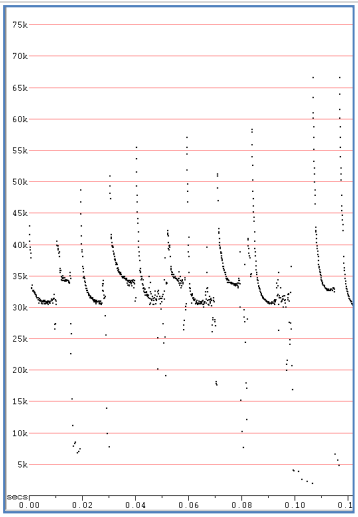
Table 1. Microbat species recorded during the Mt Isa surveys, 28 April to 2nd May 2015.

♦ = species positively identified from call data

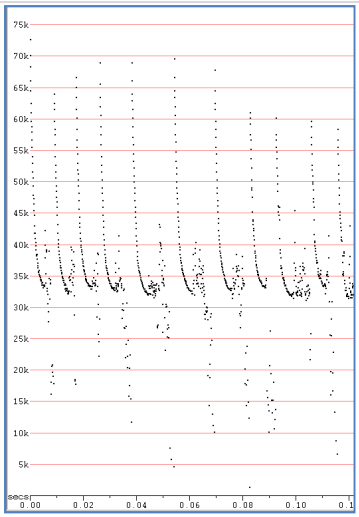
□ = species possibly present, but not reliably identified

Site:	Site 1	Site 2		Site 3		Camp 2		
Detector:	Anabat 80226	SongMeter	Anabat 82440	Anabat 80226	Anabat 05915	SongMeter	Anabat 80226	Anabat 82440
No. of detector-nights:	1	2	2	2	4	2	1	1
Total no. sequence files:	0	739	447	54	737	28	83	65
No. calls identified:	0	93	62	19	115	17	9	1
Chalinolobus gouldii		♦	♦	♦	♦	♦	♦	♦
Chalinolobus nigrogriseus			□	□	□			
Nyctophilus sp.		♦	♦		♦			
Scotorepens balstoni		♦	♦		♦			
Scotorepens greyii		♦	♦	♦	♦	□	□	
Vespadelus baverstocki		♦	♦		♦	□	□	
Vespadelus caurinus				□	□	□	♦	
Vespadelus finlaysoni			♦	♦	♦	♦	♦	
Chaerephon jobensis		♦	♦	♦	♦	♦		
Mormopterus lumsdenae (Syn. *M. beccarii)*					♦			
Mormopterus species		□	□	□	□	□	□	□
Saccolaimus flaviventris		♦	♦	♦	♦			

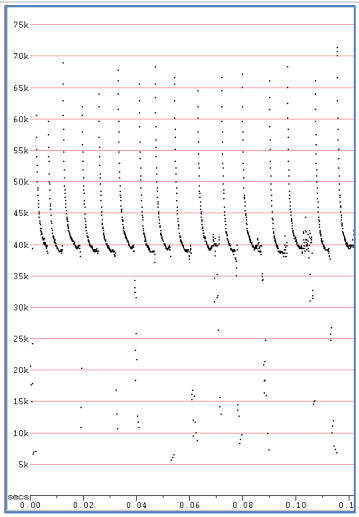
Appendix Representative bat call sequences recorded at Mt Isa, April 2015.
(10msec per tick; time between pulses removed)



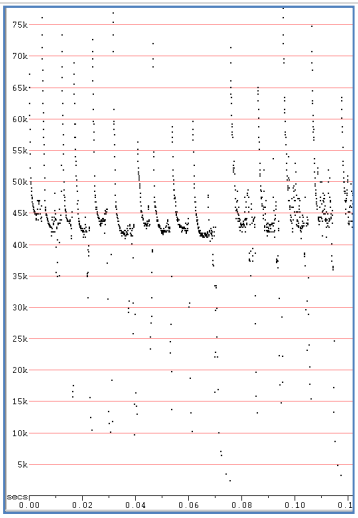
Chalinolobus gouldii



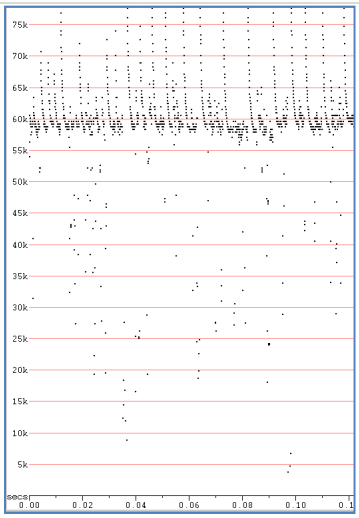
Scotorepens balstoni



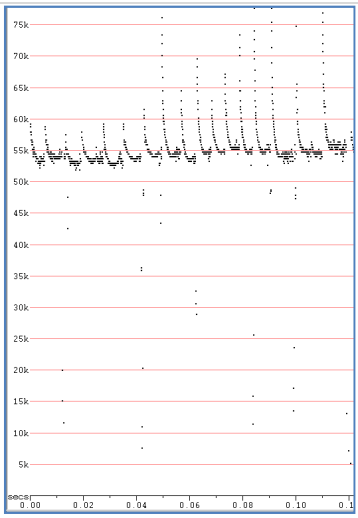
Scotorepens greyii



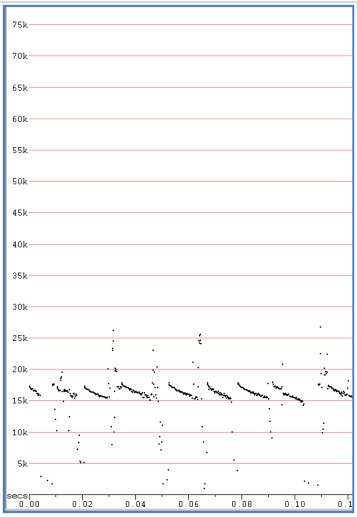
Vespadelus baverstocki



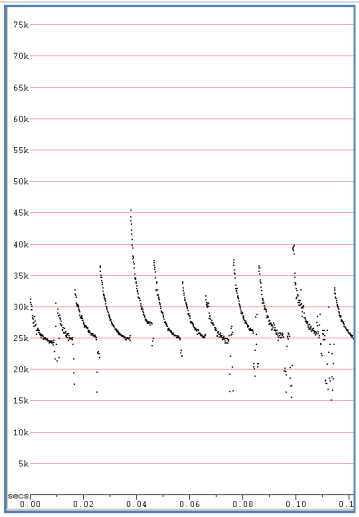
Vespadelus caurinus



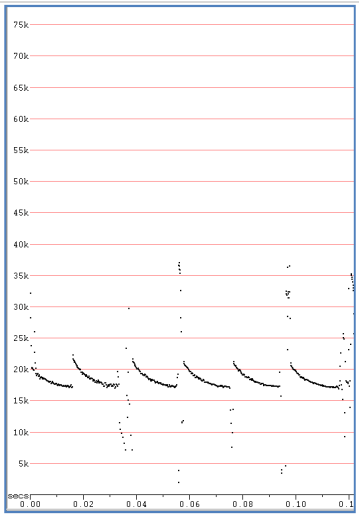
Vespadelus finlaysoni



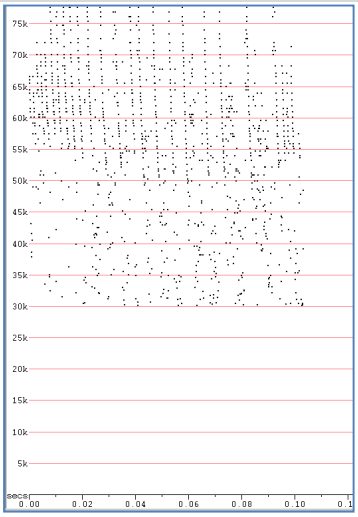
Chaerephon jobensis



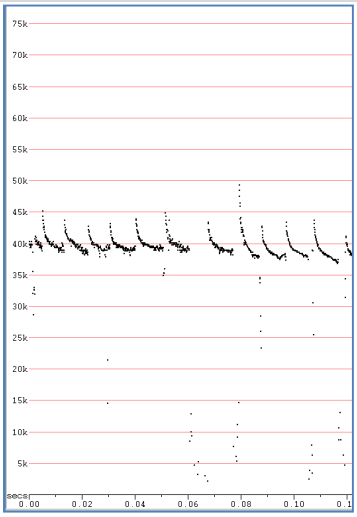
Mormopterus lumsdenae



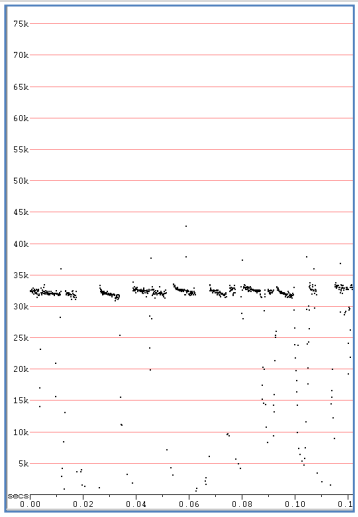
Saccolaimus flaviventris



Nyctophilus sp



Chalinolobus nigrogriseus or *Scotorepens greyii*



Mormopterus species or *Chalinolobus gouldii*

Appendix G Aquatic Invertebrate Report

Abundance, Richness and Composition

Buckley River - Camp 1.

A total of 157 aquatic invertebrates where sampled comprising 12 different Families. The numerically dominating aquatic invertebrates at Camp Site 1 were Non-biting midges from Family Chironomidae, namely the Sub-family Chironominae (30.57%) (Figure 1) and Subfamily Tanypodinae (19.75%) (Figure 2). Biting midges from the Family Ceratopogonidae were also represented in high number comprising 19.75% of the composition. 10.19% of the mayfly nymphs were represented by the Family Caenidae (Figure 3). Other aquatic invertebrates in low abundances, comprising less than 6% in the sample, include the Predaceous Diving Beetles from the Family Ditiscidae, Caddisfly larvae from the Family Leptoceridae, Long-armed shrimps from the Family Palaemonidae, Caddisflies from the Family Ecnomidae, Water Boatmen from the Family Micronectidae, Ground Beetles from the Family Carabidae, and Minute Rove Beetles from the Family Hydraenidae. (Appendix 1A).

Mingera Creek - Site 2

A total of 488 aquatic invertebrates were enumerated and identified within 17 Families. The most numerous invertebrates sampled were the mayfly nymphs from the Family Caenidae (Figure 3) comprising 44.47% of the sample composition. The non-biting midges from the Family Chironominae (21.93%) (Figure 1) and Family Tanypodinae (15.37%) (Figure 2) were also relatively numerous. The majority of invertebrate Families sampled were represented by < 3% of the composition and included the Biting Midges from the Family Ceratopogonidae, the Predacious Diving Beetles from the Family Ditiscidae, the Caddisfly nymphs from the Family Ecnomidae, the Water Boatmen from the Family Micronectidae, the Caddisfly nymphs from the Family Leptoceridae, the Mayflies from the Family Baetidae, the Aquatic Earthworms from an unidentified Family, Microcrustacea from the Order Ostracoda (Seed Shrimps), Scavenger Water Beetles from the Family Hydrophilidae, Freshwater Snails from the Family Viviparidae, Minute Rove Beetles from the Family Hydraenidae, Mosquito larvae from the Family Culicidae, Water Striders from the Family Gerridae, and the Freshwater Limpet from the Family Ancylidae. (Appenix 1A).

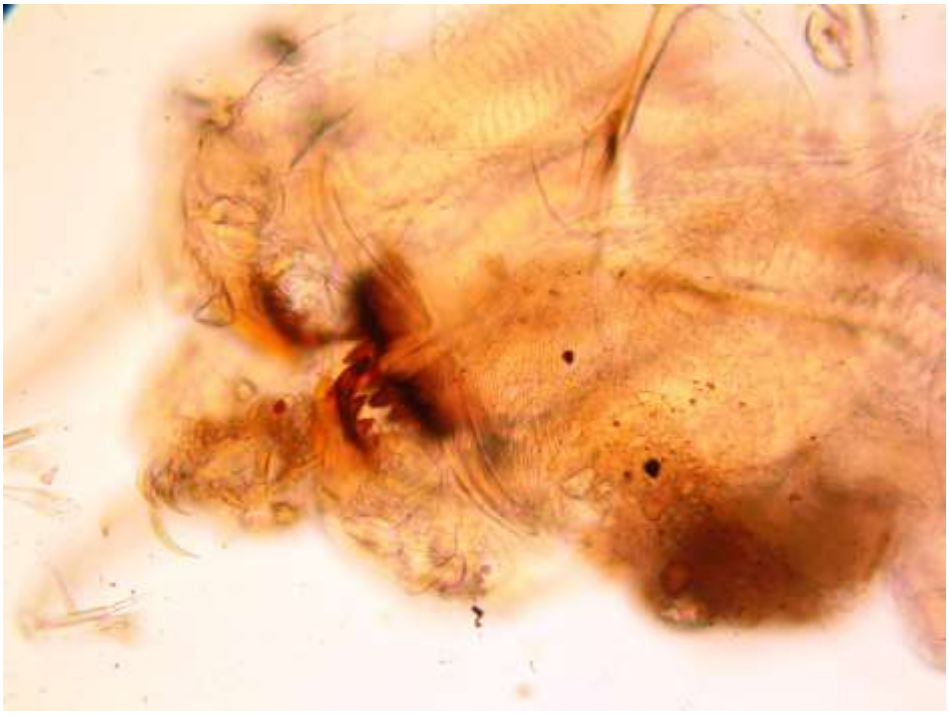


Figure 1. Head capsule of the non-biting midge larvae, *Tanytarsus* from the Subfamily, Chironominae (X100). *Tanytarsus* is an example of a chironomid Genus represented in both Buckley River and Mingera Creek sampling sites.

Figure 2. Head capsule and whole body of the non-biting midge larvae from the Subfamily Tanypodinae (X40). Tanyponids were sampled from both Buckley River and Mingera Creek sampling sites.

Figure 3: An example of a species of *Tasmanocaenis* (likely *Tasmanocaenis arcuata*) from the mayfly Family Caenidae (x 40). The Genus *Tasmanocaenis* was sampled from Buckley River and Mingera Creek sampling sites.

Shannon-Wiener Diversity Index

Species diversity was measured by the Shannon-Wiener diversity index (H'). This index considers the number of individuals and the number of taxa within a community. The results in Figure 4 indicate a higher diversity index at Buckley River - Camp 1 (H' = 1.913). Mingera Creek - Site 2 had a lower diversity index (H'= 1.718) however the confidence intervals suggest the differences between the indices are not significant. (Appendix 1B).

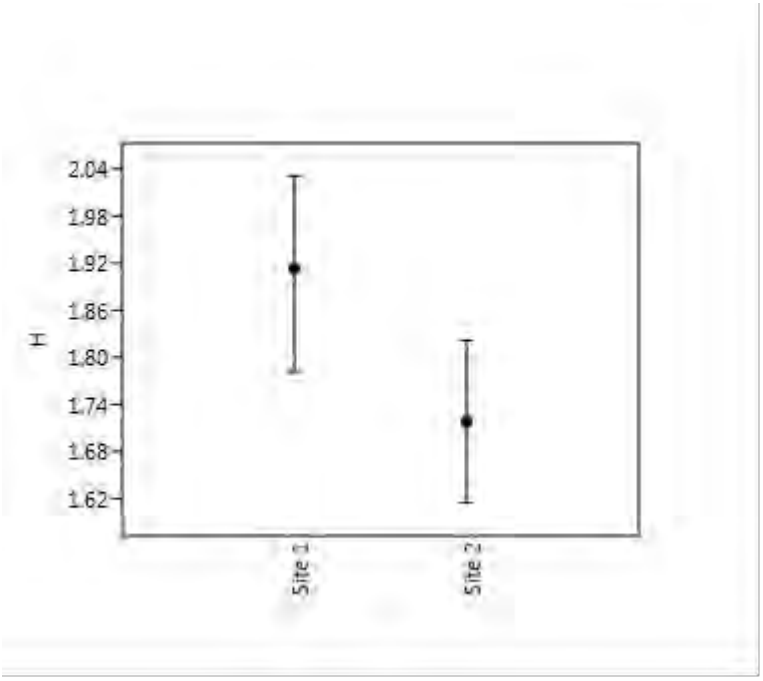
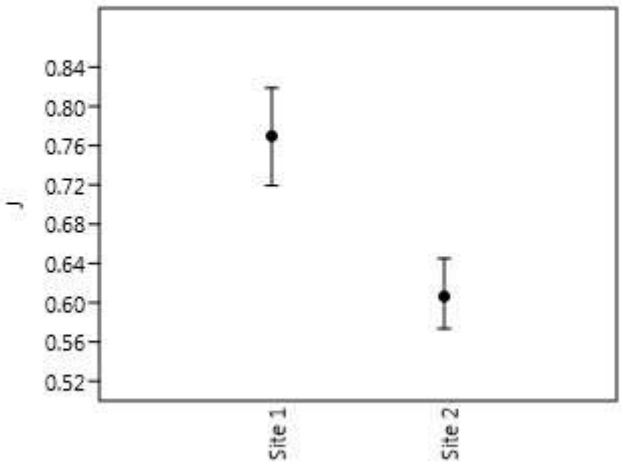


Figure 4: Shannon-Weiner diversity index across sampling sites. A Bootstrap method was applied with 1000 permutations resulting in the H' diversity index with upper and lower diversity limits for each site. Buckley River – Camp 1: H'= 1.913,CI(lower)= 1.787, CI(upper)= 2.034; Mingera Creek - Site 2: H'=1.718, CI(lower)= 1.618, CI(upper)= 1.823.

Taxa Equitability (J)

Species Equitability is a diversity index describing the evenness or numerical closeness of each taxa. The index ranges from 0 (low equitability) to 1 (high equitability). Buckley River - Camp 1 had a significantly higher evenness with greater equitable spread of individuals across species compared with Mingera Creek - Site 2 having a lower spread of individuals across species (Figure 5). Mingera Creek - Site 2 had high abundances of taxa within the mayflies from the Family Caenidae, and non-biting midges from the Sub-family Chironominae resulting in a low J index score. (Appendix 1B).



- Figure 5: A higher equitability score, J, was measured at Buckley River – Camp 1 showing a greater spread of abundances across taxa compared with Mingera Creek - Site 2. A bootstrap method was applied to the data with 1000 permutations resulting in H' diversity index and the confidence intervals showing upper and lower limits for each site. Buckley River Camp 1: J=0.7698,CI(lower)= 0.7193, CI(upper)= 0.8187; Mingera Creek - Site 2: J=0.6063, CI(lower)= 0.5736, CI(upper)= 0.6449.

SIGNAL Scores

SIGNAL stands for *Stream Invertebrate Grade Number-Average Level* and is a simple method to assess the water quality of a river using macroinvertebrates as an indicator of pollution. For example, waterways with a high SIGNAL index score can indicate high levels of dissolved oxygen and low levels of salinity, turbidity and nutrients such as nitrogen and phosphorus (Chessman, 2003). The SIGNAL 2 score (Chessman, 2003) is a weighted abundance calculated for each composite sample. If the SIGNAL 2 sensitivity score of a macroinvertebrate is 1 then that Family of macroinvertebrates is very tolerant to pollution, alternatively, if the SIGNAL 2 sensitivity score is 10 the macroinvertebrate Family is very intolerant to pollution. (Appendix 1C)

SIGNAL 2 scores were similar for both Buckley River – Camp 1 and Mingera Creek – Site 2.

- **Buckley River - Camp 1**. SIGNAL 2 score was 3.6 with a low species richness of 12 macroinvertebrate Families.

- **Mingera Creek - Site 2**. SIGNAL 2 score was slightly lower than Site 1 at 3.5 with a higher species richness of 16 compared with Buckley River – Camp 1.

PET Scores

The observation of frequency in the macroinvertebrate Families, **P**lecoptera, **E**phemeroptera and **T**richoptera (PET) provides another measure to assess changes in environmental condition. Stoneflies such as those from the Family Grypopterigidae; mayflies form the families Beatidae, Caenidae and Leptophlebiidae; and caddisflies such as Family Leptoceridae, Ecnomidae and Hydroptilidae are highly sensitive to disturbances. Sites with good habitats and water quality have a higher occurrence of PET families than degraded sites (Plafkin, Barbour et al. 1989).

- **Buckley River - Camp 1.** A total of 3 PET scores were sampled including the mayfly nymphs from the Family Caenidae, and the Caddisfly nymphs from the Family Ecnomidae and Family Leptoceridae (Appendix 1C).

- **Mingera Creek - Site 2**. A total of 4 PET scores were sampled from this site including the Mayfly nymphs from the Family Baetidae and Family Caenidae; and the Caddisfly nymphs from the Family Ecnomidae and Leptoceridae (Appendix 1C).

Water Health at Buckley River and Mingera Creek

Calculated SIGNAL scores for both sampling sites are low and indicate a degraded aquatic environment. Although the sampling sites had low SIGNAL

2 scores it is also possible that the low scores may indicate the ephemeral nature of the waterway effecting species abundance, richness and distribution. Macroinvertebrates were sampled from intermittent ephemeral pools from both sites which provide a habitat for macroinvertebrate communities during seasons with low rainfall events. Mingera Creek sampling site had a higher species richness and more sensitive taxa than the Buckley River sampling site potentially indicating a less environmentally degraded site at Mingera Creek compared with Buckley River.

To further understand the ephemeral nature of Buckley River and its catchment, more ecological assessment is required to address the water quality and biodiversity of the catchment during dry and wet seasons. This would fill gaps in the ecological knowledge for the Buckley River catchment and provide a natural baseline to monitor current and future human impacts and health of the Buckley River catchment.

References

Chessman B, 2003, *SIGNAL 2 – A Scoring System for Macro-invertebrate ('Water Bugs') in Australian Rivers*, Monitoring River Heath Initiative Technical Report no 31, Commonwealth of Australia, Canberra.

Hammer, Ø., Harper, D.A.T., and P. D. Ryan, 2001. PAST: Paleontological Statistics Software Package for Education and Data Analysis. Palaeontologia Electronica 4(1): 9pp.

Hammer, Ø. & Harper, D.A.T. 2006. Paleontological Data Analysis. Blackwell.

Plafkin, J.L., M.T. Barbour, K.D. Porter, S.K. Gross, and R.M. Hughes. 1989. *Rapid bioassessment protocols for use in streams and rivers: Benthic macroinvertebrates and fish.* U.S. Environmental Protection Agency, Office of Water Regulations and Standards, Washington, D.C. EPA 440-4-89-001.

