Gladstone - Fitzroy Pipeline

Initial Advice Statement

Gladstone Area Water Board

Gladstone - Fitzroy Pipeline

Initial Advice Statement

Department of Infrastructure

July 2007

Arup
Ove Arup Pty Ltd ABN 18 000 966 165

Arup
Level 4 Mincom Central, 192 Ann Street, Brisbane QLD 4000 Australia, GPO Box 685, Brisbane QLD 4001
Tel +61 +7 3023 6000 Fax +61 +7 3023 6023
www.arup.com

Job number 86118

Job title	Gladstone - Fitzroy Pipeline	Job number
		86118
Document title	Initial Advice Statement	File reference

Document ref

Revision	Date				
Draft 1	03/05/07	Filename	0001 Initial Advice Statement.doc		
		Description	First draft		
			Prepared by	Checked by	Approved by
		Name	Kay Casson	Sally Wilson	Cathy Crawley
		Signature			
Draft 2	08/05/07	Filename	0003 Initial Advice Statement.doc		
		Description	Revised draft following internal review		
			Prepared by	Checked by	Approved by
		Name	Kay Casson	Sally Wilson	Cathy Crawley
		Signature			
Draft 3	08/05/07	Filename	0005 Initial Advice Statement.doc		
		Description	Revised draft for issue		
			Prepared by	Checked by	Approved by
		Name	Kay Casson	Sally Wilson/David Murchland	Cathy Crawley/David Murchland
		Signature			
Final Draft	17/05/07	Filename	0006 Initial Advice Statement.doc		
		Description	Revised following GAWB review		
			Prepared by	Checked by	Approved by
		Name	Kay Casson	Sally Wilson/David Murchland	Cathy Crawley/David Murchland
		Signature			

Issue Document Verification with Document ✓

Job title	Gladstone - Fitzroy Pipeline	Job number 86118
Document title	Initial Advice Statement	File reference

Document ref

Revision	Date				
Issue	30/05/07	Filename	0007 Initial Advice Statement.doc		
		Description	For issue to DoI		
			Prepared by	Checked by	Approved by
		Name	Kay Casson	Sally Wilson/David Murchland	Cathy Crawley/David Murchland
		Signature			
Rev A	10/07/07	Filename	0007 Initial Advice Statement_revised 070710.doc		
		Description	Revised following comments from DoI		
			Prepared by	Checked by	Approved by
		Name	Kay Casson	Sally Wilson/David Murchland	Jim Grayson
		Signature			
		Filename			
		Description			
			Prepared by	Checked by	Approved by
		Name			
		Signature			
		Filename			
		Description			
			Prepared by	Checked by	Approved by
		Name			
		Signature			

Issue Document Verification with Document ✓

Contents

Tables

Figures

Photographs

Executive Summary

The subject of this IAS is the proposed Gladstone-Fitzroy Pipeline. This project would be undertaken to deliver an allocation of water from the Fitzroy River into the Gladstone Area Water Board's (GAWB) supply network in the Gladstone State Development Area.

The Gladstone region has experienced a significant decrease in rainfall over the last 40 years and Queensland as a whole is currently in severe drought. These conditions have resulted in a reduction in inflows to Gladstone's only water source, Awoonga Dam. GAWB and its customers rely upon Awoonga Dam as the sole source of water. The Gladstone region is a rapidly expanding industrial and transport hub and the efficient management of the region's water is vital for the region to grow and develop. This will in turn deliver economic benefits to both the state and national economies. The proposed expansion of GAWBs infrastructure is a key element in ensuring a continued reliable supply of water to the region.

GAWB's strategic water planning process considered a number of options including:

- Fitzroy River pipeline;
- Seawater desalination;
- Demand management measures, particularly conversion to seawater cooling or air cooling for industrial or power facilities;
- Raising of Awoonga Dam; and
- Other new weirs or dams.

The Fitzroy River pipeline and seawater desalination were ranked as the top two of the available options that could satisfy all of GAWB's objectives. Of these, the pipeline has advantages in cost, certainty and the ability to be delivered soonest.

GAWB is seeking designation of the pipeline project as outlined in the IAS as a 'significant project requiring an EIS' under the *State Development and Public Works Organisation Act 1971* (SDPWOA). This Acts sets out the requirements for environmental assessment and public review of the EIS. A referral will also be submitted to the Department of Environment and Water Resources (DEWR) under the EPBC Act as the project potentially has an impact to matters of National Environmental Significance. The EIS will be undertaken through the SDPWOA process through the bilateral agreement between the State and Federal Governments and will be in accordance with the Terms of Reference prepared by the State Government with input from the Federal Government. The scoping and preliminary works phase has been completed and work is now being undertaken to secure the necessary approvals and undertake the design to enable construction to be completed by mid to late 2010, if necessary.

The Stanwell Gladstone Infrastructure Corridor (SGIC) is expected to be declared a State Development Area in June 2007 under the *State Development and Public Works Organisation Act* 1971 (SDPWOA). The proposed Gladstone-Fitzroy Pipeline is likely to be the first pipeline located within the SGIC and will be within this corridor for the majority of its length.

The proposed pipeline will be capable of transferring 30GL of water per annum from the Fitzroy River to Gladstone industrial water users. The proposed pipeline route and infrastructure sites are being selected based on environmental, social and economic criteria and will be further refined during the EIS phase of the project.

The intake point is proposed to be located at a site on the southern bank of the Fitzroy River in the vicinity of an existing SunWater pump station that supplies Stanwell. This site is referred to as Laurel Bank and is approximately 17km upstream of Rockhampton's Alexandra Bridge. From the intake point water will be pumped to a new water treatment plant, before the pipeline joins the Stanwell – Gladstone Infrastructure Corridor (SGIC). The pipeline is intended to run within the proposed SGIC for the majority of its length and then connect to the Gladstone State Development Area (**Figure 1**)

from where the pipeline will connect with existing Gladstone water infrastructure. The pipeline traverses the local government areas of Fitzroy Shire, Rockhampton City, Calliope Shire and Gladstone City.

Elements of the project include the intake point in the Fitzroy River, a water treatment plant, 3 pump stations along the pipeline, and storages.

Baseline Environment

Investigations have been undertaken into the baseline environment of the project area. This included preliminary ecological field work. There are 163 Regional Ecosystems (RE's) that occur in the Brigalow Belt Bioregion and 145 in the Southeast Queensland Bioregion. As part of the preliminary investigations for this phase of the project, ecological fieldwork has been conducted in the study area using Regional Ecosystem Mapping as a basis to investigate the most intact patches of native vegetation intersected by the corridor route and to identify other unmapped patches. The location of the pipeline and other infrastructure has been selected to avoid RE's where possible.

Flora species of greatest concern (as identified during preliminary field work – full report in Appendix A) are endangered (under the NCA and EPBC Act) scrub species that have been defined mainly by RE 11.11.18 but are not restricted to this RE. Also of concern is the possible impact to two cycads, endangered under the NCA and EPBC which are known to occur in the study area (WBM 2007). The presence of these species will be further investigated during detailed field work in the EIS phase.

Field investigations identified 147 terrestrial vertebrate fauna species either recorded within the mapped corridor and/or recorded from similar habitats within approximately three kilometres of the corridor. The fauna assemblage was comprised of 17 mammal, 11 reptile, two frog and 117 bird species. Further fieldwork is likely to increase the species richness for the study area (Ecoserve 2007).

A large proportion of the recorded fauna species are common and widespread within both sub-bioregions in which the project area is located. Seven species recorded in the current surveys are listed as rare, threatened or otherwise significant under the provisions of the NC Act and or EPBC Act.

Of particular significance are areas of known and potential habitats for the critically endangered (under the EPBC Act) Yellow Chat. Yellow Chat sitings and habitat have been described by Houston (2006) and RLMS (2006) and occur within the pipeline corridor in the vicinity of Raglan Creek (**Figure 7**). Further detailed fieldwork will be undertaken during the EIS phase to assess and minimise the potential impact to this species.

The Fitzroy River Delta and Fitzroy River Floodplain are designated as wetlands of importance by the Queensland EPA. Approximately 5km of the study area traverses the Fitzroy Floodplain wetland (**Figure 8**). The study area traverses approximately 3km of the Fitzroy River Delta. The Port Curtis coastal wetland is also a wetland of importance and includes all of Port Curtis and coastal areas. At the closest point the study area is approximately one kilometre from this wetland.

The nearest World Heritage Area is the Great Barrier Reef Marine Park which includes all marine areas to the east of the site. The Fitzroy River flows into this area approximately 70km downstream of the intake point in an area classified as a general use zone (Great Barrier Reef Marine Park Authority 2006)

The majority of the land traversed by the pipeline or impacted by the WTP or pump stations is freehold land (**Figure 9**).

The Project corridor passes through two registered native title claims, namely the Port Curtis Coral Coast (PCCC) claim between Gladstone and approximately Raglan, and the Darumbal claim between about Raglan and the Fitzroy River.

It is intended that a Cultural Heritage Management Plan (CHMP) pursuant to part 7 of the Aboriginal Cultural Heritage Act 2003 will be undertaken during the EIS phase of the project. Expectations are that the CHMP will include cultural heritage surveys of the length of the Project area, and this activity will define all of the cultural heritage sites and areas that will require management (Archaeo 2007).

Searches of the Register of the National Estate (compiled and maintained by the Australian Heritage Commission) and the State Heritage Register (compiled and maintained by the Queensland Environmental Protection Agency) were conducted to ascertain if any historic heritage sites fall within, or in close proximity to, the Project area. 3 registered sites are within the vicinity of the project.

The pipeline and associated infrastructure is located in rural areas with low population density. The nearest residential zoned land is the southern area of Rockhampton which is approximately one kilometre from the project boundary. Special use areas in Rockhampton City are approximately 700 metres from the project boundary. There are rural properties and homesteads along the route alignment. Discussions with landowners in the SGIC have been conducted by the Department of Infrastructure to minimise the impact to these properties. Similar discussions will be held by GAWB for the specifics of this project.

Potential Impacts and Mitigation Measures - Construction

The project will require the clearing of vegetation, typically in a 30m corridor or Right of Way for the pipeline. Vegetation will also be cleared for infrastructure sites and storage areas. The potential impacts of the project are outlined below and will be further investigated during the EIS phase.

Flora and Fauna

Clearing of vegetation may result in the loss and fragmentation of habitat for fauna species and threatened species known to occur in the study area may also be removed or impacted during this process. There is the potential for the spread of weeds, feral animals and pathogens both within the corridor and adjacent to the corridor as a result of the project.

Typical management measures to be implemented during the construction phase to mitigate the identified impacts include:

- Clearing of the minimum vegetation required for construction and the trimming of trees where possible to avoid total removal (particularly in environmentally sensitive areas and at creek crossings);
- Appropriate revegetation of the corridor as soon as possible after construction;
- Checking for fauna species and relocation prior to the removal of habitat; and
- The implementation of work practices which prevent the establishment (or further promotion) of introduced weed species and weed removal in accordance with appropriate procedures.

Soils and Geology

Impacts to soil during the construction phase will result from the removal of topsoil during trenching and grading and the compaction of soil on access routes and work areas. Soil profiles will also be disrupted during trenching and grading. There is the potential for erosion and sedimentation once vegetation has been cleared and soil is exposed to the effects of wind or rain. There is the potential for contaminated land to occur within the project boundary and this will be identified where possible during the EIS phase of the project There are also some areas of the route that have high potential for the presence of Acid Sulphate Soils and this may be encountered during grading, trenching or watercourse crossings.

Typical management measures to reduce the impacts to soils during construction include the following:

- Minimising the time that soil is exposed by rapid work methods and rehabilitation of the site;

- Detailed investigations to identify areas of ASS and the implementation of ASS management measures during construction in accordance with QASSIT Guidelines to prevent acidification of soil and water and impacts to flora or fauna;
- Timing of construction activities to take account of weather conditions and reduce the likelihood of erosion; and
- Implementation of erosion and sediment controls which will be specified in the EMP for the project.

Hydrology and Water Quality

Works in streams and riparian areas may result in erosion of river banks, changes to flow regimes, and sedimentation of watercourses.

Typical management measures to minimise the impact to hydrology and watercourses will include:

- The use of appropriate creek crossing methods depending on the environment and nature of the creek;
- The appropriate storage of fuels and hazardous substances away from watercourses or drainage lines;
- Minimising the time that soil is exposed by rapid work methods and rehabilitation of the site; and
- Erosion and sediment control measures during construction

Air Quality

Construction activities may impact local air quality through the emissions from machinery and construction vehicles, and the generation of dust as a result disturbance of soils during trenching and grading. It is also possible that increased traffic on unsealed roads may cause localised dust impacts to nearby residences (the nature of the route means that there are few residential areas in close proximity that are likely to be impacted)

Further air quality assessment will be conducted in the EIS phase however it is expected that air quality impacts will be minor and localised and will be mitigated through the following measures:

- Maintenance of construction machinery to reduce emissions;
- The use of designated and well maintained access routes; and
- The use of water trucks as necessary for dust suppression although this should be minimised to reduce water use.

Socio Economic

There are beneficial and adverse socio-economic impacts resulting from the project. The main beneficial impact and reason for the project is the continued supply of water to GAWB's existing and future customers and provision for the associated regional economic growth. The construction phase will impact land use and access through the clearing of vegetation, the severance of agricultural/pastoral land uses and presence of construction machinery and vehicles on local roads and access tracks. The impact to land uses will be largely temporary as the pipeline trench will be covered and rehabilitated immediately after construction.

Land use and access impacts will typically be mitigated through the following measures:

- Further discussions with landowners to discuss the location of access tracks and other provisions during construction to reduce the land use impact;
- Consultation with Queensland Rail and the Department of Main Roads regarding major road and rail crossings; and
- Traffic management during construction to reduce the impact of construction vehicles on local roads and land uses.

Noise

There is likely to be noise generated from construction machinery and activities which may cause temporary disturbance to adjacent residences. Additional noise and vibration would also be generated on local access roads due to the increase in traffic associated with construction vehicles.

Typical noise mitigation measures will include the following:

- Consultation with landowners prior to noise generating activities;
- Restricted work hours in noise sensitive areas; and
- Noise attenuation measures for pump stations such as vegetation screening and acoustic fittings.

Visual and Landscape

The removal of vegetation, alteration of the landscape and presence of construction machinery during construction are likely to impact the visual and landscape qualities of the area. Visual and landscape impacts will typically be mitigated following construction by the rehabilitation and revegetation of the pipeline corridor where possible, however the corridor will be kept free of large trees so some visual impact will persist.

Cultural heritage

Known or unknown cultural heritage artefacts may be impact during construction works. Detailed cultural heritage investigations and consultation with indigenous and local/historical groups will be necessary as part of the EIS process, to minimise the potential for these impacts. This will include the preparation of a Cultural Heritage Management Plan.

Built Environment

Impacts to the built environment during construction may result from the increased traffic on local and other roads as well as road and rail crossings. Increased construction traffic has the potential to cause degradation of roads, and road and rail crossings may cause temporary disruption to traffic in these corridors. These impacts will typically be minimised through the following measures:

- Traffic management during construction to reduce the impact to local road infrastructure; and
- Consultation with Queensland Rail and the Department of Main Roads to ensure the road and rail crossings cause minimum disruption.

Potential Impacts and Mitigation Measures – Operation

The impacts during operation of the pipeline are both beneficial and adverse. The beneficial impacts relate to the increased security of water supply and economic benefits to the region. Adverse effects relate to the potential social and environmental impacts from maintenance and repair activities.

Maintenance and repair activities required during operation of the pipeline will require key access routes to be maintained and localised earthworks to gain access to certain sections of the pipeline as required. The impacts to the natural, social and built environment during operation will be similar to those outlined above for construction; however would occur on a much smaller scale and be infrequent. This is because repairs and maintenance will only occur on small sections of the pipeline at one time. The mitigation measures outlined for construction will also be used as required during maintenance and repair works.

Potential operational impacts relate to land use and access, pipeline failure, vegetation management, weed and pest management and soil stability and erosion.

1 Introduction

1.1 Background

A number of investigations and water supply strategies that are of particular importance to this project have been developed by Gladstone Area Water Board (GAWB) and others in the years since the 1996-2003 drought.

In 2003 the Department of Natural Resources and Mines (now Department of Natural Resources and Water – DNRW) initiated the Central Queensland Regional Water Supply Strategy (CQRWSS) process, which aimed to provide a long term regional strategy for managing Central Queensland's water resources. GAWB participated in development of this strategy, which was formally released in December 2006.

As part of its own strategic planning, GAWB prepared the report "Securing the Gladstone Region's Future: Water, Final Report of Gladstone Area Water Board's Strategic Planning Project (Nov 2004)". This report (referred to as the SWP) identified the region's future water needs and the preferred strategic options for GAWB to meet these needs and aimed to feed into the CQRWSS. The SWP considered water use efficiency options, demand management options, surface water options and desalination options.

The preferred option identified by the SWP was a pipeline to transfer water from the Fitzroy River to storage at Aldoga from where it could supply existing and potentially new industrial customers in the Gladstone area. The CQRWSS identified that this water allocation, transferred to Gladstone, would improve water supply security regionally. The pipeline to convey this allocation between the Fitzroy and Gladstone is the subject of this IAS. The scoping and preliminary works phase has been completed and work is now being undertaken to secure the necessary approvals and undertake the design to enable construction to be completed by the end of 2010.

In 2006 the Coordinator General (now Department of Infrastructure – DoI) commissioned a corridor investigation for a multi-user infrastructure corridor between Rockhampton (specifically the Stanwell Energy Park) and the Gladstone State Development Area - a distance of approximately 88km. This investigation included discussion with potential users of the corridor, identification and assessment of corridor options and recommendation of a preferred corridor. As a result of this process, a preferred corridor for the Stanwell to Gladstone Infrastructure Corridor (SGIC) was identified. This corridor is approximately 100m wide although in some areas is as wide as 2.5km due to environmental or geographic constraints. Ongoing refinement of this corridor has been undertaken by DoI in consultation with landowners, and declaration of the corridor as a State Development Area is scheduled for June 2007under the *State Development and Public Works Organisation Act* 1971 (SDPWOA).

The proposed Gladstone Fitzroy Pipeline is likely to be the first pipeline located within the SGIC and will be within this corridor for the majority of its length. From the Fitzroy River to the entrance into the SGIC, the pipeline traverses predominantly freehold land and to the South of the SGIC, the pipeline will be within the Gladstone State Development Area (GSDA) before connecting to the existing Gladstone system.

Associated infrastructure, which is related to the project but which is not covered in this IAS, since it will be delivered by proponent(s) other than GAWB, is the raising of Eden Bann weir and/or the Fitzroy Barrage and/or the construction of a new weir at Rookwood to increase storage capacity in the Fitzroy River. These projects are being planned by the State Government and regional stakeholders, and elements sufficient to secure GAWB's allocation are scheduled for completion by 2011.

1.2 The proponent

GAWB is a commercialised Statutory Authority under the Water Act 2000, responsible for the continued supply of water to the Gladstone region. The contact details for the proponent are:

Jim Grayson

Chief Executive Officer

Gladstone Area Water Board

PO Box 466 Gladstone Qld 4680

Ph: (07) 4976 3000

Fax: (07) 4972 5632

1.3 Purpose and Scope of the Document

This IAS aims to provide information on the proposed project for the following purposes:

- To assist the Coordinator General to make a decision on 'significant project' declaration, or other potential declarations of project status under the *State Development and Public Works Organisation Act 1971;*
- To enable stakeholders to determine the nature and level of their interest in the proposal; and
- To enable the preparation of Terms of Reference for an EIS for the proposed project.

The information provided in this IAS is based on preliminary desk based research and existing documentation about the study area as well as preliminary ecological field work that has been undertaken for the project. Figure 1 shows the project boundary.

At the time of writing this IAS the footprint of the proposed pipeline and associated infrastructure had been defined however functional design had not been completed. Field investigations and further research will be undertaken during the EIS phase. A detailed environmental management plan will also be developed as part of the EIS.

1.4 Stakeholder Engagement

A public engagement plan has been developed for the project to inform and educate the community about the project, to enable the community to provide feedback and to communicate with the relevant project stakeholders. Government, community and business stakeholders have been identified and they are grouped by their level of involvement and interests in the project.

Engagement is planned throughout the project with a focus on the EIS public display phase. Several methods of communication are planned, for example:

- Briefing sessions;
- Landowner visits;
- Information line;
- Enquiry email;
- Newsletters, brochures/flyers;
- Website;
- Media releases; and
- Public displays.

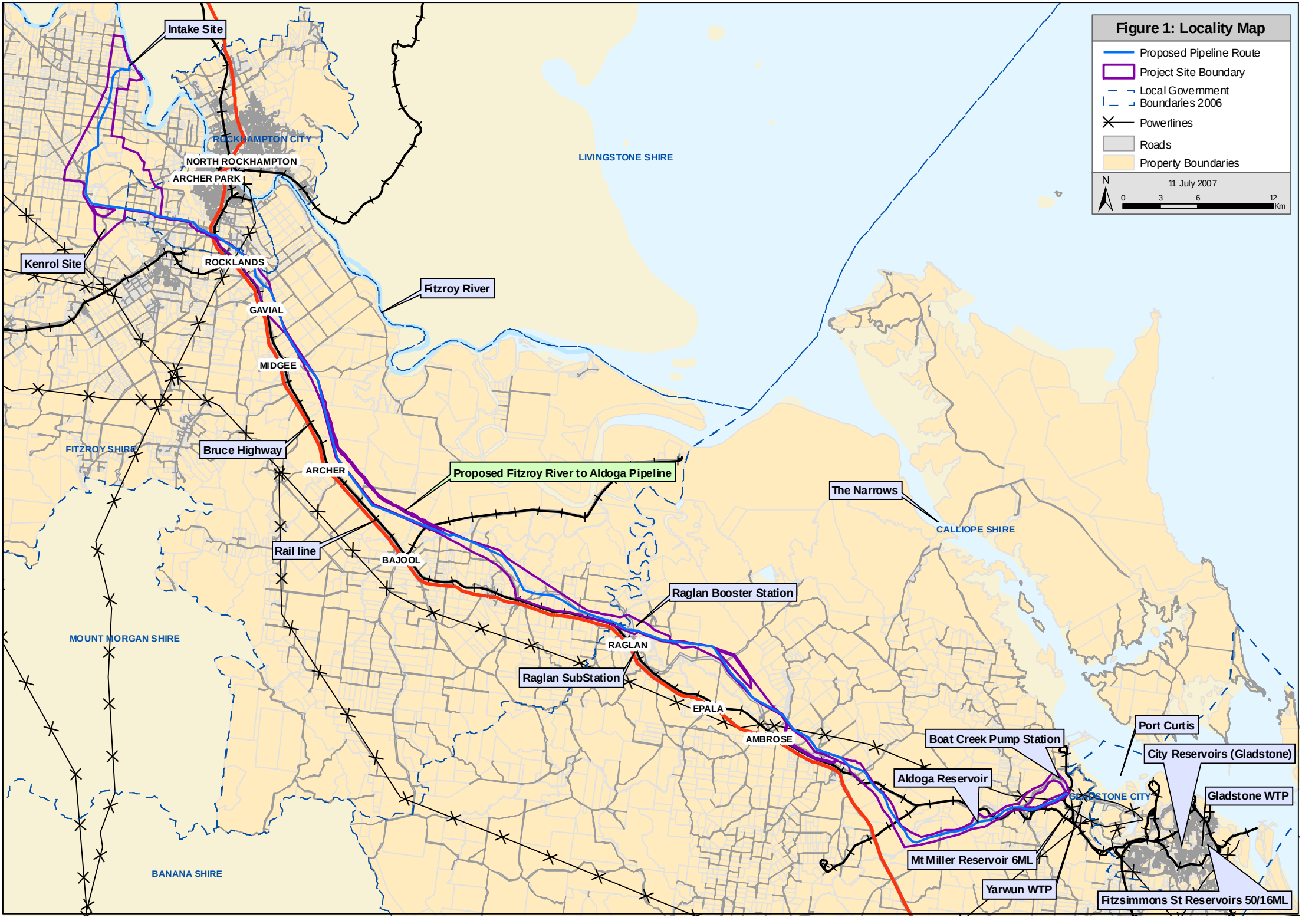


Figure 1: Locality Map
Proposed Pipeline Route
Project Site Boundary
Local Government Boundaries 2006
Powerlines
Roads
Property Boundaries
N
11 July 2007
0 3 6 12
Km
Intake Site
Kenrol Site
ROCKHAMPTON CITY
NORTH ROCKHAMPTON
ARCHER PARK
ROCKLANDS
GAVIAL
MIDGEE
ARCHER
BAJOOL
RAGLAN
EPALA
AMBROSE
LIVINGSTONE SHIRE
FITZROY SHIRE
MOUNT MORGAN SHIRE
BANANA SHIRE
CALLIOPE SHIRE
Fitzroy River
Bruce Highway
Rail line
Proposed Fitzroy River to Aldoga Pipeline
The Narrows
Raglan Booster Station
Raglan SubStation
Boat Creek Pump Station
Aldoga Reservoir
Mt Miller Reservoir 6ML
Yarwun WTP
Port Curtis
City Reservoirs (Gladstone)
GLADSTONE CITY
Gladstone WTP
Fitzsimmons St Reservoirs 50/16ML

1.5 Legislative Context and Approvals Requirements

1.5.1 General

GAWB will be seeking designation of the project, pursuant to the IAS, as a 'significant project requiring an EIS' under the SDPWOA. This Acts sets out the requirements for environmental assessment and public review of the EIS. A referral will also be submitted to the Department of Environment and Water Resources (DEWR) under the EPBC Act as the project potentially has an impact to matters of National Environmental Significance. The EIS will be undertaken through the SDPWOA process through the bilateral agreement between the State and Federal Governments and will be in accordance with the Terms of Reference prepared by the State Government with input from the Federal Government.

Other legislation applicable to the project is outlined in Table 1 below:

Table 1: Legislation with potential applicability to this project

Legislation	Description	Relevance to the project
FEDERAL LEGISLATION		
Environmental Protection and Biodiversity Conservation Act 1999	Approval under this act is triggered through significant impact on the environment of Commonwealth Land and/or matters of National Environmental Significance (NES).	A referral will be submitted to the Department of Environment and Water Resources (DEWR) under the EPBC Act as the project is considered to impact matters of National Environmental Significance.
Native Title Act 1993	This Act provides for the recognition and protection of native title and establishes ways in which dealings affecting native title may proceed	Works on land subject to native title require an indigenous land use agreement
The Aboriginal and Torres Strait Islander Heritage Protection Act 1984	Provides Aboriginal people with the right to request the federal Minister for Aboriginal Affairs to intervene through an injunction in cases where they consider that their cultural heritage is at risk. This Act does not determine significance, or limit the type and place for which protection is being sought.	
Australian Heritage Council Act 2003	Provides for the establishment of the Australian Heritage Council, which is the principal advisory group to the Australian Government on heritage matters. This Act also provides for registration of places considered of national significance on the Register of the National Estate (RNE) or the Australian Heritage Places Inventory (AHPI).	Relevant for any places of national heritage significance within the project boundary.
QUEENSLAND LEGISLATION		
Native Title (Queensland) Act 1993	This Act provides for the recognition and protection of native title and establishes ways in which dealings affecting native title may proceed specific to Queensland	Works on land subject to native title require an indigenous land use agreement
The Integrated Planning Act 1997	The *Integrated Planning Act 1997* (IPA) provides the Integrated Development Assessment System (IDAS), which is the key system operating within Queensland for the integration of State and Local Government development approvals.	Approvals required under this act as the work involves aspects of development as defined by the IPA including material change of use and operational works.
Environmental Protection Act 1994 (and associated regulations and policies for noise, air, water and waste)	Section 319 of the *Environmental Protection Act 1994* imposes a general 'duty of care', which specifies that a person must not undertake any activity that may harm the environment without taking reasonable and practical measures to prevent or minimise the harm.	Undertaking an Environmental Relevant Activity requires IDAS approval under this act.
Aboriginal Cultural Heritage Act 2003	This Act ensures a 'Duty of Care' during construction projects to prevent damage to items of Aboriginal Cultural Heritage Significance. Refer Section 28 – Duty of Care Guidelines	A Cultural Heritage Management Plan will be prepared for the project in consultation with aboriginal parties
Nature Conservation Act 1994	This Act regulates the protection of listed species and protected areas in Queensland.	A permit would be required for interfering with protected plants or animals.
Land Protection (Pest and Stock Route Management) Act 2002	This Act is applicable to projects involving working in areas of, spreading and / or keeping declared plants or animals.	It is likely declared plants or animals will be encountered during the works and the proponent has an obligation to

Legislation	Description	Relevance to the project
		remove these species
Agricultural Chemicals Distribution Control Act 1966	Under this Act, a license is required for certain weed spraying operations.	Weed spraying operations that may be undertaken during operation or commissioning of the pipeline
Chemical Usage (Agricultural and Veterinary Control) Act 1989	Under this Act a permit is required for the possession and/or use of a registered/ unregistered/ proscribed chemical product.	Possession or use of certain chemical products required for weed or pest control during the project
Vegetation Management Act 1999	This Act regulates the clearing of vegetation on freehold land	Removal of protected vegetation within the pipeline Right of Way
Fisheries Act 1994	This Act provides for the use, conservation and enhancement of the community's fisheries resources and fish habitats	A permit would be required under this act for the removal of marine plants.
Water Act 2000	Under this Act a permit is required for works impacting riverine vegetation or placing fill in a watercourse A water license is also required for the extraction of water	The pipeline will cross designated watercourses and riverine vegetation will also be impacted at the intake point A water license would be required for the extraction of water from the Fitzroy River
City Council Local Laws	Various local laws eg for vegetation protection	Interfering with protected vegetation under the local law
Various	Other approvals will be required for the project under various legislation	e.g. • Works in local government roads • Building works • Ancillary works and encroachments in a State Controlled road • Works interfering with a railway

2 The Proposal

2.1 Water Supply and Demand Considerations

2.1.1 Background

2.1.1.1 Supplies

GAWB and its customers rely upon Awoonga Dam, on the Boyne River, as the sole source of water. A number of other alternative water sources are also used by GAWB's customers. Awoonga Dam is owned by GAWB, and has a storage capacity of 770,000ML.

GAWB completed the raising of Awoonga Dam to 40m AHD in June 2002. Until the raised Dam first overtops, the notional Historic No Failure Yield (HNFY) at 36.94m AHD has been estimated as 70,000 ML pa. It is understood that the HNFY at higher water levels will increase by approximately 2,500ML pa for every metre increase in the maximum water level recorded up to the current 40m AHD spillway height.

In March 2004 Awoonga Dam peaked at 36.94m AHD (587,540ML) or 75% of its full storage capacity. Inflows for the following three years have collectively been 66% lower than the average of the worst 10 year historical sequence. This is illustrated in **Figure 2** and **Figure 3**.

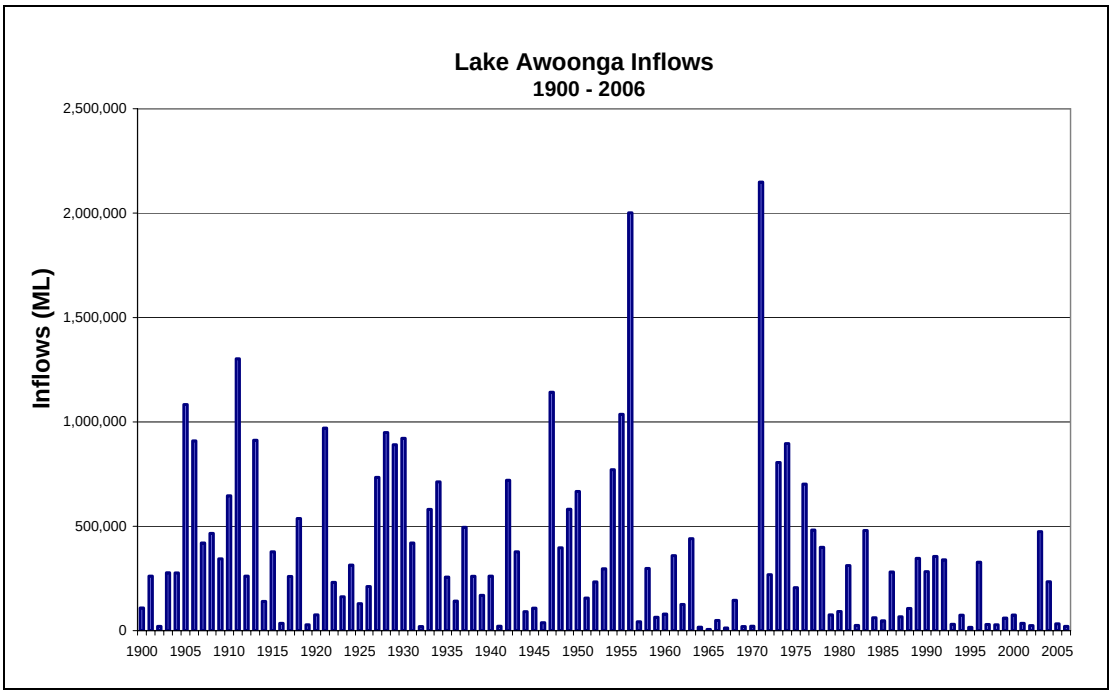


Figure 2: Lake Awoonga Inflows, 1900 – 2006

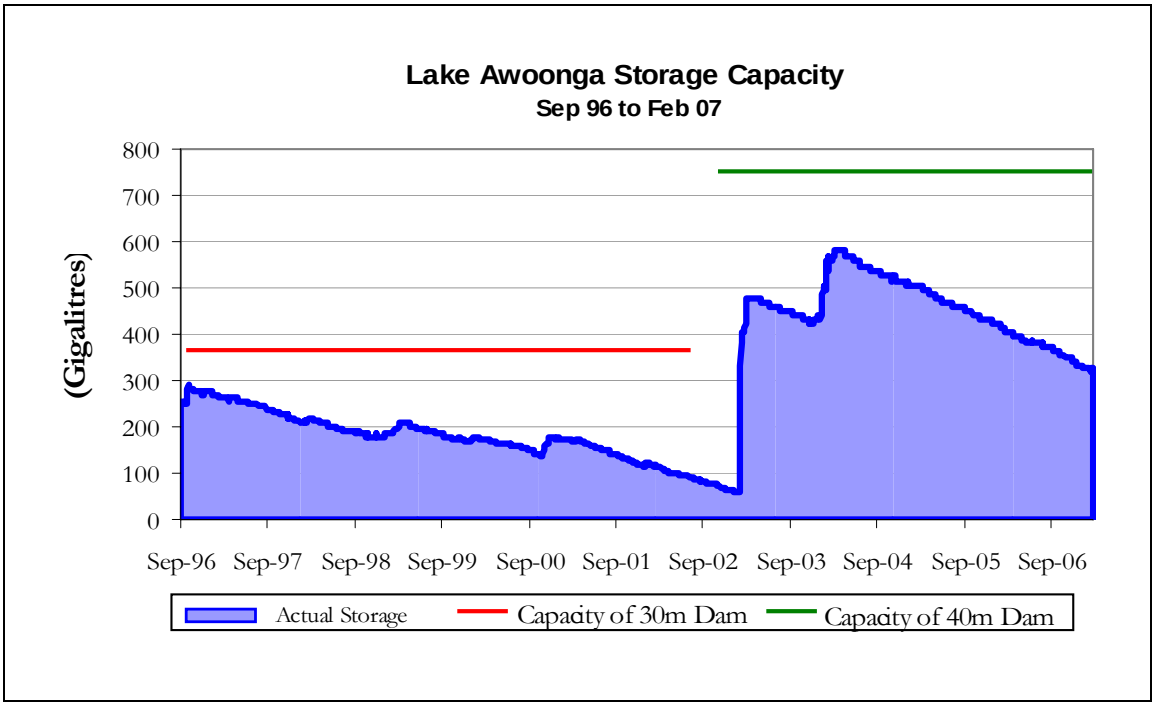


Figure 3: Lake Awoonga Storage Capacity, Sep 1996 – Feb 2007

At early March 2007 Awoonga Dam was storing approximately 41% capacity – some 321,000ML. At early May 2007 the average of the past 3 years inflow was assessed at 66% worse than the average of the worst ten years on record (that being the basis of the calculation of the HNFY, via which GAWB's current 70,000 ML/a allocation is set).

2.1.1.2 Demands

GAWB is currently obliged to supply some 55,000ML per annum. Unlike most regions in Australia, this water is largely required to service major industry.

Supplies to power stations in the Callide Valley comprise some 40% of total demand from Awoonga Dam. Industrial users within the Gladstone City and Calliope shires (including Rio Tinto Aluminium (formerly Comalco), Gladstone Power Station, Orica, QAL and BSL) account for a further 40%. Both raw and treated water are supplied to this customer segment. In addition, the above local governments themselves account for approximately 20% of total demand to service residential and commercial customers.

Gladstone is a burgeoning industrial centre of national significance due the availability of a number of key resources and infrastructure including port, energy, rail and water. It is expected that growth in industrial demand will continue into the future, with a number of major industrial developments currently being considered by various proponents.

Given the composition of GAWB's customer base, it is not surprising that the growth in demand over time has occurred in large increments based on major new industrial water users commencing operations in the region. This would be best demonstrated in terms of the increments in new commitments faced by GAWB in the past, as these commitments (e.g. to supply up to a maximum volume) drive augmentation decisions. Such data is not available, in part due to the nature of early contracts, however Figure 4 sets out historic deliveries and illustrates this point. This lumpy pattern of increases in demand is likely to continue into the future.

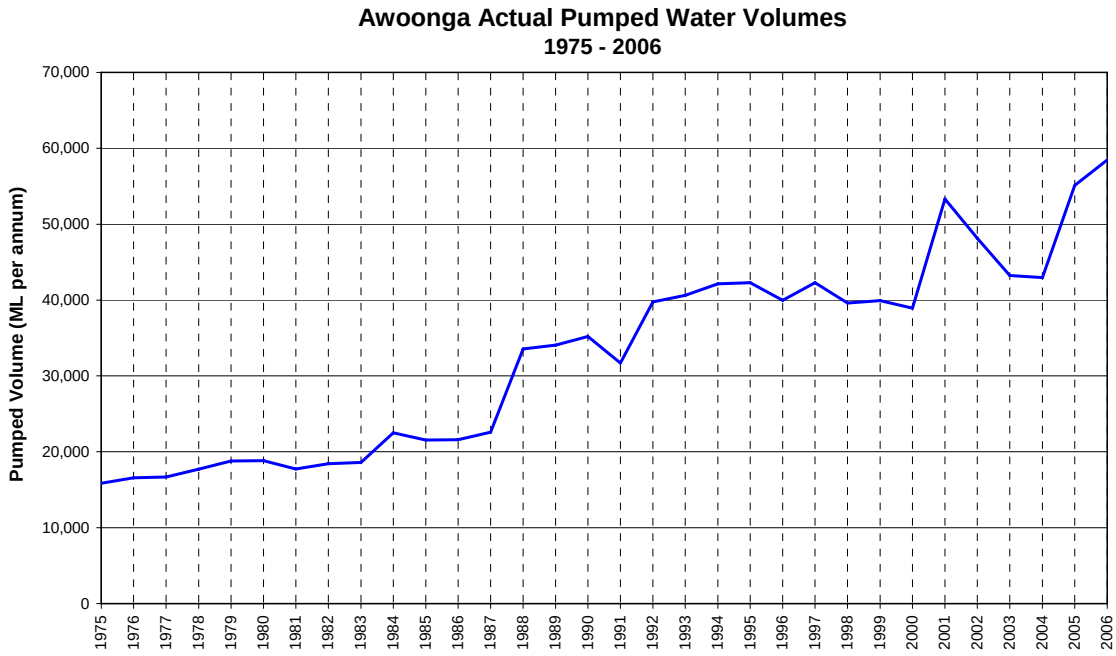


Figure 4: Awoonga Actual Pumped Water Volumes, 1975 – 2006

2.1.1.3 The Water Supply Planning Context

Given the lumpy nature of increases in demand over time, and the uncertainty surrounding major industrial projects that are in the feasibility stage, it is not possible to forecast demand with adequate levels of certainty. Moreover, previous forecasts based largely on subjective assessments of the likelihood of these projects proceeding, and the period and volumes of water they ultimately require, have not corresponded with actual demand.

A prudent water supplier should have in place plans to supply reasonably expected demand growth. In the context of GAWB's uncertain, yet lumpy, demand environment this involves either holding more spare capacity than would be prudent in a slow growing urban environment or having contingent supply plans in place to cope with large demand increments.

To date, GAWB's supply has been determined by hydrologic assessments of the sustainable yield from Awoonga Dam. GAWB is unable to commit to obligations to supply water that will result in it exceeding its water allocation from Awoonga Dam. The *Water Resource (Boyne River Basin) Plan (WRP)* sets a benchmark performance for this allocation based on the HNFY of Awoonga Dam. The subsequent ROP approved and implemented by DNRW determined GAWB's water entitlements accordingly.

This HNFY is dependent upon volumes that could be supplied to sustain the worst period of inflows into Awoonga Dam, taken over a historic sequence of storage inflows (the critical period). The HNFY will reduce upon the occurrence of a new critical period (that is a series of inflows that is worse than that previously believed to have occurred). This risk is asymmetric, that is, HNFY will never increase as a result of changes to inflow profile given the critical period is the determining parameter. Indeed, a number of downward revisions have already been made since the early 1990's.

If HNFY continues as the benchmark reliability standard, the volumes available from Awoonga Dam will reduce upon a new critical period occurring. This occurred in 1993-2003, resulting in a yield re-assessment down from 87,900ML to 78,000ML. This was enshrined in the Resource Operations Plan relating to Awoonga Dam.

Secondly, GAWB can only access the entirety of its second tranche entitlement of some 15,000ML once Awoonga Dam fills to the raised level of the dam. To date the dam has only reached a level that has triggered 7,000ML of this 15,000ML to become available. That is, GAWB's total water allocation is now 70,000ML.

In summary, supply variability (and uncertainty) presents itself to GAWB in a number of ways:

- through the potential "downgrading" of the HNFY as new critical periods occur; and
- through the provisions of the ROP, which limits GAWB's ability to supply the additional 8,000ML of water from the 40m raising until such time as Awoonga Dam fills to requisite levels. Given the maximum storage level since the raising, GAWB has an allocation available to it of only 70,000ML of the total 78,000ML potentially available.

2.1.1.4 GAWB's Strategic Water Plan

GAWB formally commenced the process of developing its present water supply strategy in June 2003, with the public announcement of a 12-month process to develop a SWP to meet the immediate and long-term water needs of the Gladstone region. The development of the plan incorporated consultation with GAWB's customers, and culminated in a final strategy being released in November 2004.

The key findings and actions arising from the strategy were:

- *water balance* – Awoonga Dam could provide the anticipated demand for water (as assessed in 2004) provided a number of assumptions regarding future demand, storage inflows and performance, and alignment of Reservation Volumes with expected usage (i.e. removal of individual buffers for drought or demand growth);
- *adequacy of current reliability* – most customers indicated a strong desire to improve the reliability of their water supply at a reasonable cost; and
- *source augmentation* – Secure a water entitlement from the Lower Fitzroy of up to 30,000ML/a and propose a pipeline to transfer water from the Fotzroy to a proposed Aldoga Reservoir.

GAWB's strategic water planning process considered a number of options including:

- Allocation of water from the Fitzroy River;
- Seawater desalination;
- Demand management measures, particularly conversion to seawater cooling or air cooling for industrial or power facilities;
- Raising of Awoonga Dam; and
- Other new weirs or dams.

The Fitzroy River pipeline and seawater desalination were ranked as the top two of the available options that could satisfy all of GAWB's objectives. Of these, the pipeline has advantages in cost, certainty and the ability to be delivered soonest.

2.1.1.5 Central Queensland Regional Water Supply Strategy

In 2003 the Department of Natural Resources and Mines established a Central Queensland Water Supply Strategy (CQRWSS) which aimed to provide a long term regional strategy for managing Central Queensland's water resources.

The CQRWSS, after considering the demand-supply issues for Gladstone, concluded that:

'…It is expected that the majority of the area's additional urban and industrial demands in the longer term will be met from the Lower-Mackenzie-Fitzroy River system via a pump station pipeline system linking the Fitzroy Barrage storage to the Gladstone Area Water

Board's reticulation system. The possible timing of these developments would be a matter for the board to consider...'

Importantly, the CQRWSS expressly provides for the Fitzroy Resource Operations Plan to be amended to reserve up to 30,000ML/a of reliable water from the Lower Fitzroy for urban and industrial purposes for GAWB, or other entity that may arise from a review of the institutional arrangements.

Given all of the above, there are two key platforms supporting the need for GAWB to undertake detailed augmentation planning and investigations for this project:

- as a drought response and contingency measure; and
- in order to meet the spikes in demand associated with new industrial developments in the region.

2.2 The Location

The proposed pipeline will be capable of transferring 30GL of water per annum from the Fitzroy River to Gladstone industrial water users. The proposed pipeline route and infrastructure sites have been decided based on environmental, social and economic criteria and will be further refined during the EIS phase of the project.

The intake point is to be located at a site on the southern bank of the Fitzroy River in the vicinity of an existing SunWater pump station that supplies Stanwell. This site is referred to as Laurel Bank and is approximately 17km upstream of Rockhampton's Alexandra Bridge. From the intake point water will be pumped to a new water treatment plant, before the pipeline joins the Stanwell – Gladstone Infrastructure Corridor (SGIC). The pipeline is intended to run within the SGIC for the majority of its length and then connect to the Gladstone State Development Area (Figure 1) from where the pipeline will connect with existing Gladstone water infrastructure. The pipeline traverses the local government areas of Fitzroy Shire, Rockhampton City, Calliope Shire and Gladstone City.

2.3 Elements, activities and infrastructure that constitute the project

2.3.1 Elements

2.3.1.1 Intake Site

The intake site is to be located on the southern bank of the Fitzroy River approximately 17km upstream of Rockhampton's Alexandra Bridge in the vicinity of the existing SunWater pump site at Laurel Bank. The exact location of the intake will be confirmed in later stages of the project. The intake point will consist of an intake structure within the river, possibly up to 15 metres from the river bank.

The functional design is yet to be finalised, but the structure may be similar to the Glenmore Water Treatment Plant intake structure as shown in Photograph 1.

Photograph 1: Glenmore WTP intake structure on the Fitzroy River

2.3.1.2 Pump Stations

Three pump stations are proposed for the project:

- At the intake site to pump water to the WTP;
- At the WTP to pump water along the pipeline; and
- A re-lift pump station in the general vicinity of Raglan.

The need for any other pump stations will be finalised during functional design.

The pump stations will vary with requirements at each site. Each station will require an area of less than 1 hectare although the station at the WTP would be within the larger compound. Individual areas would be fenced. Associated with each pump station there may be:

- a single building (approximately 30m x 25m) housing the pumps complete with motors, controls and starters;
- a storage reservoir of around 10-15 ML capacity (not required at the intake, and integrated with the WTP at that site);
- a small substation depending on details of electricity supplies; and
- connection manifolds and valves.

2.3.1.3 Water Treatment Plant

In order to ensure that the water supplied from the Fitzroy River is compatible with efficient operation of the system, including the interconnection with Gladstone's existing raw water system, a water treatment plant is required to treat the Fitzroy River water. A minimum level of treatment and location of the WTP close to the Fitzroy River avoids significant operational issues including frequent pipeline cleaning and reduced transfer capacity.

A number of possible options were considered for the location of the WTP. The selection of the preferred sites is based on key requirements such as area available, distance to power, slope of the land and flood accessibility as well as more detailed criteria including social, environmental and economic considerations.

There are two preferred sites under consideration for the location of the WTP and the final site will be selected prior to the EIS commencing. One of the preferred sites is located on a ridge in close proximity (~500m) to the intake site. The other is at Kenrol and is adjacent to the proposed SGIC.

It is envisaged that the water treatment plant will cover a footprint of about 8 hectares and will consist of the following:

- A water treatment process consisting of coagulation, flocculation, sedimentation and disinfection;
- Chemical dosing systems; and
- Residual solids handling system.

2.3.1.4 Pipeline

The pipeline will be approximately 110 km in length. The pipe is likely to have an external diameter of approximately 1200 mm and will generally be buried with at least 750mm cover, with more cover at road crossings (e.g. 1200mm) and major watercourses (> 1500mm). The details will depend on final alignment, easement agreements, and design.

The total corridor width (Right of Way) required for construction of the pipeline is ideally not less than 30m however can be significantly reduced for short distances e.g. in environmentally sensitive areas. This is the area within which vegetation will be cleared to enable construction processes to occur. A typical Right of Way layout is shown in Figure 5.

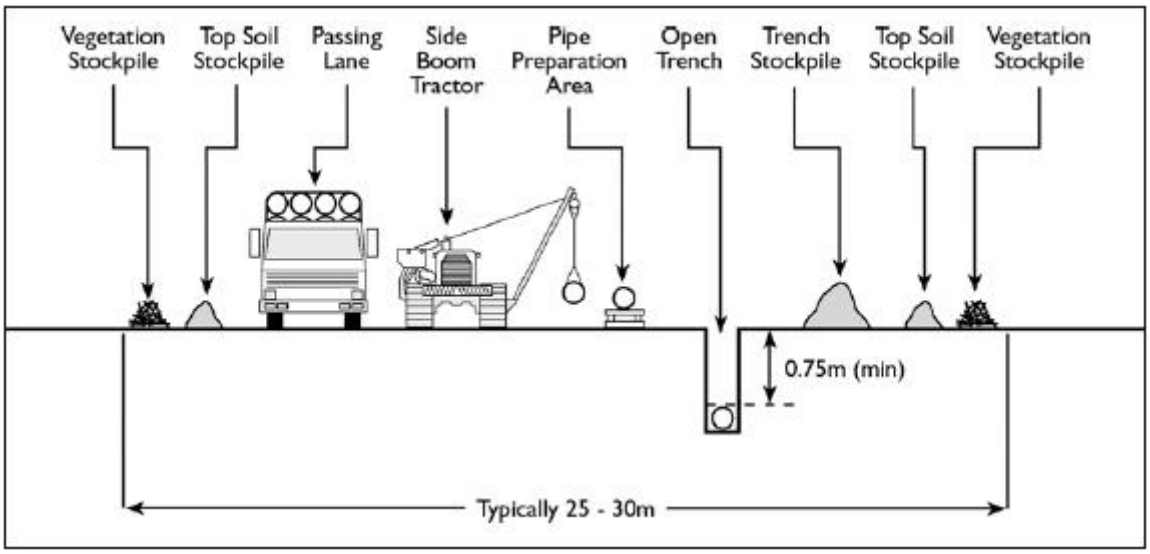


Figure 5: Typical Right of Way layout (source: APIA 2005)

2.3.1.5 Storage Tanks

A storage tank will be required at the booster station which has been proposed for the vicinity of Raglan. This storage will not be for long term balancing and as such is likely to be only 10-15 ML in size.

2.3.1.6 Aldoga Storage

Storage located in the Gladstone SDA will provide security of supply and operational control over the connection into the Gladstone raw water network. It is likely to be a cut/fill earth storage, although other storage types will also be considered. The storage will have a capacity of some hundred megalitres, with the final size and type depending on hydraulic modelling and operational risk analyses, geotechnical and other investigations, and cost estimates.

2.3.2 Activities

The following activities are likely to be carried out during future stages of the project:

- Referral of the project to the Commonwealth Department of Environment and Water Resources under the EPBC Act;
- Finalisation of the pipeline route, and sites for the WTP, pump sites and storages;
- Preparation of an EIS and supplementary documentation in accordance with the requirements of Part 4 of the SDPWO Act and the Terms of Reference;
- Design of the pipeline, storages, pump sites, water treatment plant and associated infrastructure;
- Community engagement;
- Land acquisition; and
- Construction.

2.3.3 Site and Route Alternatives for this Project

Alternatives were considered for the locations of the intake point, water treatment plant and pipeline route alignment.

Four possible sites were considered for the location of the intake site. Key issues considered in site selection were accessibility during flood, stability of the river bank, environmental impacts, distance from the SGIC (increasing distance adds to the length of pipeline required and therefore the cost) and land use.

In the selection of the pump station site at Raglan Creek, engineering considerations, power supply, social and environmental criteria have been considered. Of particular importance in this area is habitat for the endangered Yellow Chat surrounding Raglan Creek.

Six possible options were considered for the location of the WTP. The selection of the site was based on key requirements such as area available, distance to power, slope of the land and flood accessibility as well as more detailed criteria including social, environmental and economic considerations.

Pipeline options north of the SGIC were considered with reference to the location of the intake and WTP. Key factors in the selection of a route were the terrain, environmentally significant areas and existing infrastructure. The pipeline route for the SGIC was assessed in the RLMS Infrastructure Corridor Investigation (RLMS 2006) for the Department of Infrastructure (DoI) and a preferred route was identified based on environmental, social and economic constraints. This route has been refined as a result of discussions with landowners, and is scheduled for declaration in June 2007.

South of the SGIC the pipeline route is within the GSDA and the main factor considered for the pipeline alignment in this area is existing infrastructure and land uses. Within the constraints provided by DoI, environmental and topographic constraints have also been considered.

Options for route and site selection, and design, construction and operation of infrastructure elements, will continue to be refined through the implementation process.

2.4 Construction and Operational Processes

Note that the following sections outline the possible construction and operational processes to be undertaken for the project. As even functional design has not yet been completed, the exact methods cannot be determined. They are, however, expected to be generally similar to those described below.

2.4.1 Intake Site

2.4.1.1 Construction

- *Temporary Facilities* – Survey and pegging, then installation of temporary fencing for construction. Establishing erosion control measures. Setting up of temporary facilities such as work areas for equipment delivery and storage, materials storage and site office. Where possible, these areas would be co-located with the facility areas required for the intake construction.
- *Access* – Access tracks would be required but those tracks utilised for the pipeline would be used preferentially for access to the intake.
- *Clearing* – Clearing and grading of the site to prepare a safe construction working area and stockpiling topsoil. The footprint of the construction site is typically 100m by 100m.
- *Coffer Dam* – A coffer dam would be built using sheet piles. It would extend up to 20m out from the riverbank and be approximately 8 m wide.
- *Excavation* – The river bank and river bed will be excavated to allow access to the intake structure site and also to install the suction pipe.
- *Intake structure* – A reinforced concrete tower complete with gates would be erected. Depending on the depth of the bed rock, the tower may be constructed either on piles or directly on the bed rock.
- *Suction pipe* – At least two suction pipes would connect the intake structure with the pump house. The distance would be in the order of 60 – 80 m. The pipe would probably be concrete encased steel pipe.

- *Ancillaries* - A platform, lighting and other ancillary equipment would be installed.
- *Reinstatement* – The soil and rock that was excavated from the river bed and riverbanks would be reinstated. Erosion protection would be installed if necessary.

2.4.1.2 Operation

- *Operations* – The intake structure would have "gates" build into it at different levels. Depending on the river water levels gates at the required levels are opened and others closed.
- *Maintenance* – The screens of the gates would require regular cleaning of any large debris that collects on the screens. There will also be a "silt trap" at the bottom of the intake structure which would require cleaning on a less regular basis.
- *Access* – Existing roads and tracks would be used as far as practicable however extension may be required to provide all weather access.
- *Decommissioning* - If an intake structure was no longer required the tower would be removed and the area restored in accordance with the previous land use. The suction pipe would be left in place and would be blanked off at a suitable flange.

2.4.2 Pump Stations

2.4.2.1 Construction

It is expected that 3 pump stations will be required. Construction of pump stations involves the following activities:

- *Temporary Facilities* – Survey and pegging, then installation of temporary fencing for construction. Establishing erosion control measures. Setting up of temporary facilities such as work areas for equipment delivery and storage, materials storage and site office. Where possible, these areas would be co-located with the facility areas required for the pipeline construction.
- *Access* – Access tracks would be required but those tracks utilised for the pipeline would be used preferentially for access to the pumping stations.
- *Clearing* – Clearing and grading of the site to prepare a safe construction working area and stockpiling topsoil. The footprint of the pumping station is typically 100m by 50m.
- *Foundations* – Laying down of concrete foundation slab to house the pump station and ancillary facilities.
- *Building assembly* – Erection of the building to house the pumps and related equipment. Installation of the pumps, electrical equipment, valves and associated instrumentation. Connection of the inlet and outlet sections of pipe. Plant and equipment for the pump station is likely to be pre-assembled in modular form for installation on-site.
- *Electrical connection* – A transformer would be installed at each site, with the site of the transformer dependent on the transmission line voltage.
- *Permanent fixtures* - The pump house may be bounded by a permanent fence and controlled gate access.

2.4.2.2 Operation

Operation of the pump stations would generally involve the following activities:

- *Operation* – The facilities would be equipped with telemetry and instrumentation capabilities to enable off-site monitoring of the plant.
- *Maintenance* – As noted above, all water flows and pressure would be metered with high accuracy metering. This information would be checked against the volume of water

within the pipeline and any significant imbalance would be checked immediately. Routine daily visits to the pumping stations are likely to occur.