Appendix 1A - Raw Data

Code	Phylum	Class	Order	Family/Taxa	Common Name	Location	Site 1	Pi	%	Site 2	Pi	%
Oligo	Annelida	Oligochaeta	und. Oligochaeta	Oligochaeta	Aquatic Earthworms	Camp_Mt Isa			0.00	6	0.0123	1.23
Palae	Arthropoda	Crustacea	Decapoda	Palaemonidae	Long-armed Shrimps	Camp_Mt Isa	6	0.0382	3.82			0.00
Ostra	Arthropoda	Crustacea	Ostracoda	Ostracoda	Seed Shrimps	Camp_Mt Isa			0.00	5	0.0102	1.02
Carab	Arthropoda	Insecta	Coleoptera	Carabidae	Ground Beetles	Camp_Mt Isa	1	0.0064	0.64			0.00
Dytis	Arthropoda	Insecta	Coleoptera	Dytiscidae	Predacious Diving Beetles	Camp_Mt Isa	8	0.0510	5.10	13	0.0266	2.66
Hydra	Arthropoda	Insecta	Coleoptera	Hydraenidae	Minute Rove Beetles	Camp_Mt Isa	1	0.0064	0.64	1	0.0020	0.20
Hydro	Arthropoda	Insecta	Coleoptera	Hydrophilidae	Scavenger Water Beetles	Camp_Mt Isa			0.00	4	0.0082	0.82
Cerat	Arthropoda	Insecta	Diptera	Ceratopogonidae	Biting Midges	Camp_Mt Isa	31	0.1975	19.75	14	0.0287	2.87
Chiro	Arthropoda	Insecta	Diptera	Chironominae	Non-biting Midges	Camp_Mt Isa	48	0.3057	30.57	107	0.2193	21.93
Tany	Arthropoda	Insecta	Diptera	Tanypodinae	Non-biting Midges	Camp_Mt Isa	31	0.1975	19.75	75	0.1537	15.37
Culic	Arthropoda	Insecta	Diptera	Culicidae	Mosquitoes	Camp_Mt Isa			0.00	1	0.0020	0.20
Baet	Arthropoda	Insecta	Ephemeroptera	Beatidae	Mayflies	Camp_Mt Isa			0.00	7	0.0143	1.43
Caen	Arthropoda	Insecta	Ephemeroptera	Caenidae	Mayflies	Camp_Mt Isa	16	0.1019	10.19	217	0.4447	44.47
Gerr	Arthropoda	Insecta	Hemiptera	Gerridae	Water Striders	Camp_Mt Isa			0.00	1	0.0020	0.20
Micron	Arthropoda	Insecta	Hemiptera	Micronectidae	Water Boatmen	Camp_Mt Isa	2	0.0127	1.27	12	0.0246	2.46
Uroth	Arthropoda	Insecta	Odonata	Urothemistiddae	Dragonflies	Camp_Mt Isa	1	0.0064	0.64			0.00
Ecnom	Arthropoda	Insecta	Trichoptera	Ecnomidae	Caddis Flies	Camp_Mt Isa	5	0.0318	3.18	13	0.0266	2.66
Lepto	Arthropoda	Insecta	Trichoptera	Leptoceridae	Caddis Flies	Camp_Mt Isa	7	0.0446	4.46	8	0.0164	1.64
Ancil	Mollusca	Gastrapoda	Gastrapoda	Ancilidae	Freshwater Limpets	Camp_Mt Isa			0.00	1	0.0020	0.20
Vivip	Mollusca	Gastrapoda	Gastrapoda	Viviparidae	Freshwater Snails	Camp_Mt Isa			0.00	3	0.0061	0.61
						Total Abundance	157			488		
						Richness	12			17		

Site 1 = Buckley River - Camp 1
Site 2 = Mingera Creek - Site 2

Appendix 1B : Diversity Index Calculations

	Buckley River - Camp 1	Lower	Upper	Mingera Creek - Site 2	Lower	Upper
Taxa_S	12	12	12	17	16	17
Individuals	157	157	157	488	488	488
Shannon_H	1.913	1.787	2.034	1.718	1.618	1.823
Equitability_J	0.7698	0.7193	0.8187	0.6063	0.5736	0.6449

Bootstrap = 1000 permutations. Data analysed using PAST 3. Hammer et al, 2001

Appendix 1C : Signal 2 calculations

				Camp					
			DATE	**30/05/14**			**29/05/14**		
Signal Grade	**Order**	**Family/Other taxa**	**Common Name / Site**	**Camp - Site 1**	*Wf*	*GxWf*	**Camp - Site 2**	*Wf*	*GxWf*
3	Coleoptera	Carabidae	Ground Beetle	1	1	3			
2	Coleoptera	Dytiscidae	Diving beetles	8	3	6	13	4	8
3	Coleoptera	Hydraenidae	Minute moss beetles	1	1	3	1	1	3
2	Coleoptera	Hydrophilidae	Water scavenger beetles				4	2	4
4	Decapoda	Palaemonidae	Long-armed shrimps	6	3	12			
4	Diptera	Ceratopogonidae	Biting midges	31	5	20	14	4	16
3	Diptera	Chironominae	Non-biting midges	48	5	15	107	5	15
1	Diptera	Culicidae	Mosquitoes				1	1	1
4	Diptera	Tanypodinae	Non-biting midges	31	5	20	75	5	20
5	Ephemeroptera	Baetidae	Mayflies				7	3	15
4	Ephemeroptera	Caenidae	Mayflies	16	4	16	217	5	20
4	Gastrapoda	Ancylidae	Freshwater limpets				1	1	4
4	Gastrapoda	Viviparidae	Aquatic snails				3	2	8
4	Hemiptera	Gerridae	Water striders				1	1	4
2	Hemiptera	Micronectidae (formerly Corixidae)	Water boatmen	2	1	2	12	4	8
1	Odonata	Urothemistidae (formerly Libellulidae	Dragonfly Nymphs	1	1	1			
2	Oligochaeta	Oligochaeta sp.	Aquatic earthworms				6	3	6
4	Trichoptera	Ecnomidae	Caddisflies	5	2	8	13	4	16
6	Trichoptera	Leptoceridae	Caddisflies	7	3	18	8	3	18
		Macroinvertebrates	**Total Abundance**	**157**	***34***	***124***	**483**	***48***	***166***
			Total Number of Families	**12**			**16**		
			SIGNAL Score	**3.6**			**3.5**		
			PET Scores	**3**			**4**		

Site 1 = Buckley River - Camp 1
Site 2 = Mingera Creek - Site 2

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Appendix H BioCondition and CORVEG Data Sheets

BioCondition Field Assessment Sheet (v 2.1)

Queensland Government

Site: BC01	**RE/Landtype:** 1.3.7a	**Bioregion:** NWH	**Property:**
Date: 28 APR 2015	**Photos** (optional) **N:**	**S:**	**E:** **W:**
Landscape photo(s):		**Spot photo (s):**	
Datum: ~~WGS84~~ or GDA94 **Zone:** 54	**0m mark AMGE:** 273896	**AMGN:** 7728602	
	50m mark AMGE: 273853	**AMGN:** 7728582	
Transect bearing: 230	**Recorders:** AJ Franks		
General description: Riparian area			

100 x 50 m area: * Ecologically Dominant Layer (EDL)

Eucalypt Large tree DBH **(from benchmark doc.):** 30	**Non-Eucalypt Large tree DBH** **(from benchmark doc.):** 20
Number of large eucalypt trees: no data	**Number of large non-eucalypt trees:**

Total Large trees: 20/ha

Tree canopy (EDL) height: 16.7m
Subcanopy and/or emergent height (where relevant)**:** **S:** 8.5m **E:** n/a

Proportion of dominant canopy (EDL) species with evidence of recruitment: 1 of 2

Total tree species richness includes all tree (i.e. single stemmed > 2 m height) species in the 100 x 50m, not just EDL species:
Eucalyptus camaldulensis, Lophostemon grandiflorus, Melaleuca argentea
(underlined species are those dominant in the EDL) (native tree richness = 3)

50 x 10 m area: (*list species if known or count if unknown)

Shrub species richness (defined as single stemmed below 2m or multi-stemmed from base or below 20cm) ***:**
Melaleuca viridiflora, Acacia holosericea
(native shrub richness = 2)

Grass species richness:
Sporobolus australasicus, Eragrostis sp.1, Chrysopogon fallax, Eulalia aurea, Heteropogon contortus, Eragrosti sp. 2, Eriachne obtusa, Aristida inaequiglumis
(native grass richness = 8)

Forbs and others (non grass ground) species richness:
**Xanthium occidentale, Fimbristylis sp.1, Phyllanthus virgatus,* Asteraceae sp.*, Cyperus sp.1, Chenopodium sp. Ipomoea muelleri, Cyperus sp.2, Jasminum sp., Evolvulus alsinoides* (native forb richness = 9)

Non-native plant cover: <1%

50 x 20 m area: Coarse woody debris (CWD; >10 cm, >0.5 m, measured to the plot boundary):

CWD Length:		CWD Length:		CWD Length:		CWD Length:		CWD Length:		CWD Length:	
1	1.5	8		15		22		29		36	
2	0.55	9		16		23		30		37	
3	1.4	10		17		24		31		38	
4	1.26	11		18		25		32		39	
5	1.03	12		19		26		33		40	
6	0.75	13		20		27		34		41	
7		14		21		28		35		Total:64.9m/ha	

Five 1x1 m plots (* attributes used in scoring. However, assessment of all attributes helps accurately estimate cover of each attribute)

Ground cover:	1	2	3	4	5	Mean
Native perennial ('decreaser') grass cover*	0	0	0	40	35	15
Native other grass cover (if relevant)*	-	-	-	-	-	-
Native forbs and other species (non-grass)	0	0	0	5	5	2
Native shrubs (< 1m height)	0	0	0	0	0	0
Non-native grass	0	0	0	0	0	0
Non-native forbs and shrubs	0	0	0	0	0	0
Litter*	2	0.5	4	20	10	7.3
Rock	0	0	0	0	0	0
Bare ground	98	99.5	96	30	45	73.7
Cryptogams	0	0	0	5	5	2
Total	**=100%**	**=100%**	**=100%**	**=100%**	**=100%**	100

100 m transect

Tree canopy cover: (Only assess Emergent (E) or Subcanopy (S) layers if the benchmark document stipulates that these layers should be present *trees in the same layer and continuous along the transect can be grouped)

Tree or group* (C or S or E)	Distance (m)	Total	Tree or group* (C or S or E)	Distance (m)	Total	Tree or group* (C or S or E)	Distance (m)	Total	Tree or group* (C or S or E)	Distance (m)	Total
C	0-0.8	0.8									
C	10.2-15.0	4.8									
S	11.3-15.5	4.2									
S	28.5-30.3	1.8									
C	55.4-75.2	19.8									
S	61.9-64.7	2.8									
										Total C: 25.4 Total S: 8.8 Total E: n/a	

Shrub canopy cover: *denote as native or exotic. Only native shrub cover used in scoring

Shrubs*	Distance (m)	Total	Shrubs	Distance (m)	Total	Shrubs	Distance (m)	Total	Shrubs	Distance (m)	Total	Shrubs	Distance (m)	Total
												Total native: 0		
												Total exotic: 0		

BioCondition Field Assessment Sheet (v 2.1)

Site: BC03	**RE/Landtype:** 4.3.16	**Bioregion:** MGD	**Property:** Barkly Downs
Date: 29 APR 2015	**Photos** (optional) **N:**	**S:**	**E:** **W:**
Landscape photo(s):		**Spot photo (s):**	
Datum: ~~WGS84~~ or GDA94 **Zone:** 54	**25m mark AMGE:** 213450	**AMGN:** 7744898	
	75m mark AMGE: 213486	**AMGN:** 7744928	
Transect bearing: SE	**Recorders:** AJ Franks		
General description: Mapped as VM Wetland area under MSES mapping. Heavily grazed			

100 x 50 m area: * Ecologically Dominant Layer (EDL)

Eucalypt Large tree DBH **(from benchmark doc.):** n/a **Number of large eucalypt trees:**	**Non-Eucalypt Large tree DBH** **(from benchmark doc.):** n/a **Number of large non-eucalypt trees:**

Total Large trees: n/a

Tree canopy (EDL) height: n/a
Subcanopy and/or emergent height (where relevant)**:** **S:** n/a **E:** n/a

Proportion of dominant canopy (EDL) species with evidence of recruitment: n/a

Total tree species richness includes all tree (i.e. single stemmed > 2 m height) species in the 100 x 50m, not just EDL species: n/a

50 x 10 m area: (*list species if known or count if unknown)

Shrub species richness (defined as single stemmed below 2m or multi-stemmed from base or below 20cm) ***:**
Chenopodium auricomum.
(native shrub richness = 1)

Grass species richness:
Grass sp.1, **Urochloa mosambicensis, Iseilema vaginiflorum, Astrebla pectinata*

(native grass richness = 3)

Forbs and others (non grass ground) species richness: Forb sp.1, *Boerhavia coccinea*, *Alternanthera nodiflorum, Sphaeranthus indicus*

(native forb richness = 4)

Non-native plant cover: <1%

50 x 20 m area: Coarse woody debris (CWD; >10 cm, >0.5 m, measured to the plot boundary):

CWD Length:		CWD Length:		CWD Length:		CWD Length:		CWD Length:		CWD Length:	
1		8		15		22		29		36	
2		9		16		23		30		37	
3		10		17		24		31		38	
4		11		18		25		32		39	
5		12		19		26		33		40	
6		13		20		27		34		41	
7		14		21		28		35		Total:n/a	

Five 1x1 m plots (* attributes used in scoring. However, assessment of all attributes helps accurately estimate cover of each attribute)

Ground cover:	1	2	3	4	5	Mean
Native perennial ('decreaser') grass cover*	0	1	0	3	0	0.8
Native other grass cover (if relevant)*	-	-	-	-	-	-
Native forbs and other species (non-grass)	0.5	1	0	1	0	0.5
Native shrubs (< 1m height)	0	0	6	0	0	1.2
Non-native grass	0	0	0	0	0	0
Non-native forbs and shrubs	0	0	0	0	0	0
Litter*	1	4	2	1	0.5	1.7
Rock	0	0	0	0	2	0.4
Bare ground	98.5	94	92	95	97.5	95.4
Cryptogams	0	0	0	0	0	0
Total	**=100%**	**=100%**	**=100%**	**=100%**	**=100%**	100

100 m transect

Tree canopy cover: (Only assess Emergent (E) or Subcanopy (S) layers if the benchmark document stipulates that these layers should be present *trees in the same layer and continuous along the transect can be grouped)

Tree or group* (C or S or E)	Distance (m)	Total	Tree or group* (C or S or E)	Distance (m)	Total	Tree or group* (C or S or E)	Distance (m)	Total	Tree or group* (C or S or E)	Distance (m)	Total
										Total C: n/a Total S: n/a Total E: n/a	

Shrub canopy cover: *denote as native or exotic. Only native shrub cover used in scoring

Shrubs*	Distance (m)	Total	Shrubs	Distance (m)	Total	Shrubs	Distance (m)	Total	Shrubs	Distance (m)	Total	Shrubs	Distance (m)	Total
												Total native: n/a		
												Total exotic: n/a		

Sheet D – regional ecosystem type assessment site

Location

Site No. Q01 **Recorder:** A.J.Franks **Day/Date:** 28 APR 2015

Purpose NT Link Regional Ecosystem Assessment

Locality: (inc. distance/direction to nearest town) Barkly Downs Stn between KP471 & 472

GPS: GDA94 54 0228957 7741012 Unit: Val:

Vegetation structure

Median height of the EDL is to be measured

Stratum	Median height	Height interval	Est. cover density (D,M,S,V)
E		-	
T1	4	4-5	V
T2	2.5	2-3	S-M
T3			
S1	1.5	1-2	V
S2	0.8	0.5-1.0	V
G	0.5	0.1-0.5	M

Structural formation: (including height)

Low open woodland

Ecologically dominant layer: T1

Plant species

Record relative (numerical) dominance for each stratum;
d – dominant; ***c*** – codominant; **s -** subdominant, ***a*** – associated.

Str.	Rel. dom.	Scientific Name
T1	D	*Eucalyptus pruinosa*
T1	A	*Corymbia terminalis*
T1	A	*Eucalyptus leucophloia*
T2	D	*Acacia aneura*
T2	A	*Grevillea striata*
T2	A	*Alectryon oleifolius*
T2	A	*Atalaya hemiglauca*
T2	A	*Acacia lysiphloia*
S1	D	*Eremophila* sp.aff. *mitchellii*
S2	D	*Carissa lanceolata*
G	C	*Eriachne* sp. *Aristida* spp. *Sporobolus australasica*
G	A	*Triodia*

Geology, landform, soils

Geology map/scale/year: ROMA SF5401/250K/1987

Geology code and rock types: Qpa, Ed close to Td, Tpf/Edc

Land system: WH

Landform: Red sandy plain

Soils: Red, fine sandy loam with some surface rock

Field observation and notes:

Land zone: 5

RE code changes

Existing RE code: 1.5.4x1a/1.7.1/1.5.7x2

Proposed RE code: 1.5.4x1a

END

SiteQ01 facing north

south

Site Q01 Soil surface

Sheet D – regional ecosystem type assessment site

Location

Site No. Q02 **Recorder:** A.J.Franks **Day/Date:** 28 APR 2015

Purpose NT Link Regional Ecosystem Assessment

Locality: (inc. distance/direction to nearest town) Barkly Downs Stn between KP518 & 519

GPS: GDA94 54 0273951 7728760 Unc.

Vegetation structure

Median height of the EDL is to be measured

Stratum	Median height	Height interval	Est. cover density (D,M,S,V)
E		-	
T1	9	7-10	V
T2	3.5	3-4	V
T3			
S1	2	1-3	V
S2	0.8	0.5-1.0	V
G	0.5	0.1-0.5	M

Structural formation: (including height) Low woodland

Ecologically dominant layer: T1

Plant species

Record relative (numerical) dominance for each stratum;
d – dominant; ***c*** – codominant; **s -** subdominant, ***a*** – associated.

Str.	Rel. dom.	Scientific Name
T1	D	*Corymbia aparrerinja*
T1	A	*Corymbia terminalis*
T1	A	*Eucalyptus leucophloia*
T2	D	*Atalaya hemiglauca*
T2	A	*Hakea lorea*
T2	A	**Vachellia farnesiana*
S1	D	*Acacia lysiphloia*
S1	A	*Eremophila* sp.aff. *mitchellii*
S1	A	*Acacia holosericea*
S2	D	*Sida fibulifera*
G	C	*Aristida* spp. **Cenchrus ciliaris Triodia*
G	A	*Eriachne*

Geology, landform, soils

Geology map/scale/year: ROMA SF5401/250K/1987

Geology code and rock types: Qha – Alluvium: sand, silt, clay, minor gravel

Land system: KL

Landform: Alluvial plain adjacent to waterway

Soils: Red, fine sandy loam

Field observation and notes: **Xanthium occidentale* present

Land zone: 3

RE code changes

Existing RE code: 1.3.6a

Proposed RE code: 1.3.6a

END

Site Q02 facing north

south

Site Q02 Soil surface

Sheet D – regional ecosystem type assessment site

Location

Site No. Q03 **Recorder:** A.J.Franks **Day/Date:** 28 APR 2015

Purpose NT Link Regional Ecosystem Assessment

Locality: (inc. distance/direction to nearest town) Barkly Downs Stn between KP518 & 519

GPS: GDA94 54 0273980 7729047 Unit: Val

Vegetation structure

Median height of the EDL is to be measured

Stratum	Median height	Height interval	Est. cover density (D,M,S,V)
E		-	
T1	3	2.5-4.0	V
T2	1.5	1-2	V
T3		-	
S1	0.8	0.6-0.8	V
S2		-	
G	0.5	0.1-0.5	M

Structural formation: (including height)

Low open woodland

Ecologically dominant layer: T1

Plant species

Record relative (numerical) dominance for each stratum;
d – dominant; ***c*** – codominant; **s -** subdominant, ***a*** – associated.

Str.	Rel. dom.	Scientific Name
T1	D	*Atalaya hemiglauca*
T1	A	*Grevillea striata*
T2	D	**Vachellia farnesiana*
S1	D	*Atalaya hemiglauca*
G	D	*Aristida* sp.
G	A	*Sporobolus australasica*
G	A	**Urochloa mosambicensis*

Geology, landform, soils

Geology map/scale/year: ROMA SF5401/250K/1987

Geology code and rock types: Mapped as Qha

Land system: KL

Landform: Very gently undulating plain

Soils: Sandy with some surface rock

Field observation and notes: Slightly higher in elevation than Q02

Land zone: 5

RE code changes

Existing RE code: 1.5.4a/1.3.4x1/1.5.4x1a

Proposed RE code: 1.5.4x3

END

Site Q03 facing north

south

Site Q03 Soil surface

Sheet D – regional ecosystem type assessment site

Location

Site No. Q04 **Recorder:** A.J.Franks **Day/Date:** 29 APR 2015

Purpose NT Link Regional Ecosystem Assessment

Locality: (inc. distance/direction to nearest town) Barkly Downs Stn nr KP519

GPS: GDA94 54 0273966 7728676 Unit: Unk

Vegetation structure

Median height of the EDL is to be measured

Stratum	Median height	Height interval	Est. cover density (D,M,S,V)
E		-	
T1	16.5	14-18	S
T2	8.5	7-10	V
T3		-	
S1	2	1.5-3	V
S2	0.8	0.5-1.2	V
G	0.5	0.1-0.5	V

Structural formation: (including height)

Open forest

Ecologically dominant layer: T1

Plant species

Record relative (numerical) dominance for each stratum;
d – dominant; ***c*** – codominant; **s -** subdominant, ***a*** – associated.

Str.	Rel. dom.	Scientific Name
T1	D	*Eucalyptus camaldulensis*
T2	D	*Lophostemon grandiflora*
S1	D	*Melaleuca viridiflora*
S1	S	*Melaleuca argentea*
S1	A	*Acacia holosericea*
S2	D	*Indigofera* sp.
S2	A	*Sida fibulifera*
S2	A	**Xanthium occidentale*
G	D	*Sporobolus actinocladus*

Geology, landform, soils

Geology map/scale/year: ROMA SF5401/250K/1987

Geology code and rock types: Qha: alluvium: sand, silt, clay and minor gravel

Land system: KL

Landform: Ephemeral waterway

Soils: Alluvium with some exposed rock

Field observation and notes:

Land zone: 3

RE code changes

Existing RE code: 1.3.7a/1.3.4x1

Proposed RE code: 1.3.7a

END

Site Q04 facing north

south

Site Q04 Soil surface

Sheet D – regional ecosystem type assessment site

Location

Site No. Q05 **Recorder:** A.J.Franks **Day/Date:** 29 APR 2015

Purpose NT Link Regional Ecosystem Assessment

Locality: (inc. distance/direction to nearest town) Barkly Downs Stn nr KP519

GPS: GDA94 54 0274013 7728506 Unit: Val:

Vegetation structure

Median height of the EDL is to be measured

Stratum	Median height	Height interval	Est. cover density (D,M,S,V)
E		-	
T1		-	X
T2		-	X
T3		-	
S1		-	
S2		-	
G	0.5	0.1-0.5	V

Structural formation: (including height)

Ecologically dominant layer: T1

Plant species

Record relative (numerical) dominance for each stratum;
d – dominant; ***c*** – codominant; **s -** subdominant, ***a*** – associated.

Str.	Rel. dom.	Scientific Name
T1	D	*Corymbia terminalis*
T2	D	*Hakea lorea*
G	C	Native grasses
G	A	*Sida platycalyx*

Geology, landform, soils

Geology map/scale/year: ROMA SF5401/250K/1987

Geology code and rock types: Qha: alluvium: sand, silt, clay, minor gravel

Land system: KL

Landform: Red sandy plain

Soils: Red sandy loam

Field observation and notes:

Land zone: 3

RE code changes

Existing RE code: 1.3.4x1/1.3.6x1/4.3.4/4.3.8

Proposed RE code: 1.3.4x1

END

Site Q05 facing north

south

Site Q05 Soil surface

Sheet D – regional ecosystem type assessment site

Location

Site No. Q06 **Recorder:** A.J.Franks **Day/Date:** 29 APR 2015

Purpose NT Link Regional Ecosystem Assessment

Locality: (inc. distance/direction to nearest town) Barkly Downs Stn between KP471 & 472

GPS: GDA94 54 0228921 7741306 Unit: Unk

Vegetation structure

Median height of the EDL is to be measured

Stratum	Median height	Height interval	Est. cover density (D,M,S,V)
E		-	
T1		-	
T2		-	
T3		-	
S1		-	
S2		-	
G	0.7	0.6-0.8	M

Structural formation: (including height)

Grassland

Ecologically dominant layer: G

Plant species

Record relative (numerical) dominance for each stratum;
d – dominant; ***c*** – codominant; **s -** subdominant, ***a*** – associated.

Str.	Rel. dom.	Scientific Name
G	D	*Astrebla pectinata*
G	S	*Iseilema vaginiflorum*
G	A	*Sporobolus australasica*
G	A	**Urochloa mosambicensis*

Geology, landform, soils

Geology map/scale/year: ROMA SF5401/250K/1987

Geology code and rock types: Qpa, Ed

Land system: KL

Landform: Plain

Soils: Cracking clay with some surface rock

Field observation and notes:

Land zone: 4

RE code changes

Existing RE code: 4.4.1d

Proposed RE code: 4.4.1d

END

Site Q06 facing north

south

Site Q06 Soil surface

Sheet D – regional ecosystem type assessment site

Location

Site No. Q07 **Recorder:** A.J.Franks **Day/Date:** 29 APR 2015

Purpose NT Link Regional Ecosystem Assessment

Locality: (inc. distance/direction to nearest town) Barkly Downs Stn between KP464 & 465

GPS: GDA94 | 5 | 4 | | 0 | 2 | 2 | 1 | 9 | 0 | 6 | | 7 | 7 | 4 | 3 | 0 | 7 | 4 | Unit:

Vegetation structure

Median height of the EDL is to be measured

Stratum	Median height	Height interval	Est. cover density (D,M,S,V)
E		-	
T1		-	
T2		-	
T3		-	
S1	1.5	2-3	V
S2		-	
G	0.7	0.6-0.8	M

Structural formation: (including height)

Grassland

Ecologically dominant layer: G

Plant species

Record relative (numerical) dominance for each stratum;
d – dominant; ***c*** – codominant; **s -** subdominant, ***a*** – associated.

Str.	Rel. dom.	Scientific Name
S1	D	**Vachellia farnesiana*
S1	S	*Carissa lanceolata*
S1	A	*Ventilago viminalis*
G	D	*Astrebla elymoides*
G	S	*Chrysopogon fallax*
G	S	*Iseilema vaginiflorum*
G	A	**Urochloa mosambicensis*

Geology, landform, soils

Geology map/scale/year: ROMA SF5401/250K/1987

Geology code and rock types:

Land system: KL

Landform: Plain

Soils: Grey clay with surface rock.

Field observation and notes: Slightly higher than surrounding plains

Land zone: 9

RE code changes

Existing RE code: 4.9.4x1a

Proposed RE code: 4.9.4x1a

END

Site Q07 facing north

south

Sheet D – regional ecosystem type assessment site

Location

Site No. Q08 **Recorder:** A.J.Franks **Day/Date:** 29 APR 2015

Purpose NT Link Regional Ecosystem Assessment

Locality: (inc. distance/direction to nearest town) Barkly Downs Stn between KP464 & 465

GPS: GDA94 54 0221784 7742875 UTM

Vegetation structure

Median height of the EDL is to be measured

Stratum	Median height	Height interval	Est. cover density (D,M,S,V)
E		-	
T1		-	
T2		-	
T3		-	
S1		-	
S2		-	
G	0.7	0.6-0.8	M

Structural formation: (including height)

Grassland

Ecologically dominant layer: G

Plant species

Record relative (numerical) dominance for each stratum;
d – dominant; ***c*** – codominant; **s -** subdominant, ***a*** – associated.

Str.	Rel. dom.	Scientific Name
G	D	*Astrebla pectinata*
G	S	*Iseilema vaginiflorum*

Geology, landform, soils

Geology map/scale/year: ROMA SF5401/250K/1987

Geology code and rock types: Qpa^c: Pleistocene alluvium: minor sheet wash dominated by clay

Land system: KL

Landform: Plain

Soils: Light brown cracking clay

Field observation and notes:

Land zone: 4

RE code changes

Existing RE code: 4.4.1c

Proposed RE code: 4.4.1c

END

Site Q08 facing north

south

Site Q08 Soil surface

Sheet D – regional ecosystem type assessment site

Location

Site No. Q09 **Recorder:** A.J.Franks **Day/Date:** 29 APR 2015

Purpose NT Link Regional Ecosystem Assessment

Locality: (inc. distance/direction to nearest town) Barkly Downs Stn between KP460 & 461

GPS: GDA94 54 0218217 7744112 Unit:

Vegetation structure

Median height of the EDL is to be measured

Stratum	Median height	Height interval	Est. cover density (D,M,S,V)
E		-	
T1		-	X
T2		-	
T3		-	
S1		-	
S2		-	
G	0.6	0.4-0.8	V-M

Structural formation: (including height)

Grassland

Ecologically dominant layer: G

Plant species

Record relative (numerical) dominance for each stratum;
d – dominant; ***c*** – codominant; **s -** subdominant, ***a*** – associated.

Str.	Rel. dom.	Scientific Name
T1	D	*Eucalyptus coolabah*
G	D	*Astrebla elymoides*
G	S	*Eulalia aurea*
G	S	*Iseilema vaginiflorum*

Geology, landform, soils

Geology map/scale/year: ROMA SF5401/250K/1987

Geology code and rock types: Qha^c

Land system: KL

Landform: Drainage line

Soils: Cracking light alluvial loam

Field observation and notes: Grassland with very occasional coolibah tree. Channel large devoid of veg

Q09A E: 218213 N: 7744135: Between channels mostly *Iseilema vaginiflorum* to 0.7m (4.3.17) **Land zone:** 3

RE code changes

Existing RE code: 4.3.17/4.3.16a/4.3.3

Proposed RE code: 4.3.16a

END

Site Q09 facing north

south

Sheet D – regional ecosystem type assessment site

Location

Site No. Q10 **Recorder:** A.J.Franks **Day/Date:** 30 APR 2015

Purpose NT Link Regional Ecosystem Assessment

Locality: (inc. distance/direction to nearest town) Barkly Downs Stn between KP483 & 484

GPS: GDA94 54 0240539 7738422 Unit: Val

Vegetation structure

Median height of the EDL is to be measured

Stratum	Median height	Height interval	Est. cover density (D,M,S,V)
E		-	
T1	2	1.5-2.5	X
T2		-	
T3		-	
S1	1	0.8-1.2	S
S2		-	
G	0.1	0.0-0.2	V

Structural formation: (including height)

Shrubland

Ecologically dominant layer: S1

Plant species

Record relative (numerical) dominance for each stratum;
d – dominant; ***c*** – codominant; **s -** subdominant, ***a*** – associated.

Str.	Rel. dom.	Scientific Name
T1	D	**Parkinsonia aculeata*
S1	D	*Duma florulenta*
G	C	*Portulaca oleracea*
G	C	*Alternanthera nodiflora*
G	C	*Sida sp.*
G	C	*Boerhavia coccinea*
G	A	occ native grass

Geology, landform, soils

Geology map/scale/year: ROMA SF5401/250K/1987

Geology code and rock types: Ql: lacustrine deposits

Land system: KL

Landform: Plain, shallow depression

Soils: Cracking clay

Field observation and notes: Q10A (E: 240366 N: 7738735) Edge. Lignum becomes more dense

Q10B (E: 240299 N: 7738786): *Astrebla* grassland with **Urochloa* **Land zone:** 3

RE code changes

Existing RE code: 4.3.12a/4.3.16a

Proposed RE code: 4.3.12a

END

Site Q10 facing north

south

Site Q10 Soil surface

Sheet D – regional ecosystem type assessment site

Location

Site No. Q11 **Recorder:** A.J.Franks **Day/Date:** 29 APR 2015

Purpose NT Link Regional Ecosystem Assessment

Locality: (inc. distance/direction to nearest town) Barkly Downs Stn between KP440 & 441

GPS: GDA94 54 0198330 7747810 Unit: Unk

Vegetation structure

Median height of the EDL is to be measured

Stratum	Median height	Height interval	Est. cover density (D,M,S,V)
E		-	
T1	6	5-7	X
T2		-	
T3		-	
S1		-	
S2		-	
G	0.6	0.5-0.8	M

Structural formation: (including height)

Grassland

Ecologically dominant layer: G

Plant species

Record relative (numerical) dominance for each stratum;
d – dominant; ***c*** – codominant; **s -** subdominant, ***a*** – associated.

Str.	Rel. dom.	Scientific Name
T1	D	*Eucalyptus coolabah*
G	D	*Astrebla lappacea*
G	S	*Iseilema vaginiflorum*
G	A	**Urochloa mosambicensis*
G	C	*Sida* sp.

Geology, landform, soils

Geology map/scale/year: ROMA SF5401/250K/1987

Geology code and rock types: Qha^c – alluvial clay

Land system: KL

Landform: Plain

Soils: Light grey cracking clay

Field observation and notes: Grassland with very occasional coolibah tree

Land zone: 3

RE code changes

Existing RE code: 4.3.17/4.3.16a

Proposed RE code: 4.3.16a

END

Site Q11 facing north

south

Site Q11 Soil surface

Sheet D – regional ecosystem type assessment site

Location

Site No. Q12 **Recorder:** A.J.Franks **Day/Date:** 29 APR 2015

Purpose NT Link Regional Ecosystem Assessment

Locality: (inc. distance/direction to nearest town) Barkly Downs Stn between KP440 & 441

GPS: GDA94 54 0198597 7747951 Unit: Val:

Vegetation structure

Median height of the EDL is to be measured

Stratum	Median height	Height interval	Est. cover density (D,M,S,V)
E		-	
T1	9	8-10	S
T2	5	4-6	S
T3		-	
S1		-	
S2		-	
G			

Structural formation: (including height)

Woodland

Ecologically dominant layer: T1

Plant species

Record relative (numerical) dominance for each stratum;
d – dominant; ***c*** – codominant; **s -** subdominant, ***a*** – associated.

Str.	Rel. dom.	Scientific Name
T1	D	*Eucalyptus coolabah*
T2	D	*Eucalyptus coolabah*

Geology, landform, soils

Geology map/scale/year: ROMA SF5401/250K/1987

Geology code and rock types: Qha^c – alluvial clay

Land system: G

Landform: Ephemeral drainage line

Soils: Sand with some surface clay

Field observation and notes: Q12A (E: 198619 N:7747951): *E. coolabah* over native grasses. *Parkinsonia*

Q12B (E: 198726 N: 7747871): another channel with *E. coolabah* **Land zone:** 3

RE code changes

Existing RE code: 4.3.5b/4.3.17/4.3.16a

Proposed RE code: 4.3.5b

END

Site Q12 facing north

south

Site Q12 Soil surface

Sheet D – regional ecosystem type assessment site

Location

Site No. Q13 **Recorder:** A.J.Franks **Day/Date:** 30 APR 2015

Purpose NT Link Regional Ecosystem Assessment

Locality: (inc. distance/direction to nearest town) Barkly Downs Stn near KP506

GPS: GDA94 54 0262323 7732882 Unit: Val:

Vegetation structure

Median height of the EDL is to be measured

Stratum	Median height	Height interval	Est. cover density (D,M,S,V)
E		-	
T1	4	3-5	X
T2	1	1-1.5	X
T3		-	
S1	0.8	0.6-0.8	S
S2		-	S
G	0.5	0.2-0.6	M

Structural formation: (including height)

Low open woodland

Ecologically dominant layer: T1

Plant species

Record relative (numerical) dominance for each stratum;
d – dominant; ***c*** – codominant; **s -** subdominant, ***a*** – associated.

Str.	Rel. dom.	Scientific Name
T1	D	*Eucalyptus leucophloia*
T1	A	*Eucalyptus* sp.
T2	C	T1 species
S1	D	*Acacia* sp.
S1	S	*Acacia galioides*
S2	C	*Sida*
S2	C	*Polycarpaea breviflora*
G	D	*Triodia bitextura*

Geology, landform, soils

Geology map/scale/year: ROMA SF5401/250K/1987

Geology code and rock types: Pr: feldspathic sandstone, siltstone

Land system: BN

Landform: Mid-slope of low rocky hill

Soils: Red sand with large amount of surface rock

Field observation and notes:

Land zone: 11

RE code changes

Existing RE code: 1.11.2x1/1.7.1/1.11.2x5

Proposed RE code: 1.11.2

END

Site Q13 facing north

south

Site Q13 Soil surface

Sheet D – regional ecosystem type assessment site

Location

Site No. Q14 **Recorder:** A.J.Franks **Day/Date:** 30 APR 2015

Purpose NT Link Regional Ecosystem Assessment

Locality: (inc. distance/direction to nearest town) Barkly Downs Stn near KP506

GPS: GDA94 54 0262423 7732963 Unit: Val:

Vegetation structure

Median height of the EDL is to be measured

Stratum	Median height	Height interval	Est. cover density (D,M,S,V)
E		-	
T1	2.5	2-3	V
T2		-	
T3		-	
S1	0.8	0.6-0.8	S
S2		-	
G	0.2	0.2-0.4	S-M

Structural formation: (including height)

Low open woodland

Ecologically dominant layer: T1

Plant species

Record relative (numerical) dominance for each stratum;
d – dominant; ***c*** – codominant; **s -** subdominant, ***a*** – associated.

Str.	Rel. dom.	Scientific Name
T1	D	*Eucalyptus leucophloia*
T1	A	*Eucalyptus* sp.
S1	C	Eucalypt regen
S2	D	*Grevillea wickhamii*
G	D	*Triodia bitextura*

Geology, landform, soils

Geology map/scale/year: ROMA SF5401/250K/1987

Geology code and rock types: Pr

Land system: BN

Landform: Mid-slope of low rocky hill

Soils: Red sand with large amount of surface rock

Field observation and notes: Evidence of past fire

Q15 (E: 262632 N: 7733008): rocky weathered rock. Species as above. (RE 1.7.1) **Land zone:** 11

RE code changes

Existing RE code: 1.11.2x1/1.7.1/1.11.2x5

Proposed RE code: 1.11.2

END

Site Q14 facing north

south

Site Q14 Soil surface

Site Q15 facing north

soil surface

Sheet D – regional ecosystem type assessment site

Location

Site No. Q16 **Recorder:** A.J.Franks **Day/Date:** 30 APR 2015

Purpose NT Link Regional Ecosystem Assessment

Locality: (inc. distance/direction to nearest town) May Downs Stn between KP 572-573

GPS: GDA94 54 0323291 7710418 Unit: Val

Vegetation structure

Median height of the EDL is to be measured

Stratum	Median height	Height interval	Est. cover density (D,M,S,V)
E		-	
T1	5	4-6	V
T2	2	2-3	S
T3		-	
S1	1.5	1-2	S
S2		-	
G	0.4	0.2-0.4	M-D

Structural formation: (including height)

Low open woodland

Ecologically dominant layer: T1

Plant species

Record relative (numerical) dominance for each stratum;
d – dominant; ***c*** – codominant; **s -** subdominant, ***a*** – associated.

Str.	Rel. dom.	Scientific Name
T1	D	*Eucalyptus leucophylla*
T2	D	*Atalaya hemiglauca*
T2	A	**Vachellia farnesiana*
S1	D	*Eremophila* sp.
S1	A	*Atalaya hemiglauca*
S2	D	*Sida platycalyx*
S2	A	*Neptunia dimorphantha*
G	D	*Triodia longiceps*

Geology, landform, soils

Geology map/scale/year: ROMA SF5401/250K/1987

Geology code and rock types: Mapped as Qa. More likely is Eme

Land system: WV

Landform: Gently undulating

Soils: Red sandy soil with fossiliferous surface rock

Field observation and notes: Q16A (E: 323229 N: 7710308) *Eucalyptus leucophloia* over *Acacia* over *Triodia* on rocky gentle slope with coarse grained red sand

Land zone: 9

RE code changes

Existing RE code: 1.5.4/1.5.3

Proposed RE code: 11.9.5

END

Site Q16 facing north

south

Site Q16 Soil surface

Site Q16A facing north

south

Sheet D – regional ecosystem type assessment site

Location

Site No. Q17 **Recorder:** A.J.Franks **Day/Date:** 30 APR 2015

Purpose NT Link Regional Ecosystem Assessment

Locality: (inc. distance/direction to nearest town) May Downs Stn between KP 572-573

GPS: GDA94 54 0323152 7710215 UTM

Vegetation structure

Median height of the EDL is to be measured

Stratum	Median height	Height interval	Est. cover density (D,M,S,V)
E		-	
T1	5	4-6	V
T2	2	2-3	V
T3		-	
S1	1.5	1-2	V
S2		-	
G	0.5	0.2-0.6	M-D

Structural formation: (including height)

Low open woodland

Ecologically dominant layer: T1

Plant species

Record relative (numerical) dominance for each stratum;
d – dominant; ***c*** – codominant; **s -** subdominant, ***a*** – associated.

Str.	Rel. dom.	Scientific Name
T1	D	*Eucalyptus leucophloia*
T2	D	*Eucalyptus leucophloia*
T2	A	**Vachellia farnesiana*
S1	C	**Stylosanthes*
S1	C	*Acacia retivenea*
S1	A	*Senna notabilis*
S1	A	*Keraudrenia nephrosperma*
S1	A	*Corchorus sidoides*
G	D	*Triodia longiceps*
G	A	*Cymbopogon refractus*

Geology, landform, soils

Geology map/scale/year: ROMA SF5401/250K/1987

Geology code and rock types: PLgst – granite

Land system: WV

Landform: Top of jump-up

Soils: Rocky/skeletal

Field observation and notes: Q18 (E: 323242 N: 7710430) Small grove of *Acacia cambagei* (RE 1.5.4)

Land zone: 12

RE code changes

Existing RE code: 1.12.1

Proposed RE code: 1.12.1

END

Site Q17 facing north

south

Site Q17 Soil surface

Site Q18 facing north

south

Sheet D – regional ecosystem type assessment site

Location

Site No. Q19 **Recorder:** A.J.Franks **Day/Date:** 30 APR 2015

Purpose NT Link Regional Ecosystem Assessment

Locality: (inc. distance/direction to nearest town) May Downs Stn between KP 581-582

GPS: GDA94 | 5 | 4 | | 0 | 3 | 2 | 9 | 7 | 3 | 3 | | 7 | 7 | 0 | 4 | 4 | 3 | 5 | Unit:

Vegetation structure

Median height of the EDL is to be measured

Stratum	Median height	Height interval	Est. cover density (D,M,S,V)
E		-	
T1	7	6-8	V-S
T2		-	
T3		-	
S1	1.5	1-2	V
S2		-	
G	0.4	0.2-0.6	M-D

Structural formation: (including height)

Low open woodland

Ecologically dominant layer: T1

Plant species

Record relative (numerical) dominance for each stratum;
d – dominant; ***c*** – codominant; **s -** subdominant, ***a*** – associated.

Str.	Rel. dom.	Scientific Name
T1	D	*Eucalyptus leucophloia*
T1	A	*Eucalyptus leucophylla*
S1	D	*Dodonaea barklyana*
S1	A	**Calotropis procera*
S2	D	*Trichodesma zeylanicum*
G	D	*Triodia longiceps*

Geology, landform, soils

Geology map/scale/year: ROMA SF5401/250K/1987

Geology code and rock types: Pgs1 – biotite granite

Land system: WV

Landform: Undulating with granite tors

Soils: Coarse sand with surface rock

Field observation and notes: Q19A (E: 329781 N: 7704552) Drainage line with sandy soil. Sparse *Euc. camaldulensis* and occ. **Vachellia farnesiana* (RE 1.3.6x1c)

Land zone: 12

RE code changes

Existing RE code: 1.12.1x1/1.5.4

Proposed RE code: 1.12.1

END

Site Q19 facing north

south

Site Q19 Soil surface

Site Q19A facing north

south

Sheet D – regional ecosystem type assessment site

Location

Site No. Q20 **Recorder:** A.J.Franks **Day/Date:** 01 May 2015

Purpose NT Link Regional Ecosystem Assessment

Locality: (inc. distance/direction to nearest town) Barkly Downs Stn between KP 495-496

GPS: GDA94 54 0252377 7736256 Unit: Val:

Vegetation structure

Median height of the EDL is to be measured

Stratum	Median height	Height interval	Est. cover density (D,M,S,V)
E		-	
T1	2	1.5-2.5	V
T2		-	
T3		-	
S1	1.5	1-2	S
S2		-	V
G	0.4	0.2-0.6	M

Structural formation: (including height)

Low open woodland

Ecologically dominant layer: T1

Plant species

Record relative (numerical) dominance for each stratum;
d – dominant; ***c*** – codominant; **s -** subdominant, ***a*** – associated.

Str.	Rel. dom.	Scientific Name
T1	D	*Atalaya hemiglauca*
S1	C	*Gossypium sturtianum*
S1	C	*Acacia lysiphloia*
S2	D	*Capparis lasiantha*
G	D	*Aristida* sp.
G	A	*Cymbopogon bombycinus*

Geology, landform, soils

Geology map/scale/year: ROMA SF5401/250K/1987

Geology code and rock types: Qpa/s – sand/silt

Land system: BN

Landform: Plain

Soils: Red sandy clay with some surface pebbles

Field observation and notes:

Land zone: 5

RE code changes

Existing RE code: 1.5.4x1/1.5.7

Proposed RE code: 1.5.6

END

Site Q20 facing north

Site Q20 Soil surface

Sheet D – regional ecosystem type assessment site

Location

Site No. Q21 **Recorder:** A.J.Franks **Day/Date:** 01 May 2015

Purpose NT Link Regional Ecosystem Assessment

Locality: (inc. distance/direction to nearest town) Barkly Downs Stn between KP 495-496

GPS: GDA94 54 0252441 7736122 Unit: Val:

Vegetation structure

Median height of the EDL is to be measured

Stratum	Median height	Height interval	Est. cover density (D,M,S,V)
E		-	
T1	7	6-8	V
T2	2.5	2-3	X
T3		-	
S1	1.5	1-2	X
S2	0.5	-	X
G	0.4	0.2-0.6	S-M

Structural formation: (including height)

Low open woodland

Ecologically dominant layer: T1

Plant species

Record relative (numerical) dominance for each stratum;
d – dominant; ***c*** – codominant; **s -** subdominant, ***a*** – associated.

Str.	Rel. dom.	Scientific Name
T1	D	*Eucalyptus leucophloia*
T1	A	*Eucalyptus pruinosa*
T2	D	*Eucalyptus leucophylla*
S1	D	*Gossypium sturtianum*
S1	A	*Crotalaria* sp.
S2	D	*Solanum* sp.
S2	A	*Sida fibulifera*
G	D	*Aristida inaequiglumis*
G	A	*Cymbopogon bombycinus*

Geology, landform, soils

Geology map/scale/year: ROMA SF5401/250K/1987

Geology code and rock types: Td, Tpf – duricrusted palaeosoils, deeply weathered

Land system: BN

Landform: Plain

Soils: Red sandy clay

Field observation and notes:

Land zone: 5

RE code changes

Existing RE code: 1.7.1/1.5.4x1a

Proposed RE code: 1.5.4x1a

END

Site Q21 facing north

south

Site Q21 Soil surface

Sheet D – regional ecosystem type assessment site

Location

Site No. Q22 **Recorder:** A.J.Franks **Day/Date:** 01 May 2015

Purpose NT Link Regional Ecosystem Assessment

Locality: (inc. distance/direction to nearest town) Barkly Downs Stn between KP 526-527

GPS: GDA94 54 0280688 7725755 Unit: Val:

Vegetation structure

Median height of the EDL is to be measured

Stratum	Median height	Height interval	Est. cover density (D,M,S,V)
E		-	
T1	3.5	3-4	X
T2	2	2-3	X
T3		-	
S1	1	1-1.5	X
S2	0.5	0.4-0.9	X
G	0.4	0.1-0.4	S-M

Structural formation: (including height)

Low open woodland

Ecologically dominant layer: T1

Plant species

Record relative (numerical) dominance for each stratum;
d – dominant; ***c*** – codominant; **s -** subdominant, ***a*** – associated.