- *Access* - Existing roads and tracks would be used as far as practicable however extension may be required to provide all weather access.
- *Decommissioning* – If a pump station was no longer required, all above ground components would be removed and the area restored in accordance with the surrounding land use.

2.4.3 Water Treatment Plant

Construction of a water treatment plant would generally involve the following activities:

- *Site preparation* – Work undertaken to prepare the proposed water treatment plant site for construction and if required make provisions for suitable site access routes. Site preparation may involve clearing, excavation, compaction and filling of land and site access routes may be either temporary, during the construction period or permanent, to enable access to the water treatment plant while it is operating.
- *Facility construction* – This will involve transportation of construction materials to the site, assembling/constructing the water treatment plant process units (ie. coagulation tanks, flocculation chambers and sedimentation basin), use of heavy machinery and transportation of construction wastes from the site.

2.4.3.1 Operation

Operation of the water treatment plant would generally involve the following activities:

- *General operation* - Adjusting process variable as required to operate the plant on a day to day basis. The adjustment of process variables may be manual or automatic. The level of operator intervention required will depend on the water treatment plant's level of automation.
- *Maintenance* – Routinely taking care (ie. cleaning and repairing) of the water treatment plant equipment and facilities to ensure efficient and effective operation of the water treatment plant.
- *Access* - Existing roads and tracks would be used as far as practicable however extension may be required to provide all weather access.
- *Monitoring* – Various process variables will be monitored throughout the water treatment plant to assist in operation of the plant and ensure required parameters are being achieved. The monitoring may involve continual on-line monitoring using specialised equipment or manual sampling and analysis of samples.
- *Chemical management* - Tasks include chemical delivery, handling and storage. At this stage it is envisaged that the water treatment plant will require polyaluminium chlorohydrate for coagulation, chlorine gas for disinfection and lime for pH correction, however this may change as the water treatment plant design progresses.
- *By-products and waste stream management* - This may include containment, treatment and/or disposal of any by-products or wastes associated with the water treatment plant process. By-products and waste streams associated with the water treatment plant may include solid residuals, packaging and stormwater.

2.4.4 Pipeline

2.4.4.1 Overview

The pipeline will be approximately 110 km in length. The pipe is likely to have an external diameter of approximately 1200 mm and would generally be buried with at least 750mm

cover, with more cover at road crossings (e.g. 1200mm) and major watercourses (> 1500mm). The details will depend on final alignment, easement agreements, and design.

A combination of contouring the pipe to follow the landform, and regrading the landform would be necessary. Construction would probably occur using 2-3 gangs (6-7 individuals and machinery per gang) at various sections along the alignment.

The pipes are likely to be either Mild Steel pipe or Glass Reinforced Plastic (GRP) pipe. Contractors would be required to have key staff accredited by the manufacturers to install the relevant type of pipes.

The total corridor width (Right of Way) required for construction of the pipeline is approximately 30m. This is the area within which vegetation would be cleared to enable construction processes to occur.

2.4.4.2 Construction

Construction of the pipeline would generally involve the following activities:

- *Preliminaries* – Survey and pegging of the alignment, and establishment of erosion and sediment controls. A range of temporary facilities are also required including work areas for equipment and pipe delivery and storage, worker accommodation and borrow pits to source select fill.
- *Access* – Existing roads, tracks and disturbed areas would be utilised as far as practicable to minimise disturbance to the surrounding environment however new access tracks would be required in some areas.
- *Clearing* – The construction zone (typically 30m in width, although this could be reduced in sensitive areas) would be cleared of vegetation. Cleared vegetation would be stockpiled to one side of the cleared area for respreading as part of the restoration process. Trees and vegetation that are of significance would be avoided by rerouting the pipeline (this is done during detailed design stage) and by working around the object. Topsoil is normally removed by a bulldozer to a depth of between 50mm to 300mm (average around 100mm) and stockpiled separately for respreading after the pipe has been laid.
- *Delivery and stringing* - Pipes would be delivered to a major receiving yard by road. Pipes would then be transported to the installation location in small loads, where they are strung out adjacent to the trench. Pipes are typically delivered in 6 or 12m lengths.
- *Trenching* – A trench would be dug using either a wheel trencher or an excavator. Rock saws, rock breakers and blasting is usually required in hard rock terrain. Trench depths would be from a minimum of 2m up to 3.5m, and may require benching/battering or shoring of the walls. Spoil would be temporarily stockpiled upslope of the trench on one side.
- *Crossings* - Several different methods may be used when crossing watercourses, roads and major infrastructure corridors. The method used will be dependant on environmental factors and geotechnical constraints. Typical methods include open trenching, boring or directional drilling.
- *Bedding preparation* – Graded material is placed in the bottom of the trench. Material is most likely to comprise sieved in-situ sand, although where a suitable source is not available, imported crushed gravel or sand from a nearby borrow pit may be required.
- *In-trench assembly* – Pipe lengths are lowered into the trench using an excavator either with slings or an attachment that grabs the pipes using a vacuum. A line-up crew would position the pipe into the rubber-ring joints. Once connected, the pipe can be deflected around corners on a length-by-length arc. Certain connections may require welding a

band across the join. The welding could be done in or out of the trench depending on the situation.

- *Backfilling* – The pipeline is covered with the graded material in layers and compacted. The trench is then filled by returning the remaining excavated material.
- *Testing* – The pipeline is hydrostatically tested for strength and potential leaks by being filled with water and the pressure increased to greater than the anticipated operating pressure (generally tested to 125% of the operating pressure). Discharge from air and scour valves in possible during these tests.
- *Commissioning* – The first flush of water through the pipeline would be of reduced quality due to residue (including latenance if concrete lined) and construction debris within the pipe. Latenance is primarily composed of cement used in the lining and hence contains elevated levels of carbonate and has a high pH. This water would not be suitable for all purposes, and may require special provision for disposal.
- *Clean up and rehabilitation* - Clean up and rehabilitation measures would be applied to the easement, access tracks and camp sites in consultation with the relevant owner/landholder. Generally, clean up and rehabilitation would involve removal of foreign material (construction material and waste), surface contouring if required, respreading of topsoil and cleared vegetation. Some seeding or planting may also be undertaken.

2.4.4.3 Operation

Operation of the pipeline would generally involve the following activities:

- *Operation* - The pipeline would be buried, and therefore land owners are able to resume certain previous land use activities on top of the pipeline provided that this does not include excavation activities. This would be specified in an easement agreement with the landowner. Deep rooted vegetation would not be permitted to re-establish across the pipeline or within a distance of 3 meters either side of the midline of the pipe, due to potential damage of the pipe. Grass and other shallow rooted vegetation would be encouraged to establish for erosion control.
- *Maintenance* – Routine operation and maintenance programs include leak detection by inspection, ground patrols by vehicle and/or foot, possibly aerial patrols, repair or replacement of faulty pipe or other equipment, scouring and cleaning of the pipeline (pigging), “shock” chlorination, and maintenance of the easement and lease area including access roads.
- *Leak response* – If leaks are detected, a pipe section between isolating valves would be drained, and the leak repaired. The drained water would be released from a scour valve and associated surcharge pit that controls discharge to a low rate that would minimise potential for erosion. Periodic shock chlorination of the system would be undertaken. Scour valve releases would be timed (where possible) to coincide with periods during which the there is no residual chlorine in the system.
- *Access* – Existing roads and tracks would be used as far as practicable however gravel access tracks may be required in some sections along the pipeline, depending on terrain and ground conditions.
- *Water metering* – All water flows would be metered with devices such as electromagnetic flow meters. Inflow volumes would be compared with outflow volumes, and any imbalance would be checked immediately;
- *Prevention of pipeline damage* – Prevention of damage due to third party activity is achieved through depth of cover, sign posting, one call ‘Dial Before You Dig’ programs and third party education on the potential dangers of carrying out certain activities in

proximity to the pipeline. In some areas such as crossings, marker tape may be buried above the pipeline to reduce risk of third party interference. Security fencing, gates and locks are provided around major above ground facilities to inhibit accidental or unauthorised tampering;

- *Decommissioning* – Pipelines are generally designed for a minimum technical life of approximately 40 years, however this can be extended through the adoption of quality maintenance programs. If the pipeline was no longer required, it may be maintained for possible future use or disconnected and allowed to naturally degrade.

2.4.5 Storage Tanks

An above ground storage tank (probably in the order of 10 - 15 ML storage capacity) is to be installed on the suction side of the booster pumps at Raglan. The pumps at the Fitzroy River would draw directly from the river via the intake structure, and the WTP pumps would draw from the WTP storage reservoirs.

2.4.5.1 Construction

- *Temporary Facilities* – Survey and pegging, then installation of temporary fencing for construction. Establishing erosion control measures. Setting up of temporary facilities such as work areas for equipment delivery and storage, materials storage and site office. Where possible, these areas would be co-located with the facility areas required for the tank construction. This part of the construction process will probably be done in conjunction with the pump house construction.
- *Access* – As above, access tracks would be required but those tracks utilised for the pipeline would be used preferentially for access to the site.
- *Clearing* – Clearing and grading of the site to prepare a safe construction working area and stockpiling topsoil. The footprint of the tank is typically 100m by 100m.
- *Foundations* – A reinforced concrete foundation and floor slab would be poured.
- *Building assembly* – The walls of the tank and related equipment would be constructed on site. The walls would be reinforced concrete and would be poured into formwork.

2.4.5.2 Operation

- *Operations* – The pipelines in and out of the tanks would normally be open and there would be little operational inputs required. Levels in the tank would be monitored using level sensors and the data sent via telemetry to a control centre SCADA system.
- *Maintenance* – The tanks would require cleaning and inspection for leaks perhaps once a year.
- *Access* - Existing roads and tracks would be used as far as practicable however extension may be required to provide all weather access.
- *Decommissioning* – If the tank was no longer required, all above ground components would be removed and the area restored in accordance with the previous land use. Subsurface pipes would be capped on the inlets and outlets and left in place.

2.4.6 Aldoga Storage

The primary purpose of storage at Aldoga is to provide security of supply and operational control over the connection into the Gladstone raw water network. The volume of water stored will be determined during design, but is likely to be limited by physical and engineering constraints. The storage may consist of either one or two large lined and covered storage reservoirs, although alternatives will be considered ie above ground concrete reservoirs.

2.4.6.1 Construction

- *Temporary Facilities* – Survey and pegging, then installation of temporary fencing for construction. Establishing erosion control measures. Setting up of temporary facilities such as work areas for equipment delivery and storage, materials storage and site office. Where possible, these areas would be co-located with the facility areas required for the reservoir construction.
- *Access* – Access tracks would be required but those tracks utilised for the pipeline would be used preferentially for access to the site.
- *Clearing* – Clearing and grading of the site to prepare a safe construction working area and stockpiling topsoil.
- *Excavation* – The basin of the reservoir would be carried out using excavators and scrapers. The excavated material would be used to build the compacted earth embankments. The basin would be shaped and lined with a PVC or Polypropylene liner. Inlet, outlet drain pipes would be installed.
- *Cover* – A cover usually made of the same material that the liner is made of is then fixed to the top of the reservoir.
- *Connection* – The inlet and outlet pipes are connected to the appropriate pipelines.

2.4.6.2 Operation

- *Operations* – The pipelines in and out of the tanks would normally be open and there would be little operational inputs required. Levels in the tank would be monitored using level sensors and the data sent via telemetry to a control centre SCADA system.
- *Maintenance* – The tanks would require cleaning and inspection for leaks perhaps once a year.
- *Access* – Permanent bitumen access road to the site would be required for safe access during wet weather and for erosion control.
- *Decommissioning* - If the tank was no longer required, all above ground components would be removed and the area restored in accordance with the surrounding land use. Subsurface pipes would be capped on the inlets and outlets and left in place.

2.5 Waste Management

During construction of the pipeline some domestic and industrial wastes would be generated. This is likely to include the following:

- Used oils;
- Contaminated soil/gravel;
- Vegetation;
- General refuse;
- Sewage from the site accommodation; and
- Contaminated water from hydrostatic testing.

Waste will be managed to reduce the health and environmental risks associated with its management. This will include reduction and recycling of waste where possible and appropriate storage of waste in accordance with local government policy and legislative requirements.

2.6 Hazard and Risk and Health and Safety Issues

Although water pipelines are a safe and efficient means of transporting water, there are risks associated with pipeline construction and operation. Safety and emergency response have both social and environmental implications and require management to reduce the level of risk. A risk assessment will be conducted in accordance with AS/NZS 4360 and appropriate management measures implemented as required.

The Queensland *Workplace Health and Safety Act 1995* is the relevant workplace health and safety legislation. This legislation specifies the responsibilities of principals, designers and contractors to ensure a safe work environment. To ensure compliance with the legislation during construction and operation, a Contractor would be required to complete a Job Safety Assessment and a Safety Plan prior to the commencement of construction.

2.7 External Infrastructure Requirements

2.7.1 Water

During the construction phase water will be required for various construction activities and for use by construction workers. During the operational phase, the pipeline will supply 30GL per annum from the Fitzroy River to Gladstone users. It will be designed to enable upgrade for reverse operation to supply water to Rockhampton if required. The pipeline will connect to the existing Gladstone water supply infrastructure.

2.7.2 Road and Rail

Construction materials such as pipeline and other equipment will need to be delivered along the pipeline route and pump station sites. Transport of these materials is likely to be by a combination of road, rail and/or shipping.

2.7.3 Electricity

Power supply is required at the intake pump site, WTP and other pump sites. This will be obtained either through existing power or new power infrastructure will be constructed to the sites that do not currently have power available. The provision of power infrastructure to the necessary sites is being discussed with the relevant energy providers and is a factor in the selection of the final sites for the WTP and pump stations. Ergon is expected to obtain the necessary power supply approvals required for the project.

2.8 Economic Indicators

The State is seeking to develop the Gladstone Region into an internationally competitive location for industry. The Gladstone State Development Area exceeding 21,000ha has been declared for this purpose, therefore making it likely that new customers will be attracted to the region and that existing customers will expand their operations in the near future.

Awoonga Dam does not have the capacity to meet this demand and as such GAWB is seeking to secure alternative water supply. The Fitzroy Pipeline has been identified as the most effective option to mitigate the effects of drought and is the least cost supply option of all the viable options. Furthermore, the pipeline is considered to provide the most optimal social, environmental and economic benefits for the Gladstone Region.

2.9 Employment

Based on similar projects elsewhere in the State, it could be expected that the project might create in the order of 200 full time equivalent positions during construction, and perhaps 10 full time equivalent positions for the operation phase. These numbers will be dependent on final timelines for construction, and the design of the WTP in particular.

2.10 Proposed Timeframes for the Project

The planning for the project was initiated in 2004 with GAWB's Strategic Water Planning Project. A pipeline from the Fitzroy to Gladstone was identified as the preferred option for securing ongoing water supply for Gladstone industrial water users. The scoping and preliminary works phase has been completed and work is now being undertaken to secure the necessary approvals and undertake the design to enable construction to be completed by mid to late 2010 if necessary. The key projected timeframes are outlined in Table 2 below:

Table 2: Key Anticipated Timeframes

Timeframe	Element of the project
February 2007 – September 2007	Functional Design
February 2007 – January 2008	Undertake baseline studies and prepare approvals documentation including EIS
February 2007 – May 2008	Community Consultation
July 2007 – December 2007	Native Title and Cultural Heritage requirements
July 2007 – late 2010	Procurement and Construction
Mid to Late 2010	Project Completion

2.11 Financing requirements and implications

By 30 June 2007 GAWB anticipates it will have spent $2.9m on preparatory work for the Fitzroy River - Gladstone pipeline. In addition GAWB anticipates spending approximately $20.9m in 2007/08 for work to bring completion within a 2 year timeframe. If GAWB chooses to proceed with construction, the estimated costs in addition to the preparatory costs are $293 M for the Gladstone Fitzroy Pipeline, and a $28 M contribution to the Lower Fitzroy storage infrastructure (all in 2006 dollars).

GAWB is currently seeking approval from the QCA to treat expenditure as work in progress (WIP) and to roll it forward at its weighted average cost of capital until the asset is commissioned or until a scheduled price review at 1 July 2010. GAWB is funding initial stages from cash reserves, and is developing a business case and financial model to determine the most appropriate funding mechanism, particularly in respect of construction costs.

2.12 Additional studies needed

The information in this document is based mainly on desktop research and previous studies. Some ecological and geotechnical field investigations have been undertaken, the results of which are summarised in Section 3 below. As the approvals phase progresses, further detailed field investigations will be completed:

- Engineering functional design;
- Ecological field surveys;
- Visual/Landscape Impact Assessment;
- Geotechnical investigations;
- Cultural Heritage Studies – Indigenous and Non indigenous Heritage;
- Social Impact Assessment;

- Economic Analysis; and
- Other environmental assessments – air quality, noise, contaminated sites.

3 Existing Environment

The project boundary within which the pipeline is to be located has been defined based on environmental, social and economic criteria and is located within the proposed SGIC and Gladstone SDA for the majority of its length. This project area is approximately 110km long and varies in width from 100m to 2.5km to allow for refinement of the pipeline route and location of infrastructure. It comprises approximately 7155 hectares (Figure 1).

The exact footprint of the pipeline within the project boundary will be confirmed during the functional design and EIS phases of the project. The pipeline itself will be approximately 110 km in length with a corridor width (right of way) of approximately 30m (although this can be reduced in environmentally sensitive areas).

3.1 Natural Environment

3.1.1 Terrain

Terrain is a key factor in the placement of the pipeline as steep terrain increases the amount of earthworks and pumping required and therefore the cost. For this reason the topography of the pipeline route is generally flat and avoids areas of high relief. The pump stations and WTP are required to be flood free and as such are located on higher ground.

Mountain ranges in proximity to the pipeline route include the following:

- The Native Cat Range to the West of Gracemere;
- Razorback Range to the south of Stanwell Energy Park;
- Redan Range at Marmor;
- Mt Morgan and other smaller Mounts and Ranges to the west of the SGIC; and
- Mt Larcom and the Mt Larcom range in proximity to the pipeline as it enters Gladstone.

3.1.2 Soils and Geology

Geological Survey of Queensland Sheet SF56-13 Rockhampton covers the area of the proposed route. The proposed pipe route will cross several major geological units and the geological setting of the route is complex, particularly at the southern end where the route crosses Langmorn Gold and Mineral Field, an area of steeply dipping, highly faulted and unconforming geological deposits.

Universal Soil Loss Equation Mapping (NRM 2002) demonstrates broad scale mapping of soils susceptible to erosion. The mapping shows that soils within the study area (the SGIC study area investigated by RLMS) are moderately to highly susceptible to erosion. Areas of sloping relief greater than 5% are also generally susceptible to erosion (RLMS 2006).

The Queensland Acid Sulphate Layer (NRM 2002) indicates that there is the potential for ASS to occur in the last 2km of the study area before reaching Gladstone. Other areas of the pipeline route that are below 20m AHD may also have potential for ASS or PASS to occur. The potential for ASS to occur is higher in areas below 5m AHD for example creek crossings. This will be further investigated during the EIS phase of the project and an ASS management plan will be developed for the construction phase.

3.1.3 Bioregions and Ecosystems

Rockhampton and surrounds is in Bioregion 11 – The Brigalow Belt. This bioregion is divided into the northern and southern Brigalow Belt and consists of 36 provinces. The study area traverses province 14 – Marlborough Plains, and 18 – Mount Morgan Ranges. The border between these provinces is also the border between the northern and southern

Brigalow Belt. The Brigalow Belt is characterised by Brigalow (*Acacia harpophylla*) forest and woodland on clay soils however Brigalow ecosystems are not predominant through the entire region and large areas are characterised by a range of ecosystems (Sattler and Williams 1999).

Gladstone is in Province 10 – The Burnett-Curtis Hills and Ranges, of the Southeast Queensland Bioregion. The western area of this bioregion is closely related to the eastern Brigalow Belt in terms of biodiversity. The Brigalow Belt bioregion has been subject to rapid and extensive habitat loss as a result of agricultural and pastoral activities in the past and the Southeast Queensland Bioregion is subject to increasing pressure from population expansion.

There are 163 Regional Ecosystems (RE's) that occur in the Brigalow Belt Bioregion and 145 in the Southeast Queensland Bioregion. As part of the preliminary investigations for this phase of the project, ecological fieldwork has been conducted in the study area using Regional Ecosystem Mapping as a basis to investigate the most intact patches of native vegetation intersected by the corridor route and to identify other unmapped patches. The location of the pipeline and other infrastructure has been selected to avoid RE's where possible (Figure 6). The extent and condition of these communities will be determined through detailed field investigations during the EIS phase.

3.1.4 Flora

A Herbrecs search was conducted for the study area through the Queensland Herbarium. 7451 plant species are known to occur in the study area. A summary of the threatened species results is provided in Table 3.

Table 3: Summary of Herbrecs Data

Status under the Queensland *Nature Conservation Act 1992*	TOTAL
Endangered	70 species
Rare	129 species
Vulnerable	97 species

Searches of Wildlife Online (EPA 2007) and the EPBC Act protected matters report (DEWR 2007) have also been conducted for a broad region which includes the study area. Results of these searches are included in Table 4.

Table 4: Wildlife Online and EPBC Protected Matters Report – Flora

Species records, with unrecorded species from EPBC Protected Matters Report	NCA*	Records*	EPBC*	EPBC Protected Matters Report(smaller defined area)
Acacia pubicosta	R	1	.	
Acacia storyi	R	2	.	
Actephila sessilifolia	R	9	.	
Alyxia magnifolia	R	9	.	
Asplenium pellucidum	V	2	V	
Atalaya calcicola	R	6	.	
Atalaya collina	E	3	E	Reported
Atalaya rigida	R	18	.	
Callicarpa thozetii	R	1	.	

Choricarpia subargentea	R	3	.	
Cossinia australiana	E	4	E	
Cupaniopsis shirleyana	V	10	V	Reported
Cycas megacarpa	E	25	E	
Cycas ophiolitica	E	14	E	
Dansiea elliptica	R	10	.	
Decaspermum struckoilicum	E	10	.	
Denhamia parvifolia	V	1	V	
Eucalyptus raveretiana	V	2	V	Reported
Graptophyllum excelsum	R	15	.	
Hakea trineura	V	1	V	
Hernandia bivalvis	R	18	.	
Livistona drudei	V	2	.	
Macropteranthes fitzalanii	R	4	.	
Macropteranthes leiocaulis	R	13	.	
Marsdenia brevifolia	V	1	V	
Parsonsia larcomensis	V	4	V	Reported
Parsonsia lenticellata	R	12	.	
Quassia bidwillii	V	2	V	Reported
Stackhousia tryonii	R	4	.	
Zieria sp. (Mt Larcom N.Gibson TOI8)	V	4	.	
Unrecorded species				
Bosistoa selwynii	NAQ	0	V	Reported
Bosistoa transversa	.	0	V	Reported
Bulbophyllum globuliforme	R	0	V	Reported
Leucopogon cuspidatus	.	0	V	Reported

Flora species of greatest concern (as identified during preliminary field work – full report in Appendix A) are *endangered* (under the NCA and EPBC Act) scrub species that have been defined mainly by RE 11.11.18 but are not restricted to this RE. Also of concern is the possible impact to two cycads, *endangered* under the NCA and EPBC which are known to occur in the study area (WBM 2007). The presence of these species will be further investigated during detailed field work in the EIS phase.

Significant weeds that have previously been identified in the study area include Parthenium Weed and *Sporobolus* spp including American Rat's Tail Grass, Giant Rat's Tail Grass and Paramatta Grass (RLMS 2006). These plants are all Class 2 Declared Species under the *Land Protection (Pest and Stock Route Management) Act 2002.* Further ecological studies during the EIS phase will identify other weeds and pests likely to occur in the area.

3.1.5 Fauna

As part of the preliminary field investigations for this project a fauna survey has been conducted by Ecoserve Ecological Consultants (Appendix A). This investigation aimed to provide a preliminary assessment of the type, condition and extent of fauna habitats in the

study area and their potential suitability as habitat to support rare and threatened species (Ecoserve 2007).

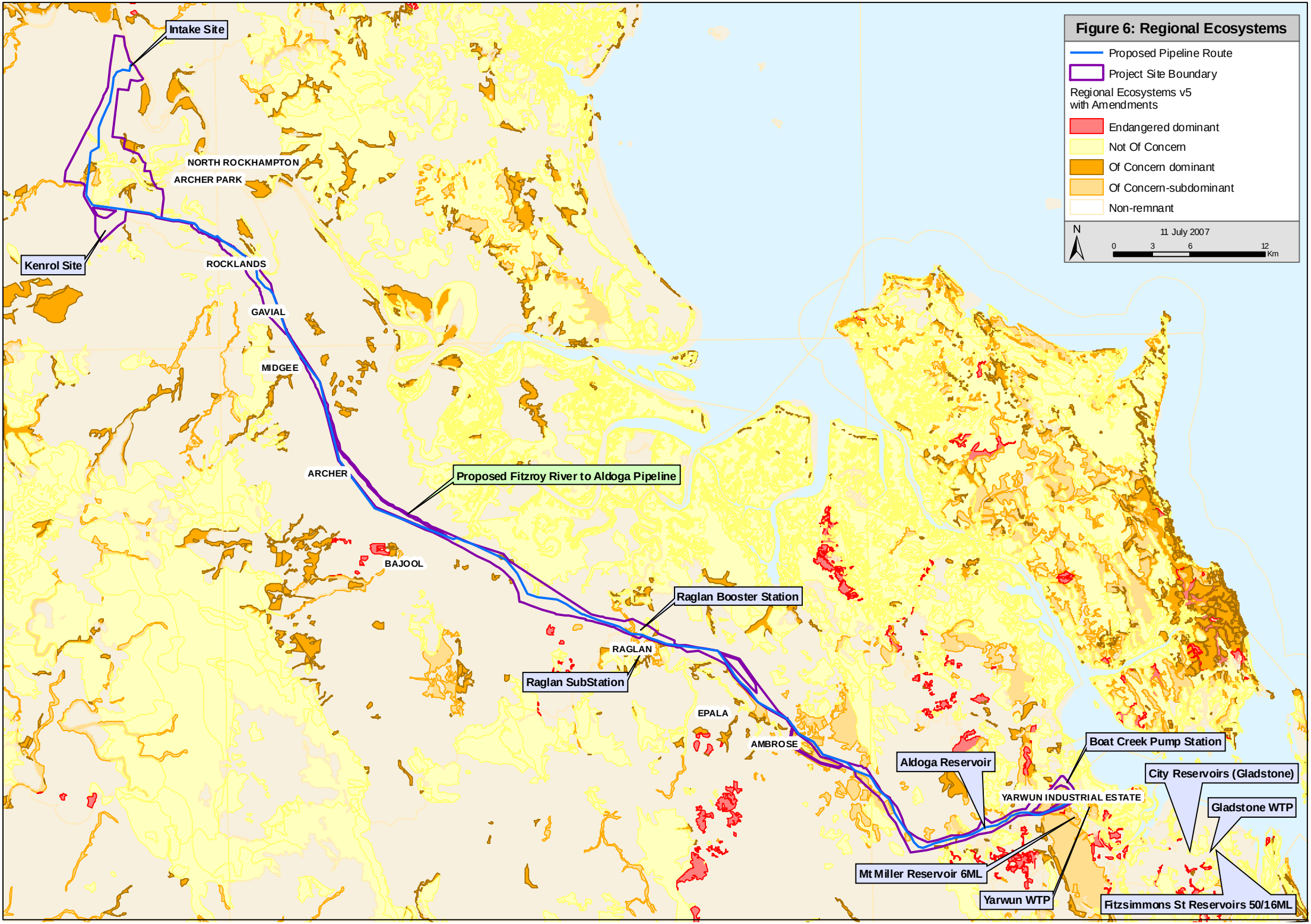


Figure 6: Regional Ecosystems
Proposed Pipeline Route
Project Site Boundary
Regional Ecosystems v5
with Amendments
Endangered dominant
Not Of Concern
Of Concern dominant
Of Concern-subdominant
Non-remnant
N
11 July 2007
0 3 6 12
Km
Intake Site
Kenrol Site
NORTH ROCKHAMPTON
ARCHER PARK
ROCKLANDS
GAVIAL
MIDGEE
ARCHER
BAJOOL
Proposed Fitzroy River to Aldoga Pipeline
Raglan Booster Station
RAGLAN
Raglan SubStation
EPALA
AMBROSE
Boat Creek Pump Station
Aldoga Reservoir
City Reservoirs (Gladstone)
YARWUN INDUSTRIAL ESTATE
Gladstone WTP
Mt Miller Reservoir 6ML
Yarwun WTP
Fitzsimmons St Reservoirs 50/16ML

Field investigations identified 147 terrestrial vertebrate fauna species either recorded within the mapped corridor and/or recorded from similar habitats within approximately three kilometres of the corridor. The fauna assemblage was comprised of 17 mammal, 11 reptile, two frog and 117 bird species. Further fieldwork is likely to increase the species richness for the study area (Ecoserve 2007).

A large proportion of the recorded fauna species are common and widespread within both sub-bioregions in which the project area is located. Seven species recorded in the current surveys are listed as rare, threatened or otherwise significant under the provisions of the NC Act and or EPBC Act as shown in Table 5.

Table 5: Rare, threatened or significant fauna species under NC or EPBC Acts

Species	**Status**	**Observations** (within the study area and or similar habitats within approximately 3km of the study area)
Koala	*Regionally Vulnerable* in Southeast Queensland, though *Culturally Significant* elsewhere in Queensland	No koalas observed although evidence of their presence observed at 2 locations
Squatter Pigeon	*Vulnerable* under the NCA and EPBC	Detected at 8 locations
Cotton Pygmy Goose	*Rare* under the NC Act	Recorded at 6 locations
Black chinned honeyeater	*Rare* under the NC Act	6 birds observed in one location
Rainbow Bee eater	*Migratory* under the EPBC Act	Recorded in a variety of habitats
Sharp-tailed sandpiper	*Migratory* under the EPBC Act	6 recorded at one location
Marsh Sandpiper	*Migratory* under the EPBC Act	1 recorded at 2 locations
Glossy Black Cockatoo	*Vulnerable* under the NC Act	Calls heard although no visual confirmation

The areas surveyed support habitat for other rare, threatened or otherwise significant species not recorded during preliminary field surveys.

Of particular significance are areas of known and potential habitats for the *critically endangered* (under the EPBC Act) Yellow Chat. Yellow Chat sitings and habitat have been described by Houston (2006) and RLMS (2006) and occur within the pipeline corridor in the vicinity of Raglan Creek (Figure 7). Further detailed fieldwork will be undertaken during the EIS phase to assess and minimise the potential impact to this species.

A full list of species of conservation significance with known or potential occurrence in the study area is included in the full ecological report in Appendix A

A search was also conducted using the EPBC Act search tool on the DEWR website. This search identified that there are two threatened ecological communities, 24 threatened species (6 birds, 4 mammals, 5 reptiles and 9 plants) and 18 migratory species known to

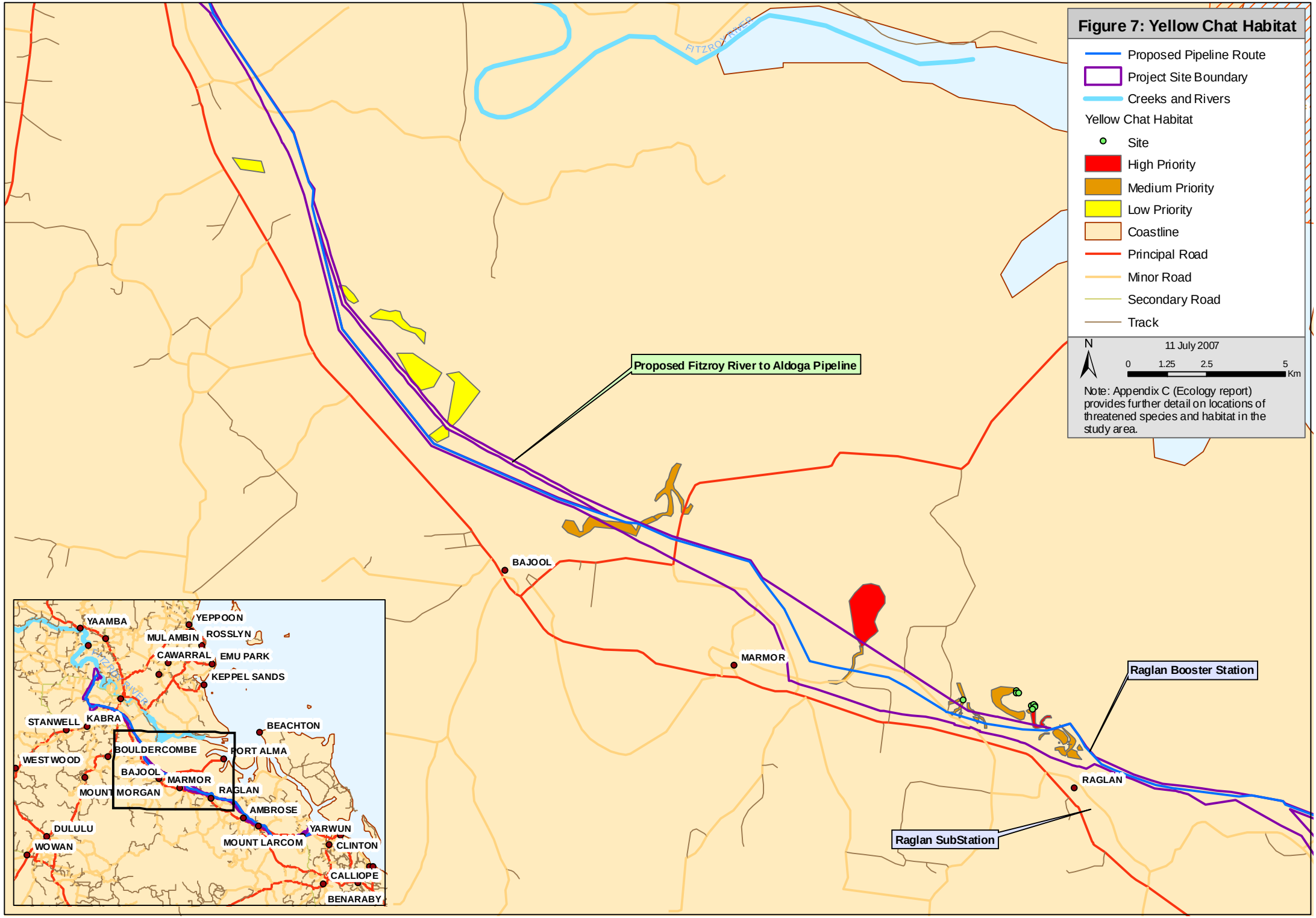


Figure 7: Yellow Chat Habitat
Proposed Pipeline Route
Project Site Boundary
Creeks and Rivers
Yellow Chat Habitat
Site
High Priority
Medium Priority
Low Priority
Coastline
Principal Road
Minor Road
Secondary Road
Track
N
11 July 2007
0 1.25 2.5 5
Km
Note: Appendix C (Ecology report) provides further detail on locations of threatened species and habitat in the study area.
FITZROY RIVER
Proposed Fitzroy River to Aldoga Pipeline
BAJOOL
MARMOR
Raglan Booster Station
RAGLAN
Raglan SubStation
YAAMBA
YEPPOON
ROSSLYN
MULAMBIN
CAWARRAL
EMU PARK
KEPPEL SANDS
STANWELL
KABRA
BEACHTON
BOULDERCOMBE
PORT ALMA
WESTWOOD
BAJOOL
MARMOR
MOUNT MORGAN
RAGLAN
AMBROSE
YARWUN
DULULU
WOWAN
MOUNT LARCOM
CLINTON
CALLIOPE
BENARABY

occur in the study area and surrounds (a broad area defined using the search tool. Coordinates of this area are included in the full report attached in Appendix A).

More detailed ecological fieldwork will be conducted during the EIS phase of the project including detailed surveys for the Yellow Chat during the wet and dry seasons.

3.1.6 Hydrology and Water Quality

The major water body in the study area is the Fitzroy River from where the pipeline water will be extracted. The Fitzroy River Catchment is the second largest in Australia. The mean annual discharge (year ended October) measured in the Fitzroy River at Riverslea since 1922 is about 5,000,000 ML. In the same period the annual discharge has varied from about 23,900,000 ML in 1953–54 to about 83,000 ML in 1968–69.

There are also a number of creeks traversing the study area which are of differing sizes but the majority are ephemeral. Raglan Creek and Inkerman Creek are the major creeks along the pipeline route. These and other creeks within the study area are shown on Figure 8.

There are no Ramsar wetlands within the study area. The nearest Ramsar Wetland is Shoalwater and Corio Bay. The southern boundary of this wetland is approximately 50km north of Rockhampton. The majority of the area falls within the Shoalwater Bay Military Training Area (SWBTA) and includes the intertidal areas, adjacent lands and marine waters up to High Astronomical Water Mark (HAWM) from Broome Head in the north to the southern boundary of the SWBTA and the intertidal areas of Corio Bay in the south.

The Fitzroy River Delta and Fitzroy River Floodplain are designated as wetlands of importance by the Queensland EPA. Approximately 5km of the study area traverses the Fitzroy Floodplain wetland (Figure 8). The study area traverses approximately 3km of the Fitzroy River Delta. The Port Curtis coastal wetland is also a wetland of importance and includes all of Port Curtis and coastal areas. At the closest point the study area is approximately one kilometre from this wetland.

The estuarine areas of the Fitzroy River and tributaries are designated as DPI Coastal Wetlands. Approximately 3km of the study area traverses the edge of this wetland area (Figure 8).

The nearest World Heritage Area is the Great Barrier Reef Marine Park which includes all marine areas to the east of the site. The Fitzroy River flows into this area approximately 70km downstream of the intake point in an area classified as a *general use* zone (Great Barrier Reef Marine Park Authority 2006)

3.1.7 Air Quality

The pipeline route traverses mostly rural areas where air quality is expected to be better than that of a town or city. There are industrial uses at Stanwell and in the GSDA which may impact local air quality.

In central Queensland, air quality monitoring was carried out by the Environmental Protection Agency (EPA) at three sites in the Gladstone region and one site in Mackay during February 2007.

During February, measured pollutant levels did not exceed the relevant Air National Environmental Protection Measure (NEPM) standard or Environmental Protection Policy (EPP) (Air) visibility goal at EPA and industry air monitoring sites in central Queensland.

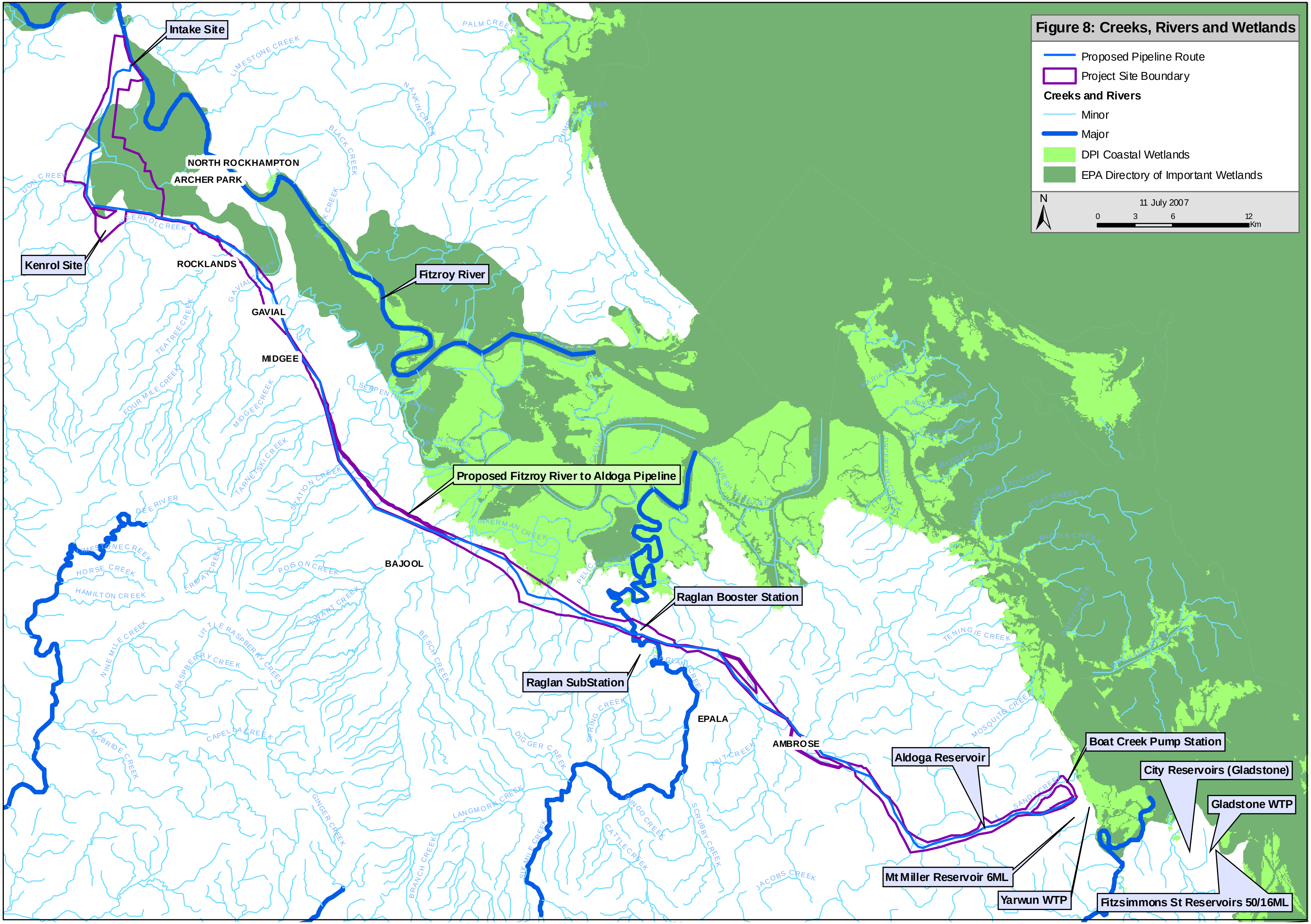


Figure 8: Creeks, Rivers and Wetlands
Proposed Pipeline Route
Project Site Boundary
Creeks and Rivers
Minor
Major
DPI Coastal Wetlands
EPA Directory of Important Wetlands
N
11 July 2007
0 3 6 12 Km
Intake Site
Kenrol Site
NORTH ROCKHAMPTON
ARCHER PARK
ROCKLANDS
GAVIAL
MIDGEE
BAJOOL
EPALA
AMBROSE
Fitzroy River
Proposed Fitzroy River to Aldoga Pipeline
Raglan Booster Station
Raglan SubStation
Boat Creek Pump Station
Aldoga Reservoir
City Reservoirs (Gladstone)
Gladstone WTP
Mt Miller Reservoir 6ML
Yarwun WTP
Fitzsimmons St Reservoirs 50/16ML

3.2 Socio Economic

The proposed pipeline route traverses four local government areas (LGA's) (Figure 1). The social and economic characteristics of these areas are outlined below:

- Fitzroy Shire – The majority of the pipeline route (60km) including the intake point, WTP and booster station will be in this shire. It has a population of approximately 10,000 people with Gracemere as its centre. The land use in the shire is predominantly rural agricultural with intensive industrial development around the Stanwell Energy Park.
- Rockhampton City – Nine kilometres of the pipeline traverses the edge of Rockhampton City. Rockhampton has a population of approximately 60,000 with a large commercial and business centre surrounded by mining and rural industries. Major industries in this local government area are cattle production, agriculture, fishing and tourism.
- Calliope Shire – The southern section of the pipeline route in the GSDA (42km) is within Calliope Shire. This Shire has a population of approximately 16,000 and includes the major urban centres of Tannum Sands, Boyne Island, Benaraby & surrounds, Calliope Township and surrounds, as well as other rural centres.
- Gladstone City – The pipeline route does not enter Gladstone City although the pipeline will connect to existing Gladstone water infrastructure. Gladstone City is in an industrial region and has a population of approximately 27,000. The City is situated between the Calliope River to the north and the Boyne River 14 kilometres to the south, with Port Curtis being the major industrial port in the region and the focus of large scale industrial and resource development.

3.2.1 Planning Schemes and Government Policies

Relevant Planning Schemes in the study area include the following:

- The Rockhampton City Plan (2005);
- The Fitzroy Shire Planning Scheme (2005);
- The Calliope Shire Planning Scheme (2006);
- The Gladstone Plan (2006);
- The Development Scheme for the Gladstone State Development Area; and
- The State Coastal Management Plan.

Key relevant State Planning Policies (SPPs) applicable to the project include:

- SPP 1/92 Development and the Conservation of Agricultural Land;
- SPP 2/02: Planning and Managing Development Involving Acid Sulfate Soils; and
- SPP 1/03: Mitigating the Adverse Impacts of Flood, Bushfire and Landslide.

The implications of these and other schemes and policies will be investigated during the EIS process.

3.2.2 Land Tenure and ownership

The majority of the land traversed by the pipeline or impacted by the WTP or pump stations is freehold land (Figure 9).

The Stanwell- Gladstone Infrastructure Corridor forms the central portion of the study area and the Gladstone State Development Area (GSDA) occupies 21000 hectares around Aldoga. The tenure of these areas is freehold. The GSDA is subject to the Development Scheme for the Gladstone State Development Area.

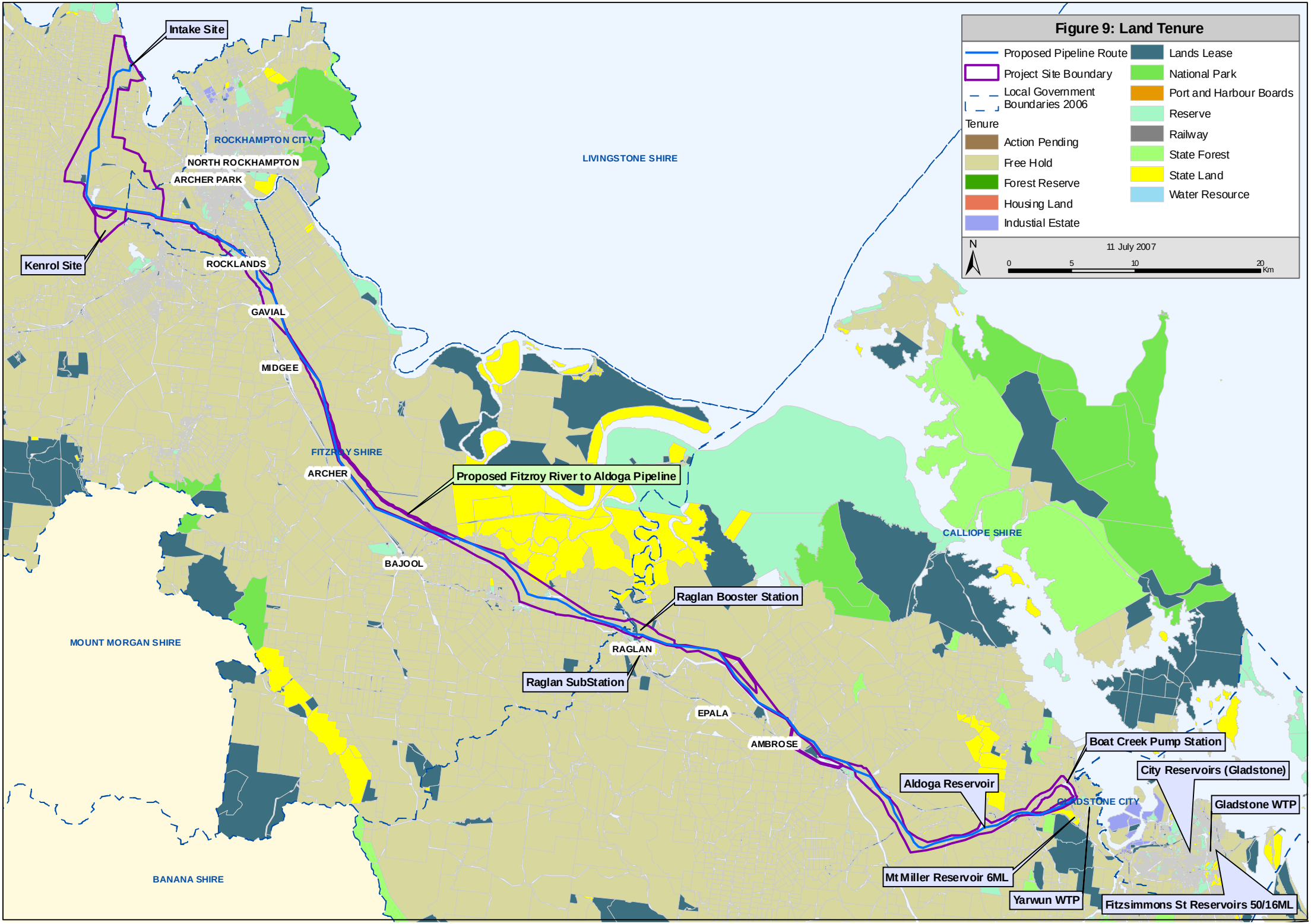


Figure 9: Land Tenure
Proposed Pipeline Route
Project Site Boundary
Local Government Boundaries 2006
Tenure
Action Pending
Free Hold
Forest Reserve
Housing Land
Industrial Estate
Lands Lease
National Park
Port and Harbour Boards
Reserve
Railway
State Forest
State Land
Water Resource
N
11 July 2007
0 5 10 20 Km
Intake Site
Kenrol Site
ROCKHAMPTON CITY
NORTH ROCKHAMPTON
ARCHER PARK
ROCKLANDS
GAVIAL
MIDGEE
ARCHER
LIVINGSTONE SHIRE
FITZROY SHIRE
Proposed Fitzroy River to Aldoga Pipeline
BAJOOL
CALLIOPE SHIRE
Raglan Booster Station
RAGLAN
Raglan SubStation
MOUNT MORGAN SHIRE
EPALA
AMBROSE
Boat Creek Pump Station
City Reservoirs (Gladstone)
Aldoga Reservoir
GLADSTONE CITY
Gladstone WTP
Mt Miller Reservoir 6ML
Yarwun WTP
Fitzsimmons St Reservoirs 50/16ML
BANANA SHIRE

A State Development Area does not change the ownership of the land within the declared area. However, the Queensland Government may acquire land and/or easements within a State Development Area for purposes which can include the establishment of industry, essential services or infrastructure corridors.

There are no protected areas such as National Parks or Conservation Areas within the study area.

3.2.3 Native Title and Indigenous Cultural Heritage

The *Aboriginal Cultural Heritage Act 2003* provides guidance on who can be regarded as Aboriginal Parties to the Project. The Project corridor passes through two registered native title claims, namely the Port Curtis Coral Coast (PCCC) claim between Gladstone and approximately Raglan, and the Darumbal claim between about Raglan and the Fitzroy River. Sections 34 and 35 of the Act state that the native title party for an area is the Aboriginal Party in regard to Aboriginal cultural heritage (Archaeo 2007).

It is intended that a Cultural Heritage Management Plan (CHMP) pursuant to part 7 of the Aboriginal Cultural Heritage Act 2003 will be undertaken during the EIS phase of the project. Expectations are that the CHMP will include cultural heritage surveys of the length of the Project area, and this activity will define all of the cultural heritage sites and areas that will require management (Archaeo 2007).

A CHMP is initiated by notification to the Aboriginal Parties via their nominated service address on their registered native title claim. Those Aboriginal Parties who respond to the notification will be endorsed to take part in the development of the CHMP. Importantly, it is the Aboriginal Parties for an area who are responsible for defining the significance of Aboriginal cultural heritage (see section 8-10 of the Act). By implication, this means that all discussions about management of Aboriginal cultural heritage found during cultural heritage surveying of the Project corridor will involve the endorsed Aboriginal Parties for the CHMP (Archaeo 2007).

Register Searches

The Department of Natural Resources and Water is responsible for maintaining a site Register and a Database for Aboriginal sites, areas and objects. The register provides information on agreements, studies and CHMPs that have been registered. The database is a compilation of information from a range of sources, including site assessments done under permit under the former Cultural Record (Landscapes Queensland and Queensland Estate) Act 1987.

A search of both the Register and the Database resulted in seven registered sites as summarised in Table 6.

Table 6: Register and Database Results

Site ID	Attribute	Latitude	Longitude
JF:A10	QUARRY	23.41382	150.40688
JF:C68	TREE	23.82950	151.15908
JF:C71	ARTEFACT	23.83308	151.15417
JF:D07	TREE	23.45560	150.53691
JF:D08	TREE	23.45487	150.53716
JF:D51	TREE	23.85974	151.03463
JF:D53	ARTEFACT	23.85420	151.07578

Existing data from a previous cultural heritage survey over that part of the Project area that is within the external boundaries of the PCCC native title claim indicates that there is a higher potential for Aboriginal cultural heritage to be found. In many cases, this cultural

heritage will be of low to medium levels of significance. Of particular importance to the Aboriginal parties in the region is the area around Dry Creek, where a significant Aboriginal site is located (Figure 10). The PCCC Aboriginal Parties have already indicated that this area is of very high levels of cultural significance, and wish to have it protected as the preferred form of management. The Dry Creek site is significantly removed from the project boundary and is not likely to be impacted by the project (Archaeo 2007).

3.2.4 Non Indigenous Cultural Heritage

Searches of the Register of the National Estate (compiled and maintained by the Australian Heritage Commission) and the State Heritage Register (compiled and maintained by the Queensland Environmental Protection Agency) were conducted to ascertain if any historic heritage sites fall within, or in close proximity to, the Project area. The following sites are in proximity to the project area (Figure 10):

- Raglan Homestead – This site is located on the western side of Raglan Station Rd and consists of a homestead and several work sheds. The SGIC is approximately 350m to the east of this site.
- Parsons Inn – This site includes the Inn, its subsidiary structures and grounds and is to the south west of Raglan on the western side of the Bruce Highway. It is approximately 2.5km west of the SGIC.
- Gracemere Homestead – this site comprises a number of single storey, timber and corrugated iron structures, including a large house, characteristic of a Central Queensland pastoral property established during the 1850s. It is located on Gracemere Road approximately 2.6km south of the pipeline alignment.

3.3 Built Environment

The pipeline and associated infrastructure is located in rural areas with low population density. The nearest residential zoned land is the southern area of Rockhampton which is approximately one kilometre from the project boundary. Special use areas in Rockhampton City are approximately 700 metres from the project boundary. There are rural properties and homesteads along the route alignment. Discussions with landowners in the SGIC have been conducted by the Department of Infrastructure to minimise the impact to these properties. Similar discussions will be held by GAWB for the specifics of this project.

Within the GSDA there are industrial land uses in the vicinity of the pipeline and there is Heavy Industrial Zoning under the Calliope Planning Scheme where the pipeline will connect to existing Gladstone Water Infrastructure.

To the north of the SGIC the pipeline route follows an existing easement and local roads for most its length. Within the SGIC the pipeline corridor crosses the Bruce Highway (the major road in the area) and remains east of the highway in freehold land for the remainder of its length. Other minor roads and tracks will also be traversed by the pipeline. The North Coast Rail line from Gladstone crosses the proposed pipeline corridor near Gladstone and again around Mt Larcom. This rail line then travels east of the Bruce Highway, between the highway and the proposed pipeline corridor until south of Rockhampton where the rail line crosses the proposed SGIC going north into Rockhampton. The pipeline will pass under road and rail infrastructure at the necessary crossing points.

There is a power line from Gladstone which traverses the proposed pipeline corridor within the GSDA and again around Mt Larcom. From here the power line is to the west of the Bruce Highway and the proposed SGIC. It passes a substation south of Gracemere then branches to Gracemere and Stanwell Energy Park. Another line from the south leads to Rockhampton and crosses the proposed SGIC corridor south of Rockhampton. Pipeline crossings of power easements will be discussed with the relevant power provider however are not likely to require a change from proposed construction methods.

Figure 10: Cultural Heritage

Proposed Pipeline Route
Project Site Boundary
Local Government Boundaries 2006
Cultural Hertiage Sites
QLD Heritage Register Places
Principal Road
Minor Road
Secondary Road
Track

N
11 July 2007
0 3 6 12 Km

Intake Site
Kenrol Site
Indigenous Cultural Heritage JF:A10 Quarry
Non Indigenous Cultural Heritage Gracemere Homestead
Indigenous Cultural Heritage JF:D08 Tree
Indigenous Cultural Heritage JF:D07 Tree
ROCKHAMPTON CITY
LIVINGSTONE SHIRE
ROCKLANDS
MIDGEE
FITZROY SHIRE
ARCHER
Proposed Fitzroy River to Aldoga Pipeline
BAJOOL
MOUNT MORGAN SHIRE
Raglan Booster Station
Non Indigenous Cultural Heritage Raglan Homestead
RAGLAN
Raglan SubStation
Non Indigenous Cultural Heritage Parson's Inn
EPALA
AMBROSE
Indigenous Cultural Heritage JF:D53 Artefact
Indigenous Cultural Heritage JF:C71 Artefact
Boat Creek Pump Station
Indigenous Cultural Heritage JF:C68 Tree
Aldoga Reservoir
City Reservoirs (Gladstone)
CALLIOPE SHIRE
GLADSTONE CITY
Gladstone WTP
Indigenous Cultural Heritage JF:D51 Tree
Mt Miller Reservoir 6ML
Yarwun WTP
Fitzsimmons St Reservoirs 50/16ML
BANANA SHIRE

4 Potential Impacts and Mitigation Measures

The potential impacts resulting from the proposal will be investigated in more detail in the EIS phase of the project. At this stage of the project it is possible only to discuss potential impacts in general terms based on the existing environment of the study area. An Environmental Management Plan will also be developed in the EIS phase which will detail the environmental management measures. Outlined below are some key management measures likely to be used during the project.