Str.	Rel. dom.	Scientific Name
T1	D	*Eucalyptus leucophloia*
T2	D	*Hakea lorea*
T2	D	*Eucalyptus leucophylla*
S1	D	*Acacia chisholmii*
S2	D	*Acacia galioides*
S2	A	*Solanum* sp.
S2	A	*Acacia lysiphloia*
G	D	*Triodia longiceps*

Geology, landform, soils

Geology map/scale/year: ROMA SF5401/250K/1987

Geology code and rock types: TQd/q - silcrete

Land system: BN

Landform: Low stony rise

Soils: Skeletal, mostly rock

Field observation and notes:

Land zone: 7

RE code changes

Existing RE code: 1.7.1c/1.7.1

Proposed RE code: 1.7.1

END

Site Q22 facing north

south

Site Q22 Soil surface

Sheet D – regional ecosystem type assessment site

Location

Site No. Q23 **Recorder:** A.J.Franks **Day/Date:** 01 May 2015

Purpose NT Link Regional Ecosystem Assessment

Locality: (inc. distance/direction to nearest town) May Downs Stn between KP 572-573

GPS: GDA94 54 0323455 7710319 Unit: Val

Vegetation structure

Median height of the EDL is to be measured

Stratum	Median height	Height interval	Est. cover density (D,M,S,V)
E		-	
T1	9	8-10	S
T2	3	2-4	X
T3		-	
S1	1	1-1.5	X
S2			
G	0.4	0.1-0.4	M

Structural formation: (including height)

Low woodland

Ecologically dominant layer: T1

Plant species

Record relative (numerical) dominance for each stratum;
d – dominant; ***c*** – codominant; **s -** subdominant, ***a*** – associated.

Str.	Rel. dom.	Scientific Name
T1	D	*Eucalyptus camaldulensis*
T2	D	*Eucalyptus camaldulensis*
G	D	**Cenchrus ciliaris*

Geology, landform, soils

Geology map/scale/year: ROMA SF5401/250K/1987

Geology code and rock types: Qa

Land system: WV

Landform: Riparian channel

Soils: Sandy/gravelly alluvium

Field observation and notes: Q23A (E: 323462 N: 7710376) alluvial flat area mostly **Cenchrus ciliaris*

Q23B (E: 323495 N: 7710384) rocky slope with box trees, snappy gum over spinifex **Land zone:** 3

RE code changes

Existing RE code: 1.3.7b/1.3.6a

Proposed RE code: 1.3.7b

END

Site Q23 facing north

south

Sheet D – regional ecosystem type assessment site

Location

Site No. Q24 **Recorder:** A.J.Franks **Day/Date:** 01 May 2015

Purpose NT Link Regional Ecosystem Assessment

Locality: (inc. distance/direction to nearest town) Barkly Downs Stn south of KP535

GPS: GDA94 54 0307434 7715678 Unit: Val

Vegetation structure

Median height of the EDL is to be measured

Stratum	Median height	Height interval	Est. cover density (D,M,S,V)
E		-	
T1	3.5	3-4	V
T2		-	
T3		-	
S1	1	0.5-1.5	V
S2		-	
G	0.4	0.1-0.4	M-D

Structural formation: (including height)

Low open woodland

Ecologically dominant layer: T1

Plant species

Record relative (numerical) dominance for each stratum;
d – dominant; ***c*** – codominant; **s -** subdominant, ***a*** – associated.

Str.	Rel. dom.	Scientific Name
T1	D	*Eucalyptus leucophloia*
S1	C	*Owenia acidula*
S1	C	*Acacia galioides*
S1	A	*Acacia lysiphloia*
S1	A	*Grevillea dryandri*
S1	A	*Mirbelia viminalis*
G	D	*Triodia pungens*

Geology, landform, soils

Geology map/scale/year: ROMA SF5401/250K/1987

Geology code and rock types: PLss: quartzite and silcrete

Land system: M

Landform: Rolling low hills

Soils: Pale red sandy loam with large surface rocks

Field observation and notes:

Land zone: 11

RE code changes

Existing RE code: 1.11.2a/1.3.6x1

Proposed RE code: 1.11.2a

END

Site Q24 facing north

Site Q24 Soil surface

Sheet D – regional ecosystem type assessment site

Location

Site No. Q25 **Recorder:** A.J.Franks **Day/Date:** 01 May 2015

Purpose NT Link Regional Ecosystem Assessment

Locality: (inc. distance/direction to nearest town) May Downs Stn north of KP564

GPS: GDA94 54 0316129 7714411 Unit: Unk

Vegetation structure

Median height of the EDL is to be measured

Stratum	Median height	Height interval	Est. cover density (D,M,S,V)
E		-	
T1	3.5	3-4	V
T2	2	2-3	X
T3		-	
S1			
S2			
G	0.5	0.1-0.8	M-D

Structural formation: (including height)

Low open woodland

Ecologically dominant layer: T1

Plant species

Record relative (numerical) dominance for each stratum;
d – dominant; ***c*** – codominant; **s -** subdominant, ***a*** – associated.

Str.	Rel. dom.	Scientific Name
T1	D	*Eucalyptus leucophloia*
T1	A	*Eucalyptus pruinosa* (along drainage line)
T2	D	*Acacia lysiphloia*
G	D	*Triodia pungens*

Geology, landform, soils

Geology map/scale/year: ROMA SF5401/250K/1987

Geology code and rock types: Pgs1: biotite granite

Land system: WV

Landform: Gently sloping

Soils: Rocky/skeletal

Field observation and notes: Q25A: (E: 316078 N: 7714479) *Eucalyptus pruinosa* fringing waterway

Land zone: 12

RE code changes

Existing RE code: 1.12.2/1.12.1x1/1.12.1x4

Proposed RE code: 1.12.1

END

Site Q25 facing north

south

Site Q25A facing north

near Q25A

Sheet D – regional ecosystem type assessment site

Location

Site No. Q26 **Recorder:** A.J.Franks **Day/Date:** 01 May 2015

Purpose NT Link Regional Ecosystem Assessment

Locality: (inc. distance/direction to nearest town) Royton Timber Reserve between KP589-590

GPS: GDA94 54 0335509 7698802 Unit:

Vegetation structure

Median height of the EDL is to be measured

Stratum	Median height	Height interval	Est. cover density (D,M,S,V)
E		-	
T1	3.5	3-4	V
T2		-	
T3		-	
S1	1	1-1.5	X
S2			
G	0.4	0.1-0.4	S-M

Structural formation: (including height)

Low open woodland

Ecologically dominant layer: T1

Plant species

Record relative (numerical) dominance for each stratum;
d – dominant; ***c*** – codominant; **s -** subdominant, ***a*** – associated.

Str.	Rel. dom.	Scientific Name
T1	D	*Eucalyptus leucophloia*
T1	S	*Eucalyptus melanophloia*
T1	A	*Eucalyptus pruinosa*
S1	D	*Acacia dictyophleba*
S1	A	*Keraudrenia nephrosperma*
S1	A	*Crotalaria* sp.
G	D	*Triodia pungens*
G	A	*Cymbopogon bombycinus*

Geology, landform, soils

Geology map/scale/year: ROMA SF5401/250K/1987

Geology code and rock types: Pgs1: biotite granite

Land system: M

Landform: Low rolling hills

Soils: Sandy, gravelly with surface rock

Field observation and notes:

Land zone: 12

RE code changes

Existing RE code: 1.12.1x1/1.12.1/1.12.2

Proposed RE code: 1.12.1

END

Site Q26 facing north

north

Sheet D – regional ecosystem type assessment site

Location

Site No. Q27 **Recorder:** A.J.Franks **Day/Date:** 02 May 2015

Purpose NT Link Regional Ecosystem Assessment

Locality: (inc. distance/direction to nearest town) Glencoe Stn between KP 599-600

GPS: GDA94 54 0341631 7701075 Unit: Val

Vegetation structure

Median height of the EDL is to be measured

Stratum	Median height	Height interval	Est. cover density (D,M,S,V)
E		-	
T1	6	5-7	V
T2	2.5	2-3	S
T3		-	
S1	1.5	1-2	S
S2		-	
G	0.4	0.1-0.4	S

Structural formation: (including height) Low open woodland

Ecologically dominant layer: T1

Plant species

Record relative (numerical) dominance for each stratum;
d – dominant; ***c*** – codominant; **s -** subdominant, ***a*** – associated.

Str.	Rel. dom.	Scientific Name
T1	D	*Eucalyptus leucophylla*
T1	S	*Corymbia aparrerinja*
T1	A	*Corymbia terminalis*
T2	D	*Acacia chisholmii*
S1	D	*Acacia lysiphloia*
S1	A	*Senna planiticola*
G	D	*Triodia longiceps*
G	A	*Pterocaulon serrulatum*

Geology, landform, soils

Geology map/scale/year: ROMA SF5401/250K/1987

Geology code and rock types: PLha – metabasalt, tuff

Land system: M

Landform: Gently undulating

Soils: Red, sandy loam with surface rock

Field observation and notes:

Land zone: 11

RE code changes

Existing RE code: 1.11.3/1.11.2a

Proposed RE code: 1.11.2a

END

Site Q27 facing north

south

Site Q27 Soil surface

Sheet D – regional ecosystem type assessment site

Location

Site No. Q28 **Recorder:** A.J.Franks **Day/Date:** 02 May 2015

Purpose NT Link Regional Ecosystem Assessment

Locality: (inc. distance/direction to nearest town) Glencoe Stn between KP 595-596

GPS: GDA94 54 0340145 7697538 Unit: Val

Vegetation structure

Median height of the EDL is to be measured

Stratum	Median height	Height interval	Est. cover density (D,M,S,V)
E		-	
T1	6	5-7	V
T2	2.5	2-3	S
T3		-	
S1		-	
S2		-	
G	0.4	0.1-0.4	S

Structural formation: (including height)

Low open woodland

Ecologically dominant layer: T1

Plant species

Record relative (numerical) dominance for each stratum;
d – dominant; ***c*** – codominant; **s -** subdominant, ***a*** – associated.

Str.	Rel. dom.	Scientific Name
T1	D	*Eucalyptus leucophloia*
T2	D	*Eucalyptus leucophloia*
T2	A	*Acacia cambagei*
G	D	*Triodia longiceps*

Geology, landform, soils

Geology map/scale/year: ROMA SF5401/250K/1987

Geology code and rock types: PLim – laminate sandstone

Land system: M

Landform: Gently undulating

Soils: Red, sandy loam with surface rock

Field observation and notes:

Land zone: 11

RE code changes

Existing RE code: 1.11.3x1b/1.11.2x2

Proposed RE code: 1.11.x2

END

Site Q28 facing north

north

Site Q28 Soil surface

Sheet D – regional ecosystem type assessment site

Location

Site No. Q29 **Recorder:** A.J.Franks **Day/Date:** 02 May 2015

Purpose NT Link Regional Ecosystem Assessment

Locality: (inc. distance/direction to nearest town) Glencoe Stn between KP 595-596

GPS: GDA94 54 0340011 7697429 Unit: Val:

Vegetation structure

Median height of the EDL is to be measured

Stratum	Median height	Height interval	Est. cover density (D,M,S,V)
E		-	
T1	6	5-7	S
T2	1.5	2-3	V
T3		-	
S1		-	
S2		-	
G	0.4	0.1-0.5	S

Structural formation: (including height)

Low open woodland

Ecologically dominant layer: T1

Plant species

Record relative (numerical) dominance for each stratum;
d – dominant; ***c*** – codominant; **s -** subdominant, ***a*** – associated.

Str.	Rel. dom.	Scientific Name
T1	D	*Corymbia terminalis*
T1	S	*Eucalyptus leucophloia*
T2	D	*Acacia lysiphloia*
G	D	*Triodia longiceps*
G	A	*Sporobolus australasicus*
G	A	*Pterocaulon serrulatum*

Geology, landform, soils

Geology map/scale/year: ROMA SF5401/250K/1987

Geology code and rock types: PLim – laminate sandstone

Land system: M

Landform: Undulating

Soils: Rocky, stony loam

Field observation and notes:

Land zone: 11

RE code changes

Existing RE code: 1.11.3x1b/1.11.2x2

Proposed RE code: 1.11.3x1b

END

Site Q29 facing north

south

Site Q29 Soil surface

Sheet D – regional ecosystem type assessment site

Location

Site No. Q30 **Recorder:** A.J.Franks **Day/Date:** 02 May 2015

Purpose NT Link Regional Ecosystem Assessment

Locality: (inc. distance/direction to nearest town) Glencoe Stn between KP 595-596

GPS: GDA94 | 5 | 4 | | 0 | 3 | 3 | 9 | 9 | 1 | 8 | | 7 | 6 | 9 | 7 | 2 | 5 | 8 | Unit:

Vegetation structure

Median height of the EDL is to be measured

Stratum	Median height	Height interval	Est. cover density (D,M,S,V)
E		-	
T1	5	4-6	S
T2	3.5	3-4	S
T3		-	
S1		-	
S2		-	
G	0.4	0.1-0.5	S

Structural formation: (including height)

Low woodland

Ecologically dominant layer: T1

Plant species

Record relative (numerical) dominance for each stratum;
d – dominant; ***c*** – codominant; **s -** subdominant, ***a*** – associated.

Str.	Rel. dom.	Scientific Name
T1	D	*Eucalyptus leucophloia*
T2	D	*Eucalyptus leucophloia*
G	D	*Triodia longiceps*

Geology, landform, soils

Geology map/scale/year: ROMA SF5401/250K/1987

Geology code and rock types: PLim – laminate sandstone

Land system: M

Landform: Steep hill

Soils: Rocky, skeletal, fine grained soil

Field observation and notes:

Land zone: 11

RE code changes

Existing RE code: 1.11.2a

Proposed RE code: 1.11.2a

END

Site Q30 facing north

south

Site Q30 Soil surface

Sheet D – regional ecosystem type assessment site

Location

Site No. Q31 **Recorder:** A.J.Franks **Day/Date:** 02 May 2015

Purpose NT Link Regional Ecosystem Assessment

Locality: (inc. distance/direction to nearest town) Mica Creek between KP 594-595

GPS: GDA94 | 5 | 4 | | 0 | 3 | 3 | 9 | 8 | 2 | 7 | | 7 | 6 | 9 | 6 | 8 | 4 | 0 | Unit:

Vegetation structure

Median height of the EDL is to be measured

Stratum	Median height	Height interval	Est. cover density (D,M,S,V)
E		-	
T1	11	10-12	S-M
T2	9	8-10	S
T3	4	3-6	S
S1	1.5	1-2	S
S2		-	
G	0.4	0.1-0.5	S

Structural formation: (including height)

Woodland

Ecologically dominant layer: T1

Plant species

Record relative (numerical) dominance for each stratum;
d – dominant; ***c*** – codominant; **s -** subdominant, ***a*** – associated.

Str.	Rel. dom.	Scientific Name
T1	D	*Eucalyptus camaldulensis*
T2	D	*Lophostemon grandiflorus*
T3	D	*Lophostemon grandiflorus*
T3	A	*Acacia holosericea*
S1	C	**Xanthium occidentale*
S1	A	**Calotropis procera*
G	D	*Eriachne* sp.

Geology, landform, soils

Geology map/scale/year: ROMA SF5401/250K/1987

Geology code and rock types:

Land system: M

Landform: Creek line

Soils: Sandy alluvium

Field observation and notes: Mostly sandy bed

Land zone: 3

RE code changes

Existing RE code: 1.3.7a/1.3.7b/1.3.6a

Proposed RE code: 1.3.7a

END

Site Q31 facing north

south

Sheet D – regional ecosystem type assessment site

Location

Site No. Q32 **Recorder:** A.J.Franks **Day/Date:** 02 May 2015

Purpose NT Link Regional Ecosystem Assessment

Locality: (inc. distance/direction to nearest town) Royton Timber Reserve between KP 593-594

GPS: GDA94 54 0338946 7696596 Unit:

Vegetation structure

Median height of the EDL is to be measured

Stratum	Median height	Height interval	Est. cover density (D,M,S,V)
E		-	
T1	15	14-17	S
T2	8	7-10	S
T3		-	
S1	2.5	2-3	V
S2	1.5	1-2	V
G	0.2	0.1-0.4	V

Structural formation: (including height)

Open forest

Ecologically dominant layer: T1

Plant species

Record relative (numerical) dominance for each stratum;
d – dominant; ***c*** – codominant; **s -** subdominant, ***a*** – associated.

Str.	Rel. dom.	Scientific Name
T1	D	*Corymbia aparrerinja*
T2	D	*Atalaya hemiglauca*
T2	S	*Corymbia aparrerinja*
T2	A	*Eucalyptus leucophloia*
S1	D	*Acacia lysiphloia*
S1	A	*Atalaya hemiglauca*
S1	A	*Grevillea striata*
S2	D	*Capparis lanceolata*
G	D	*Triodia longiceps*

Geology, landform, soils

Geology map/scale/year: ROMA SF5401/250K/1987

Geology code and rock types: PLhe/s

Land system: M

Landform: Plain, very gently sloping

Soils: Fine sandy loam alluvium

Field observation and notes:

Land zone: 3

RE code changes

Existing RE code: 1.11.2a

Proposed RE code: 1.3.6a

END

Site Q32 facing north

south

Site Q32 Soil surface

Sheet D – regional ecosystem type assessment site

Location

Site No. Q33 **Recorder:** A.J.Franks **Day/Date:** 02 May 2015

Purpose NT Link Regional Ecosystem Assessment

Locality: (inc. distance/direction to nearest town) Royton Timber Reserve between KP 592-593

GPS: GDA94 | 5 | 4 | | 0 | 3 | 3 | 76 | 8 | 6 | 7 | | 7 | 6 | 9 | 6 | 5 | 9 | 6 | Unit:

Vegetation structure

Median height of the EDL is to be measured

Stratum	Median height	Height interval	Est. cover density (D,M,S,V)
E		-	
T1	5.5	5-6	S
T2	3	2-4	S-M
T3		-	
S1	1.5	1-2	V
S2		-	
G	0.2	0.1-0.4	S

Structural formation: (including height)

Low woodland

Ecologically dominant layer: T1

Plant species

Record relative (numerical) dominance for each stratum;
d – dominant; ***c*** – codominant; **s -** subdominant, ***a*** – associated.

Str.	Rel. dom.	Scientific Name
T1	D	*Acacia cambagei*
T2	D	*Acacia cambagei*
T2	A	*Atalaya hemiglauca*
T2	A	*Grevillea striata*
S1	D	*Grevillea striata*
G	D	*Triodia longiceps*
G	A	*Sporobolus australasicus*

Geology, landform, soils

Geology map/scale/year: ROMA SF5401/250K/1987

Geology code and rock types: PLac

Land system: M

Landform: Gentle slope

Soils: Fine grey brown sand with surface rock/mica flakes

Field observation and notes:

Land zone: 11

RE code changes

Existing RE code: 1.11.3x1b/1.11.2x2

Proposed RE code: 1.11.2x2

END

Site Q33 facing north

south

Site Q33 Soil surface

Sheet D – regional ecosystem type assessment site

Location

Site No. Q34 **Recorder:** A.J.Franks **Day/Date:** 02 May 2015

Purpose NT Link Regional Ecosystem Assessment

Locality: (inc. distance/direction to nearest town) Royton Timber Reserve between KP 592-593

GPS: GDA94 54 0337534 7696791 Unit:

Vegetation structure

Median height of the EDL is to be measured

Stratum	Median height	Height interval	Est. cover density (D,M,S,V)
E		-	
T1	7	6-8	S
T2		-	
T3		-	
S1	1.5	1-2	S-M
S2		-	
G	0.2	0.1-0.4	V

Structural formation: (including height)

Low woodland

Ecologically dominant layer: T1

Plant species

Record relative (numerical) dominance for each stratum;
d – dominant; ***c*** – codominant; **s -** subdominant, ***a*** – associated.

Str.	Rel. dom.	Scientific Name
T1	D	*Eucalyptus camaldulensis*
S1	C	*Acacia holosericea*
S1	C	*Melaleuca bracteata*
G	D	*Enteropogon acicularis*

Geology, landform, soils

Geology map/scale/year: ROMA SF5401/250K/1987

Geology code and rock types: PLac

Land system: M

Landform: Riparian drainage line

Soils: Alluvial sands and gravel

Field observation and notes: Mostly sandy bed

Land zone: 3

RE code changes

Existing RE code: 1.3.7b/1.3.4/1.5.6x2

Proposed RE code: 1.3.7b

END

Site Q34 facing north

south

Site Q34 Soil surface

Sheet D – regional ecosystem type assessment site

Location

Site No. Q35 **Recorder:** A.J.Franks **Day/Date:** 02 May 2015

Purpose NT Link Regional Ecosystem Assessment

Locality: (inc. distance/direction to nearest town) Royton Timber Reserve between KP 592-593

GPS: GDA94 54 0337494 7696827 Unit: Val

Vegetation structure

Median height of the EDL is to be measured

Stratum	Median height	Height interval	Est. cover density (D,M,S,V)
E		-	
T1	4	3-4	M
T2		-	
T3		-	
S1		-	
S2		-	
G	0.2	0.1-0.4	V

Structural formation: (including height)

Low open forest

Ecologically dominant layer: T1

Plant species

Record relative (numerical) dominance for each stratum;
d – dominant; ***c*** – codominant; **s -** subdominant, ***a*** – associated.

Str.	Rel. dom.	Scientific Name
T1	D	*Acacia cambagei*
G	C	Native Poaceae

Geology, landform, soils

Geology map/scale/year: ROMA SF5401/250K/1987

Geology code and rock types: PLac

Land system: M

Landform: Gentle sloping area

Soils: Red sands with pebbles

Field observation and notes:

Land zone: 5

RE code changes

Existing RE code: 1.3.7b/1.3.4/1.5.6x2

Proposed RE code: 1.5.6x2

END

Site Q35 facing north

Site Q35 Soil surface

Sheet D – regional ecosystem type assessment site

Location

Site No. Q36 **Recorder:** A.J.Franks **Day/Date:** 02 May 2015

Purpose NT Link Regional Ecosystem Assessment

Locality: (inc. distance/direction to nearest town) Royton Timber Reserve between KP 592-593

GPS: GDA94 | 5 | 4 | | 0 | 3 | 3 | 7 | 4 | 4 | 7 | | 7 | 6 | 9 | 7 | 0 | 0 | 8 | Unit:

Vegetation structure

Median height of the EDL is to be measured

Stratum	Median height	Height interval	Est. cover density (D,M,S,V)
E		-	
T1	9	8-10	S
T2	2.5	2-3	V
T3		-	
S1	0.5	0.4-1.0	V
S2		-	
G	0.2	0.1-0.4	V

Structural formation: (including height)

Low woodland

Ecologically dominant layer: T1

Plant species

Record relative (numerical) dominance for each stratum;
d – dominant; ***c*** – codominant; **s -** subdominant, ***a*** – associated.