4.1 Construction

4.1.1 Natural Environment

Ecosystems, Flora, Fauna

The ROW for the project would be in the order of 30 metres and it is within this area that vegetation would be cleared during construction. Areas of vegetation would also be cleared for the siting of infrastructure such as pump stations and the WTP. Riparian vegetation would also be cleared at the intake site and at creek crossings. Some additional clearing may be required for stockpile and storage areas. The location of these areas will be finalised during the EIS phase of the project.

Clearing of vegetation may result in the loss and fragmentation of habitat for fauna species and threatened species known to occur in the study area may also be removed or impacted during this process. The impact to significant vegetation has been reduced where possible in the route selection process by avoiding mapped areas of remnant vegetation and areas with known habitat value such as wetlands. The route will be further refined when more detailed ecological work has been completed during the EIS phase

There is the potential for the spread of weeds, feral animals and pathogens both within the corridor and adjacent to the corridor as a result of the project. This is due to the disturbance to native vegetation during construction and the potential transport of seeds and pathogens on construction machinery or equipment.

Typical measures that will be implemented during the construction phase to mitigate the identified impacts include:

- Clearing of the minimum vegetation required for construction and the trimming of trees where possible to avoid total removal (particularly in environmentally sensitive areas and at creek crossings);
- Appropriate revegetation of the corridor as soon as possible after construction;
- Checking for fauna species and relocation prior to the removal of habitat; and
- The implementation of work practices which prevent the establishment (or further promotion) of introduced weed species and weed removal in accordance with appropriate procedures.

Soils and Geology

Impacts to soil during the construction phase will result from the removal of topsoil during trenching and grading and the compaction of soil on access routes and work areas. Soil profiles will also be disrupted during trenching and grading. There is the potential for erosion and sedimentation once vegetation has been cleared and soil is exposed to the effects of wind or rain.

There is the potential for contaminated land to occur within the project boundary and this will be identified where possible during the EIS phase of the project through the Contaminated Land Register and Environmental Management Register (Available through the EPA). There

are also some areas of the route that have high potential for the presence of ASS and this may be encountered during grading, trenching or watercourse crossings.

Typical management measures to reduce the impacts to soils during construction include the following:

- Minimising the time that soil is exposed by rapid work methods and rehabilitation of the site;
- Detailed investigations to identify areas of ASS and the implementation of ASS management measures during construction in accordance with QASSIT Guidelines to prevent acidification of soil and water and impacts to flora or fauna;
- Timing of construction activities to take account of weather conditions and reduce the likelihood of erosion; and
- Implementation of erosion and sediment controls which will be specified in the EMP for the project.

Hydrology and Water Quality

There are creeks and watercourses within the study area that will be traversed by the pipeline. The actual location and method for crossing streams will be determined during functional design and will be dependent on site factors such as hydrology, geology and environmentally sensitive areas. Works in streams and riparian areas may result in erosion of river banks, changes to flow regimes, and sedimentation of watercourses.

Typical management measures to minimise the impact to hydrology and watercourses would include:

- The use of appropriate creek crossing methods depending on the environment and nature of the creek;
- The appropriate storage of fuels and hazardous substances away from watercourses or drainage lines;
- Minimising the time that soil is exposed by rapid work methods and rehabilitation of the site; and
- Erosion and sediment control measures during construction

Air Quality

Construction activities may impact local air quality through the emissions from machinery and construction vehicles, and the generation of dust as a result disturbance of soils during trenching and grading. It is also possible that increased traffic on unsealed roads may cause localised dust impacts to nearby residences (the nature of the route means that there are few residential areas in close proximity that are likely to be impacted).

Further air quality assessment will be conducted in the EIS phase however it is expected that air quality impacts will be minor and localised and will be mitigated through the following measures:

- Maintenance of construction machinery to reduce emissions;
- The use of designated and well maintained access routes; and
- The use of water trucks as necessary for dust suppression although this should be minimised to reduce water use.

4.1.2 Socio-economic

There are beneficial and adverse socio-economic impacts resulting from the project. The main beneficial impact and reason for the project is the continued supply of water to

GAWB's existing and future customers and provision for the associated regional economic growth. The likely socio economic impacts during construction are outlined below.

Land use and access

The pipeline route and other infrastructure are to be located primarily on freehold land. The construction phase will impact land use and access through the clearing of vegetation, the severance of agricultural/pastoral land uses and presence of construction machinery and vehicles on local roads and access tracks. There may be some requirement for the displacement of residents however the pipeline route has been selected to avoid residential areas and initial discussions have been held with landholders to accommodate their needs where possible. The impact to land uses will be largely temporary as the pipeline trench will be covered and rehabilitated immediately after construction.

Any crossing of major road or rail infrastructure has the potential to temporarily affect traffic in these corridors. This and other land use and access impacts will be mitigated through the following measures:

- Further discussions with landowners to discuss the location of access tracks and other provisions during construction to reduce the land use impact;
- Consultation with Queensland Rail and the Department of Main Roads regarding major road and rail crossings; and
- Traffic management during construction to reduce the impact of construction vehicles on local roads and land uses.

Noise

There is likely to be noise generated from construction machinery and activities which may cause temporary disturbance to adjacent residences. There are few houses in close vicinity to the pipeline or associated infrastructure such as the pump stations and the disturbance during construction will be for short periods only. Additional noise and vibration would also be generated on local access roads due to the increase in traffic associated with construction vehicles. Typical noise mitigation measures include the following:

- Consultation with landowners prior to noise generating activities;
- Restricted work hours in noise sensitive areas; and
- Noise attenuation measures for pump stations such as vegetation screening and acoustic fittings.

Visual and Landscape

The removal of vegetation, alteration of the landscape and presence of construction machinery during construction are likely to impact the visual and landscape qualities of the area. This will affect landowners along the pipeline corridor however the rural nature of the corridor means the number of people impacted will be minimal. Visual and landscape impacts will be mitigated following construction by the rehabilitation and revegetation of the pipeline corridor where possible, however the corridor will be kept free of large trees so some visual impact will persist.

Cultural Heritage

Cultural heritage can be impacted in two main ways:

- Impact to known indigenous and non-indigenous cultural heritage features, and
- Impact to unknown cultural heritage features encountered during construction.

Detailed cultural heritage investigations and consultation with indigenous and local/historical groups will be necessary as part of the EIS process, to minimise the potential for these impacts. This will include the preparation of a Cultural Heritage Management Plan.

4.1.3 Built Environment

Impacts to the built environment during construction may result from the increased traffic on local and other roads as well as road and rail crossings. Increased construction traffic has the potential to cause degradation of roads, and road and rail crossings may cause temporary disruption to traffic in these corridors. These impacts will be minimised through the following measures:

- Traffic management during construction to reduce the impact to local road infrastructure; and
- Consultation with Queensland Rail and the Department of Main Roads to ensure the road and rail crossings cause minimum disruption.

4.2 Operation

The impacts during operation of the pipeline are both beneficial and adverse. The beneficial impacts are outlined elsewhere in this report and relate to the increased security of water supply and economic benefits to the region. Adverse effects relate to the potential social and environmental impacts from maintenance and repair activities and are outlined below.

Following the construction phase the pipeline corridor will be rehabilitated and the pipeline commissioned. This will involve revegetation of the corridor however the corridor will be kept free of large trees that may cause damage to the pipeline and inhibit access.

Maintenance and repair activities required during operation of the pipeline will require key access routes to be maintained and localised earthworks to gain access to certain sections of the pipeline as required. The impacts to the natural, social and built environment during operation will be similar to those outlined above for construction; however would occur on a much smaller scale and be infrequent. This is because repairs and maintenance will only occur on small sections of the pipeline at one time. The mitigation measures outlined for construction will also be used as required during maintenance and repair works.

Impacts and mitigation measures specific to operation are outlined in the sections below.

4.2.1 Land use and access

Generally land use in the corridor can return to normal after construction is complete however certain types of land use will be limited to prevent damage to the pipe and maintain access. For this reason there may be some adverse impacts to landowners. Noise and air quality impacts resulting from the periodic use of machinery during maintenance and repairs may affect landowners. Consultation with landowners will occur to ensure these impacts are minimised.

4.2.2 Pipeline failure

Prior to commissioning the pipeline will undergo integrity testing to reduce the risk of leaks. The impacts from pipeline failure will depend on the scale of the incident and integrity of the pipeline will be tested throughout operation to reduce this risk.

4.2.3 Vegetation Management

The corridor will be revegetated following construction. Poor vegetation cover may result in the following impacts:

- Erosion and Sedimentation;
- Loss of Agricultural Capacity; and
- Loss of visual amenity.

To mitigate these impacts appropriate vegetation will be planted and maintained during operation of the pipeline however the pipeline corridor will need to be kept free of large trees that may inhibit access or damage the pipeline.

4.2.4 Weed and Pest Management

During pipeline operation there is the potential for weeds to propagate in the corridor as a result of topsoil disturbances during construction, spread of weeds from construction activities and removal of native vegetation. Weeds can have a negative ecological impact and their propagation will be minimised during operation through the following measures:

- Implementation of a weed management plan during construction;
- Measures to reduce the transport of soil or seeds along the corridor; and
- Regular monitoring of the corridor to identify weed infestations and implement species specific eradication measures

4.2.5 Soil Stability and Erosion

Following construction the pipeline will be covered and soil compacted as required. During operation it is possible that there may be subsidence and loss of topsoil from erosion. In turn erosion may result in sedimentation of waterways and impacts to local flora and fauna.

Typical mitigation measures to prevent these impacts in the operation phase include:

- Regular checks of the pipeline for subsidence, pipe exposure and vegetation cover;
- Maintenance of vegetation cover and or erosion control measures to prevent erosion; and
- Restriction of vehicle access to areas of stable ground to prevent subsidence.

5 Costs and Benefits Summary

The project is expected to cost in the order of $345m. The cost of water from the pipeline supplied to industrial users will be regulated by the Queensland Competition Authority.

The benefits of the pipeline project include the following:

- Contribution to the objectives of the Central Queensland Water Supply Strategy – to meet the expected supply shortfalls in the Gladstone Region;
- Least cost solution to increasing availability and reliability of water supply to GAWB's customers in the Gladstone Region which will allow the region to further develop into an internationally competitive location for industry;
- Economic growth associated with this industrial expansion which will have regional, state and national benefits; and
- Provision of employment during construction and operation of the pipeline

As identified in this report, there are potential environmental and social impacts resulting from the construction and operation of the pipeline. These impacts can be considered as a cost of the project however these will be identified and minimised where possible during the EIS phase.

6 References

Archaeo Cultural Heritage Services 2007. Initial Advice Statement, Rockhampton to Gladstone Pipeline. Unpublished report prepared for Arup.

Australian Pipeline Industry Association (APIA) (2005). *Code of Environmental Practice – Onshore Pipelines*. APIA, Canberra.

Department of Natural Resources and Mines (2005) *Central Queensland Regional Water Supply Strategy and Report*

Ecoserve (2007). *Preliminary Assessment of Terrestrial Fauna and Fauna Habitat Values – GAWB Water Pipeline Project*. Unpublished report prepared for Arup.

Great Barrier Reef Marine Park Authority 2006. *Great Barrier Reef Marine Park Zoning Plan 2003 MPZ17 – Gladstone.*

Resource and Land Management Services (RLMS) (2006). *Rockhampton to Gladstone Corridor - Infrastructure Corridor Investigation*. Report for the Department of State Development.

Houston, W. (2006). *Advice on the proposed pipeline from Marlbourough to Gladstone with respect to protecting habitat of the Capricorn Yellow Chat – Draft*. An unpublished report prepared by the Central Queensland University for RLMS.

Sattler, P.S. and Williams, R.D. (eds) (1999). *The Conservation Status of Queensland's Bioregional Ecosystems*. Published by Environmental Protection Agency; Brisbane.

WBM (2007). *Rockhampton to Gladstone Pipeline Corridor: Preliminary Flora and Fauna Assessment.* Unpublished report prepared for Arup.

7 Glossary

AHPI	Australian Heritage Places Inventory
ASS	Acid Sulphate Soils
BSL	Boyne Smelters Limited
CHMP	Cultural Heritage Management Plan
CQRWSS	Central Queensland Regional Water Supply Strategy
DEWR	Department of Environment Water and Resources
DNRW	Department of Natural Resources and Water (previously DNRM)
DoI	Department of Infrastructure
DPI	Department of Primary Industries
EIS	Environmental Impact Statement
EPBC	*Environment Protection Biodiversity Conservation Act* 1999
EPP	Environmental Protection Policy
GAWB	Gladstone Area Water Board
GBRMP	Great Barrier Reef Marine Park
GRP	Glass Reinforced Plastic
GSDA	Gladstone State Development Area
HAWM	High Astronomical Water Mark
HNFY	Historic No Failure Yield
IAS	Initial Advice Statement
IDAS	Integrated Development Assessment System
IPA	*Integrated Planning Act 1997*
LGA's	local government areas
NCA	*Nature Conservation Act*
NEPM	National Environmental Protection Measure
NES	National Environmental Significance
PASS	Potential Acid Sulphate Soils
PCCC	Port Curtis Coral Coast
QAL	Queensland Alumina Limited
QASSIT	Queensland Acid Sulphate Soils Investigation Team
QCA	Queensland Competition Authority
RE's	Regional Ecosystems
RLMS	Resource and Land Management Services
RNE	Register of the National Estate
SDPWOA	*State Development and Public Works Organisation Act* 1971
SGIC	Stanwell to Gladstone Infrastructure Corridor
SPP's	State Planning Policies
SWBTA	Shoalwater Bay Military Training Area
SWP	Strategic Water Plan
ToR	Terms of Reference
WRP	Water Resource Plan
WTP	Water Treatment Plant

Appendix A

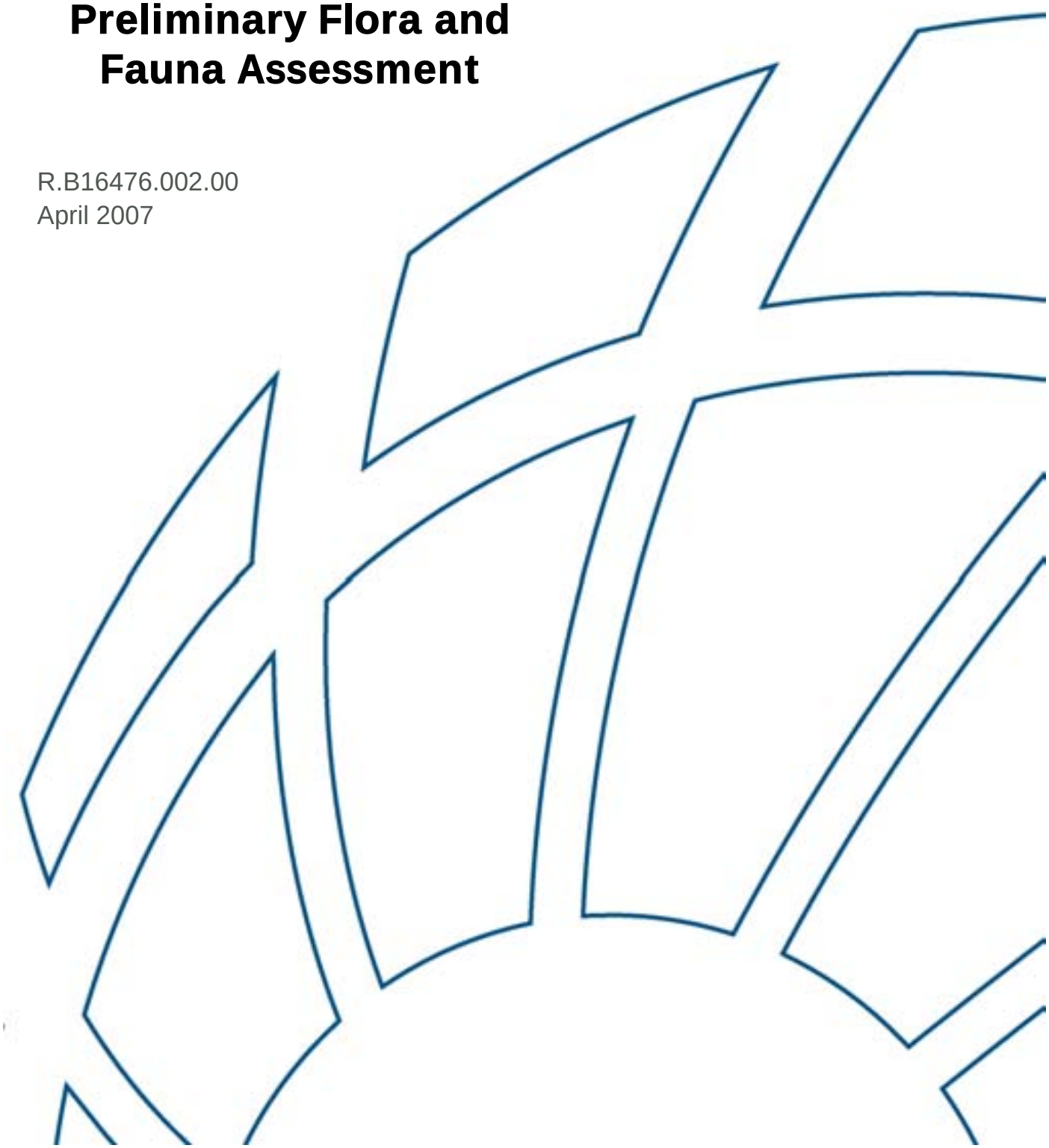
Ecological Report

BMT WBM

A part of BMT in Energy and Environment

Rockhampton to Gladstone Pipeline Corridor: Preliminary Flora and Fauna Assessment

R.B16476.002.00
April 2007



Rockhampton to Gladstone Pipeline Corridor: Preliminary Flora and Fauna Assessment

Prepared For:	Arup P/L
Prepared By:	BMT WBM Pty Ltd (Member of the BMT group of companies)

Offices

Brisbane
Denver
Karratha
Melbourne
Morwell
Newcastle
Perth
Sydney
Vancouver

DOCUMENT CONTROL SHEET

BMT WBM Pty Ltd

BMT WBM Pty Ltd
Level 11, 490 Upper Edward Street
Brisbane 4000
Queensland Australia
PO Box 203 Spring Hill 4004

Tel: +61 7 3831 6744
Fax: + 61 7 3832 3627

ABN 54 010 830 421 002

www.wbmpl.com.au

Document :	R.B16476.002.00
Project Manager :	Darren Richardson
Client :	Arup P/L
Client Contact:	Sally Wilson
Client Reference	

Title :	Rockhampton to Gladstone Pipeline Corridor: Preliminary Flora and Fauna Assessment
Author :	Derek Johnson
Synopsis :	Preliminary flora and fauna survey of proposed water supply pipeline route for Gladstone Area Water Board. The pipeline would be one of several services along the proposed corridor. Sampling was limited to selected accessible points along the route.

REVISION/CHECKING HISTORY

REVISION NUMBER	DATE OF ISSUE	CHECKED BY		ISSUED BY	
1	20 April 2007	DLR		DCJ	
2	27 April 2007	DLR		DCJ	

DISTRIBUTION

DESTINATION	REVISION			
	0	1	2	3
Arup P/L	PDF	PDF		
BMT WBM File	1	1		
BMT WBM Library	PDF	PDF		

CONTENTS

LIST OF TABLES

1 INTRODUCTION

Arup P/L has commissioned WBM P/L to do a preliminary flora and fauna assessment of the proposed water supply pipeline route for Gladstone Area Water Board. The pipeline would be one of several services along the proposed corridor, and would extract and carry water from the Fitzroy River near Rockhampton, to Gladstone.

The specific aims of the assessment are to provide:

- A broad-based assessment of the conservation values of vegetation, fauna and their habitats within and directly adjacent to the proposed corridor;
- Assessment of threatened species known or potentially occurring within the project area, including species listed under the Commonwealth's *Environment Protection and Biodiversity Conservation Act 1999* (EPBC) and Queensland's *Nature Conservation Act 1992* (NCA);
- An assessment and comment on significant habitats within the study area

All observations and recommendations provided in this report are based on a review of available literature as well as field inspection and assessment conducted by qualified ecologists. Assessments were undertaken at a degree of detail required for preliminary planning purposes only.

2 NOMENCLATURE AND TERMINOLOGY

Within this report, the conservation status of a species may be described as *Endangered, Vulnerable, Rare, Culturally Significant* or *Common*. These terms are used in accordance with the provisions of the Queensland *Nature Conservation Act 1992* (*NC Act*) and its amendments[1], and/or the *Environment Protection and Biodiversity Conservation Act 1999* (*EPBC Act*). *Threatened* is a commonly used term to collectively describe *Endangered* and *Vulnerable* species.

This report describes the potential impacts of the proposal on remnant vegetation as defined under the *Vegetation Management Act 1999* (*VM Act*). The *VM Act* and the presence of Regional Ecosystems (RE's) provides the legislative framework for vegetation conservation in Queensland. This occurs through two processes that are administered by the Department of Natural Resources and Water (DNRW) under the *VM Act* and a process developed by the Environmental Protection Agency (EPA) and administered under the *Integrated Planning Act 1997* (*IP Act*). The descriptions of conservation status used in this report reflect those defined under the *VM Act* and Regional Ecosystem Description Database (REDD) maintained by the Queensland Herbarium.

The following abbreviations were used in this report:

AVH – Australia's Virtual Herbarium

DEWR – Australian Department of Environment and Water Resources (recently changed from Australian Department of Environment and Heritage)

EPA –Queensland Environmental Protection Agency

GIS - Geographical Information System

RE – Regional Ecosystem

REDD – Regional Ecosystem Description Database

RAMSAR – The Convention on Wetlands, signed in Ramsar, Iran, in 1971

VMA – Vegetation Management Act 1999

Wildlife Online – public internet access to Queensland EPA flora and fauna records

[1] For the purposes of this report, relevant NC Act regulations and amendments refer to the Nature Conservation (Wildlife) Regulation 1994 and reprinted as in force on 8 March 2004 (including amendments up to 2004 SL No. 9).

3 METHODS

3.1 General

Public roads and reserves were used to visit all possible publicly accessable sampling points along the corridor route, and relevant areas adjacent to the route. Regional Ecosystem (EPA, 2005) mapping was used to locate the most intact patches of native vegetation intersected by the corridor route, and to identify any other unmapped patches of native vegetation. Field searches for Rare or Threatened flora and fauna species known to occur in the area of the corridor route were not targetted for this level of assessment, witht the exception of the Yellow Chat Chat (*Epthianura crocea macgregori*), due to its Critically Endangered status under the EPBC Act.

3.2 Vegetation Communities

Regional Ecosystem mapping was checked for accuracy at as many intersections as possible along the corridor route. Constraints at this stage were budgetary and the limited access to the corridor route – mostly public roads and reserves. Unmapped vegetation likely to be affected was also noted, including unmapped stands or communities (including grasslands and wetlands) and significant trees (e.g. old growth). Any Rare or Threatened species seen during the vegetation survey were also recorded.

3.3 Fauna

Ecoserve did a preliminary fauna habitat survey for WBM P/L, including an opportunistic fauna survey. General fauna habitat was assessed at selected assessable points along the corridor route, along with targetted habitat survey of the Yellow Chat (*Epthianura crocea macgregori*), Critically Endangered under the EPBC Act. This targetted survey was also done in relevant areas adjacent to the corridor route. The Ecoserve report is presented in Appendix A-1.

3.4 Rare and Threatened species data

3.4.1 Flora

Two public access databases with restricted locational precision were searched to identify Rare or Threatened flora and fauna known to occur, or to have occurred, in the area. Both Rare and Threatened categories are used in the Nature Conservation Act, and Threatened is used in the EPBC. The EPBC also lists migratory species. Both searches were done by specifying coordinates (defining a rectangle) that contained the entire proposal area.

- Wildlife Online – a Queensland EPA internet database accessible to the public which stores records of plant collections and fauna sightings (and other groups including algae, fungi *etc*) for a search area defined by the user. Rare and Threatened species can be selected from the data.
- EPBC Act Protected Matters Report – a Commonwealth DEWR internet database accessible to the public which lists Rare and Threatened species for a search area defined by the user.

3.4.2 Fauna

Ecoserve did a preliminary fauna habitat survey for WBM P/L, including an opportunistic fauna survey. Databases of Rare or Threatened fauna referred to by Ecoserve are listed in their report in Appendix A-1.

4 OBSERVATIONS

4.1 Flora

4.1.1 Remnant vegetation communities

Observations of remnant vegetation communities, with Regional Ecosystem codes, are shown in Appendix A-1. In most cases the remnant vegetation communities are consistent with Regional Ecosystems, but appropriate notes are made where there is disagreement. The Regional Ecosystem mapping, with site numbers, is shown in Appendix E-1.

The known remnant vegetation communities intersected by the proposed corridor route are discussed as follows, starting from the extraction point at the Fitzroy River and finishing near Gladstone:

1 The extraction point on the Fitzroy River has a narrow strip of remnant riverine forest, consisting mostly of *Eucalyptus tereticornis, Eucalyptus coolabah* and *Corymbia tessellaris*. The understorey has been removed by grazing and other activities. Refer to site number 152. There was also a Declared Plant (water hyacinth – *Eichhornia crassipes*) seen at this site.

2 The area northwest of Rockhampton is mostly cleared. There is a road reserve of *Eucalyptus populnea* on the Rockhampton-Ridgelands Road that is intersected by the corridor route. Refer to site numbers 160, 161 and 163. There is also an area of scattered *E.populnea* further to the south on the Alton Downs – Nine Mile Road that is intersected. Refer to sites 169 and 171. There is also an area of mapped wetland between these two areas that is intersected.

3 An area of *Eucalyptus tereticornis* and *E.coolabah* represented by Regional Ecosystem mapping is intersected by the corridor route near the Malchi – Nine Mile Road. Refer to site 172, where *E.crebra* was recorded, suggesting that another Regional Ecosystem may also be present. Further south along the same road, south of Fairy Bower Road, there may be areas of wetlands intersected. Refer to sites 181, 182, 183 and surrounds.

4 A small unmapped remnant of softwood scrub is intersected on the Malchi – Nine Mile Road at site 177. This scrub falls into the category of Endangered “Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions” , as defined in the EPBC Protected Matters Report.

5 There are unmapped areas of partially cleared riverine rainforest on the Fairy Bower Road that may be intersected. Refer to site 185.

6 There are wetlands in the Fairy Bower area, just south of the Capricorn Highway, that may be intersected. Refer to sites 191 and 192.

7 There are areas of unmapped *Eucalyptus populnea, E.tereticornis* and *E.coolabah,* and also unmapped wetlands, that may be intersected east of the intersection of the Burnett and Bruce Highways. Refer to site 196.

8 There is a remnant of *Eucalyptus populnea* and *E.tereticornis* on the road reserve near the intersection of Roopes Road and River Road which is intersected by the corridor route. Refer to site 2.

9 There are remnants of *Eucalyptus populnea* and some *E.tereticornis* on the road reserves of Georges Road and Casuarina Road that are intersected by the corridor route. Refer to sites 6 and 8 respectively.

10 Some unmapped very open woodlands of *Eucalyptus populnea* may be intersected north of Bajool. Refer to sites 10, 11 and 12.

11 A creek west of the Bajool – Port Alma Road, probably with mangroves, is intersected. An advanced regrowth patch of *Acacia harpophylla* (brigalow) approximately 100m west of the road is just missed by the corridor route. Refer to sites 14, 15 and 17.

12 A mapped remnant of *Eucalyptus cambageana* with *Acacia harpophylla*, mosaiced with *Eucalyptus moluccana* is intersected. Refer north of sites 18 and 19, which are on the Toonda – Port Alma Road.

13 Regrowth areas of diverse scrub-related species as part of a former understorey of cleared *Eucalyptus crebra* are intersected. Refer to sites 19 and 21 on the Toonda – Port Alma Road.

14 Unmapped areas of *Eucalyptus populnea* may exist and be intersected, as indicated by unmapped road reserves of this community on the Toonda – Port Alma Road and the Twelve Mile Road, surrounding sites 22 to 36.

15 *Eucalyptus tereticornis* forest in good condition is intersected on the Twelve Mile Road at site 29. This is contiguous with a small patch of remnant scrub in good condition at site 30 on the same road. This scrub falls into the category of Endangered “Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions”, as defined in the EPBC Protected Matters Report.

16 Extensive mapped areas of mangroves, dominated by *Avicennia marina* and *Excoecaria agallocha*, and some areas of riverine *Eucalyptus tereticornis*, are intersected near Raglan. Some surrounding unmapped areas of Eucalyptus crebra are also intersected. Refer to sites 39 and 37.

17 An extensive length of the corridor route was unaccessible by road east of Raglan, but sites 79 to 91 (Raglan Station Road) suggested there would be unmapped remnants of *Eucalyptus populnea* (RE 11.3.2) and *E.crebra* (RE 11.11.15 or 11.9.9) communities on higher ground, and *E.tereticornis* communities (RE 11.3.4) along creeklines. This is supported by intersection points along a road reserve of *E.populnea* and *E.crebra* on Reedy Creek Road at sites 92 and 94. The area is cleared north of site 94. Site 93 supports the presence of *E.tereticornis* communities along creeklines. Sites 95 to 104 also support the presence of the above-mentioned communities.

18 Sites 45, 46 and 49 on Dart Creek Road show that there is a general change in this area to *Eucalyptus moluccana*, which continues eastward. This is also supported by sites 105 to 119, including Popenia Road. *Eucalyptus tereticornis* is also present in lower lying areas. Site 123 is also *E.moluccana*.

19 There is a large lagoon named Horseshoe Lagoon north west of Mount Larcom intersected by the corridor route at sites 107 to 109. The dominant trees are large *Eucalyptus tereticornis*.

20 There is a grassland area of several hectares on Popenia Road that may possibly be a natural grassland, rather than cleared forest. Further investigation would be needed to verify this. The western side of this grassland is intersected by the corridor route.

21 More *Eucalyptus moluccana* forest is intersected north of Mount Larcom at sites 52 to 56. Site 57, further north, is cleared as indicated on the RE mapping.

22 Road access is poor for the corridor route from Mount Larcom to the east for an extensive distance (to Aldoga), and further survey is needed to confirm intersections with remnant vegetation. RE mapping indicates that the remnants intersected are *Eucalyptus moluccana* (11.3.26) and *E.tereticornis* (11.3.4), with some *E.crebra* (11.11.15) further east.

23 Sites 63 to 70, near Aldoga, show that the area is mostly cleared, but there are some small remnants of *Eucalyptus moluccana*. Sites 67, 68, 70 and 71 confirm a large remnant of Eucalyptus moluccana in good condition, which is partly intersected by the corridor route. The RE is probably incorrect, however, and may need revising – possibly 11.9.13.

24 Site 125 helps to confirm that *Eucalyptus crebra* (11.11.15) occurs as mapped approximately 1.5km further west along the corridor route.

25 Sites 72 and 73 confirm fragments of RE 11.3.25 (*Eucalyptus tereticornis et.al*.) are intersected by the corridor route.

26 East of Yarwun, sites 133 to 136 confirm that REs 12.11.6 and 12.11.14 are correctly mapped (the change to REs preceded by 12 indicates the South East Queensland bioregion, rather than the Brigalow bioregion). These communities are dominated by *Corymbia citriodora* and *Eucalyptus crebra* respectively. *Macrozamia* sp. were seen in the understorey in places. These communities are both intersected by the corridor route in this area.

27 Riverine *Eucalyptus tereticornis* and rainforest on Boat Creek are intersected by the corridor route at sites 137 to 141.

4.1.2 Rare and Threatened species

Results of the searches of Wildlife Online (EPA, 2007) and the EPBC Act Protected Matters Report (DEWR, 2007) are shown in Table 4-1.

Table 4-1 Wildlife Online and EPBC Protected Matters Report 17/4/07 GAWB pipeline corridor

Species records, with unrecorded species from EPBC Protected Matters Report at bottom of list	NCA*	Records*	EPBC*	EPBC Protected Matters Report (smaller defined area)
Acacia pubicosta	R	1	.	
Acacia storyi	R	2	.	
Actephila sessilifolia	R	9	.	
Alyxia magnifolia	R	9	.	
Asplenium pellucidum	V	2	V	
Atalaya calcicola	R	6	.	
Atalaya collina	E	3	E	Reported
Atalaya rigida	R	18	.	

Callicarpa thozetii	R	1	.	
Choricarpia subargentea	R	3	.	
Cossinia australiana	E	4	E	
Cupaniopsis shirleyana	V	10	V	Reported
Cycas megacarpa	E	25	E	
Cycas ophiolitica	E	14	E	
Dansiea elliptica	R	10	.	
Decaspermum struckoilicum	E	10	.	
Denhamia parvifolia	V	1	V	
Eucalyptus raveretiana	V	2	V	Reported
Graptophyllum excelsum	R	15	.	
Hakea trineura	V	1	V	
Hernandia bivalvis	R	18	.	
Livistona drudei	V	2	.	
Macropteranthes fitzalanii	R	4	.	
Macropteranthes leiocaulis	R	13	.	
Marsdenia brevifolia	V	1	V	
Parsonsia larcomensis	V	4	V	Reported
Parsonsia lenticellata	R	12	.	
Quassia bidwillii	V	2	V	Reported
Stackhousia tryonii	R	4	.	
Zieria sp. (Mt Larcom N.Gibson TOI8)	V	4	.	
Unrecorded species below				
Bosistoa selwynii	NAQ	0	V	Reported
Bosistoa transversa	.	0	V	Reported
Bulbophyllum globuliforme	R	0	V	Reported
Leucopogon cuspidatus	.	0	V	Reported

* CODES
NCA - Indicates the conservation status of each taxon under the *Nature Conservation Act 1992.*
The codes are Presumed Extinct (PE), Endangered (E), Vulnerable (V), Rare (R), Common (C) or Not Protected (.). NAQ is not an original code used by NCA – it has been added here to indicate that this taxon is not held at the Queensland Herbarium according to AVH, and therefore has no status in the NCA at present.

EPBC - Indicates the conservation status of each taxon under the *Environment Protection and Biodiversity Conservation Act 1999.*
The codes are Conservation Dependent (CD), Critically Endangered (CE), Endangered (E), Extinct (EX), Extinct in the Wild (XW) and Vulnerable (V).
Records - Indicates the number of records of the species contained within the database for the area searched.

A search of the Wildlife Online database (EPA, 2007) for Rare and Threatened species listed in the Nature Conservation Act 1992 returned a list of 30 plant species. The list is shown in Appendix C-1, and is represented in two halves (west and east) due to limitations in longitudinal range of the database search. It should be noted that the search area specified needs to be a rectangle, and the

number of different species are highly likely to be over-represented (i.e. some are not likely to be present). A total of five species were listed as Endangered, 10 species were Vulnerable, and 15 were Rare.

An EPBC Protected Matters Report (DEH, 2007) was generated from a similar search, but with a more narrowly defined search area (search area and results are shown in Appendix D-1) and returned a list of nine plant species and their conservation status (eight Vulnerable and one Endangered). Four species were reported that did not occur on the Wildlife Online list, indicating that these species are expected to occur, but have not been recorded in the search area.

Almost all of the species listed as Endangered or Vulnerable in the NCA from Wildlife Online, *and* reported on by the EPBC Act, are scrub species *sens. lat*. These species were therefore assumed to occur most likley within remnant patches of softwood scrub or vine-thicket, so targetted survey for these species was considered unecessary for this level of assessment. Remnant and partially cleared, or regrowth, areas of scrub were therefore identified normally as part of the vegetation survey.

Eucalyptus raveretiana (black ironbox) was listed in both databases as Vulnerable and is known to occur in riverine areas that are likely to be intersected by the corridor route.

The two cycads *Cycas megacarpa* and *C.ophiolitica* were listed in both databases as Endangered, but are not reported in the EPBC search for the study area. They are known to occur in the study area and are likely to be in forested areas intersected by the corridor route.

Decaspermum struckoilicum (Mt. Morgan Myrtle) was listed only in Wildlife Online, and as Endangered, but it occurs in the Mt. Morgan area only (AVH search, Centre for Plant Biodiversity Research, Council of Heads of Australian Herbaria, 2007, and Harden, McDonald and Williams, 2006), and is considered unlikely to occur in areas intersected by the corridor route.

There are many species listed in Wildlife Online as Vulnerable or Rare, which are not reported by the EPBC search. These include a variety of species that occur in a variety of habitats, so it was considered beyond the scope of this preliminary study to target these species at this stage.

4.2 Fauna

The Ecoserve report in Appendix A-1 details the results of desktop analysis (including database searches for Rare and Threatened species) and field survey. The fied survey results look at:

- Species richness and representativeness
- Species of conservation significance

The existing environment and fauna values are then discussed, by looking at the corridor route in five separate sections. The results are shown in Section 3 of that report.

5 ASSESSMENT

5.1 Flora

5.1.1 Communities

Any clearing of remnant vegetation should be avoided if possible. Larger tracts should be kept intact to maintain viability and wildlife corridors. Existing cleared easements should be used or widened wherever possible to minimise fragmentation of remnants.

With reference to the numbered points of corridor route intersection in Section 4.1.1, the most important concerns in terms of conserving biodiversity and wildlife habitat are (in order along the corridor route):

- The small unmapped remnant of softwood scrub on the Malchi – Nine Mile Road at site 177.
- Wetlands in the Fairy Bower area, just south of the Capricorn Highway. Refer to sites 191 and 192.
- The road reserve of *Eucalyptus populnea* and *E.tereticornis* near the intersection of Roopes Road and River Road. Refer to site 2.
- The remnants of *Eucalyptus populnea* and some *E.tereticornis* on the road reserves of Georges Road and Casuarina Road. Refer to sites 6 and 8 respectively.
- *Eucalyptus tereticornis* forest in good condition on the Twelve Mile Road at site 28. This is contiguous with a small patch of remnant scrub in good condition at site 29 on the same road.
- Extensive mapped areas of mangroves, dominated by *Avicennia marina* and *Excoecaria agallocha*, and some areas of riverine *Eucalyptus tereticornis*, near Raglan. Refer to sites 39 and 37.
- The large lagoon named Horseshoe Lagoon north west of Mount Larcom at sites 107 to 109. The dominant trees are large *Eucalyptus tereticornis*.
- The grassland area of several hectares on Popenia Road that may possibly be a natural grassland, rather than cleared forest. Further investigation would be needed to verify this. The western side of this grassland is intersected by the corridor route.
- East of Yarwun, communities dominated by *Corymbia citriodora* and *Eucalyptus crebra,* with *Macrozamia* sp.
- Riverine *Eucalyptus tereticornis* and rainforest at sites 137 to 141.
- A general minimisation of impacts to the forests of *Eucalytus moluccana* from Raglan eastwards.

5.1.2 Species

There are a number of plant species that may potentially be impacted by the corridor route, and it is beyond the scope of this report to discuss each of these in detail. However, it appears that Endangered (under NCA and EPBC) scrub species are of greatest concern, indicating the need to keep the corridor route clear of any patches of scrub, or scrub regrowth. Scrub in the study area is

defined mainly by the Regional Ecosystem 11.11.18, but is not necessarily restricted to this RE, and this and other scrub REs may not necessarily appear on RE mapping due to scale or error. There are a large number of scrub REs which could also occur, depending on geological substrate and species assemblage.

Another significant concern is the possible impact on the two cycads, Endangered under the NCA and EPBC. *Cycas megacarpa* and *C.ophiolitica* are known to occur in areas that may be intersected by the corridor route, and remnant vegetation in these areas should be avoided. Further research and field survey are necessary to better understand the potential impacts on these species, and the other Rare and Threatened species.

5.2 Fauna

The Ecoserve report in Appendix A-1 provides a preliminary assessment of fauna and fauna habitat that are likely to be impacted by the corridor route. There are a number of concerns that cannot be succinctly summarised here. Most notable of the concerns is the impact on habitat for the Critically Endangered (under EPBC) Yellow Chat (*Epthianura crocea macgregori*). Conclusions of the fauna study are presented in Section 4 of that report.

5.3 Combined assessment of flora and fauna

Combined assessment of flora and fauna will be necessary to identify those areas that are at risk in terms of both flora and fauna issues. This will make it easier to prioritise these areas for conservation. Generally, areas of priority will be:

- forest remnants, especially with fauna habitat
- wetlands, especially with fauna habitat
- riverine and floodplain vegetation including mangroves, especially with fauna habitat
- areas of fauna habitat that are not necessarily either forested nor wetlands nor riverine (e.g. disturbed areas)
- areas of habitat for Rare and Threatened flora or fauna species (needs to be confirmed by targetted field survey)
- possible areas of natural grassland
- any vegetation remnants of significant conservation value not shown on Regional Ecosystem mapping due to scale or error

6 EPBC ACT REFERRAL TRIGGERS IDENTIFIED FROM PRELIMINARY DATA

Several EPBC Act referral triggers can be identified from preliminary data, but more could possibly arise from more detailed field investigation. Those triggers identified so far based on likelihood of occurrence, based on habitat and distribution, are:

6.1 Flora

1 The presence of "Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions" (here-on called "scrub"), as defined in the EPBC Protected Matters Report as Threatened Ecological Communities. A small unmapped patch of this scrub exists on the Malchi – Nine Mile Road at site 177 (see dot-point 4, in section 4.1.1), and is an EPBC Act referral trigger. Also, there is the possible presence of *Atalaya collina* (EPBC Endangered) in this scrub. This species is only known from Yarwun, near Gladstone (Harden, McDonald and Williams, 2006), but there is the possibility it will also occur here. There may also be other unmapped patches of the same type of scrub as site 177 in the general area. It would be reasonable to assume that it might also occur in any unmapped patches of scrub elsewhere within at least a 2km radius. The patch of scrub at site 177 should be inspected for the presence of *Atalaya collina*, and a search for this species should be made for at least 2km either side of that patch along the corridor route, whether it is within a remnant patch of scrub or not. A simultaneous search can be made for the EPBC-listed scrub species *Quassia bidwillii, Cossinia australiana* and *Denhamia parvifolia*.

2 A similar situation exists where *Atalaya collina* could occur in the patch of scrub at site 30 (see dot-point 15, in section 4.1.1), which is closer to Yarwun. Site 30 is approximately 200m off the corridor route, but there may also be other unmapped patches of the same type of scrub in the general area, and it would be reasonable to assume that it might occur in any unmapped patches of scrub elsewhere within at least a 2km radius. A search for this species should be made for at least 2km either side of that patch along the corridor route, whether it is within a remnant patch of scrub or not. A simultaneous search can be made for the EPBC-listed scrub species *Quassia bidwillii, Cossinia australiana* and *Denhamia parvifolia*.

3 The forest communities east of Yarwun, (viewed from sites 133 to 136) dominated by *Corymbia citriodora* and *Eucalyptus crebra,* had *Macrozamia* sp. in the understorey in places, and in some cases might be the Endangered cycads *Cycas megacarpa* or *C.ophiolitica*. This is an EPBC Act referral trigger for Threatened Species and the forested areas affected by the corridor route in these mapped remnants (RE mapping) should be surveyed for the presence of these species.

4 Riverine crossings along the corridor route may possibly have *Eucalyptus raveretiana*, which is an EPBC Act referral trigger for Threatened Species. All river crossings (about a dozen) from the extraction point to just south of Raglan should be inspected for this species. It is considered unlikely that the species would be found further south due to distribution records (AVH, 2007), but if this species was to be found during the survey, then it would be recommended to continue the survey the rest of the way to the Gladstone end of the corridor route (about another three crossings).

6.2 Fauna

Notes on EPBC Referral Triggers – Terrestrial Fauna - GAWB Project

The purpose of a referral is to determine whether your proposed action will need formal assessment and approval under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). A referral is required for actions that are likely to have a significant impact on matters protected by Part 3 of the EPBC Act. Those matters of national environmental significance relevant to terrestrial fauna and the project are:

- Listed threatened species and communities (sections 18 and 18A); and
- Listed migratory species (sections 20 and 20A).

The following table lists those taxa, listed under the EPBC Act under one or both of the abovementioned categories, which are known or likely to occur within the project area.

Zoological Name	Common Name	EPBC Status
Listed Threatened Species		
Chalinolobus dwyeri	Large-eared Pied Bat	**V**
Nyctophilus timoriensis	Greater Long-eared Bat	**V**
Rheodytes leukops	Fitzroy Tortoise	**V**
Delma torquata	Collared Delma	**V**
Paradelma orientalis	Brigalow Scaly-foot	**V**
Egernia rugosa	Yakka Skink	**V**
Erythrotriorchis radiatus	Red Goshawk	**V & M**
Geophaps scripta	Squatter Pigeon (sth. sub-sp.)	**V**
Epthianura crocea macgregori	Yellow Chat	**CE**
Listed Migratory Species		
Anseranas semipalmata	Magpie Goose	**M**
Aythya australis	Hardhead	**M**
Biziura lobata	Musk Duck	**M**
Cheonetta jubata	Australian Wood Duck	**M**
Dendrocygna arcuata	Wandering Whistling Duck	**M**
Dendrocygna eytoni	Plumed Whistling Duck	**M**
Tadorna radjah	Radjah Shelduck	**M**
Cygnus atratus	Black Swan	**M**
Nettapus coromandelianus	Cotton Pygmy-goose	**M**
Nettapus pulchellus	Green Pygmy-goose	**M**
Anas castanea	Chestnut Teal	**M**
Anas gracilis	Grey Teal	**M**
Anas rhynchotis	Australasian Shoveler	**M**
Anas superciliosa	Pacific Black Duck	**M**
Malacorhynchus membranaceus	Pink-eared Duck	**M**
Ardea alba[b]	Great Egret	**M**
Ardea ibis	Cattle Egret	**M**
Plegadis falcinellus	Glossy Ibis	**M**
Aviceda subcristata	Pacific Baza	**M**
Elanus axillaris	Black-shouldered Kite	**M**
Haliastur indus	Brahminy Kite	**M**
Haliastur spenurus	Whistling Kite	**M**
Lophoictinia isura	Square-tailed Kite	**M**
Hieraaetus morphnoides	Little Eagle	**M**
Accipiter cirrhocephalus	Collared Sparrowhawk	**M**

Zoological Name	Common Name	EPBC Status
Accipiter fasciatus	Brown Goshawk	**M**
Accipiter novaehollandiae	Grey Goshawk	**M**
Pandion haliaetus	Osprey	**M**
Haliaeetus leucogaster	White-bellied Sea-Eagle	**M**
Aquila audax	Wedge-tailed Eagle	**M**
Circus approximans	Swamp Harrier	**M**
Circus assimilis	Spotted Harrier	**M**
Falco berigora	Brown Falcon	**M**
Falco cenchroides	Nankeen Kestrel	**M**
Falco hypoleucos	Grey Falcon	**M**
Falco longipennis	Australian Hobby	**M**
Falco peregrinus	Peregrine Falcon	**M**
Grus rubicundus	Brolga	**M**
Gallinago hardwickii	Latham's Snipe	**M**
Numenius minutus	Little Curlew N	**M**
Numenius phaeopus	Whimbrel	**M**
Tringa stagnatilis	Marsh Sandpiper	**M**
Tringa nebularia	Common Greenshank	**M**
Tringa glareola	Wood Sandpiper	**M**
Actitis hypoleucos	Common Sandpiper	**M**
Calidris ruficollis	Red-necked Stint	**M**
Calidris acuminata	Sharp-tailed Sandpiper	**M**
Calidris ferruginea	Curlew Sandpiper	**M**
Rostratula benghalensis	Painted Snipe	**M**
Himantopus himantopus	Black-winged Stilt	**M**
Recurvirostra novaehollandiae	Red-necked Avocet	**M**
Charadrius ruficapillus	Red-capped Plover	**M**
Elseyornis melanops	Black-fronted Dotterel	**M**
Erythrogonys cinctus	Red-kneed Dotterel	**M**
Vanellus miles	Masked Lapwing	**M**
Vanellus tricolor	Banded Lapwing	**M**
Chlidonias leucopterus	White-winged Black Tern	**M**
Cuculus saturatus	Oriental Cuckoo	**M**
Hirundapus caudacutus	White-throated Needletail	**M**
Apus pacificus	Fork-tailed Swift	**M**
Merops ornatus	Rainbow Bee-eater	**M**
Acrocephalus stentoreus	Clamorous Reed-warbler	**M**
Megalurus gramineus	Little Grassbird	**M**
Megalurus timoriensis	Tawny Grassbird	**M**
Cinclorhamphus cruralis	Brown Songlark	**M**
Cinclorhamphus mathewsi	Rufous Songlark	**M**
Cisticola exilis	Golden-headed Cisticola	**M**
Cisticola juncidis laveryii	Zitting Cisticola (eastern subspecies)	**M**

Those sections or locations along the project area corridor which are relevant to the abovementioned taxa are as follows:

Fitzroy River to the Bruce Highway Section

- A small rocky knoll supporting a disturbed area of semi-evergreen vine thicket - southern side of Malchi-Nine Mile Road (app. 235098E 7409472S) – Listed threatened reptile species.
- Large swales and depressions (seasonal wetlands) within the vicinity of Newman Road (app. 238730E 7409500S; 2389720E 7409300S and 243000E 7408500S) – Listed migratory species.

Bruce Highway to Archer Section

- Large swales and depressions (seasonal wetlands) north of River Road (248664E 7403864S) – Listed migratory species.
- Riparian vegetation along the tributary of Gavial Creek and associated seasonal wetlands (app. 248120E 7404586S) - Primarily Yellow Chat.
- Riparian vegetation along the tributary of Serpentine Creek and associated seasonal wetlands from about 248938E 7403192S to 250173E 7400309S - Primarily Yellow Chat.
- Patches of remnant vegetation (*Eucalyptus populnea* dominated) and Dingo Creek (part of the Serpentine Creek system) at and to the near south of Causarina Road (includes potential Yellow Chat habitat) - Primarily Yellow Chat, though also Squatter Pigeon.
- Two small artificial wetland systems to the near west of the corridor - approximately 250763E 7395925S (to near north-east of the Moglino Road intersection) and 251453E 7394380S (to the near south-east of the McLean Road intersection) - Primarily Yellow Chat.

Archer to Raglan Booster Station Section

- Riparian vegetation associated with Station Creek (and its tributary Oaky Creek) and seasonal wetlands to near east of corridor (app. 256251E 7389205S) - Primarily Yellow Chat, though also Squatter Pigeon.
- Seasonal wetlands (swales and depressions) within the vicinity of the disused rail line (associated with the area centred on 261356E 7384512S) – Primarily Yellow Chat, though also migratory species.
- Seasonal wetlands and saltmarsh adjacent to eastern side of corridor which correspond with that section of the corridor from about 260200E 7385200S to 265000E 7383500S - Primarily Yellow Chat, though also migratory species.
- Seasonal wetlands and saltmarsh environs between the Marmoor Road-Toonda Port Alma Road intersections through to Twelve Mile Creek freshwater habitat - Primarily Yellow Chat, though also migratory species.
- Seasonal wetlands (both artificial and natural) associated with Pelican Creek (vicinity of 273662E 7377875S) - Primarily Yellow Chat, though also migratory species.
- Seasonal wetlands, riparian habitat and remnant vegetation communities associated with Hourigan and Raglan Creeks - Primarily Yellow Chat, though also migratory species.
- Saltmarsh environs associated with the Raglan Creek oxbow to the near east of the corridor- Primarily Yellow Chat, though also migratory species.

Raglan Booster Station Options to Mt Larcom Gladstone Road Section

- Seasonal wetlands and remnant vegetation (including *Eucalyptus tereticornis*) associated with Horseshoe Lagoon – adjacent and to the east of corridor (vicinity of 291278E 7366934S) - Yellow Chat, Large-eared Pied Bat, Greater Long-eared Bat and migratory species.
- Remnant vegetation either side of existing power easement and extending south from Darts Creek Road to Gostevsky Road (north-west of Mt Larcom township) - Large-eared Pied Bat, and Greater Long-eared Bat.

Mt Larcom Gladstone Road to Boat Creek Landing Road

- Large native vegetation remnants and Scrubby Creek riparian habitat between Mt Larcom Gladstone and Myrlea Road - Large-eared Pied Bat, Greater Long-eared Bat.
- Riparian habitat along Boat Creek (northern side of Mt Larcom Gladstone Road) - Large-eared Pied Bat, Greater Long-eared Bat.
- Remnant open forest habitat on low rises south of the Calliope River Targinie Road - Listed threatened reptile species.

The *EPBC Act Policy Statement 1.1 - Significant Impact Guidelines* provides the significant impact criteria for the matters of national environmental significance, including those which are relevant to the project area, i.e. listed threatened or migratory species. A variety of these significant impact criteria are relevant in regards to potential impacts to listed threatened and/or migratory species terrestrial fauna known or likely to occur within the project area.

The following provides a summary of the significant impact criteria for threatened species and migratory species (refer to *EPBC Act Policy Statement 1.1*).

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.

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.

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.

6.3 Wetlands of International Significance (Ramsar Sites)

The close proximity of a Wetland of International Significance (Ramsar site), and its presence in the EPBC Protected Matters Report for a search area restricted to a relatively small buffer zone around the corridor route, is an EPBC Act referral trigger. This is consolidated by sightings of the Sharp-tailed Sandpiper and the Marsh Sandpiper, near the corridor route by Ecoserve. These are migratory waders and are listed under the migratory provisions of the EPBC Act, which constitutes another EPBC referral trigger.

6.4 World Heritage Properties

The possible effects of reduction in flow of the Fitzroy River on the southern extent of the Great Barrier Reef Marine Park as a result of water extraction (for the proposed pipeline) is largely unknown at this stage. It would be prudent to consider this as an EPBC referral trigger.

7 REFERENCES

Centre for Plant Biodiversity Research, Council of Heads of Australian Herbaria. (2007) *Australia's Virtual Herbarium.* Viewed 30 January 2007, <http://www.cpbr.gov.au/cgi-bin/avh.cgi>

Department of the Environment and Water Resources (2007) *EPBC Protected Matters Report.* Viewed 30 January 2007, <http://www.deh.gov.au/erin/ert/epbc/index.html>

Environmental Protection Agency (2005). *Regional Ecosystem Mapping. Version 5.0.* Maintained by Queensland Herbarium, Brisbane.

Environmental Protection Agency (2007) *Wildlife Online.* Viewed 30 January 2007 http://www.epa.qld.gov.au/nature_conservation/wildlife/wildlife_online

Harden, G.J, McDonald, W.J.F and Williams, J.B. (2006) *Rainforest Trees and Shrubs: A field guide to their identification.* Gwen Harden Publishing.