Str.	Rel. dom.	Scientific Name
T1	D	*Eucalyptus cambagei*
T2	D	*Eucalyptus cambagei*
S1	D	*Melaleuca argentea*
G	C	Native Poaceae

Geology, landform, soils

Geology map/scale/year: ROMA SF5401/250K/1987

Geology code and rock types: PLac

Land system: M

Landform: Gentle sloping area

Soils: Red sands with pebbles

Field observation and notes: Q37 (E: 337441 N: 7697040): *Acacia cambagei* (RE 1.12.1x2)

Q37A (E: 337293 N: 7697119): *Acacia cambagei* (RE 1.12.1x2) **Land zone:** 3

RE code changes

Existing RE code: 1.3.7a/1.3.7b/1.3.6a

Proposed RE code: 1.3.7b

END

Site Q36 facing north

Sheet D – regional ecosystem type assessment site

Location

Site No. Q38 **Recorder:** A.J.Franks **Day/Date:** 02 May 2015

Purpose NT Link Regional Ecosystem Assessment

Locality: (inc. distance/direction to nearest town) Royton Timber Reserve between KP 591-592

GPS: GDA94 54 0336995 7697222 Unit: Val

Vegetation structure

Median height of the EDL is to be measured

Stratum	Median height	Height interval	Est. cover density (D,M,S,V)
E		-	
T1	4	3-4	M
T2		-	
T3		-	
S1		-	
S2		-	
G	0.2	0.1-0.4	V

Structural formation: (including height)

Low open forest

Ecologically dominant layer: T1

Plant species

Record relative (numerical) dominance for each stratum;
d – dominant; ***c*** – codominant; **s -** subdominant, ***a*** – associated.

Str.	Rel. dom.	Scientific Name
T1	D	*Eucalyptus leucophloia*
T1	S	*Eucalyptus leucophylla*
S1	D	*Acacia dictyophleba*
S1	A	*Eucalyptus melanophloia*

Geology, landform, soils

Geology map/scale/year: ROMA SF5401/250K/1987

Geology code and rock types: PLgul

Land system: M

Landform: Sloping area

Soils: Red sands with rock and boulders

Field observation and notes:

Land zone: 12

RE code changes

Existing RE code: 1.12.2/1.12.1x1

Proposed RE code: 1.12.1

END

Site Q38 facing north

Site Q38 Soil surface

Sheet D – regional ecosystem type assessment site

Location

Site No. Q39 **Recorder:** A.J.Franks **Day/Date:** 02 May 2015

Purpose NT Link Regional Ecosystem Assessment

Locality: (inc. distance/direction to nearest town) Royton Timber Reserve near KP590

GPS: GDA94 | 5 | 4 | | 0 | 3 | 3 | 5 | 7 | 6 | 6 | | 7 | 6 | 9 | 8 | 3 | 0 | 2 | Unit:

Vegetation structure

Median height of the EDL is to be measured

Stratum	Median height	Height interval	Est. cover density (D,M,S,V)
E		-	
T1	4	3-4	S
T2		-	
T3		-	
S1	1.5	1-2	S
S2		-	
G	0.2	0.1-0.4	V

Structural formation: (including height)

Low open forest

Ecologically dominant layer: T1

Plant species

Record relative (numerical) dominance for each stratum;
d – dominant; ***c*** – codominant; **s -** subdominant, ***a*** – associated.

Str.	Rel. dom.	Scientific Name
T1	D	*Eucalyptus leucophylla*
S1	D	*Acacia lysiphloia*
G	D	*Triodia pungens*

Geology, landform, soils

Geology map/scale/year: ROMA SF5401/250K/1987

Geology code and rock types: PLac

Land system: M

Landform: Near top of low rise

Soils: Rocky sand with lots of surface rock

Field observation and notes: Q40 (E: 335723 N: 7698590): *E. leucophylla* and *E. leucophloia* over *Triodia*

Q40A (E: 339390 N: 7696775) Euc. leucophloia on rocky soil (RE 1.11.2a) **Land zone:** 11

RE code changes

Existing RE code: 1.11.2d/1.11.2a

Proposed RE code: 1.11.2d

END

Site Q39 facing north

Site Q39 Soil surface

Appendix I Fauna Data Sheets

SITE DESCRIPTIONS

O2ECOLOGY

NT Link Ecology Surveys (Queensland)
Mt Isa to NT border

Site Name	Date	Type	Trap Name	AMG Zone	Easting	Northing	General Description or Comments
Camp 1	29/04/2015	Opportunistic		54	197773	7747377	WP 184 3m accuracy. Braided Waterway with sandy/silty bottom, banks 2-3m. fringing coolabah woodland surrounded by mitchell grass land. Mistletoe in trees. Pools. Deep cracking black soil above high bank
Camp 1	29/04/2015	Camera		54	197833	7747414	WP 185 4m accuracy. Camo camera #3 facing pool
Camp 1	29/04/2015	Camera		54	197786	7747335	WP 186 4m accuracy. Grey camera #1 facing pool
Camp 1	29/04/2015	Camera		54	197833	7747414	Black camera facing trail
Camp 2	30/04/2015	Opportunistic		54	329784	7704474	adjacent to dry waterway. Large groups of red boulders with exfoliation and splitting, open euc woodland, spinifex. Dry riverbed. Eucalypt woodland over spinifex. Some buffel grass on riverbanks
Camp 2	30/04/2015	Camera		54	329568	7704653	Grey camera #1 in rocky boulder outcrop with spinifex, vines, fig
Camp 2	30/04/2015	Song Meter		54	329891	7704666	WP190 3m accuracy. On rock in low open euc woodland on granite boulder
Camp 2	30/04/2015	Camera		54	329805	7704574	Black camera facing spiny tailed monitor burrow
Camp 2	30/04/2015	Camera		54	329786	7704571	camera #4 facing trail to creekline
Camp 2	30/04/2015	Anabat		54	329891	7704666	SN80226
Camp 2	30/04/2015	Anabat		54	329891	7704666	SN82440
Q7 (Andy)	29/04/2015	Opportunistic		54	221795	7742883	mapped as 4.4.1c - big flat tussock grassland, deep crackling clay soil. Cattle present. Photo 11:44am MLphone
Site 1	28/04/2015	T intersection		54	228959	7740996	WP 173 3m accuracy. Belt of acacia surrounded by spinifex and mitchelgrass with sparse eucalypts. Red dirt with some surface stone. Dead acacias, bare ground between clumps of mitchelgrass and spinifex hummocks. 1/5/2015 9:41am Mlphone
Site 1	1/05/2015	Camera		54	228959	7740996	camera #4 facing drift fence
Site 1	1/05/2015	Anabat		54	228959	7740996	SN80226
Site 2	28/04/2015	T intersection		54	273969	7728722	WP 175 3m accuracy. Bank of wide braided sandy gravelly river channel, some pools present, spinifex, acacia scrub, eucalyptus woodland, bare red dirt between grass hummocks. 11.09am Mlphone 1/5/2015
Site 2	1/05/2015	Camera		54	273969	7728722	Grey camera #1 facing drift fence.
Site 2	28-29/04/2015	Song Meter		54	274057	7728726	WP 174 3m accuracy. On tree root adjacent to water hole in otherwise dry creek bed
Site 2	28-29/04/2015	Anabat		54	274018	7728698	WP 179 4m accuracy. In waterway next to pool. SN82440
Site 2	30/04/2015-02/05/2015	Camera		54	274057	7728723	WP189 3m accuracy. Camo camera #3 facing bank across pool
Site 3	28/04/2015	T intersection		54	323275	7710404	WP 176 3m accuracy. Spinifex and eucalypt woodland on bare reed dirt with cobbles (fossils). Termite mounds, patch of gidgee. Rocky jump ups nearby on one side of trap line, braided eucalypt lined brown dirt cobbled creek on opposite side of trap line. Caves and rocky hollows on jump up. 1/5/2015 12:44pm photo MLp
Site 3	1/05/2015	Camera		54	323275	7710404	Grey camera #5 on fence
Site 3	1/05/2015	Camera		54	323275	7710404	Camo camera #2 on fence
Site 3	28/04/2015-01/5/2015	Camera		54	323245	7710426	WP 177 4m accuracy. Grey camera #5 In gidgee.
Site 3	28/04/2015-02/05/2015	Camera		54	323380	7710416	WP 178 3m accuracy. Camo camera #2 In waterway facing game trail
Site 3	28/04/2015-02/05/2015	Anabat		54	323393	7710451	SN05915 all week in creek and moved 150 m to trap site for night of 1/5
Site 3	28-29/04/2015	Camera		54	323177	7710157	camera #4 in rocks on jump up
Site 3	28-29/04/2015	Anabat		54	323177	7710157	SN80226
WP 180	29/04/2015	Opportunistic		54	221892	7743069	mapped as 4.4.1a, 5m accuracy - big flat tussock grassland. Bare ground with ironstone pebbles, a couple of small patches of shrubs, sink holes in depressions, large, flattened burrow 20cmx8cm. Cattle present. Photo 11:30am MLphone
WP 182	29/04/2015	Opportunistic		54	218180	7744103	mapped as 4.3.17/4.3.16a/4.3.3 - drainage line in the middle of big grass plain. Dry no water at present (muddy puddle a bit further along), cracking black soil, very few trees in landscape. Cattle dung. Photo 12:22pm MLphone
WP 183	29/04/2015	Opportunistic		54	213452	7744884	mapped as 4.3.17/4.3.16a and VMA wetland (MSES) - dry. Cracking black soil. Cattle prints. Surrounded by mitchell grassland. Photo 12:52pm MLphone
WP 187	30/04/2015	Opportunistic		54	240540	7738421	mapped as 4.3.12a/4.3.16a - large dry inland lake. Deep Cracking black soil. Uneven bare ground surface, very little ground cover. Cattle present. Photo 10:22am MLphone
WP 188	30/04/2015	Opportunistic		54	262520	7733051	mapped as 1.11.2x1/1.7.1/1.11.2x5 - red surface sand on rock. Surface pebbles and rock piles. Spinifex under eucalypt woodland on undulating rolling hills. Fire has been through, lots of dead standing acacia. Cattle present. Photo 11:12am Mlphone
WP 191	1/05/2015	Opportunistic		54	252451	7736248	mapped as 1.5.4x1a/1.5.7 - flat bare red dirt, mitchel grass dead acacia, sparse eucalypts, termite mounds, hibiscus/abutilon, teddy bears arseholes. Photo 10:19am Mlphone
WP 192	1/05/2015	Opportunistic		54	280577	7725843	mapped as 1.5.7a/1.5.6x2/1.5.4x1a/4.3.4x2a - spinifex clumps on red surface stones on red dirt. Eucalypt woodland. Dead standing acacia (fire), some shrubs. Termite mounds. Photo 11:45am Mlphone
WP 193	1/05/2015	Opportunistic		54	307430	7715675	mapped as 1.11.2a/1.3.6x1 - hillslope, one ridge in a strange squarish geological formation. surface rocks, cobbles, on red dirt. Spinifex hummocks, snappy gum woodland. Photo 1:21pm Mlphone
WP 194	1/05/2015	Opportunistic		54	316165	7714311	mapped as 1.12.2/1.12.1x1/1.12.2x1 - spinifex and low shrub, low open eucalypt woodland. Red and white pebbles on surface, red dirt, bare ground between vegetation, undulating low hills with groups of large boulders. Dry creek line. Photo 1:48pm Mlphone
WP 195	1/05/2015	Opportunistic		54	335495	7698817	mapped as 1.12.1x1/1.12.1/1.12.2 - small hill surrounded by rocky ranges. Good rock wallaby habitat. Eucalypt woodland over spinifex hummocks, bare ground between vegetation. White/pink surface rocks in seams, mostly red stones on surface of red dirt. Photo 3:22pm Mlphone

AEF007

River Bioassessment Program

Queensland Government
Natural Resources and Mines

HABITAT ASSESSMENT FIELD SHEET

SITE NUMBER: [| | | | | |] **SITE NAME:** SITE 2

Date: 28/04/2015 **Time (24 hrs):** [1PM1] **GPS:** WP174 **Project Name:** NT UNK

Habitat Variable	CATEGORY			
	Excellent	**Good**	**Fair**	**Poor**
1. Bottom substrate/available cover	Greater than 50% rubble, gravel, submerged logs, undercut banks or other stable habitat. 20, 19, 18, 17, 16	30-50% rubble, gravel or other stable habitat. Adequate habitat. 15, 14, 13, 12, 11	10-30% rubble, gravel or other stable habitat. Habitat availability less than desirable. 10, 9, 8, 7, (6)	Less than 10% rubble, gravel or stable habitat. Lack of habitat is obvious. 5, 4, 3, 2, 1, 0
2. Embeddedness	Gravel, cobble and boulder particles are between 0 & 25% surrounded by fine sediment. 20, 19, 18, 17, 16	Gravel, cobble and boulder particles are between 25% & 50% surrounded by fine sediment. 15, 14, 13, 12, 11	Gravel, cobble and boulder particles are between 50 & 75% surrounded by fine sediment. 10, 9, 8, 7, 6	Gravel, cobble and boulder particles are over 75% surrounded by fine sediment. (5), 4, 3, 2, 1, 0
3. Velocity/depth category	Slow deep (<0.3 m/s & >0.5 m); slow shallow; fast deep; fast shallow; habitats all present. 20, 19, 18, 17, (16)	Only 3 of the four habitat categories present (missing riffles or runs receive lower score than missing pools). 15, 14, 13, 12, 11	Only two of the four habitat categories present (missing riffles/runs receive lower score). 10, 9, 8, 7, 6	Dominating by one velocity/depth category (usually pool). 5, 4, 3, 2, 1, 0
4. Channel alteration	Little or no enlargement of islands or point bars and/or no channelisation. 15, 14, 13, 12	Some new increase in bar formation, mostly from coarse gravel; and/or some channelisation present. 11, 10, 9, 8	Moderate deposition of new gravel, coarse sand, on old and new bars; pools partly filled with silt; and/or embankments on both banks. 7, 6, 5, 4	Heavy deposits of fine materials, increased bar development; most pools filled with silt; and/or extensive channelisation. (3), 2, 1, 0
5. Bottom scouring and deposition	Less than 5% of the bottom affected by scouring and deposition. 15, 14, 13, 12	5-30% affected. Scours at constrictions and where grades steepen, some deposition in pools. 11, 10, (9), 8	30-50% affected. Deposits and scours at obstructions and bends. Some deposition in pools. 7, 6, 5, 4	More than 50% of the bottom changing nearly year long. Pools almost absent due to deposition. Only large rocks in riffle exposed. 3, 2, 1, 0

River Bioassessment Program

HABITAT ASSESSMENT FIELD SHEET cont.

Habitat Variable	CATEGORY			
	Excellent	**Good**	**Fair**	**Poor**
6. Pool/riffle, run/bend ratio. *(Distance between riffles divided by stream width)*	0-7 Variety of habitat. Deep riffles and pools. 15, 14, 13, (12)	7-15 Adequate depth in pools and riffles. Bends provide habitat. 11, 10, 9, 8	15-25 Occasional riffle or bend. Bottom contours provide some habitat. 7, 6, 5, 4	>25 Essentially a straight stream. Generally all flat water or shallow riffle. Poor habitat. 3, 2, 1, 0
7. Bank stability	Stable. No evidence of erosion or bank failure. Side slopes generally <30%. Little potential for future problem. 10, 9	Moderately stable. Infrequent, small areas of erosion mostly healed over. Side slopes up to 40% on one bank. Slight potential in extreme floods. 8, 7, (6)	Moderately unstable. Moderate frequency and size of erosional areas. Side slopes up to 60% on some banks. High erosion potential during extreme/high flows. 5, 4, 3	Unstable. Many eroded areas. Side slopes > 60% common. 'Raw' areas frequent along straight sections and bends. 2, 1, 0
8. Bank vegetative stability	Over 80% of the streambank surfaces covered by vegetation or boulders and cobble. 10, 9	50-79% of the streambank surfaces covered by vegetation, gravel or larger material. 8, 7, (6)	25-49% of the streambank covered by vegetation, gravel or larger material. 5, 4, 3	Less than 25% of the streambank surfaces covered by vegetation, gravel or larger material. 2, 1, 0
9. Streamside cover	Dominant vegetation is of tree form. (10), 9	Dominant vegetation shrub. 8, 7, 6	Dominant vegetation is grass, sedge, ferns. 5, 4, 3	Over 50% of the streambank has no vegetation and dominant material is soil, rock, bridge materials, culverts, or mine tailings. 2, 1, 0

Column Totals	38	20	6	8

Score 72 / 135

AEF007

River Bioassessment Program

Queensland Government
Natural Resources and Mines

HABITAT ASSESSMENT FIELD SHEET

SITE NUMBER: [| | | | | |] **SITE NAME:** SITE 3

Date: 28/04/2015 **Time (24 hrs):** [1PM1] **GPS:** WP 178 **Project Name:** NT LINK

Habitat Variable	CATEGORY			
	Excellent	**Good**	**Fair**	**Poor**
1. Bottom substrate/available cover	Greater than 50% rubble, gravel, submerged logs, undercut banks or other stable habitat. 20, 19, 18, 17, 16	30-50% rubble, gravel or other stable habitat. Adequate habitat. (15) 14, 13, 12, 11	10-30% rubble, gravel or other stable habitat. Habitat availability less than desirable. 10, 9, 8, 7, 6	Less than 10% rubble, gravel or stable habitat. Lack of habitat is obvious. 5, 4, 3, 2, 1, 0
2. Embeddedness	Gravel, cobble and boulder particles are between 0 & 25% surrounded by fine sediment. 20, 19, 18, 17, 16	Gravel, cobble and boulder particles are between 25% & 50% surrounded by fine sediment. (15) 14, 13, 12, 11	Gravel, cobble and boulder particles are between 50 & 75% surrounded by fine sediment. 10, 9, 8, 7, 6	Gravel, cobble and boulder particles are over 75% surrounded by fine sediment. 5, 4, 3, 2, 1, 0
3. Velocity/depth category	Slow deep (<0.3 m/s & >0.5 m); slow shallow; fast deep; fast shallow; habitats all present. 20, 19, 18, 17, 16	Only 3 of the four habitat categories present (missing riffles or runs receive lower score than missing pools). 15, 14, 13, 12, 11	Only two of the four habitat categories present (missing riffles/runs receive lower score). (10) 9, 8, 7, 6	Dominating by one velocity/depth category (usually pool). 5, 4, 3, 2, 1, 0
4. Channel alteration	Little or no enlargement of islands or point bars and/or no channelisation. 15, 14, 13, 12	Some new increase in bar formation, mostly from coarse gravel; and/or some channelisation present. 11, 10, 9, 8	Moderate deposition of new gravel, coarse sand, on old and new bars; pools partly filled with silt; and/or embankments on both banks. (7) 6, 5, 4	Heavy deposits of fine materials, increased bar development; most pools filled with silt; and/or extensive channelisation. 3, 2, 1, 0
5. Bottom scouring and deposition	Less than 5% of the bottom affected by scouring and deposition. 15, 14, 13, (12)	5-30% affected. Scours at constrictions and where grades steepen, some deposition in pools. 11, 10, 9, 8	30-50% affected. Deposits and scours at obstructions and bends. Some deposition in pools. 7, 6, 5, 4	More than 50% of the bottom changing nearly year long. Pools almost absent due to deposition. Only large rocks in riffle exposed. 3, 2, 1, 0

River Bioassessment Program

HABITAT ASSESSMENT FIELD SHEET cont.

Habitat Variable	CATEGORY			
	Excellent	**Good**	**Fair**	**Poor**
6. Pool/riffle, run/bend ratio. *(Distance between riffles divided by stream width)*	0-7 Variety of habitat. Deep riffles and pools. 15, 14, 13, 12	7-15 Adequate depth in pools and riffles. Bends provide habitat. 11, 10, 9, 8	15-25 Occasional riffle or bend. Bottom contours provide some habitat. 7, 6, 5, 4	>25 Essentially a straight stream. Generally all flat water or shallow riffle. Poor habitat. (3), 2, 1, 0
7. Bank stability	Stable. No evidence of erosion or bank failure. Side slopes generally <30%. Little potential for future problem. 10, 9	Moderately stable. Infrequent, small areas of erosion mostly healed over. Side slopes up to 40% on one bank. Slight potential in extreme floods. (8), 7, 6	Moderately unstable. Moderate frequency and size of erosional areas. Side slopes up to 60% on some banks. High erosion potential during extreme/high flows. 5, 4, 3	Unstable. Many eroded areas. Side slopes > 60% common. 'Raw' areas frequent along straight sections and bends. 2, 1, 0
8. Bank vegetative stability	Over 80% of the streambank surfaces covered by vegetation or boulders and cobble. 10, 9	50-79% of the streambank surfaces covered by vegetation, gravel or larger material. (8), 7, 6	25-49% of the streambank covered by vegetation, gravel or larger material. 5, 4, 3	Less than 25% of the streambank surfaces covered by vegetation, gravel or larger material. 2, 1, 0
9. Streamside cover	Dominant vegetation is of tree form. 10 (9)	Dominant vegetation shrub. 8, 7, 6	Dominant vegetation is grass, sedge, ferns. 5, 4, 3	Over 50% of the streambank has no vegetation and dominant material is soil, rock, bridge materials, culverts, or mine tailings. 2, 1, 0

Column Totals	21	46	17	3

Score 87/135

AEF007

River Bioassessment Program

Queensland Government
Natural Resources and Mines

HABITAT ASSESSMENT FIELD SHEET

SITE NUMBER: [| | | | | |] **SITE NAME:** CAMP 1

Date: 29/04/2015 **Time (24 hrs):** [1 9 1 M 1] **GPS:** WP 183 **Project Name:** NT LINK

Habitat Variable	CATEGORY			
	Excellent	**Good**	**Fair**	**Poor**
1. Bottom substrate/available cover	Greater than 50% rubble, gravel, submerged logs, undercut banks or other stable habitat. 20, 19, 18, 17, 16	30-50% rubble, gravel or other stable habitat. Adequate habitat. 15, 14, 13, 12, 11	10-30% rubble, gravel or other stable habitat. Habitat availability less than desirable. 10, 9, 8, 7, 6	Less than 10% rubble, gravel or stable habitat. Lack of habitat is obvious. (5) 4, 3, 2, 1, 0
2. Embeddedness	Gravel, cobble and boulder particles are between 0 & 25% surrounded by fine sediment. 20, 19, 18, 17, 16	Gravel, cobble and boulder particles are between 25% & 50% surrounded by fine sediment. 15, 14, 13, 12, 11	Gravel, cobble and boulder particles are between 50 & 75% surrounded by fine sediment. 10, 9, 8, 7, 6	Gravel, cobble and boulder particles are over 75% surrounded by fine sediment. 5, 4, 3, 2, 1, (0)
3. Velocity/depth category	Slow deep (<0.3 m/s & >0.5 m); slow shallow; fast deep; fast shallow; habitats all present. 20, 19, 18, 17, (16)	Only 3 of the four habitat categories present (missing riffles or runs receive lower score than missing pools). 15, 14, 13, 12, 11	Only two of the four habitat categories present (missing riffles/runs receive lower score). 10, 9, 8, 7, 6	Dominating by one velocity/depth category (usually pool). 5, 4, 3, 2, 1, 0
4. Channel alteration	Little or no enlargement of islands or point bars and/or no channelisation. 15, 14, 13, 12	Some new increase in bar formation, mostly from coarse gravel; and/or some channelisation present. 11, 10, 9, 8	Moderate deposition of new gravel, coarse sand, on old and new bars; pools partly filled with silt; and/or embankments on both banks. 7, 6, 5, (4)	Heavy deposits of fine materials, increased bar development; most pools filled with silt; and/or extensive channelisation. 3, 2, 1, 0
5. Bottom scouring and deposition	Less than 5% of the bottom affected by scouring and deposition. 15, 14, 13, 12	5-30% affected. Scours at constrictions and where grades steepen, some deposition in pools. 11, 10, 9, (8)	30-50% affected. Deposits and scours at obstructions and bends. Some deposition in pools. 7, 6, 5, 4	More than 50% of the bottom changing nearly year long. Pools almost absent due to deposition. Only large rocks in riffle exposed. 3, 2, 1, 0

DU503400RSC.P65 [UM3883] 20/8/98

River Bioassessment Program

HABITAT ASSESSMENT FIELD SHEET cont.

Habitat Variable	CATEGORY			
	Excellent	**Good**	**Fair**	**Poor**
6. Pool/riffle, run/bend ratio. *(Distance between riffles divided by stream width)*	0-7 Variety of habitat. Deep riffles and pools. 15, 14, 13, (12)	7-15 Adequate depth in pools and riffles. Bends provide habitat. 11, 10, 9, 8	15-25 Occasional riffle or bend. Bottom contours provide some habitat. 7, 6, 5, 4	>25 Essentially a straight stream. Generally all flat water or shallow riffle. Poor habitat. 3, 2, 1, 0
7. Bank stability	Stable. No evidence of erosion or bank failure. Side slopes generally <30%. Little potential for future problem. 10, 9	Moderately stable. Infrequent, small areas of erosion mostly healed over. Side slopes up to 40% on one bank. Slight potential in extreme floods. 8, 7, 6	Moderately unstable. Moderate frequency and size of erosional areas. Side slopes up to 60% on some banks. High erosion potential during extreme/high flows. 5, 4, (3)	Unstable. Many eroded areas. Side slopes > 60% common. 'Raw' areas frequent along straight sections and bends. 2, 1, 0
8. Bank vegetative stability	Over 80% of the streambank surfaces covered by vegetation or boulders and cobble. 10, 9	50-79% of the streambank surfaces covered by vegetation, gravel or larger material. 8, 7, 6	25-49% of the streambank covered by vegetation, gravel or larger material. 5, 4, 3	Less than 25% of the streambank surfaces covered by vegetation, gravel or larger material. 2, 1, (0)
9. Streamside cover	Dominant vegetation is of tree form. (10) 9	Dominant vegetation shrub. 8, 7, 6	Dominant vegetation is grass, sedge, ferns. 5, 4, 3	Over 50% of the streambank has no vegetation and dominant material is soil, rock, bridge materials, culverts, or mine tailings. 2, 1, 0

Column Totals	38	8	7	5

Score 58 / 135

AEF007

River Bioassessment Program

Queensland Government
Natural Resources and Mines

HABITAT ASSESSMENT FIELD SHEET

SITE NUMBER: [| | | | | |] **SITE NAME:** CAMP 2

Date: 30/04/2015 **Time (24 hrs):** [1PM] **GPS:** 54 329784 7704474 **Project Name:** NT UNK

Habitat Variable	CATEGORY			
	Excellent	**Good**	**Fair**	**Poor**
1. Bottom substrate/available cover	Greater than 50% rubble, gravel, submerged logs, undercut banks or other stable habitat. 20, 19, 18, 17, 16	30-50% rubble, gravel or other stable habitat. Adequate habitat. 15, 14, 13, 12, (11)	10-30% rubble, gravel or other stable habitat. Habitat availability less than desirable. 10, 9, 8, 7, 6	Less than 10% rubble, gravel or stable habitat. Lack of habitat is obvious. 5, 4, 3, 2, 1, 0
2. Embeddedness	Gravel, cobble and boulder particles are between 0 & 25% surrounded by fine sediment. 20, 19, 18, 17, 16	Gravel, cobble and boulder particles are between 25% & 50% surrounded by fine sediment. 15, 14, 13, 12, (11)	Gravel, cobble and boulder particles are between 50 & 75% surrounded by fine sediment. 10, 9, 8, 7, 6	Gravel, cobble and boulder particles are over 75% surrounded by fine sediment. 5, 4, 3, 2, 1, 0
3. Velocity/depth category	Slow deep (<0.3 m/s & >0.5 m); slow shallow; fast deep; fast shallow; habitats all present. 20, 19, 18, 17, 16	Only 3 of the four habitat categories present (missing riffles or runs receive lower score than missing pools). 15, 14, 13, 12, 11	Only two of the four habitat categories present (missing riffles/runs receive lower score). (10) 9, 8, 7, 6	Dominating by one velocity/depth category (usually pool). 5, 4, 3, 2, 1, 0
4. Channel alteration	Little or no enlargement of islands or point bars and/or no channelisation. 15, 14, 13, 12	Some new increase in bar formation, mostly from coarse gravel; and/or some channelisatiou present. 11, 10, 9, 8	Moderate deposition of new gravel, coarse sand, on old and new bars; pools partly filled with silt; and/or embankments on both banks. (7) 6, 5, 4	Heavy deposits of fine materials, increased bar development; most pools filled with silt; and/or extensive channelisation. 3, 2, 1, 0
5. Bottom scouring and deposition	Less than 5% of the bottom affected by scouring and deposition. 15, 14, 13, 12	5-30% affected. Scours at constrictions and where grades steepen, some deposition in pools. (11) 10, 9, 8	30-50% affected. Deposits and scours at obstructions and bends. Some deposition in pools. 7, 6, 5, 4	More than 50% of the bottom changing nearly year long. Pools almost absent due to deposition. Only large rocks in riffle exposed. 3, 2, 1, 0

River Bioassessment Program

HABITAT ASSESSMENT FIELD SHEET cont.

Habitat Variable	CATEGORY			
	Excellent	**Good**	**Fair**	**Poor**
6. Pool/riffle, run/bend ratio. *(Distance between riffles divided by stream width)*	0-7 Variety of habitat. Deep riffles and pools. 15, 14, 13, 12	7-15 Adequate depth in pools and riffles. Bends provide habitat. 11, 10, 9, 8	15-25 Occasional riffle or bend. Bottom contours provide some habitat. (7), 6, 5, 4	>25 Essentially a straight stream. Generally all flat water or shallow riffle. Poor habitat. 3, 2, 1, 0
7. Bank stability	Stable. No evidence of erosion or bank failure. Side slopes generally <30%. Little potential for future problem. 10, 9	Moderately stable. Infrequent, small areas of erosion mostly healed over. Side slopes up to 40% on one bank. Slight potential in extreme floods. (8), 7, 6	Moderately unstable. Moderate frequency and size of erosional areas. Side slopes up to 60% on some banks. High erosion potential during extreme/high flows. 5, 4, 3	Unstable. Many eroded areas. Side slopes > 60% common. 'Raw' areas frequent along straight sections and bends. 2, 1, 0
8. Bank vegetative stability	Over 80% of the streambank surfaces covered by vegetation or boulders and cobble. 10 (9)	50-79% of the streambank surfaces covered by vegetation, gravel or larger material. 8, 7, 6	25-49% of the streambank covered by vegetation, gravel or larger material. 5, 4, 3	Less than 25% of the streambank surfaces covered by vegetation, gravel or larger material. 2, 1, 0
9. Streamside cover	Dominant vegetation is of tree form. 10 (9)	Dominant vegetation shrub. 8, 7, 6	Dominant vegetation is grass, sedge, ferns. 5, 4, 3	Over 50% of the streambank has no vegetation and dominant material is soil, rock, bridge materials, culverts, or mine tailings. 2, 1, 0

Column Totals	18	41	24	0

Score 83/135

TRAP NIGHTS

O2ECOLOGY **Project Name** NT Link Ecology Surveys (Queensland)
Location Mt Isa to NT border

Site Name	Date Checked	Trap Type	Trap Name	Open (1 - Yes)	Closed/Partly closed (1 - Yes)	Bait Taken (1 - Yes)	Other observations
Site 1	28/04/2015	Elliot					20 elliot traps set
Site 1	28/04/2015	Funnel					13 funnel traps set
Site 1	28/04/2015	Pitfall					2 pitfall traps set
Site 1	28/04/2015	Camera					none
Site 1	28/04/2015	Anabat					none
Site 2	28/04/2015	Elliot					20 elliot traps set
Site 2	28/04/2015	Funnel					13 funnel traps set
Site 2	28/04/2015	Pitfall					2 pitfall traps set
Site 2	28/04/2015	Camera					none
Site 2	28/04/2015	Anabat					1 anabat set
Site 3	28/04/2015	Elliot					20 elliot traps set
Site 3	28/04/2015	Funnel					13 funnel traps set
Site 3	28/04/2015	Pitfall					2 pitfall traps set
Site 3	28/04/2015	Camera					2 camera traps set
Site 3	28/04/2015	Anabat					1 anabat set
Site 1	29/04/2015	Elliot					20 elliot traps set
Site 1	29/04/2015	Funnel					13 funnel traps set
Site 1	29/04/2015	Pitfall					2 pitfall traps set
Site 1	29/04/2015	Camera					none
Site 1	29/04/2015	Anabat					none
Site 2	28/04/2015	Song Meter					1 Song Meter set
Site 2	29/04/2015	Elliot					20 elliot traps set
Site 2	29/04/2015	Funnel					13 funnel traps set
Site 2	29/04/2015	Pitfall					2 pitfall traps set
Site 2	29/04/2015	Camera					none
Site 2	29/04/2015	Song Meter					1 Song Meter set
Site 2	29/04/2015	Anabat					1 anabat set
Site 3	29/04/2015	Elliot					20 elliot traps set
Site 3	29/04/2015	Funnel					13 funnel traps set
Site 3	29/04/2015	Pitfall					2 pitfall traps set
Site 3	29/04/2015	Camera					3 camera trap set
Site 3	29/04/2015	Anabat					2 anabat set
Camp 1	29/04/2015	Funnel					3 funnels set in pools for aquatic sampling
Camp 1	29/04/2015	Camera					3 cameras set in creek bed facing trails and pools
Camp 1	30/04/2015	Opportunistic					macroinvertebrate samples taken from pools
Camp 1	30/04/2015	Opportunistic					spot lighting
Site 1	30/04/2015	Elliot			1 closed and empty		20 elliot traps set

Site 1	30/04/2015	Funnel					13 funnel traps set
Site 1	30/04/2015	Pitfall					2 pitfall traps set
Site 1	30/04/2015	Camera					none
Site 1	30/04/2015	Anabat					none
Site 2	30/04/2015	Elliot					20 elliot traps set
Site 2	30/04/2015	Funnel					13 funnel traps set
Site 2	30/04/2015	Pitfall					2 pitfall traps set
Site 2	30/04/2015	Camera					1 camera set
Site 2	30/04/2015	Anabat					none
Site 3	30/04/2015	Elliot					20 elliot traps set
Site 3	30/04/2015	Funnel					13 funnel traps set
Site 3	30/04/2015	Pitfall					2 pitfall traps set
Site 3	30/04/2015	Camera					2 camera trap set
Site 3	30/04/2015	Anabat					1 anabat set
Camp 2	30/04/2015	Song Meter					1 song meter set
Camp 2	30/04/2015	Anabat					2 anabat set
Camp 2	30/04/2015	Camera					3 cameras set
Camp 2	30/04/2015	Opportunistic					spot lighting
Site 1	1/05/2015	Elliot			1 closed and empty		20 elliot traps set
Site 1	1/05/2015	Funnel					13 funnel traps set
Site 1	1/05/2015	Pitfall					2 pitfall traps set
Site 1	1/05/2015	Camera					1 camera set
Site 1	1/05/2015	Anabat					1 anabat set
Site 2	1/05/2015	Elliot			5 closed and empty		20 elliot traps set
Site 2	1/05/2015	Funnel					13 funnel traps set
Site 2	1/05/2015	Pitfall					2 pitfall traps set
Site 2	1/05/2015	Camera					2 camera set
Site 2	1/05/2015	Song Meter					1 song meter set
Site 2	1/05/2015	Funnel					3 funnels set in pools
Site 2	1/05/2015	Opportunistic					macroinvertebrate samples taken from pools
Site 2	1/05/2015	Anabat					1 anabat set
Site 3	1/05/2015	Elliot					20 elliot traps set
Site 3	1/05/2015	Funnel					13 funnel traps set
Site 3	1/05/2015	Pitfall					2 pitfall traps set
Site 3	1/05/2015	Camera					2 camera trap set
Site 3	1/05/2015	Anabat					1 anabat set

TERRESTRIAL FAUNA OBSERVATIONS

O2ECOLOGY NT Link Ecology Surveys (Queensland)
Mt Isa to NT border

Site	Date Checked	Time	Type	Trap Number	Common Name	Scientific Name	Class	Comments
Site 2	28/04/2015	AM	Opportunistic		Gravelly-soil Ctenotus	Ctenotus lateralis	Reptiles	5 individuals
Site 2	28/04/2015	AM	Opportunistic		Leopard Ctenotus	Ctenotus pantherinus	Reptiles	
Site 2	28/04/2015	AM	Opportunistic		Gilbert's Dragon	Lophognathus gilberti	Reptiles	numerous juveniles along creek line
Site 3	28/04/2015	AM	Pitfall	P-1	Yellow-sided two-lined dragon	Diporiphora magna	Reptiles	juvenile
Site 3	28/04/2015	PM	Camera		Common Wallaroo	Macropus robustus	Mammals	camera #4 in rocks on jump up. IMAG0004-6
Camp 1	29/04/2015	PM	Opportunistic		Metallic snake-eyed skink	Cryptoblepharus metallicus	Reptiles	
Camp 1	29/04/2015	PM	Opportunistic		pig	Sus scrofa	Mammals	
Camp 1	29/04/2015	PM	Opportunistic		European Cattle	Bos taurus	Mammals	
Camp 1	29/04/2015	PM	Opportunistic		fresh water mussel		Invertebrates	
Camp 1	29/04/2015	PM	Opportunistic		fresh water crab		Invertebrates	
Camp 1	29/04/2015	PM	Opportunistic		Tessellated Gecko	Diplodactylus tessellatus	Reptiles	
Q7 (Andy	29/04/2015	AM	Opportunistic		European Cattle	Bos taurus	Mammals	
Site 1	29/04/2015	AM	Funnel	F-13	Gravelly-soil Ctenotus	Ctenotus lateralis	Reptiles	
Site 1	29/04/2015	AM	Funnel	F-12	Gravelly-soil Ctenotus	Ctenotus lateralis	Reptiles	
Site 1	29/04/2015	AM	Funnel	F-1	Gravelly-soil Ctenotus	Ctenotus lateralis	Reptiles	
Site 1	29/04/2015	AM	Funnel	F-6	Gravelly-soil Ctenotus	Ctenotus lateralis	Reptiles	
Site 2	29/04/2015	AM	Funnel	F-1	Common dwarf skink	Menetia greyii	Reptiles	
Site 2	29/04/2015	AM	Funnel	F-3	Gravelly-soil Ctenotus	Ctenotus lateralis	Reptiles	
Site 2	29/04/2015	AM	Funnel	F-11	Robust ctenotus	Ctenotus robustus	Reptiles	
Site 2	29/04/2015	AM	Funnel	F-11	Gravelly-soil Ctenotus	Ctenotus lateralis	Reptiles	
Site 2	29/04/2015	AM	Funnel	F-13	Robust ctenotus	Ctenotus robustus	Reptiles	
Site 2	29/04/2015	AM	Funnel	F-9	Gilbert's Dragon	Lophognathus gilberti	Reptiles	
Site 3	29/04/2015	AM	Funnel		Gravelly-soil Ctenotus	Ctenotus lateralis	Reptiles	
Site 3	29/04/2015	AM	Camera		Common Wallaroo	Macropus robustus	Mammals	Camo camera #2 In waterway facing game trail. NEED ID IMAG0022-24 Euro (most likely). Based on one individual on camera using game trail. (not a few moving through which may have been the case of reds)
Site 3	29/04/2015	PM	Camera		Common Wallaroo	Macropus robustus	Mammals	camera #4 in rocks on jump up. IMAG0025-30 Still don't know. Not a red as not the right habitat. I don't think the reds would be hoping around those rocks whereas the euro's would be. Ears too big for rock wallaby (I think it is a few meters past where I was standing as I recall a game trail running through there).
WP 180	29/04/2015	AM	Opportunistic		European Cattle	Bos taurus	Mammals	
WP 182	29/04/2015	PM	Opportunistic		Gravelly-soil Ctenotus	Ctenotus lateralis	Reptiles	
WP 182	29/04/2015	PM	Opportunistic		aquatic snail		Invertebrates	shell
WP 182	29/04/2015	PM	Opportunistic		pig	Sus scrofa	Mammals	ran off
WP 182	29/04/2015	PM	Opportunistic		fresh water crab		Invertebrates	shell and burrows
WP 182	29/04/2015	PM	Opportunistic		European Cattle	Bos taurus	Mammals	
WP 183	29/04/2015	PM	Opportunistic		Eyrean Earless Dragon	Tympanocryptis tetraporophora	Reptiles	2 young individuals
WP 183	29/04/2015	PM	Opportunistic		crustacean holes		Invertebrates	
WP 183	29/04/2015	PM	Opportunistic		European Cattle	Bos taurus	Mammals	
Camp 2	30/04/2015	PM	Opportunistic		Pebble Dragon	Tympanocryptis cephalus	Reptiles	
Camp 2	30/04/2015	PM	Opportunistic		Spiny-tailed monitor	Varanus acanthurus	Reptiles	in crevice
Camp 2	30/04/2015	PM	Opportunistic		Bynoe's gecko	Heteronotia binoei	Reptiles	
Camp 2	30/04/2015	PM	Opportunistic		Robust Dtella	Gehyra robusta	Reptiles	x8
Site 1	30/04/2015	AM	Funnel	F-3	Leopard Ctenotus	Ctenotus pantherinus	Reptiles	
Site 1	30/04/2015	AM	Pitfall		Long-tailed Planigale	Planigale ingrami	Mammals	
Site 2	30/04/2015	AM	Funnel	F-1	Gravelly-soil Ctenotus	Ctenotus lateralis	Reptiles	
Site 2	30/04/2015	AM	Funnel	F-2	Robust ctenotus	Ctenotus robustus	Reptiles	Large. SVL > 10cm.
Site 2	30/04/2015	AM	Funnel	F-6	Gilbert's Dragon	Lophognathus gilberti	Reptiles	
Site 2	30/04/2015	AM	Funnel	F-6	Gravelly-soil Ctenotus	Ctenotus lateralis	Reptiles	
Site 2	30/04/2015	AM	Funnel	F-3	Robust ctenotus	Ctenotus robustus	Reptiles	Moderate - large. SVL > 7cm
Site 2	30/04/2015	AM	Funnel	F-12	Robust ctenotus	Ctenotus robustus	Reptiles	Large. SVL > 10cm.

Site 2	30/04/2015	PM	Camera		cat	Felis catus	Mammals	Camo camera #3 facing bank across pool. Light colour cat
Site 3	30/04/2015	AM	Funnel	F-1	Phasmid striped gecko	Strophurus taeniatus	Reptiles	
Site 3	30/04/2015	AM	Funnel	F-1	Common dwarf skink	Menetia greyii	Reptiles	
Site 3	30/04/2015	AM	Funnel	F-2	Gravelly-soil Ctenotus	Ctenotus lateralis	Reptiles	
Site 3	30/04/2015	AM	Pitfall	P-1	Yellow-sided two-lined dragon	Diporiphora magna	Reptiles	x2
Site 3	30/04/2015	AM	Funnel	F-5	Sombre whipsnake	Demansia quaesitor	Reptiles	
Site 3	30/04/2015	AM	Pitfall	P-1	Military dragon	Ctenophorus isolepis	Reptiles	
Site 3	30/04/2015	AM	Pitfall	P-2	Yellow-sided two-lined dragon	Diporiphora magna	Reptiles	x3
Site 3	30/04/2015	AM	Pitfall	P-2	Military dragon	Ctenophorus isolepis	Reptiles	
Site 3	30/04/2015	AM	Pitfall	P-2	Strip-headed finesnout Ctenotus	Ctenotus striaticeps	Reptiles	
Site 3	30/04/2015	AM	Funnel	F-9	Stripe-faced Dunnart	Sminthopsis macroura	Mammals	
Site 3	30/04/2015	AM	Camera		Common Wallaroo	Macropus robustus	Mammals	Camo camera #2 In waterway facing game trail. IMAG0190-2
Site 3	30/04/2015	PM	Camera		Common Wallaroo	Macropus robustus	Mammals	Camo camera #2 In waterway facing game trail. IMAG0526-8
Site 3	30/04/2015	PM	Camera		Common Wallaroo	Macropus robustus	Mammals	Grey camera #5 In gidgee. IMAG00019-21
WP 187	30/04/2015	AM	Opportunistic		European Cattle	Bos taurus	Mammals	
WP 187	30/04/2015	AM	Opportunistic				Reptiles	large reptile scat (bigger than blue tongue scat)
WP 188	30/04/2015	AM	Opportunistic		European Cattle	Bos taurus	Mammals	
WP 188	30/04/2015	AM	Opportunistic				Reptiles	tracks
WP 188	30/04/2015	AM	Opportunistic				Mammals	small mammal tracks
WP 188	30/04/2015	AM	Opportunistic		Ring-tailed Dragon	Ctenophorus caudicinctus	Reptiles	see photo
WP 188	30/04/2015	PM	Opportunistic					many monitor tracks, macropod scat, dragon burrows (small to 20cm wide large in river bank), cows, geckos, windy (not many birds detectable)
Camp 2	1/05/2015	PM	Camera		Purple-necked Rock Wallaby	Petrogale purpureicollis	Mammals	Grey camera #1 facing boulders IMAG0215-30 purple-necked rock wallaby based on the dark brown patch behind the arm (226 also can see the dark patch) 226 also makes it look very rock wallabyish with those arms and face. Locally common there
Camp 2	1/05/2015	AM	Opportunistic		Common Wallaroo	Macropus robustus	Mammals	
Camp 2	1/05/2015	AM	Opportunistic		European Cattle	Bos taurus	Mammals	
Camp 2	1/05/2015	AM	Opportunistic		European Cattle	Bos taurus	Mammals	
Site 1	1/05/2015	AM	Pitfall	P-2	Yellow-sided two-lined dragon	Diporiphora magna	Reptiles	
Site 1	1/05/2015	AM	Funnel	F-13	Gravelly-soil Ctenotus	Ctenotus lateralis	Reptiles	
Site 1	1/05/2015	AM	Funnel	F-4	Gravelly-soil Ctenotus	Ctenotus lateralis	Reptiles	x2
Site 1	1/05/2015	AM	Funnel	F-2	Leopard Ctenotus	Ctenotus pantherinus	Reptiles	
Site 1	1/05/2015	AM	Opportunistic					cow tracks and dung, macropod tracks and scat, windy
Site 2	1/05/2015	AM	Pitfall	P-1	Gravelly-soil Ctenotus	Ctenotus lateralis	Reptiles	
Site 2	1/05/2015	AM	Funnel	F-6	Leopard Ctenotus	Ctenotus pantherinus	Reptiles	
Site 2	1/05/2015	AM	Funnel	F-2	Gravelly-soil Ctenotus	Ctenotus lateralis	Reptiles	
Site 2	1/05/2015	AM	Funnel	F-13	Gilbert's Dragon	Lophognathus gilberti	Reptiles	
Site 2	1/05/2015	AM	Camera		cat	Felis catus	Mammals	Camo camera #3 facing bank across pool. tabby colour cat
Site 2	1/05/2015	PM	Camera		cat	Felis catus	Mammals	Camo camera #3 facing bank across pool. tabby colour cat
Site 3	1/05/2015	PM	Opportunistic		Yellow-sided two-lined dragon	Diporiphora magna	Reptiles	
Site 3	1/05/2015	PM	Opportunistic		Military dragon	Ctenophorus isolepis	Reptiles	
Site 3	1/05/2015	AM	Elliot		Stripe-faced Dunnart	Sminthopsis macroura	Mammals	
Site 3	1/05/2015	AM	Pitfall	P-1	Military dragon	Ctenophorus isolepis	Reptiles	
Site 3	1/05/2015	AM	Funnel	F-4	Gravelly-soil Ctenotus	Ctenotus lateralis	Reptiles	
Site 3	1/05/2015	AM	Funnel	F-2	Strip-headed finesnout Ctenotus	Ctenotus striaticeps	Reptiles	
Site 3	1/05/2015	AM	Funnel	F-10	Leopard Ctenotus	Ctenotus pantherinus	Reptiles	
Site 3	1/05/2015	AM	Funnel	F-13	Yellow-sided two-lined dragon	Diporiphora magna	Reptiles	
Site 3	1/05/2015	PM	Camera		Leopard Ctenotus	Ctenotus pantherinus	Reptiles	Grey camera #5 facing drift fence
WP 191	1/05/2015	AM	Opportunistic				Reptiles	dragon scat
WP 193	1/05/2015	PM	Opportunistic					dragon, macropod scat, orb web spiders, grasshoppers
Site 2	1/05/2015	PM	Camera		dragon		Reptiles	Grey camera #1 facing drift fence. Dragon tail only IMAG1501-2. Not Ta Ta (gilberts) as tail tapers to quick given thickness at base. Could be magna but we can't conclusively say.
Site 2	1/05/2015	PM	Camera		Gilbert's Dragon	Lophognathus gilberti	Reptiles	Grey camera #1 facing drift fence. IMAG1700-3
Site 1	2/05/2015	AM	Funnel	F-5	Leopard Ctenotus	Ctenotus pantherinus	Reptiles	