APPENDIX A: OBSERVATIONS OF VEGETATION

Site no / Intersection	Locality	Regional Ecosystem mapping V5.0	Brief vegetation description at site and RE as observed	VMA status	Easting	Northing	Field survey agrees?
1							
2		cleared	Eucalyptus populnea and E.tereticornis 11.3.2	Of Concern			no, remnant on road reserve not mapped
3							
4							
5		cleared	Eucalyptus populnea and E.tereticornis 11.3.2	Of Concern			no, remnant on road reserve not mapped
6		cleared	Eucalyptus populnea and E.tereticornis 11.3.2	Of Concern			no, remnant on road reserve not mapped
7		cleared	cleared to east				yes, end of remnant on road reserve
8		cleared	Eucalyptus populnea and E.tereticornis 11.3.2	Of Concern			no, remnant on road reserve not mapped
9		cleared	trees approx 1km east	?			only at site
10		cleared	trees approx 1km east	?			only at site
11		cleared	trees approx 1km east	?			only at site
12		cleared	trees approx 1km east	?			only at site
13	creek	11.3.25/11.3.4	E.tereticornis and other riverine species including Livistona sp.	Only 11.3.4 is Of Concern			yes
14		cleared	cleared				yes
15		cleared	Acacia harpophylla approx 200m west 11.3.1	Endangered			yes, but remnant to west not mapped
16		cleared	cleared				yes
17		cleared	As for site 15				yes, but remnant to west not mapped
18		cleared	Eucalyptus moluccana road reserve 11.9.13	Of Concern			no, road reserve not cleared, and not Land Zone 3, likely Land Zone is 9
19		cleared	cleared, with partially cleared probably semi-evergreen vine-thicket (SEVT) approx 200m west probably 11.11.18	May be SEVT remnants (Endangered)			

20		cleared	Eucalyptus crebra with diverse understorey including Alphitonia excelsa, Capparis spp., Carissa ovata, Corymbia spp. Etc 11.11.15	Not Of Concern			no, road reserve inot cleared, and remnant to west, and regrowth to east
21		cleared	Eucalyptus crebra with diverse understorey including Alphitonia excelsa, Capparis spp., Carissa ovata, Corymbia spp. Etc 11.11.15	Not Of Concern			no, road reserve inot cleared, and remnant to west, and regrowth to east
22		cleared	Eucalyptus populnea and E.tereticornis 11.3.2	Of Concern			no, remnant on road reserve not mapped
23		cleared	Eucalyptus populnea and E.tereticornis 11.3.2	Of Concern			no, remnant on road reserve not mapped
24			Eucalyptus populnea with patch of Casuarina cristata 11.3.2	Of Concern			no, remnant on road reserve not mapped
25							
26							
27							
28		cleared	Eucalyptus tereticornis 11.3.4	Of Concern			no, remnant on road reserve not mapped
29		cleared	Eucalyptus tereticornis 11.3.4	Of Concern			no, remnant on road reserve not mapped
30		cleared	Softwood scrub, probably semi-evergreen vine-thicket 11.3.11	Endangered			no, remnant on road reserve not mapped
31		cleared	Eucalyptus populnea and E.tereticornis 11.3.2	Of Concern			no, remnant on road reserve not mapped
32		cleared	Eucalyptus populnea and E.tereticornis 11.3.2	Of Concern			no, remnant on road reserve not mapped
33		cleared	Eucalyptus populnea and E.tereticornis 11.3.2	Of Concern			no, remnant on road reserve not mapped
34		cleared	Eucalyptus populnea and E.tereticornis 11.3.2	Of Concern			no, remnant on road reserve not mapped
35		cleared	Eucalyptus populnea and E.tereticornis 11.3.2	Of Concern			no, remnant on road reserve not mapped
36		cleared	Eucalyptus populnea and E.tereticornis 11.3.2	Of Concern			no, remnant on road reserve not mapped
37							
38							

39		11.11.4	Mangroves, dominated by Avicennia marina and Excoecaria agallocha 11.1.4b	Not of Concern			yes
40							
41		cleared	Eucalyptus tereticornis and riverine rainforest species including Cupaniopsis anacardioides and Ficus spp. 11.3.25	Of Concern			no, remnant not mapped
42							
43			Eucalyptus tereticornis and Corymbia tessellaris 11.3.25	Of Concern			yes
44			Eucalyptus tereticornis and Corymbia tessellaris with riverine rainforest species including Ficus spp., with Callistemon viminalis and Melaleuca bracteata 11.3.25	Of Concern			yes
45			Eucalyptus moluccana probably 11.9.13	Of Concern			no, remnant not mapped
46			Eucalyptus moluccana probably 11.9.13	Of Concern			no, remnant not mapped
47		11.3.26	Eucalyptus moluccana probably 11.9.13	Of Concern			Yes, but Land Zone is probably 9 not 3
48							
49							
50		cleared	Cleared to west, Eucalyptus tereticornis to east	11.3.26 is Of Concern			No, 11.3.26 to east
51							
52							
53		11.3.26/11.3.4	Eucalyptus moluccana 11.9.13	Of Concern			yes,but Land Zone is probably 9 not 3
54		11.3.26/11.3.4	Eucalyptus moluccana 11.9.13	Of Concern			yes,but Land Zone is probably 9 not 3
55		11.3.26/11.3.4	Eucalyptus moluccana 11.9.13	Of Concern			yes,but Land Zone is probably 9 not 3
56		11.3.26/11.3.4	Eucalyptus moluccana 11.9.13	Of Concern			yes,but Land Zone is probably 9 not 3
57		cleared	cleared				yes
58		cleared	cleared				yes
59		cleared	cleared, with Eucalyptus crebra to NW 11.11.15				yes
60		cleared	cleared				yes

61		cleared	cleared				yes
62		cleared	partially cleared Eucalyptus tereticornis and other Eucalyptus spp. probably 11.11.4 as mapped nearby				yes
63		cleared	cleared				yes
64		cleared	scattered patches of remnant Eucalyptus moluccana probably 11.9.13				yes
65		cleared	scattered patches of remnant Eucalyptus moluccana probably 11.9.13				yes
66		cleared	scattered patches of remnant Eucalyptus moluccana to north, and remnant Eucalyptus spp. to south probably 11.9.13				yes
67		cleared	Eucalyptus moluccana immediately south probably 11.9.13				edge of clearing
68		cleared	Eucalyptus moluccana immediately south probably 11.9.13				edge of clearing
69		cleared	Eucalyptus moluccana immediately south probably 11.9.13				edge of clearing
70		cleared	Eucalyptus moluccana immediately south probably 11.9.13				edge of clearing
71		11.3.26/11.11.4 c/11.3.4/11.3.4	Eucalyptus moluccana probably 11.9.13	All Of Concern except 11.11.4c			Yes, but Land Zone probably 9 not 3, and 11.3.4 not at this site but is present nearby
72		cleared	Eucalyptus tereticornis – partially cleared 11.3.25				nartially cleared
73		cleared	Eucalyptus tereticornis – with dense understorey of Acacia disparrima etc				no, but cleared pipeline easement is immediately SE
74		cleared	severely disturbed				yes
75		cleared	severely disturbed				yes
76		cleared	severely disturbed				yes
77							
78							
79		11.3.25	Eucalyptus tereticornis – partially cleared but old-growth trees	Of Concern			yes

80		11.3.25	Eucalyptus tereticornis with rainforest species in understorey including Ficus spp. and Syzygium sp. – disturbed by tracks	Of Concern			yes
81		11.3.26	Eucalyptus moluccana road reserve 11.9.13	Of Concern			Yes, but Land Zone is probably 9 not 3
82		11.3.26	Eucalyptus moluccana road reserve 11.9.13	Of Concern			Yes, but Land Zone is probably 9 not 3
83		11.3.26	Eucalyptus crebra uphill north, Eucalyptus tereticornis creek south 11.9.9/11.3.25	11.9.9 Not of Concern/11.3.25 Of Concern			No, probably 11.9.9/11.3.25
84							
85							
86							
87							
88							
89							
90							
91		11.11.15	Eucalyptus moluccana and Eucalyptus crebra 11.9.13/11.9.9	11.9.13 Of Concern/11.9.9 Not of Concern			Yes, but Land Zone is probably 9 not 11
92		cleared	Eucalyptus moluccana	Of Concern			no, remnant on road reserve not mapped
93		cleared	Eucalyptus tereticornis drainage line	Of Concern			no, remnant on road reserve not mapped
94		cleared	eastern extent of remnant in poor condition, of Eucalyptus moluccana and Eucalyptus crebra 11.9.13/11.9.9	11.9.13 Of Concern/11.9.9 Not of Concern			no, remnant on road reserve not mapped, but this is the eastern extent of remnant – in poor condition
95		11.11.15	Eucalyptus moluccana and Eucalyptus crebra 11.9.13/11.9.9	11.9.13 Of Concern/11.9.9 Not of Concern			yes, but E.moluccana component not mapped
96		11.3.26/11.3.4	Eucalyptus moluccana and Eucalyptus crebra 11.9.13/11.9.9	11.9.13 Of Concern/11.9.9 Not of Concern			yes, but E.crebra component not mapped
97							
98							
99		11.3.26	Eucalyptus moluccana road reserve 11.9.13	Of Concern			Yes, but Land Zone is probably 9 not 3

100		11.3.26	Eucalyptus moluccana road reserve 11.9.13	Of Concern			Yes, but Land Zone is probably 9 not 3
101		11.3.26	Eucalyptus moluccana road reserve 11.9.13	Of Concern			Yes, but Land Zone is probably 9 not 3
102							
103			Eucalyptus 11.3.25	Of Concern			yes
104			Eucalyptus 11.3.25	Of Concern			yes
105		11.3.26	Eucalyptus moluccana 11.9.13	Of Concern			yes,but Land Zone is probably 9 not 3
106		11.3.26	Eucalyptus moluccana 11.9.13	Of Concern			yes,but Land Zone is probably 9 not 3
107		11.3.4	Eucalyptus moluccana 11.9.13, with some E.tereticornis	Of Concern			no, but subdominant has been mapped
108		11.3.4	Eucalyptus moluccana 11.9.13, with some E.tereticornis	Of Concern			no, but subdominant has been mapped
109		11.3.4	Eucalyptus moluccana 11.9.13, with some E.tereticornis	Of Concern			no, but subdominant has been mapped
110		11.3.26	Eucalyptus moluccana 11.9.13	Of Concern			Yes,but Land Zone is probably 9 not 3
112		11.3.26	Eucalyptus moluccana 11.9.13	Of Concern			yes,but Land Zone is probably 9 not 3
113		11.3.26	Eucalyptus moluccana 11.9.13	Of Concern			yes,but Land Zone is probably 9 not 3
114		11.3.26	Eucalyptus moluccana 11.9.13	Of Concern			yes,but Land Zone is probably 9 not 3
115		11.3.26	Eucalyptus moluccana 11.9.13, with E.crebra to north 11.9.9	Of Concern			yes,but Land Zone is probably 9 not 3
116		cleared	Eucalyptus moluccana 11.9.13	Of Concern			yes,but Land Zone is probably 9 not 3
117		cleared	Eucalyptus moluccana 11.9.13	Of Concern			yes,but Land Zone is probably 9 not 3
118		cleared	Eucalyptus moluccana 11.9.13	Of Concern			yes,but Land Zone is probably 9 not 3
119		cleared	mostly cleared Eucalyptus moluccana 11.3.26	Of Concern			yes

120		cleared	Eucalyptus tereticornis drainage line	Of Concern			yes, but drainage line is intact
121		cleared	grassland, possibly 11.3.21	Endangered			need to investigate historis air photos and records
122		cleared	northern extent of grassland, with scattered trees, possibly 11.3.21	Endangered			need to investigate historis air photos and records
123		cleared	cleared to east, Eucalyptus moluccana 11.9.13 to west				yes, but remnant 11.9.13 to west
124		11.3.26/11.11.4 c/11.3.4/11.3.4	Eucalyptus moluccana probably 11.9.13, but cleared to north	All Of Concern except 11.11.4c			Yes, but Land Zone possibly 9 not 3, and 11.3.4 not at this site but is present nearby
125		11.11.4	Eucalyptus crebra and Corymbia citriodora 11.11.4 (SW corner)	Not of Concern			yes
126		cleared	severely disturbed				yes
127		cleared	severely disturbed				yes
128		cleared	severely disturbed				yes
129		cleared	severely disturbed, with small remnant patch of Corymbia tessellaris to east 11.3.4	small remnant patch of Corymbia tessellaris to east is Of Concern			yes
130		cleared	severely disturbed				yes
131		cleared	severely disturbed				yes
132		cleared	Corymbia ciriodora, Eucalyptus crebra and other eucalypts 100m N 12.11.6	Not of Concern			yes, but remnant to north
133		cleared	Corymbia ciriodora, Eucalyptus crebra and other eucalypts 100m N and 100m S 12.11.6	Not of Concern			yes, but remnants either side
134		cleared	Corymbia ciriodora, Eucalyptus crebra and other eucalypts 100m N and 100m S 12.11.6, with Xanthorrhoea johnsonii and Macrozamia sp.	Not of Concern			yes, but remnants either side, with Macrozamia sp. (possibly Endangered)
135		cleared	Corymbia ciriodora, Eucalyptus crebra and other eucalypts immediately south	Not of Concern			yes, but remnant to south
136		12.11.6/12.11.6/ 12.11.6/12.11.1 4	Corymbia ciriodora, Eucalyptus crebra, E.acmenoides, E.exserta and Corymbia clarksoniana	Not of Concern			yes

137		cleared – 12.3.7/12.3.3/12 .3.1 to north, 12.11.6/12.11.1 4 to south	Eucalyptus tereticornis and numerous riverine and riverine rainforest species to north, Eucalyptus crebra and Corymbia citriodora to south				yes
138		12.3.7/12.3.3/12 .3.1 immediately north	Eucalyptus tereticornis and numerous riverine and riverine rainforest species				yes
139		12.3.7/12.3.3/12 .3.1 immediately north	Eucalyptus tereticornis and numerous riverine and riverine rainforest species				yes
140	bridge over river	12.3.7/12.3.3/12 .3.1	Eucalyptus tereticornis and numerous riverine and riverine rainforest species				yrs
141							
142		cleared	cleared				yes
143							
144		11.3.29 immediately east	Eucalyptus tereticornis and Lophostemon suaveolens immediately east	Not of Concern			no, but species could be variable in this area
145		cleared	cleared, scattered trees remain				yes
146		cleared	cleared, scattered trees remain				yes
147		cleared	cleared, scattered trees remain				yes
148		cleared	cleared, scattered trees remain				yes
149		cleared	cleared, scattered trees remain				yes
150		cleared	cleared, scattered trees remain				yes
151		cleared	cleared, scattered trees remain				yes
152		cleared	fringing riverine community of Eucalyptus tereticornis, Corymbia tessellaris and Eucalyptus coolabah 11.3.25	11.3.25 is Not of Concern			yes, but river bank has remnant tall trees
153		cleared	cleared, scattered trees remain				yes
154		cleared	cleared, scattered trees remain				yes
155		cleared	cleared, scattered trees remain				yes
156		cleared	cleared, scattered trees remain				yes
157		cleared	fringing riverine community of Eucalyptus tereticornis, Corymbia tessellaris and Eucalyptus coolabah 11.3.25	11.3.25 is Not of Concern			yes, but river bank has remnant tall trees
158		cleared	cleared, scattered trees remain				yes
159		cleared	Eucalyptus populnea and E.tereticornis on road reserve 11.3.2	11.3.2 is Of Concern			no, road reserve is not mapped due to scale

160		cleared	Eucalyptus populnea and E.tereticornis on road reserve 11.3.2	11.3.2 is Of Concern			no, road reserve is not mapped due to scale
161		cleared	Eucalyptus populnea and E.tereticornis on road reserve 11.3.2	11.3.2 is Of Concern			no, road reserve is not mapped due to scale
162		cleared	Eucalyptus populnea and E.tereticornis on road reserve 11.3.2	11.3.2 is Of Concern			no, road reserve is not mapped due to scale
163							
164							
165		11.3.27c	Eucalyptus tereticornis and E.coolabah immediately north 11.3.4, with freshwater wetland 100m north 11.3.27c	11.3.4 is Of Concern			yes, but probably 11.3.27b on site
166		cleared, with 11.3.27c to north, 11.3.27b to south	scattered (mostly cleared) Eucalyptus spp. to north, no trees to south				yes
167		11.3.3/11.3.4	Eucalyptus tereticornis and E.coolabah immediately north	11.3.3 and 11.3.4 are Of Concern			yes
168		11.3.3/11.3.4	Eucalyptus tereticornis and E.coolabah	11.3.3 and 11.3.4 are Of Concern			yes
169		cleared	very open woodland of Eucalyptus populnea 11.3.2	Of Concern			no
170		cleared	cleared, cultivated				yes
171		cleared	very open woodland of Eucalyptus populnea 11.3.2	Of Concern			no
172		11.3.3/11.3.4 immediately west, cleared to east	Eucalyptus tereticornis on roadside, E.crebra uphill to west	11.3.3 and 11.3.4 are Of Concern			yes, but hillside of E.crebra may be different RE
173		cleared	cleared				yes, but entire surrounding area may be naturally treeless (wetland 11.3.27 Not of Concern)
174		cleared	cleared				yes, but entire surrounding area may be naturally treeless (wetland 11.3.27 Not of Concern)
175		cleared	cleared				yes, but entire surrounding area may be naturally treeless (wetland 11.3.27 Not of Concern)
176		cleared	cleared				yes, but entire surrounding area may be naturally treeless (wetland 11.3.27 Not of Concern)

177		cleared	Cleared, but with a small unmapped remnant of scrub on a rocky outcrop. RE needs to be determined by geological confirmation.				yes, but entire surrounding area may be naturally treeless (wetland 11.3.27 Not of Concern). Small patch of scrub is unmapped.
178		cleared	cleared				yes, but entire surrounding area may be naturally treeless (wetland 11.3.27 Not of Concern)
179		cleared	cleared				yes, but entire surrounding area may be naturally treeless (wetland 11.3.27 Not of Concern)
180		cleared	cleared				yes, but entire surrounding area may be naturally treeless (wetland 11.3.27 Not of Concern)
181		cleared	cleared				yes, but entire surrounding area may be naturally treeless (wetland 11.3.27 Not of Concern)
182		cleared	cleared				yes, but entire surrounding area may be naturally treeless (wetland 11.3.27 Not of Concern)
183		cleared	cleared				yes, but entire surrounding area may be naturally treeless (wetland 11.3.27 Not of Concern)
184		cleared	cleared				yes, but entire surrounding area may be naturally treeless (wetland 11.3.27 Not of Concern)
185		cleared	scattered riverine or floodplain rainforest tree species including Eucalyptus tereticornis, Ficus spp.				only partially cleared
186		cleared	scattered riverine or floodplain rainforest tree species including Eucalyptus tereticornis, Ficus spp.				only partially cleared
187		cleared	cleared				yes, but entire surrounding area may be naturally treeless (wetland 11.3.27 Not of Concern)
188		cleared	Cleared, with scattered trees including Eucalyptus spp.				yes, but entire surrounding area may be naturally treeless (wetland 11.3.27 Not of Concern)

189		cleared	cleared				yes, but entire surrounding area may be naturally treeless (wetland 11.3.27 Not of Concern)
190		cleared	cleared				yes, but entire surrounding area may be naturally treeless (wetland 11.3.27 Not of Concern)
191		cleared	cleared				yes
192		cleared	cleared				yes
193		cleared	cleared				yes
194		cleared	cleared				yes
195		cleared	scattered Eucalyptus coolabah or E.populnea				yes, but small patches of 11.3.3 or 11.3.2 remain (both Of Concern)
196		cleared	cleared, with Eucalyptus populnea approx. 150m NE and treeless area beyond				yes, but remnant 11.3.2 to east (Of Concern) probably joins mapped area beyond, of 11.3.25/11.3.27c

APPENDIX B: PRELIMINARY FAUNA SURVEY BY ECOSERVE

Draft Report Submission

Preliminary Assessment of Terrestrial Fauna and Fauna Habitat Values – GAWB Water Pipeline Project

Prepared for: **Darren Richardson, WBM Pty Ltd**

Prepared by: **Lindsay Agnew,** ECOServe

TABLE OF CONTENTS

List of Tables

1. INTRODUCTION

1.1. Background

The Gladstone Area Water Board (GAWB) is a commercialised statutory authority and proposes the development of regional bulk water transfer system between the Fitzroy River and Gladstone. The two key drivers for the project are:

- Meeting water supply needs of the region as manifest in the growth in demand for water, particularly from industrial sector; and
- Maintenance of a reliable water supply which is buffered against supply influences such as drought and climate variability.

Ecoserve has been commissioned by WBM Pty Ltd to assist in preparing ecological assessments required as part of the development assessment process for the project. Ecoserve's project brief is to provide specialist advice on issues related to terrestrial fauna and fauna habitat.

This report provides the findings of a preliminary investigation into the terrestrial fauna and fauna habitat values associated with the proposed bulk water pipeline and associated infrastructure (e.g. pumping stations).

The objectives of this report, in regards to the pipeline corridor and vicinity, are to:

- Provide an overview of the existing environment in terms of terrestrial fauna and fauna habitats;
- Provide a summary of key fauna habitat values; and
- Provide advice in regards to any potential referral requirements under the EPBC Act.

1.2. Nomenclature and Terminology

In this report, the *project area* refers to the land within the pipeline corridor as described by way of mapping produced by WBM prior to the initiation of the field investigation program. The term *surrounding area* refers to the lands surrounding the *project area*. This varies in width, though relates principally to land adjacent to the *project area* and as described within the report.

Within this report, the conservation status of a species may be described as *Endangered, Vulnerable, Regionally Vulnerable, Rare* or *Culturally Significant*. These terms are used in accordance with the provisions of the Queensland *Nature Conservation Act 1992* (NC Act) and its regulations and amendments, and/or the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). *Threatened* is a common term used to collectively describe endangered and vulnerable species.

With regards to migratory birds, the terms CAMBA and JAMBA refer to the following:

- JAMBA, the *Agreement between the Government of Australia and the Government of Japan for the protection of migratory birds in danger of extinction and their environment 1974*; and
- CAMBA, the *Agreement between the Government of Australia and the Government of China for the protection of migratory birds in danger of extinction and their environment 1986*.

Fauna refers to all vertebrate fauna (excluding fish) and the nomenclature used in this report follows Strahan (2000) for non-flying mammals, Churchill (1998) for bats, Christidis and Boles (1994) for birds and Cogger (2000) for reptiles and amphibians. Common names for frogs follow the nomenclature of Ingram *et al.* (1993). The terms *shorebirds* and *waders* are generic terms used in this study to describe both resident and migratory species from the following families: Scolopacidae; Burhinidae; Haematopodidae; Recurvirostridae; Charadriidae; and Glareolidae.

Vegetation type descriptions used (e.g. forest and grassland) are based on the structural types described by Specht (1970).

1.3. Methodological Approach

1.3.1. Review of Existing Information

Existing information regarding the fauna of the *study site* and *surrounding area* was collated and reviewed. The following documents and database information were considered in the preparation of this report:

- Fauna databases of Environment Australia - the Queensland Museum, Birds Australia and Queensland Environment Protection Agency's (QEPA) WildNet.;
- Fauna data and background information derived from relevant studies for the area (e.g. Longmore 1978; Driscoll 1997; Sattler & Williams 1999; Young 1999, McFarland *et. al.* 1999; CZEWM CRC 2003a & b; DEH 2005; Houston *et. al.* 2004a & b; Jaensch *et. al.* 2004; RLMS 2006a & b; HLA 2006; Houston *et. al.* 2006; Houston 2006);
- Vegetation cover, ecosystem and community mapping (e.g. QEPA Regional Ecosystem mapping and Biodiversity Planning Assessment Mapping.).

Aerial photography in order to identify vegetation in the local area, comparing patterns observed with existing vegetation mapping.

1.3.2. Field Investigations

The field investigation program was undertaken during the period 1 to 5 April 2007 by Lindsay Agnew and Dr. Ed Meyer. The latter part of the program was undertaken in conjunction with the project botanist, Derek Johnson (WBM). The primary aims of the field investigation program were to:

- Undertake a preliminary assessment of the type, condition and extent of fauna habitats and habitat connectivity;
- Assess their potential suitability as habitat to support rare and threatened species;
- Assess habitat significance in a local area context; and
- Gain a level of field data sufficient to draw conclusions about the general patterns of fauna use throughout the *project area* and *surrounding area*.

2. FIELD SURVEY RESULTS

2.1. Species Richness and Representativeness

The field investigation program provided records for 147 terrestrial vertebrate fauna species either recorded within the mapped corridor and/or recorded from similar habitats within approximately three kilometres of the corridor. The fauna assemblage was comprised of 17 mammal, 11 reptile, two frog and 117 bird species. Further field survey work is likely increase the species richness for the *project area*, especially in relation to mammals, reptiles and frogs.

The survey work undertaken by HLA (2006) over a nine-day program for the assessment of nickel slurry pipeline, (which transects a similar variety of habitats), provided records for 145 species (26 mammal, 21 reptile, 10 frog and 88 bird species). These results also suggest that further survey work would increase the species richness for the *project area*.

The species richness recorded for the *project area* and vicinity is generally in keeping with the results expected from the suite of habitats assessed and the limitations associated with a relatively short field program. Many species recorded during the field program, were recorded only in low abundance with species records represented by only a single sighting. The relatively low abundance of some species may be linked to the dry ground conditions (and drier conditions which preceded the survey), though also partly linked to other factors such as habitat degradation, survey timing and short duration.

2.2. Species of Conservation Significance

A large proportion of the recorded fauna assemblage was comprised of species regarded as relatively common and widespread within both sub-bioregions in which the *project area* is located. Seven species recorded in the current surveys are listed as rare, threatened, or otherwise significant under the provisions of the NC Act and/or EPBC Act. The unconfirmed presence of an additional species has been included for discussion. The following provides a summary of the survey records.

The Koala *Phascolarctos cinereus* is listed as *Regionally Vulnerable* in south-east Queensland, though elsewhere in Queensland, as species of *Cultural Significance*. No Koalas were observed, though characteristic tree-trunk scratches and scats were located at two locations. At both locations, *Eucalyptus tereticornis* was present and abundant. Numerous other areas with similar attributes were assessed though evidence was not present. The two locations were:

- 0291210E 7367065S – tree trunk scratches and scats, Horseshoe Lagoon wetland complex.
- 0292747E 7367138S - tree trunk scratches within riparian habitat along a small watercourse.

The Squatter Pigeon (sth. subsp.) *Geophaps scripta scripta* is listed as *Vulnerable* under both the NC and EPBC Acts. Squatter Pigeons were detected at the following eight locations:

- 0271008E 7379403S – five birds within *Eucalyptus tesselaris* grassy woodland.
- 0275732E 7377015S – two birds within open grassland.
- 0269852E 7378839S - two birds within open grassland.
- 0255069E 7397139S – two birds within *Eucalyptus coolibah* grassy open woodland.
- 0284971E 7373708S – six birds within *Eucalyptus coolibah* grassy woodland.
- 0288112E 7369756 – two birds within *Eucalyptus mollucana* grassy woodland.
- 0291210E 7367065S – four birds within *Eucalyptus tereticornis-E. mollucana* grassy open woodland.
- 0255737E 7388795S – two birds in open grassland.

The Cotton Pygmy-goose *Nettapus coromandelianus* is listed as *Rare* under the NC Act. Cotton Pygmy-geese were recorded form the following locations:

- 0235951E 7413617S – 13 birds on billabong adjacent to Nine Mile Road.
- 0261312E 7382789S – seven birds on Eight Mile Creek Weir.
- 0251435E 7394401 – four birds on a small dam east of Bruce Highway.
- 0264984E 7382627 - two birds on a small dam adjacent to Bajool Port Alma Road.
- 0269953E 7378782S – two birds on Twelve Mile Creek.
- 0305381E 7361325S – six birds on Aldoga water reserve.

The Black-chinned Honeyeater *Melithreptus gularis* is listed as *Rare* under the NC Act. Six birds were recorded in a patch of flowering *Eucalyptus mollucana* at 0291342E 7366828S adjacent to the power easement to the near north of Mt Larcom township. There was a potential that more birds were in the area, though survey time constraints did not permit the required time to further investigate this. A characteristic Black-chinned Honeyeater calls was also heard within a linear remnant bordering Nine Mile Road (0235626E 7413532S), though visual confirmation was not achieved.

The Rainbow Bee-eater *Merops ornatus* is listed under the migratory provisions of the EPBC Act. Rainbow Bee-eaters were recorded from a variety of timbered habitats throughout the corridor and adjoining areas.

Both the Sharp-tailed Sandpiper *Calidris acuminata* and Marsh Sandpiper *Tringa stagnatilis* are migratory waders and are listed under the migratory provisions of the EPBC Act. Six Sharp-tailed Sandpipers were recorded from brackish pools along Twelve Mile Creek (270588E 7379605S). One Marsh Sandpiper was recorded at each of the following locations:

- 0265361E 7384254S – western side of Cheetam drain wetlands.
- 0235951E 7413617S –billabong adjacent to Nine Mile Road.

The Glossy Black Cockatoo *Calyptrohynchus lathami* is listed as *Vulnerable* under the NC Act. Calls were heard at distance late one afternoon, though visual confirmation of these birds in transit could not be achieved. Calls were heard to the east of 309443E 7362434S from a ridgeline within a large remnant in the vicinity of the existing slurry pipeline easement. Access to this area was highly limited, though for the small area sampled, no potentially suitable food trees were observed (*Casuarina* and/or *Allocasuarina* spp.).

Field assessments indicate that the areas surveyed support habitat suitable for other rare, threatened, or otherwise significant species not recorded during the survey period. The relevance of these species, and those recorded on the *study site* are discussed in the following sections.

3. EXISTING ENVIRONMENT AND FAUNA VALUES

3.1. Fitzroy River to Bruce Highway

Riparian vegetation along the Fitzroy River is relatively narrow (e.g. 15 to 30m wide), lacks a well-developed understorey and is fragmented in some sections (Pump Lane south to Sun Water pump station reserve). Hollow-bearing trees appear rare. Common trees species include *Eucalyptus tereticornis*, *E. tessellaris* and *E. coolibah*. A band of aquatic floating and emergent vegetation adjoins the riverbank. This vegetation is dominated by exotic taxa. The key values associated with riparian habitat is the maintenance of wildlife movement, principally avifauna, though also mega and microchiropteran bats. Several trees species provide potential Koala habitat, though no direct or indirect evidence (e.g. scats &/or diagnostic trunk scratches) of their presence was detected.

Lands within the corridor south to Rockhampton Ridgelands Road have been subject to clearing and grazing (both horses and cattle). Small areas of native regrowth vegetation occur, though the area supports low quality native fauna habitat values at best.