Site 1	2/05/2015	AM	Funnel	F-2	Striped rainbow skink	Carlia munda	Reptiles	
Site 1	2/05/2015	AM	Funnel	F-1	Robust ctenotus	Ctenotus robustus	Reptiles	
Site 2	2/05/2015	AM	Funnel	F-4	Gilbert's Dragon	Lophognathus gilberti	Reptiles	
Site 2	2/05/2015	AM	Funnel	F-1	Gilbert's Dragon	Lophognathus gilberti	Reptiles	
Site 3	2/05/2015	AM	Funnel	F-5	Strip-headed finesnout Ctenotus	Ctenotus striaticeps	Reptiles	
Site 3	2/05/2015	AM	Funnel	F-2	Gravelly-soil Ctenotus	Ctenotus lateralis	Reptiles	
Site 3	2/05/2015	AM	Funnel	F-8	Leopard Ctenotus	Ctenotus pantherinus	Reptiles	
Site 2	28-29/04/2015		Song Meter		Gould's Wattled Bat	Chalinolobus gouldii	Mammals	
Site 2	28-29/04/2015		Song Meter		Long-eared bat species	Nyctophilus sp.	Mammals	
Site 2	28-29/04/2015		Song Meter		Inland Broad-nosed Bat	Scotorepens balstoni	Mammals	
Site 2	28-29/04/2015		Song Meter		Little Broad-nosed Bat	Scotorepens greyii	Mammals	
Site 2	28-29/04/2015		Song Meter		Inland Forest Bat	Vespadelus baverstocki	Mammals	
Site 2	28-29/04/2015		Song Meter		Northern Freetail-bat, Northern Mastif	Chaerephon jobensis	Mammals	
Site 2	28-29/04/2015		Song Meter		Yellow-bellied Sheathtail-bat	Saccolaimus flaviventris	Mammals	
Site 2	28-29/04/2015		Anabat		Gould's Wattled Bat	Chalinolobus gouldii	Mammals	
Site 2	28-29/04/2015		Anabat		Long-eared bat species	Nyctophilus sp.	Mammals	
Site 2	28-29/04/2015		Anabat		Inland Broad-nosed Bat	Scotorepens balstoni	Mammals	
Site 2	28-29/04/2015		Anabat		Little Broad-nosed Bat	Scotorepens greyii	Mammals	
Site 2	28-29/04/2015		Anabat		Inland Forest Bat	Vespadelus baverstocki	Mammals	
Site 2	28-29/04/2015		Anabat		Finlayson's Cave Bat	Vespadelus finlaysoni	Mammals	
Site 2	28-29/04/2015		Anabat		Northern Freetail-bat, Northern Mastif	Chaerephon jobensis	Mammals	
Site 2	28-29/04/2015		Anabat		Yellow-bellied Sheathtail-bat	Saccolaimus flaviventris	Mammals	
Site 2	28-29/04/2015		Anabat		Hoary Wattled Bat	Chalinolobus nigrogriseus	Mammals	species possibly present, but not reliably identified by call
Site 2	28-29/04/2015		Anabat		Free-tailed bat species	Mormopterus species	Mammals	species possibly present, but not reliably identified by call
Site 2	28-29/04/2015		Song Meter		Free-tailed bat species	Mormopterus species	Mammals	species possibly present, but not reliably identified by call
Site 3	28-29/04/2015		Anabat		Gould's Wattled Bat	Chalinolobus gouldii	Mammals	
Site 3	28-29/04/2015		Anabat		Hoary Wattled Bat	Chalinolobus nigrogriseus	Mammals	species possibly present, but not reliably identified by call
Site 3	28-29/04/2015		Anabat		Little Broad-nosed Bat	Scotorepens greyii	Mammals	
Site 3	28-29/04/2015		Anabat		Northern Cave Bat	Vespadelus caurinus	Mammals	species possibly present, but not reliably identified by call
Site 3	28-29/04/2015		Anabat		Finlayson's Cave Bat	Vespadelus finlaysoni	Mammals	
Site 3	28-29/04/2015		Anabat		Northern Freetail-bat, Northern Mastif	Chaerephon jobensis	Mammals	
Site 3	28-29/04/2015		Anabat		Free-tailed bat species	Mormopterus species	Mammals	species possibly present, but not reliably identified by call
Site 3	28-29/04/2015		Anabat		Yellow-bellied Sheathtail-bat	Saccolaimus flaviventris	Mammals	
Site 3	28/04/2015-02/05/2015		Anabat		Gould's Wattled Bat	Chalinolobus gouldii	Mammals	
Site 3	28/04/2015-02/05/2015		Anabat		Hoary Wattled Bat	Chalinolobus nigrogriseus	Mammals	species possibly present, but not reliably identified by call
Site 3	28/04/2015-02/05/2015		Anabat		Long-eared bat species	Nyctophilus sp.	Mammals	
Site 3	28/04/2015-02/05/2015		Anabat		Inland Broad-nosed Bat	Scotorepens balstoni	Mammals	
Site 3	28/04/2015-02/05/2015		Anabat		Little Broad-nosed Bat	Scotorepens greyii	Mammals	
Site 3	28/04/2015-02/05/2015		Anabat		Inland Forest Bat	Vespadelus baverstocki	Mammals	
Site 3	28/04/2015-02/05/2015		Anabat		Northern Cave Bat	Vespadelus caurinus	Mammals	species possibly present, but not reliably identified by call
Site 3	28/04/2015-02/05/2015		Anabat		Finlayson's Cave Bat	Vespadelus finlaysoni	Mammals	
Site 3	28/04/2015-02/05/2015		Anabat		Northern Freetail-bat, Northern Mastif	Chaerephon jobensis	Mammals	
Site 3	28/04/2015-02/05/2015		Anabat		Northern Free-tailed Bat	Mormopterus lumsdenae (Syn. M. be	Mammals	
Site 3	28/04/2015-02/05/2015		Anabat		Free-tailed bat species	Mormopterus species	Mammals	species possibly present, but not reliably identified by call
Site 3	28/04/2015-02/05/2015		Anabat		Yellow-bellied Sheathtail-bat	Saccolaimus flaviventris	Mammals	
Camp 2	30/04/2015		Song Meter		Gould's Wattled Bat	Chalinolobus gouldii	Mammals	
Camp 2	30/04/2015		Song Meter		Little Broad-nosed Bat	Scotorepens greyii	Mammals	species possibly present, but not reliably identified by call
Camp 2	30/04/2015		Song Meter		Inland Forest Bat	Vespadelus baverstocki	Mammals	species possibly present, but not reliably identified by call
Camp 2	30/04/2015		Song Meter		Northern Cave Bat	Vespadelus caurinus	Mammals	species possibly present, but not reliably identified by call
Camp 2	30/04/2015		Song Meter		Finlayson's Cave Bat	Vespadelus finlaysoni	Mammals	
Camp 2	30/04/2015		Song Meter		Northern Freetail-bat, Northern Mastif	Chaerephon jobensis	Mammals	
Camp 2	30/04/2015		Song Meter		Free-tailed bat species	Mormopterus species	Mammals	species possibly present, but not reliably identified by call
Camp 2	30/04/2015		Anabat		Gould's Wattled Bat	Chalinolobus gouldii	Mammals	
Camp 2	30/04/2015		Anabat		Little Broad-nosed Bat	Scotorepens greyii	Mammals	species possibly present, but not reliably identified by call
Camp 2	30/04/2015		Anabat		Inland Forest Bat	Vespadelus baverstocki	Mammals	species possibly present, but not reliably identified by call
Camp 2	30/04/2015		Anabat		Northern Cave Bat	Vespadelus caurinus	Mammals	
Camp 2	30/04/2015		Anabat		Finlayson's Cave Bat	Vespadelus finlaysoni	Mammals	

Camp 2	30/04/2015		Anabat		Free-tailed bat species	Mormopterus species	Mammals	species possibly present, but not reliably identified by call
Camp 2	30/04/2015		Anabat		Gould's Wattled Bat	Chalinolobus gouldii	Mammals	
Camp 2	30/04/2015		Anabat		Free-tailed bat species	Mormopterus species	Mammals	species possibly present, but not reliably identified by call

AVIFAUNA OBSERVATIONS

O2ECOLOGY **Project Name** NT Link Ecology Surveys (Queensland)
Location Mt Isa to NT border

Site	Date	Time	Type	Easting	Northing	Number of Individuals	Common Name	Scientific Name	Observation	Distance	Comments
Site 1	28/04/2015	10:33:00 AM	Opportunistic	228959	7740996		Zebra finch	Taeniopygia guttata			
Site 1	28/04/2015	10:33:00 AM	Opportunistic	228959	7740996		cockatiel	Nymphicus hollandicus			
Site 1	28/04/2015	10:33:00 AM	Opportunistic	228959	7740996		singing honeyeater	Lichenostomus virescens			
Site 1	28/04/2015	10:33:00 AM	Opportunistic	228959	7740996		little corella	Cacatua sanguinea			
Site 1	28/04/2015	10:33:00 AM	Opportunistic	228959	7740996		budgerigar	Melopsittacus undulatus			
Site 2	28/04/2015	9:18:00 AM	Opportunistic	273969	7728722		crested pigeon	Ocyphaps lophotes			
Site 2	28/04/2015	9:18:00 AM	Opportunistic	273969	7728722		white-necked heron	Ardea pacifica			
Site 2	28/04/2015	9:18:00 AM	Opportunistic	273969	7728722		black kite	Milvus migrans			
Site 2	28/04/2015	9:18:00 AM	Opportunistic	273969	7728722		galah	Eolophus roseicapillus			
Site 2	28/04/2015	9:18:00 AM	Opportunistic	273969	7728722		Australian Ringneck	Barnardius zonarius			
Site 2	28/04/2015	9:18:00 AM	Opportunistic	273969	7728722		white-plumed honeyeater	Lichenostomus penicillatus			
Site 2	28/04/2015	9:18:00 AM	Opportunistic	273969	7728722		yellow-throated miner	Manorina flavigula			
Site 2	28/04/2015	9:18:00 AM	Opportunistic	273969	7728722		grey shrike-thrush	Colluricincla harmonica			
Site 2	28/04/2015	9:18:00 AM	Opportunistic	273969	7728722		whistling kite	Haliastur sphenurus			
Site 2	28/04/2015	9:18:00 AM	Opportunistic	273969	7728722		magpie-lark	Grallina cyanoleuca			
Site 2	28/04/2015	9:18:00 AM	Opportunistic	273969	7728722		varied lorikeet	Psitteuteles versicolor			
Site 2	28/04/2015	9:18:00 AM	Opportunistic	273969	7728722		striated pardalote	Pardalotus striatus			
Site 2	28/04/2015	9:18:00 AM	Opportunistic	273969	7728722		cockatiel	Nymphicus hollandicus			
Site 2	28/04/2015	9:18:00 AM	Opportunistic	273969	7728722		Zebra finch	Taeniopygia guttata			
Site 2	28/04/2015	9:18:00 AM	Opportunistic	273969	7728722		variegated fairy-wren	Malurus lamberti			
Site 2	28/04/2015	9:18:00 AM	Opportunistic	273969	7728722		grey-crowned babbler	Pomatostomus temporalis			
Site 2	28/04/2015	9:18:00 AM	Opportunistic	273969	7728722		brolga	Grus rubicunda			
Site 2	28/04/2015	9:18:00 AM	Opportunistic	273969	7728722		bar-shouldered dove	Geopelia humeralis			
Site 3	29/04/2015	7:22:00 AM	Opportunistic	323275	7710404		weebill	Smicrornis brevirostris			
Site 3	29/04/2015	7:22:00 AM	Opportunistic	323275	7710404		pied butcherbird	Cracticus nigrogularis			
Site 3	29/04/2015	7:22:00 AM	Opportunistic	323275	7710404		crested pigeon	Ocyphaps lophotes			
Site 3	29/04/2015	7:22:00 AM	Opportunistic	323275	7710404		white-plumed honeyeater	Lichenostomus penicillatus			
Site 3	29/04/2015	7:22:00 AM	Opportunistic	323275	7710404		Zebra finch	Taeniopygia guttata			
Site 3	29/04/2015	7:22:00 AM	Opportunistic	323275	7710404		black-faced cuckoo-shrike	Coracina novaehollandiae			
Site 3	29/04/2015	7:22:00 AM	Opportunistic	323275	7710404		striated pardalote	Pardalotus striatus			
Site 3	29/04/2015	7:22:00 AM	Opportunistic	323275	7710404		variegated fairy-wren	Malurus lamberti			
Site 3	29/04/2015	7:22:00 AM	Opportunistic	323275	7710404		budgerigar	Melopsittacus undulatus			
Site 3	29/04/2015	7:22:00 AM	Opportunistic	323275	7710404		Australian Ringneck	Barnardius zonarius			
Site 2	29/04/2015	8:45:00 AM	Opportunistic	273969	7728722		galah	Eolophus roseicapillus			
Site 2	29/04/2015	8:45:00 AM	Opportunistic	273969	7728722		crested pigeon	Ocyphaps lophotes			
Site 2	29/04/2015	8:45:00 AM	Opportunistic	273969	7728722		budgerigar	Melopsittacus undulatus			
Site 2	29/04/2015	8:45:00 AM	Opportunistic	273969	7728722		australian raven	Corvus coronoides			
Site 2	29/04/2015	8:45:00 AM	Opportunistic	273969	7728722		white-necked heron	Ardea pacifica			
Site 2	29/04/2015	8:45:00 AM	Opportunistic	273969	7728722		striated pardalote	Pardalotus striatus			
Site 2	29/04/2015	8:45:00 AM	Opportunistic	273969	7728722		mistletoebird	Dicaeum hirundinaceum			
Site 2	29/04/2015	8:45:00 AM	Opportunistic	273969	7728722		red-winged parrot	Aprosmictus erythropterus			
Site 2	29/04/2015	8:45:00 AM	Opportunistic	273969	7728722		white-plumed honeyeater	Lichenostomus penicillatus			
Site 2	29/04/2015	8:45:00 AM	Opportunistic	273969	7728722		varied lorikeet	Psitteuteles versicolor			
Site 2	29/04/2015	8:45:00 AM	Opportunistic	273969	7728722		torresian crow	Corvus orru			
Site 2	29/04/2015	8:45:00 AM	Opportunistic	273969	7728722		galah	Eolophus roseicapillus			
Site 2	29/04/2015	8:45:00 AM	Opportunistic	273969	7728722		whistling kite	Haliastur sphenurus			
Site 2	29/04/2015	8:45:00 AM	Opportunistic	273969	7728722		little corella	Cacatua sanguinea			
Site 2	29/04/2015	8:45:00 AM	Opportunistic	273969	7728722		black kite	Milvus migrans			
Camp 1	29/04/2015	2:00:00 PM	Opportunistic	197773	7747377		pied butcherbird	Cracticus nigrogularis			
Camp 1	29/04/2015	2:00:00 PM	Opportunistic	197773	7747377		singing honeyeater	Lichenostomus virescens			
Camp 1	29/04/2015	2:00:00 PM	Opportunistic	197773	7747377		budgerigar	Melopsittacus undulatus			
Camp 1	29/04/2015	2:00:00 PM	Opportunistic	197773	7747377		cockatiel	Nymphicus hollandicus			
Camp 1	29/04/2015	2:00:00 PM	Opportunistic	197773	7747377		Zebra finch	Taeniopygia guttata			

Camp 1	29/04/2015	2:00:00 PM	Opportunistic	197773	7747377		white-plumed honeyeater	Lichenostomus penicillatus			
Camp 1	29/04/2015	2:00:00 PM	Opportunistic	197773	7747377		black kite	Milvus migrans			
Camp 1	29/04/2015	2:00:00 PM	Opportunistic	197773	7747377		budgerigar	Melopsittacus undulatus			
Camp 1	29/04/2015	2:00:00 PM	Opportunistic	197773	7747377		pacific black duck	Anas superciliosa			
Camp 1	29/04/2015	2:00:00 PM	Opportunistic	197773	7747377		black-faced woodswallow	Artamus cinereus			
Camp 1	29/04/2015	2:00:00 PM	Opportunistic	197783	7747265		mistletoebird	Dicaeum hirundinaceum			
Camp 1	29/04/2015	2:00:00 PM	Opportunistic	197783	7747265		galah	Eolophus roseicapillus			
Camp 1	29/04/2015	2:00:00 PM	Opportunistic	197783	7747265		australian raven	Corvus coronoides			
Camp 1	29/04/2015	2:00:00 PM	Opportunistic	197783	7747265		white-breasted woodswallow	Artamus leucorynchus			
Camp 1	29/04/2015	2:00:00 PM	Opportunistic	197783	7747265		black-faced cuckoo-shrike	Coracina novaehollandiae			
Camp 1	29/04/2015	2:00:00 PM	Opportunistic	197783	7747265		willie wagtail	Rhipidura leucophrys			
Camp 1	29/04/2015	2:00:00 PM	Opportunistic	197783	7747265		australian owlet-nightjar	Aegotheles cristatus			
Camp 1	29/04/2015	2:00:00 PM	Opportunistic	197783	7747265		grey fantail	Rhipidura fuliginosa			
Camp 1	29/04/2015	2:00:00 PM	Opportunistic	197783	7747265		whistling kite	Haliastur sphenurus			
Camp 1	29/04/2015	2:00:00 PM	Opportunistic	197783	7747265		black-faced cuckoo-shrike	Coracina novaehollandiae			
Camp 1	29/04/2015	2:00:00 PM	Opportunistic	197783	7747265		grey butcherbird	Cracticus torquatus			
Site 1	30/04/2015	9:30:00 AM	Opportunistic	228959	7740996		wedge-tailed eagle	Aquila audax			
Site 2	30/04/2015	11:49:00 AM	Opportunistic	273969	7728722		black kite	Milvus migrans			
Site 2	30/04/2015	11:49:00 AM	Opportunistic	273969	7728722		whistling kite	Haliastur sphenurus			
Site 2	30/04/2015	11:49:00 AM	Opportunistic	273969	7728722		weebill	Smicrornis brevirostris			
Site 2	30/04/2015	11:49:00 AM	Opportunistic	273969	7728722		varied lorikeet	Psitteuteles versicolor			
Site 2	30/04/2015	11:49:00 AM	Opportunistic	273969	7728722		grey-headed honeyeater	Lichenostomus keartlandi			
Site 2	30/04/2015	11:49:00 AM	Opportunistic	273969	7728722		white-plumed honeyeater	Lichenostomus penicillatus			
Site 2	30/04/2015	11:49:00 AM	Opportunistic	273969	7728722		galah	Eolophus roseicapillus			
Site 2	30/04/2015	11:49:00 AM	Opportunistic	273969	7728722		torresian crow	Corvus orru			
Site 2	30/04/2015	11:49:00 AM	Opportunistic	273969	7728722		white-necked heron	Ardea pacifica			
Site 2	30/04/2015	11:49:00 AM	Opportunistic	273969	7728722		crested pigeon	Ocyphaps lophotes			
Camp 2	30/04/2015	3:26:00 PM	Opportunistic	329784	7704474		brown goshawk	Accipiter fasciatus			visual all light under with dark wing tips, grey above. Photos
Camp 2	30/04/2015	2:35:00 PM	Opportunistic	329761	7704530		White-throated Honeyeater	Melithreptus albogularis			
Camp 2	1/05/2015	7:50:00 AM	Opportunistic	329762	7704529		budgerigar	Melopsittacus undulatus			
Timber reserve	2/05/2015		Opportunistic	344301	7707468		rufous whistler	Pachycephala rufiventris			andy in timber reserve
Timber reserve	2/05/2015		Opportunistic	344301	7707468		spinifex pigeon	Geophaps plumifera			andy in timber reserve
Camp 1	29/04/2015		Camera	197786	7747335		owl				Grey camera #1 facing pool. owl species
Site 2	30/04/2015	4:53:00 PM	Camera	274057	7728723		white-necked heron	Ardea pacifica			Camo camera #3 facing bank across pool
Site 2	30/04/2015	5:02:00 PM	Camera	274057	7728723		torresian crow	Corvus orru			Camo camera #3 facing bank across pool
Site 2	30/04/2015	5:05:00 PM	Camera	274057	7728723		white-necked heron	Ardea pacifica			Camo camera #3 facing bank across pool
Site 2	1/05/2015	8:31:00 AM	Camera	274057	7728723		australian raven	Corvus coronoides			Camo camera #3 facing bank across pool
Site 2	1/05/2015	2:28:00 PM	Camera	274057	7728723		magpie-lark	Grallina cyanoleuca			Camo camera #3 facing bank across pool
Site 3	28/04/2015	5:51:00 PM	Camera	323245	7710426		australian raven	Corvus coronoides			Grey camera #5 In gidgee
WP 182	29/04/2015	12:22:00 PM	Opportunistic	218180	7744103		wedge-tailed eagle	Aquila audax			
WP 182	29/04/2015	12:22:00 PM	Opportunistic	218180	7744103		galah	Eolophus roseicapillus			
WP 182	29/04/2015	12:22:00 PM	Opportunistic	218180	7744103		brolga	Grus rubicunda			
WP 187	30/04/2015	10:22:00 AM	Opportunistic	240540	7738421		budgerigar	Melopsittacus undulatus			
WP 187	30/04/2015	10:22:00 AM	Opportunistic	240540	7738421		Zebra finch	Taeniopygia guttata			
WP 188	30/04/2015	11:12:00 AM	Opportunistic	262520	7733051		nankeen kestrel	Falco cenchroides			
WP 188	30/04/2015	11:12:00 AM	Opportunistic	262520	7733051		Zebra finch	Taeniopygia guttata			
site 1	1/05/2015	9:41:00 AM	Opportunistic	228959	7740996		willie wagtail	Rhipidura leucophrys			
site 1	1/05/2015	9:41:00 AM	Opportunistic	228959	7740996		singing honeyeater	Lichenostomus virescens			
WP 191	1/05/2015	10:19:00 AM	Opportunistic	252451	7736248		black-faced woodswallow	Artamus cinereus			
WP 191	1/05/2015	10:19:00 AM	Opportunistic	252451	7736248		singing honeyeater	Lichenostomus virescens			
WP 191	1/05/2015	10:19:00 AM	Opportunistic	252451	7736248	9	little corella	Cacatua sanguinea			
Site 2	1/05/2015	11:09:00 AM	Opportunistic	273969	7728722		little woodswallow	Artamus minor			
Site 2	1/05/2015	11:09:00 AM	Opportunistic	273969	7728722		pied butcherbird	Cracticus nigrogularis			
Site 2	1/05/2015	11:09:00 AM	Opportunistic	273969	7728722		australian magpie	Cracticus tibicen			
Site 2	1/05/2015	11:09:00 AM	Opportunistic	273969	7728722		grey-headed honeyeater	Lichenostomus keartlandi			
Site 2	1/05/2015	11:09:00 AM	Opportunistic	273969	7728722		white-plumed honeyeater	Lichenostomus penicillatus			
Site 2	1/05/2015	11:09:00 AM	Opportunistic	273969	7728722		striated pardalote	Pardalotus striatus			
Site 2	1/05/2015	11:09:00 AM	Opportunistic	273969	7728722		galah	Eolophus roseicapillus			
Site 2	1/05/2015	11:09:00 AM	Opportunistic	273969	7728722		white-necked heron	Ardea pacifica			

Site 2	1/05/2015	11:09:00 AM	Opportunistic	273969	7728722		crested pigeon	Ocyphaps lophotes			
Site 2	1/05/2015	11:09:00 AM	Opportunistic	273969	7728722		willie wagtail	Rhipidura leucophrys			
Site 2	1/05/2015	11:09:00 AM	Opportunistic	273969	7728722		yellow-throated miner	Manorina flavigula			
WP 192	1/05/2015	11:45:00 AM	Opportunistic	280577	7725843		brown falcon	Falco berigora			
Site 3	1/05/2015	12:44:00 PM	Opportunistic	323275	7710404		brown falcon	Falco berigora			
Site 3	1/05/2015	12:44:00 PM	Opportunistic	323275	7710404		weebill	Smicrornis brevirostris			
Site 3	1/05/2015	12:44:00 PM	Opportunistic	323275	7710404		red-backed kingfisher	Todiramphus pyrrhopygius			
Site 3	1/05/2015	12:44:00 PM	Opportunistic	323275	7710404		white-plumed honeyeater	Lichenostomus penicillatus			
Site 3	1/05/2015	12:44:00 PM	Opportunistic	323275	7710404		striated pardalote	Pardalotus striatus			
Site 3	1/05/2015	12:44:00 PM	Opportunistic	323275	7710404		australian magpie	Cracticus tibicen			
Site 3	1/05/2015	12:44:00 PM	Opportunistic	323275	7710404		black-faced cuckoo-shrike	Coracina novaehollandiae			
Site 3	1/05/2015	12:44:00 PM	Opportunistic	323275	7710404		grey shrike-thrush	Colluricincla harmonica			
Site 3	1/05/2015	12:44:00 PM	Opportunistic	323275	7710404		Zebra finch	Taeniopygia guttata			
WP 193	1/05/2015	1:21:00 PM	Opportunistic	307430	7715675		grey-headed honeyeater	Lichenostomus keartlandi			
WP 194	1/05/2015	1:48:00 PM	Opportunistic	316165	7714311		wedge-tailed eagle	Aquila audax			
WP 194	1/05/2015	1:48:00 PM	Opportunistic	316165	7714311		weebill	Smicrornis brevirostris			
Camp 1	30/04/2015	6:50:00 AM	Point Count/Sur	197773	7747389	2	magpie-lark	Grallina cyanoleuca	H		
Camp 1	30/04/2015	6:50:00 AM	Point Count/Sur	197773	7747389	2	white-plumed honeyeater	Lichenostomus penicillatus	H		
Camp 1	30/04/2015	6:50:00 AM	Point Count/Sur	197773	7747389	3	white-plumed honeyeater	Lichenostomus penicillatus	H		
Camp 1	30/04/2015	6:50:00 AM	Point Count/Sur	197773	7747389	1	white-faced heron	Egretta novaehollandiae	S		
Camp 1	30/04/2015	6:50:00 AM	Point Count/Sur	197773	7747389	1	willie wagtail	Rhipidura leucophrys	SH		
Camp 1	30/04/2015	6:50:00 AM	Point Count/Sur	197773	7747389	1	black-faced cuckoo-shrike	Coracina novaehollandiae	SH		
Camp 1	30/04/2015	6:50:00 AM	Point Count/Sur	197773	7747389	1	australian raven	Corvus coronoides	SH		
Camp 1	30/04/2015	7:03:00 AM	Point Count/Sur	197828	7747443	20	white-breasted woodswallow	Artamus leucorynchus	SH		
Camp 1	30/04/2015	7:03:00 AM	Point Count/Sur	197828	7747443	12	galah	Eolophus roseicapillus	SH		
Camp 1	30/04/2015	7:03:00 AM	Point Count/Sur	197828	7747443	2	cockatiel	Nymphicus hollandicus	SH		
Camp 1	30/04/2015	7:03:00 AM	Point Count/Sur	197828	7747443	1	white-plumed honeyeater	Lichenostomus penicillatus	SH		
Camp 1	30/04/2015	7:03:00 AM	Point Count/Sur	197828	7747443	1	pied butcherbird	Cracticus nigrogularis	H		
Camp 1	30/04/2015	7:03:00 AM	Point Count/Sur	197828	7747443	3	black-faced cuckoo-shrike	Coracina novaehollandiae	SH		
Camp 1	30/04/2015	7:03:00 AM	Point Count/Sur	197828	7747443	20	cockatiel	Nymphicus hollandicus	SH		
Camp 1	30/04/2015	7:03:00 AM	Point Count/Sur	197828	7747443	1	masked woodswallow	Artamus personatus	S		
Camp 1	30/04/2015	7:03:00 AM	Point Count/Sur	197828	7747443	1	crested pigeon	Ocyphaps lophotes	SH		
Camp 1	30/04/2015	7:03:00 AM	Point Count/Sur	197828	7747443	34	white-breasted woodswallow	Artamus leucorynchus	S		
Camp 1	30/04/2015	7:03:00 AM	Point Count/Sur	197828	7747443	1	black kite	Milvus migrans	S		
Camp 1	30/04/2015	7:03:00 AM	Point Count/Sur	197828	7747443	1	Zebra finch	Taeniopygia guttata	H		
Camp 1	30/04/2015	7:03:00 AM	Point Count/Sur	197828	7747443	1	mistletoebird	Dicaeum hirundinaceum	SH		
Camp 1	30/04/2015	7:03:00 AM	Point Count/Sur	197828	7747443	7	yellow-throated miner	Manorina flavigula	SH		
Camp 1	30/04/2015	7:32:00 AM	Point Count/Sur	197837	7747479	1	mistletoebird	Dicaeum hirundinaceum	SH		
Camp 1	30/04/2015	7:32:00 AM	Point Count/Sur	197837	7747479	1	collared sparrowhawk	Accipiter cirrocephalus	SH		
Camp 1	30/04/2015	7:32:00 AM	Point Count/Sur	197837	7747479	2	torresian crow	Corvus orru	H		
Camp 1	30/04/2015	7:32:00 AM	Point Count/Sur	197837	7747479	4	masked woodswallow	Artamus personatus	SH		
Camp 1	30/04/2015	7:32:00 AM	Point Count/Sur	197837	7747479	3	black-faced woodswallow	Artamus cinereus	SH		
Camp 1	30/04/2015	7:32:00 AM	Point Count/Sur	197837	7747479	25	cockatiel	Nymphicus hollandicus	SH		
Camp 1	30/04/2015	7:32:00 AM	Point Count/Sur	197837	7747479	8	crested pigeon	Ocyphaps lophotes	S		
Camp 1	30/04/2015	7:32:00 AM	Point Count/Sur	197837	7747479	1	willie wagtail	Rhipidura leucophrys	S		
Camp 1	30/04/2015	7:32:00 AM	Point Count/Sur	197837	7747479	2	australian raven	Corvus coronoides	H		
Camp 1	30/04/2015	7:32:00 AM	Point Count/Sur	197837	7747479	2	magpie-lark	Grallina cyanoleuca	SH		
Camp 1	30/04/2015	7:32:00 AM	Point Count/Sur	197837	7747479	1	red-backed kingfisher	Todiramphus pyrrhopygius	S		
Camp 1	30/04/2015	7:32:00 AM	Point Count/Sur	197837	7747479	2	white-plumed honeyeater	Lichenostomus penicillatus	S		
Camp 2	1/05/2015	6:45:00 AM	Point Count/Sur	329823	7704503	1	Zebra finch	Taeniopygia guttata	H		
Camp 2	1/05/2015	6:45:00 AM	Point Count/Sur	329823	7704503	1	common bronzewing	Phaps chalcoptera	S		
Camp 2	1/05/2015	6:45:00 AM	Point Count/Sur	329823	7704503	2	Zebra finch	Taeniopygia guttata	SH		
Camp 2	1/05/2015	6:45:00 AM	Point Count/Sur	329823	7704503	4	variegated fairy-wren	Malurus lamberti	SH		
Camp 2	1/05/2015	6:45:00 AM	Point Count/Sur	329823	7704503	1	Australian Ringneck	Barnardius zonarius	H		
Camp 2	1/05/2015	6:45:00 AM	Point Count/Sur	329823	7704503	10	black-faced cuckoo-shrike	Coracina novaehollandiae	S		
Camp 2	1/05/2015	6:45:00 AM	Point Count/Sur	329823	7704503	1	australian raven	Corvus coronoides	SH		
Camp 2	1/05/2015	7:20:00 AM	Point Count/Sur	329918	7704129	1	grey-headed honeyeater	Lichenostomus keartlandi	SH		
Camp 2	1/05/2015	7:20:00 AM	Point Count/Sur	329918	7704129	1	australian raven	Corvus coronoides	H		
Camp 2	1/05/2015	7:20:00 AM	Point Count/Sur	329918	7704129	1	grey-headed honeyeater	Lichenostomus keartlandi	SH		

Camp 2	1/05/2015	7:30:00 AM	Point Count/Sur	329951	7704283	2	spotted bowerbird	Ptilonorhynchus maculatus	S		

Appendix J Construction Methods and Timing

Construction Methods and Timing as supplied by Steve Fox (Steve.Fox@apa.com.au) by email June 17, 2015 4:57 PM

APA has also committed to the following mitigation measures during construction, as supplied by Steve Fox (Steve.Fox@apa.com.au) by email 19 June 2015 5:39 PM:

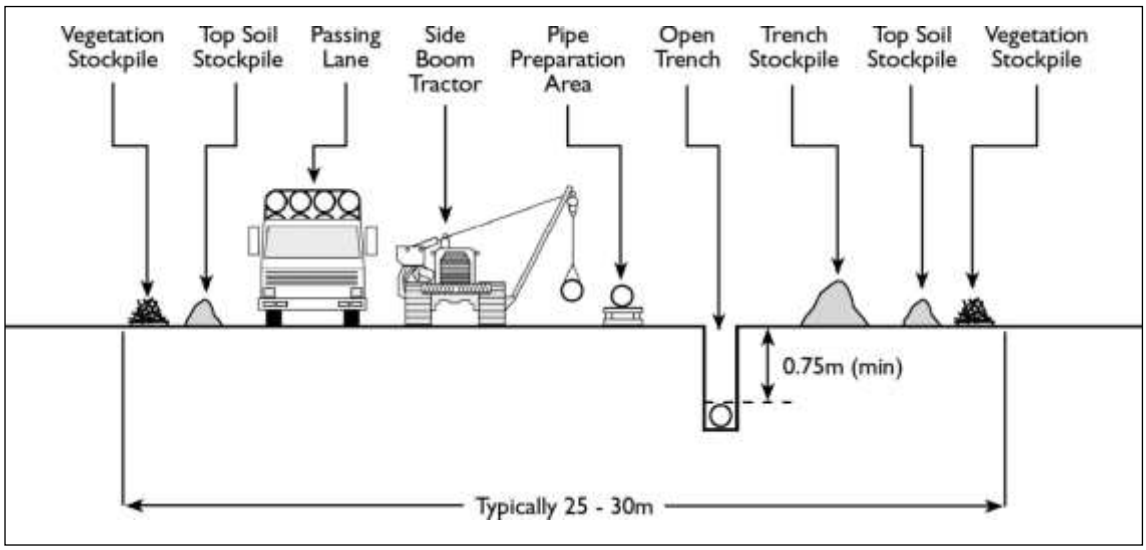
(1) Fauna spotter/catchers on site whenever there is an open trench
(2) Preclearance flora and fauna surveys in advance of clearing activities
(3) Felled brush/trees will not be burnt and will be retained in regular stockpiles in the vicinity of the ROW (subject to landholder agreement)
(4) Hollow-bearing trees (if/when encountered) will be preferentially avoided to the extent practicable (i.e. subject to consideration of safety, cultural heritage, landholder and constructability constraints).

Construction Methods and Timing

All construction will be conducted in general accordance with the applicable standards and codes, particularly 'AS2885 Pipelines – gas and liquid petroleum' and the guidelines within APGA Code of Environment Practice (APGA 2013). Works will also be carried out according to the approved Construction Environmental Management Plan (CEMP). The CEMP will, in part, provide for any appropriate management measures needed to avoid and minimise potential impacts on ecological resources. This includes measures such as vegetation pre-clearance checks and supervision of any works in ecologically sensitive areas, as appropriate.

The pipeline's construction will typically be carried out within a 30m-wide Construction Corridor - using a production line approach. An indicative cross-section of an active pipeline Construction Corridor is shown in Figure 1.

Figure 1: Typical construction cross-section (not-to-scale)



Source: APIA 2013

1.1.1 Pipeline Installation

A number of specialised crews pass along the easement, joining and installing the pipeline then backfilling and rehabilitating the Construction Corridor. Typical construction activities expected for the pipeline are described in Table 1.

Table 1: Typical Pipeline Construction Activities

Activity	Description
Detailed survey	Engineering, environmental and cultural heritage surveys are used both in route selection and to determine if any special construction techniques or mitigation measures are required. Once the preferred pipeline route has been determined, the centreline is surveyed and marked and engineering aspects are finalised. Markers are placed to identify the pipeline route and Construction Corridor and important environmental and cultural items from the Construction Line List
Fencing	Fences are severed and construction gates installed to allow access
Clear and	Graders and bulldozers are used to clear the Construction

Activity	Description
Grade	Corridor to provide for construction activities. This Construction Corridor may be widened if required at watercourse crossings. Cleared vegetation will be stockpiled separately. Topsoil will typically be graded off and stored separately
Stringing	Steel pipe is trucked to the construction site and sections laid end-to-end next to the trench. The sections are placed on sandbags and raised on blocks of wood (timber skids) to protect the pipe from corrosion and coating damage
Bending	Where required, pipe sections are bent to match changes in either elevation or direction of the route
Welding	Pipe sections are welded together
Non-destructive weld testing	The pipe welds are inspected using x-ray or ultrasonic equipment, as per AS 2885.2
Joint coating	The area around the weld is grit-blasted and then coated with a protective coating to prevent corrosion
Trenching	After the route is cleared, a trench is dug for the pipeline by either a trenching machine or an excavator in accordance with pre-defined depths of burial. The required depths are determined by a risk assessment process and recorded on construction alignment sheets. Trench spoil is stockpiled within the Construction Corridor, usually on the non-working side. Trench spoil is stockpiled separately to topsoil. The trenches will be ramped at regular intervals to allow larger fauna to escape. The period that any part of a trench will be left open will be minimised. Where possible, trenching will be delayed until completion of the welding and joint coating as part of ensuring that the trench will be open for the minimum amount of time
Padding	Where required, padding machines are used to sift the excavated subsoil to remove coarse materials to prevent damage to the pipe coating. The remaining fine material is used to pad beneath and on top of the buried pipe. In some instances (e.g. rocky soils), imported sand or foam pillows will be used for padding
Lowering-in	Side booms or excavators are used to lower the welded pipe into the trench
Backfilling	Trench spoil is returned to the trench and material compacted to minimise the likelihood of subsidence of material over the pipe
Restoration and Rehabilitation	The Construction Corridor is re-contoured to match surrounding landform, and erosion controls constructed where necessary. Separately stockpiled topsoil is then re-spread evenly across the Construction Corridor and any stockpiled vegetation placed across the Construction Corridor, to assist in soil retention, provision of seed stock and fauna shelter. Reseeding or revegetation of the Construction Corridor, using appropriate species (i.e. crops/pasture or indigenous native species of the right provenance), will be undertaken to restore vegetation

Activity	Description
	cover. An access track will remain as bare ground
Signage	Information signs indicating the presence of the buried pipeline are erected along the Construction Corridor line-of-sight, as per AS 2885.1

1.1.2 Trenched Watercourse Crossings

The Queensland portion of NT Link is expected to cross various temporary drainage lines and to intersect Mica Creek around KP620-626; it is currently expected that all watercourse crossings will use an open trench methodology.

Crossings completed by open-cut excavation require excavation of the banks and watercourse bed, to achieve the required minimum safe depth for pipe location at approximately 2m below the stable watercourse bed.

The increased burial depth is required to maintain pipeline integrity by ensuring flow events do not expose the pipeline. There will also be the need to extend this excavation through the riverbank profile for some distance away from the river channel - which is expected to result in a requirement for increased working width in the Construction Corridor to enable safe excavation of the trench and installation of the pipeline.

Erosion and sediment control (ESC) measures will be implemented to ensure there are no significant erosion impacts in the vicinity of the crossing - and the ongoing integrity of the crossing architecture will be monitored as part of the ongoing ROW maintenance commitment. ESC measures to be installed will comply with the objectives of the International Erosion Control Association Guidelines (IECA 2008).

1.1.3 Borrow Pits

Borrow pits to win material for temporary access tracks, laydown areas, etc, may be required, with the need dependent on final demand calculations. Should a new borrow pit be required, its establishment will be discussed with the applicable landowner and regulators on a case-by-case basis, with approval from the regulatory authorities to be secured prior to the establishment of any new pit.

1.1.4 Pressure Testing

Pipeline integrity is verified using hydrostatic testing, conducted in accordance with AS 2885.5. During hydrostatic testing, the pipeline is capped with test manifolds, filled with water and pressurised up to a minimum of 125% of design maximum operating pressure for a minimum of two hours. A minimum 24-hour duration leak test then follows.

Providing it meets applicable water quality guidelines and surface disposal has landholder approval, hydro-test water is discharged to the surrounding environment, applying the minimum performance standards of the APGA Code of Environmental Practice (2013) and any other applicable standards / requirements. Water for pressure testing will be sourced from adjacent properties, with agreement from the applicable landowner; if additional groundwater is needed, extraction approval will be sought from the regulators.

As an indication of the volumes involved, the total volume of a 14” NT Link pipe extending for 632km would be approximately 63ML (or approximately 25 Olympic swimming pools), indicating this would be the total volume of hydrotest water required if all water was used just once.

In general, it is expected that no chemicals will be added to hydro-test water as the pipeline is internally coated and coatings may be affected by aggressive water additives. However, in some locations chemicals may need to be added if there is danger of water with a very high pH affecting the integrity of the internal coating. In such cases - and subject to regulatory approval - the water may be treated to neutralise alkaline elements to an appropriate standard before discharge to the environment. This discharge is a once-off event during commissioning of the pipeline and water is re-used wherever possible for multiple hydrotesting applications.

1.1.5 Access Tracks

Construction access tracks will be required where pipe delivery and construction contractor access to the Construction Corridor is required. Existing tracks will be used wherever possible and any additional clearing for access tracks – which will be quantified once the final detailed alignment is settled - will be conducted in accordance with the applicable permit, with the approval of the applicable landowner and in accordance with the standards enunciated in the project CEMP and the APGA Code of Environmental Practice (COEP) (APGA 2013).

The total number of access tracks for the entire alignment (in both NT and Queensland) is likely to be 20-30, with the final number driven by alignment definition and location of camps and other ancillary works. It is likely that approximately 5-10 access tracks will be required in Queensland.

In general, station tracks will be used - upgraded if required - to get as close to the alignment as possible, with new turn-outs built only to allow Construction Corridor access if / when required. For the purposes of project footprint calculations, it will be conservatively assumed every second access track will require clearing.

Access tracks will be rehabilitated at the end of construction, unless the landholder requests they are left for the landowner's use – in which case they will be left in a stable condition.

After construction, a 3m-wide strip within the NT Link Construction Corridor will provide a track for ongoing operational maintenance access.

1.1.6 Additional Surface Infrastructure

Additional surface infrastructure required by the Project will include the following components:

- Scrapper station (< 50m^2)
- Pipeline inlet facilities (50m^2)
- Two Compressor stations (500mx700m for construction; 200mx150m operational)
- Main Line Valve sites (25m^2, every 75km along alignment)
- Temporary construction camp sites (5 in total, area TBC)
- Temporary areas for laydowns and additional workspace for truck turnarounds, washdown facilities and communication towers (area TBC)

Where practicable, the additional surface infrastructure will located outside any ecologically sensitive areas. The opportunity to co-locate surface infrastructure will be realised wherever practicable.

In addition to the above, a gas processing facility may be required. At the time of writing it is not confirmed whether this facility will be located in Queensland or the Northern Territory. However, for the purposes of this assessment it is assumed it will be in Queensland. The facility will occupy a construction footprint of approximately 500m^2, but its final operational footprint will be circa 400m^2.

1.1.7 Waste Management

All project waste will be managed in accordance with a Waste Management Plan based on industry best practice and in accordance with the Queensland Environmental Protection Policy (Waste Management) and all applicable legislated requirements. Waste management will be based on the waste hierarchy - avoidance, re-use, recycling and disposal. General refuse shall be collected and transported to a Local Government approved disposal site.

1.1.8 Pipeline Operations

The NT Link pipeline will be operated under an approved Operations Environment Management Plan and in accordance with the requirements of its Pipeline Licence. The pipeline itself will be managed as a part of the existing and well-established APA system.

Specific pipeline operations and maintenance activities which will apply include:

- General equipment and facility maintenance
- Filter changes
- Cathodic protection surveys
- Pipeline excavation
- Venting
- Pipeline pigging
- Pipeline patrols
- Easement, facility and equipment inspections
- Breakdown and emergency response exercises.

Fuel and resource requirements for the NT Link operations are expected to be minimal.

Pipeline Construction Corridor patrols will be the primary mode of monitoring the pipeline during operations. Vehicle patrols are completed by pipeline technicians at least annually and involve visual inspections of the pipeline corridor from a light vehicle. Aerial patrols may be completed more frequently – up to as often as monthly or after significant events such as flooding. Patrols may identify issues such as:

- 3rd-party encroachments
- Vegetation growth
- Presence of weeds
- Erosion
- Exposed pipe
- Condition of signage and aerial markers.

Additional patrols are envisaged for the initial stages post construction. These will include monitoring and inspection as a part of the pipeline construction defects liability period for the pipeline construction contractor, as well as inspections by landowners, tenement holders and 3rd-party infrastructure owners for compliance with agreement conditions.