Lands within the corridor south to Alton Downs-Nine Mile Road are largely cleared for grazing and cultivation and support low quality native fauna habitat values at best. A relatively narrow band of mapped remnant vegetation occurs about half way along this section (app. 234699E 7414830S). It forms the north-eastern extent of a larger mosaic of remnant vegetation and wetlands (broad swales and depressions) which extend east to the Rockhampton airport. Within the corridor, that habitat is likely to support values for waterfowl and shorebirds, including a variety of species listed under the migratory provisions of the EPBC Act.

Lands within the corridor south across Lion Mountain Road to the Malchi-Nine Mile Road are largely cleared for grazing and cultivation and support low quality native fauna habitat values at best. The notable exceptions are:

- The riparian vegetation community dominated by *Eucalyptus coolibah* (app. 233943E 7412214S) to the near south of the intersection of Lion Mountain and Nine Mile Roads. This habitat is likely to be important for wildlife movement and as habitat in its own right.

- A small rocky knoll supporting a disturbed area of semi-evergreen vine thicket (southern side of Malchi-Nine Mile Road (app. 235098E 7409472S). This area may support the *vulnerable* Brigalow Scaly-foot *Paradelma orientalis* &/or Yakka Skink *Egernia rugosa*.

- Remnant and remnant regrowth vegetation on the western side of the Malchi-Nine Mile Road. This area supports habitat features uncommon within the wider area and as a result, would support comparatively higher (though not high) biodiversity values.

Lands within the corridor east through to the Bruce Highway are largely cleared and support grazing or low density development. Within the *surrounding area*, a variety of large swales and depressions occur and when inundated, these would support wetland habitat values for waterfowl and shorebirds, including a variety of species listed under the migratory provisions of the EPBC Act. The *project area* appears to intersect with such habitat to the near east of Newman Road (app. 238730E 7409500S) and would be close to at least two other sites (app. 2389720E 7409300S and 243000E 7408500S).

3.2. Bruce Highway to Archer

This section of the *project area* transects lands extensively cleared for grazing. Remnant vegetation is mainly associated with a variety of watercourses.

The corridor south to about River Road passes through a landscape of supporting numerous swales and depressions. At the time of the field investigations these lower-lying parts of the landscape did not contain surface water. The primary vegetation community was open, rank grassland. During wetter periods, swales and depressions would support wetlands and open waterbodies suitable for a variety of waterfowl and shorebirds, including a several species listed under the migratory provisions of the EPBC Act. These low-lying areas form part of a wider mosaic of wetlands associated with Gavial Creek. The corridor transects a small tributary of Gavial Creek at about 248120E 7404586S. Riparian vegetation is mapped as remnant vegetation.

Lands within the corridor south to Archer are drier and do not exhibit the extent of swale and depression characteristics of land to the north of River Road. Lands within the corridor south to Archer transect a small tributary of Serpentine Creek and associated wetlands from about 248938E 7403192S to 250173E 7400309S. No surface water was present at the time of field survey. Development of vegetation cover associated with wetter periods and retention of surface water may support habitat for a variety of waterbirds and shorebirds, including several species listed under the NC and EPBC Acts (e.g. migratory waders and Black-necked Stork *Ephippiorhynchus asiaticus*). Denser fringing vegetation may also support potentially suitable habitat for the threatened Yellow Chat *Epthianura crocea macgregori*.

At and to the near south of Causarina Road, the corridor passes through several patches of remnant vegetation (*Eucalyptus populnea* dominated) and transects Dingo Creek, a small watercourse and part of the Serpentine Creek system. Values associated with remnant vegetation are likely to be of local importance in terms of native fauna habitat generally as such features are uncommon within the *project area* and *surrounding area*.

The corridor in this area passes to the near east of an area identified previously as habitat for the Yellow Chat *Epthianura crocea macgregori* (see RLMS 2006b). Two small artificial wetland systems occur between the Bruce Highway and the corridor. These were dry at the time of the field survey and lacked sufficient tall ground cover vegetation which may be present and suitable for the Yellow Chat during wetter periods. These sites are approximately 250763E 7395925S (to near north-east of the Moglino Road intersection) and 251453E 7394380S (to the near south-east of the McLean Road intersection).

3.3. Archer to Raglan Booster Station

The section of the *project area* transects lands extensively cleared for grazing. Cleared lands are most extensive in association with that part of the corridor from Archer to the Bajool-Port Alma Road. Here the corridor transects Station Creek which supports a narrow band of riparian vegetation within a cleared grazing landscape. Riparian vegetation associated with Station Creek (and its tributary-Oaky Creek) are likely to be locally important as habitat refuges and would support some wildlife movement values. Habitat for the threatened Yellow Chat *Epthianura crocea macgregori* has been mapped for this general area (see RLMS 2006b). The core of this wider habitat area is potentially to the near east of the corridor (app. 256251E 7389205S), though the corridor is likely to transect part of the surrounding habitat area. It is here that the western corridor option is most desirable.

Further to the south, both corridor options appear to transect two areas mapped as potential Yellow Chat habitat (see Houston 2006; RLMS 2006b). This occurs in the vicinity of the northern and southern sides of the disused rail line (associated with the area centred on 261356E 7384512S). To the near south-east, again, the corridor transects another area mapped as potential Yellow Chat habitat (see Houston 2006; RLMS 2006b). The former are apparently associated with wetlands which develop within broad swales, whilst the latter is associated with saltmarsh habitat. This area appears to correspond with that section of the corridor from about 260200E 7385200S to 265000E 7383500S.

To the near east (approximately 1-2 kilometres), there is a known Yellow Chat breeding site (centred on the Cheetham Creek saltmarsh habitats) (see Houston 2006).

The corridor south from about the junction of Newsome and Toonda Port Alma Roads supports small patches of remnant vegetation, including those dominated by *Acacia harpophylla* or *Eucalyptus populnea* and/or *Eucalyptus crebra*. Many of these patches do exceed the threshold for mapping of regional ecosystems, though support moderate fauna habitat values. Those patches which support a sparser understorey and dominated by shorter grasses provide potentially suitable habitat for the threatened Squatter Pigeon *Geophaps scripta scripta*. This species was recorded several times from the general area during the course of the field investigation program.

The section of the corridor trending east from about the intersection of Marmoor and Toonda Port Alma Roads to where it crosses with Twelve Mile Road, transects potentially suitable habitat for the threatened Yellow Chat. This includes part of the Twelve Mile Creek salt marsh habitat system and the upper freshwater part of Twelve Mile Creek. The latter supported surface water at the time of the field investigations. That area has been identified as potential freshwater habitat and is linked to the known Yellow Chat breeding site which is located downstream approximately one kilometre to the near north of the corridor (see Houston 2006 and RLMS 2006b). The Twelve Mile area supports highly significant habitat for Yellow Chat.

In this area, the threatened Squatter Pigeon was recorded during field investigations.

Further south, at or about the point where the corridor again crosses Twelve Mile Road, it adjoins another area known to support the Yellow Chat, i.e. Pelican Creek and associated wetlands/dams (approximately 273662E 7377875S) (see Houston 2006 and RLMS 2006b).

Further to the near south, the corridor crosses Hourigan and Raglan Creeks. The network of riparian habitats and adjoining habitat is considered to support locally significant values in terms of ecological connectivity, wildlife movement and fauna habitat in itself. Habitat within this area is potentially suitable for migratory waders and several threatened species (e.g. Black-necked Stork *Ephippiorhynchus asiaticus*; Powerful Owl *Ninox strenua*; Black-chinned Honeyeater *Melithreptus gularis*).

The corridor also encompasses habitat mapped as potentially suitable Yellow Chat habitat (Hourigan Swamp; Houston 2006) and known Yellow Chat breeding habitat adjoins the north-eastern side of the corridor (Raglan oxbow and saltmarsh area; Houston 2006).

The remaining section of the corridor south of the Raglan Creek remnant system to about the point where the booster station is proposed is largely cleared and grazed and supports comparatively lower fauna habitat values.

3.4. Raglan Booster Station Options to Mt Larcom Gladstone Road

This section of the corridor supports two options at two separate sections of the corridor. In the north, both alignment options transect mainly cleared and grazed landscapes. Neither differs significantly in terms of impact to fauna habitat values. It is possible that the eastern alignment may allow a greater buffer between it and the band of remnant vegetation associated with Raglan Station Road. On this basis, the eastern alignment is preferred.

Patchy coverage of remnant vegetation (where *Eucalyptus mollucana* is abundant) occurs to the near west and east of the corridor crossing of Darts Creek Road. From this area, the corridor is split into two alignment options. It is presumed that the southern option is based on an existing power line easement. This alignment crosses Darts Creek and then transects a large remnant patch. The most abundant canopy species within this area is *Eucalyptus mollucana*, though *Eucalyptus tereticornis* is present in association with lower lying area (particularly in and around Horseshoe Lagoon wetland complex). Horseshoe lagoon is situated within 200m of the corridor. This area is likely to support a diverse avifauna, including threatened species, waterfowl and migratory waders. That wetland and adjacent forest is likely to be locally significant. Numerous trees exhibited evidence of Koala usage and a small flock of the threatened Black-chinned Honeyeater *Melithreptus gularis* was recorded in adjoining *Eucalyptus mollucana* open forest which surrounds this site.

If the alignment through this remnant area can not be contained within the existing power line easement clearing, the alternative proposed alignment to the north is preferred as the majority of the land it transects is largely cleared, except for a short transect through the northern part of the remnant complex within which the southern proposed alignment transects.

The remainder of the corridor extending to Mt Larcom and the crossing of the Bruce Highway transects habitat of comparatively lower fauna habitat values.

It should be noted that all grassy open woodland habitats within this section of the corridor and adjoining land support potentially suitable habitat for the threatened Squatter Pigeon.

3.5. Mt Larcom Gladstone Road to Boat Creek Landing Road

From the crossing of the Mt Larcom Gladstone Road, the corridor trends south-east, then north-east towards the Larcom Gladstone Road and Myrlea Road. This section of the corridor transects two large areas of mapped remnant vegetation and a tributary of Scrubby Creek. These habitat areas are likely to form part of a wider mosaic of habitats which link into the core of this network within the Mt Larcom Range (to the north-north/east of the *project area*).

Open forest associated with this section of the corridor appears to be dominated by canopy tree species including *Eucalyptus mollucana*, *E. crebra*, *Corymbia citriodora*, though also supporting smaller areas where *Eucalyptus tereticornis* is more common. These open forest types typically support an open and grassy understorey. Field sampling indicates that hollow-bearing trees are rare and that many areas support even-aged stands of trees. This habitat type does not typically support a diverse fauna assemblage. Riparian habitats of Scrubby Creek are likely to be locally important in terms of supporting wildlife movement and as habitat of value in its own right.

From Myrlea Road to the Calliope River Targinie Road, the corridor encompasses variety of smaller patches of remnant vegetation. Much of this vegetation cover has been previously disturbed and habitat quality varies considerably. The less disturbed habitats, particularly those on rockier substrates, may provide potentially suitable habitat for the Brigalow Scaly-foot *Paradelma orientalis*.

From the crossing of Calliope River Targinie Road, the corridor splits into two alternative alignment options, one trending to the north-east (and crossing the Mt Larcom Gladstone Road), whilst the other, trends east and follows the rail and existing pipeline easements.

The alignment option trending to the north-east (and crossing the Mt Larcom Gladstone Road), encompasses riparian habitat along Boat Creek. The closed forest environment which is supported along the waterway is likely to support high fauna habitat values, both in terms of fauna movement and as high value habitat in its own right. This area is likely to support potentially suitable habitat for several threatened fauna species (e.g. Powerful Owl *Ninox strenua*; Black-chinned Honeyeater *Melithreptus gularis*).

The other alignment option trending east, encompasses the existing the rail and existing pipeline easements initially, then only the existing slurry pipeline easement. The mapped corridor encompasses open forest remnant vegetation. These remnant areas (and those adjacent) may provide habitat for threatened species (e.g. Brigalow Scaly-foot *Paradelma orientalis*).

If the proposed pipeline infrastructure can be partially accommodated within the existing easement (and accompanied with minimal additional vegetation clearing), it clearly preferred over the northern alternative option which may result in comparatively greater impacts to riparian habitats of higher fauna habitat value.

The area through which both corridor options transect is likely to form part of a locally important network of fauna habitats which extend from the west of Gladstone, north through the *project area* to remnant vegetation associated with the Mt Larcom Range and Scrubby Mountain further to the north.

4. CONCLUSIONS

This report has provided a summary of the fauna and fauna habitat values for the *project area*. These findings are of a preliminary nature only. They highlight potential issues of sensitivity in regards to the project proposal and to provide guidance for the nature and extent of future more detailed investigations which may be required in the following stages of development assessment and design.

As described, there are extensive areas within the *project area* and *surrounding area* where fauna habitat values have been degraded and as a result, support comparatively poor habitat values for native fauna. This report also highlights that there are areas which support higher habitat values in regards to biodiversity generally, wildlife movement, and as known or potentially suitable habitat for species of conservation significance.

In regards to the protection and maintenance of fauna habitat values, two tenets for development within the *project area* should be:

1. To reduce the width of clearing in any area of remnant vegetation to that which only essential for the construction and operation of the pipeline.

2. To minimise both the pipeline easement footprint and potential construction impacts at all waterway crossings.

Achievement of both will result in mitigating impacts to native fauna habitat values and especially, with respect to the maintenance of habitat areas which support potentially higher biodiversity values and species of conservation significance.

Areas which support comparatively higher value native fauna habitat and/or sensitive values in regards to species of conservation significance within the *project area* and adjacent lands include:

Fitzroy River to the Bruce Highway Section

- Riparian vegetation along the Fitzroy River;
- A relatively narrow band of mapped remnant vegetation occurs about half way along this section (app. 234699E 7414830S).
- Riparian vegetation community dominated by *Eucalyptus coolibah* (app. 233943E 7412214S) to the near south of the intersection of Lion Mountain and Nine Mile Roads.
- A small rocky knoll supporting a disturbed area of semi-evergreen vine thicket - southern side of Malchi-Nine Mile Road (app. 235098E 7409472S).
- Large swales and depressions (seasonal wetlands) within the vicinity of Newman Road (app. 238730E 7409500S; 2389720E 7409300S and 243000E 7408500S).

Bruce Highway to Archer Section

- Large swales and depressions (seasonal wetlands) north of River Road (248664E 7403864S).
- Riparian vegetation along the tributary of Gavial Creek and associated seasonal wetlands (app. 248120E 7404586S).
- Riparian vegetation along the tributary of Serpentine Creek and associated seasonal wetlands from about 248938E 7403192S to 250173E 7400309S.
- Patches of remnant vegetation (*Eucalyptus populnea* dominated) and Dingo Creek (part of the Serpentine Creek system) at and to the near south of Causarina Road (includes potential Yellow Chat habitat).
- Two small artificial wetland systems to the near west of the corridor (potential Yellow Chat habitat) - approximately 250763E 7395925S (to near north-east of the Moglino Road

intersection) and 251453E 7394380S (to the near south-east of the McLean Road intersection).

Archer to Raglan Booster Station Section

- Riparian vegetation associated with Station Creek (and its tributary Oaky Creek) and seasonal wetlands (potential Yellow Chat habitat) to near east of corridor (app. 256251E 7389205S).
- Seasonal wetlands (swales and depressions – potential Yellow Chat habitat) within the vicinity of the disused rail line (associated with the area centred on 261356E 7384512S).
- Seasonal wetlands and saltmarsh adjacent to eastern side of corridor which correspond with that section of the corridor from about 260200E 7385200S to 265000E 7383500S (includes Yellow Chat habitat).
- Seasonal wetlands and saltmarsh environs between the Marmoor Road-Toonda Port Alma Road intersection through to Twelve Mile Creek freshwater habitat (includes Yellow Chat habitat).
- Seasonal wetlands (both artificial and natural) associated with Pelican Creek (vicinity of 273662E 7377875S) (Yellow Chat habitat).
- Seasonal wetlands, riparian habitat and remnant vegetation communities associated with Hourigan and Raglan Creeks.
- Saltmarsh environs associated with the Raglan Creek oxbow to the near east of the corridor (Yellow Chat habitat).

Raglan Booster Station Options to Mt Larcom Gladstone Road Section

- Remnant vegetation associated with Raglan Station Road adjacent and to the west of the corridor.
- Seasonal wetlands and remnant vegetation (including *Eucalyptus tereticornis*) associated with Horseshoe Lagoon – adjacent and to the east of corridor (vicinity of 291278E 7366934S).
- Remnant vegetation either side of existing power easement and extending south from Darts Creek Road to Gostevsky Road (north-west of Mt Larcom township).

Mt Larcom Gladstone Road to Boat Creek Landing Road

- Large native vegetation remnants and Scrubby Creek riparian habitat between Mt Larcom Gladstone and Myrlea Road.
- Riparian habitat along Boat Creek (northern side of Mt Larcom Gladstone Road)
- Remnant open forest habitat on low rises south of the Calliope River Targinie Road.

The *project area* and adjacent lands sustain habitats known or potentially likely to support a variety of fauna species which are listed as rare, threatened or otherwise significant under the NC and/or EPBC Acts (see following Table). For a variety of these, the *project area* is unlikely to support quality habitat to meet their requirements. For others, implementation of suitable environment management plans may successfully minimise the potential for any potential significant impacts.

Given the level of information currently available on the location and design features for the proposed pipeline, and the findings of the field investigation program, it is considered likely referral under the EPBC Act will be necessary. This primarily relates to the potential to impact on a suite of known and potential habitats for the *Critically Endangered* Yellow Chat *Epthianura crocea macgregori*, though also a variety of other threatened species and groups (see Table 1).

Information necessary to fulfil referral requirements will require significantly greater detail derived from future field work which is based on a greater level of detail on corridor alignment, pipeline

alignment and design, construction approaches and commitments to environment management regimes for both construction and operational phases of the project.

It is noteworthy that fauna assessments conducted for the proposed nickel slurry pipeline, covering similar habitats to the *project area*, identified a similar suite of threatened and migratory species which were considered to have a potential to be impacted by the project due to the potential effects on proposed habitat (see HLA 2006). That study also highlighted potential issues in regards to impacts to known and potential habitat for the *Critically Endangered* Yellow Chat, remnant vegetation and riparian habitats.

Table 4-1 List of Species of Conservation Significance - Known or Potential Occurrence with the Project Area and Surrounding Area

Status E = Endangered; V = Vulnerable; RV = Regionally Vulnerable; R = Rare; RV = Regionally Vulnerable (SEQ only); CS = Culturally Significant in Qld; and M = Migratory.

Classification QLD = Nature Conservation Act; J/C = Jamba/Camba; EPBC = Environment Protection and Biodiversity Conservation Act.

Zoological Name	Common Name	QLD	J/C	EPBC
MAMMALS				
Tachyglossus aculeatus	Short-beaked echidna	**CS**		
Phascolarctos cinereus	Koala (South East Qld)	**RV; CS**		
Chalinolobus dwyeri	Large-eared Pied Bat	**R**		**V**
Nyctophilus timoriensis	Greater Long-eared Bat	**V**		**V**
Chalinolobus picatus	Little Pied Bat	**R**		
REPTILES				
Crocodylus porosus	Estuarine Crocodile	**V**		
Rheodytes leukops	Fitzroy tortoise	**V**		**V**
Delma torquata	Collared Delma	**V**		**V**
Paradelma Orientalis	Brigalow Scaly-foot	**V**		
Egernia rugosa	Yakka Skink	**V**		**V**
FROGS				
Adelotus brevis	Tusked Frog	**V**		
BIRDS				
Anseranas semipalmata	Magpie Goose			**M**
Aythya australis	Hardhead			**M**
Biziura lobata	Musk Duck			**M**
Cheonetta jubata	Australian Wood Duck			**M**

Zoological Name	Common Name	QLD	J/C	EPBC
Dendrocygna arcuata	Wandering Whistling Duck			**M**
Dendrocygna eytoni	Plumed Whistling Duck			**M**
Tadorna radjah	Radjah Shelduck	**R**		**M**
Cygnus atratus	Black Swan			**M**
Nettapus coromandelianus	Cotton Pygmy-goose	**R**		**M**
Nettapus pulchellus	Green Pygmy-goose			**M**
Anas castanea	Chestnut Teal			**M**
Anas gracilis	Grey Teal			**M**
Anas rhynchotis	Australasian Shoveler			**M**
Anas superciliosa	Pacific Black Duck			**M**
Malacorhynchus membranaceus	Pink-eared Duck			**M**
Ardea alba[b]	Great Egret		**C**	**M**
Ardea ibis	Cattle Egret		**C J**	**M**
Plegadis falcinellus	Glossy Ibis		**C**	**M**
Ephippiorhynchus asiaticus	Black-necked Stork	**R**		
Aviceda subcristata	Pacific Baza			**M**
Elanus axillaris	Black-shouldered Kite			**M**
Haliastur indus	Brahminy Kite			**M**
Haliastur spenurus	Whistling Kite			**M**
Lophoictinia isura	Square-tailed Kite	**R**		**M**
Hieraaetus morphnoides	Little Eagle			**M**
Accipiter cirrhocephalus	Collared Sparrowhawk			**M**
Accipiter fasciatus	Brown Goshawk			**M**
Accipiter novaehollandiae	Grey Goshawk	**R**		**M**
Erythrotriorchis radiatus	Red Goshawk	**E**		**V / M**
Pandion haliaetus	Osprey			**M**

Zoological Name	Common Name	QLD	J/C	EPBC
Haliaeetus leucogaster	White-bellied Sea-Eagle		**C**	**M**
Aquila audax	Wedge-tailed Eagle			**M**
Circus approximans	Swamp Harrier			**M**
Circus assimilis	Spotted Harrier			**M**
Falco berigora	Brown Falcon			**M**
Falco cenchroides	Nankeen Kestrel			**M**
Falco hypoleucos	Grey Falcon	**R**		**M**
Falco longipennis	Australian Hobby			**M**
Falco peregrinus	Peregrine Falcon			**M**
Grus rubicundus	Brolga			**M**
Gallinago hardwickii	Latham's Snipe		**C J**	**M**
Numenius minutus	Little Curlew N		**C J**	**M**
Numenius phaeopus	Whimbrel		**C J**	**M**
Tringa stagnatilis	Marsh Sandpiper		**C J**	**M**
Tringa nebularia	Common Greenshank		**C J**	**M**
Tringa glareola	Wood Sandpiper		**C J**	**M**
Actitis hypoleucos	Common Sandpiper		**C J**	**M**
Calidris ruficollis	Red-necked Stint		**C J**	**M**
Calidris acuminata	Sharp-tailed Sandpiper		**C J**	**M**
Calidris ferruginea	Curlew Sandpiper		**C J**	**M**
Rostratula benghalensis	Painted Snipe	**R**	**C**	**M**
Himantopus himantopus	Black-winged Stilt			**M**
Recurvirostra novaehollandiae	Red-necked Avocet			**M**
Charadrius ruficapillus	Red-capped Plover			**M**
Elseyornis melanops	Black-fronted Dotterel			**M**
Erythrogonys cinctus	Red-kneed Dotterel			**M**

Zoological Name	Common Name	QLD	J/C	EPBC
Vanellus miles	Masked Lapwing			**M**
Vanellus tricolor	Banded Lapwing			**M**
Chlidonias leucopterus	White-winged Black Tern		**C J**	
Geophaps scripta	Squatter Pigeon (sth. sub-sp.)	**V**		**V**
Calyptrohynchus lathami	Glossy Black Cockatoo	**V**		
Cuculus saturatus	Oriental Cuckoo		**C J**	**M**
Ninox strenua	Powerful Owl	**V**		
Ninox rufa queenslandica	Rufous Owl	**V**		
Hirundapus caudacutus	White-throated Needletail		**C**	**M**
Apus pacificus	Fork-tailed Swift		**C J**	**M**
Merops ornatus	Rainbow Bee-eater			**M**
Melithreptus gularis	Black-chinned Honeyeater	**R**		
Epthianura crocea macgregori	Yellow Chat	**E**		**CE**
Acrocephalus stentoreus	Clamorous Reed-warbler			**M**
Megalurus gramineus	Little Grassbird			**M**
Megalurus timoriensis	Tawny Grassbird			**M**
Cinclorhamphus cruralis	Brown Songlark			**M**
Cinclorhamphus mathewsi	Rufous Songlark			**M**
Cisticola exilis	Golden-headed Cisticola			**M**
Cisticola juncidis laveryii	Zitting Cisticola (eastern subspecies)			**M**

5. REFERENCES

Christidis, L. and Boles, W. E. (1994). *The Taxonomy of Species of Birds in Australia and Its Territories.* Royal Australasian Ornithologists Union, Monograph 2. Royal Australasian Ornithologists Union, Hawthorn East.

Churchill, S. (1998). *Australian Bats.* New Holland Publishers (Australia), Sydney.

Cogger, H. (2000) *Reptiles and Amphibians of Australia*. 6th Edition. eed Books, Chatswood, NSW.

CZEWM CRC (2003a). Isaac/Connors Catchment Volume 7 In *Central Queensland information paper to support regional natural resource management planning*. Published by the Cooperative Research Centre for Coastal Zone Estuary and Waterway Management.

CZEWM CRC (2003b). *Central Queensland Information Paper - Central Queensland information paper to support regional natural resource management planning.* Published by the Cooperative Research Centre for Coastal Zone Estuary and Waterway Management.

DEH (2005). *A Directory of Important wetlands in Australia.* http://www.deh.gov.au/water/wetlands/database/directory April 2006, DEH. Brisbane

Driscoll, P. (1997). The distribution of waders along the Queensland coastline. *In* P. Straw (ed) *Shorebird Conservation in the Asia-Pacific Region.* Australian Wader Study Group, Birds Australia, Melbourne.

HLA (2006). *Flora and Fauna Assessment Gladstone Pacific Nickel Slurry Pipeline.* An unpublished report prepared by HLA Envirosciences Pty Ltd for Gladstone Pacific Nickel Ltd.

Houston, W. (2006). *Advice on the proposed pipeline from Marlborough to Gladstone with respect to protecting habitat of the Capricorn Yellow Chat – Draft.* An unpublished report prepared by the Central Queensland University for RLMS.

Houston, W. Porter, G., Elder, R., Black, R. and Sheaves, M. (2004a). Rediscovery of Yellow Chats (Capricorn subspecies) on the Fitzroy River Delta, central Queensland. *Sunbird* 34: 36-42.

Houston, W., Elder, R., Black, R. and McCabe, J (2006) Conservation significance of coastal wetland habitats for birds at Twelve Mile Creek, Fitzroy River, Central Queensland. *Sunbird* 36: 20-36.

Houston, W., Porter, G., O'Neill, P. & Elder, R. (2004b) The ecology of the Critically Endangered Yellow Chat *Epthianura crocea macgregori* on Curtis Island. *Sunbird* 34: 10-23.

Jaensch, R., Houston, W., Black, R., Campbell, L., Elder, R. & McCabe, J. (2004). Rediscovery of the Capricorn subspecies of Yellow Chat E*pthianura crocea macgregori* at Torilla Plain, on the mainland coast of central Queensland. *Sunbird* 34: 24-35.

Longmore, N.W. (1978). *Avifauna of the Rockhampton area, Queensland.* Sunbird 9:25-53.

McFarland, D., Haseler, M., Venz, M., Reis, T., Ford, G. and Hines, B. (1999). *Terrestrial vertebrate fauna of the Brigalow Belt South Bioregion: assessment and analysis of conservation planning.* Biodiversity Planning, Environment Protection Agency, Brisbane.

RLMS (2006a). *Fitzroy River Water Infrastructure Corridor Investigation Report.* An unpublished report prepared for the GAWB.

RLMS (2006b). Rockhampton to Gladstone Corridor Infrastructure Corridor Investigation. An unpublished report prepared by Resource and Land Management Services for the Coordinator Generals Department.

Sattler, P.S. and Williams, R. D. (eds) (1999). *The Conservation Status of Queensland's Bioregional Ecosystems.* Queensland Environmental Agency, Brisbane.

Specht, R. L. (1970). Vegetation. In *The Australian Environment*. G. W. Leeper. Melbourne, CSIRO and Melbourne University Press**:** 44-64.

Strahan, R. (2000). *The Mammals of Australia*. Australian Museum and Reed Books, Sydney, Australia.

Young , P.A.R. (1999). *Central Queensland Coast* in Sattler, P.S. and Williams, R. D. (eds) (1999) *The Conservation Status of Queensland's Bioregional Ecosystems.* Queensland Environmental Agency, Brisbane.

APPENDIX C: WILDLIFE ONLINE SEARCH RESULTS

Note that this search had to be done in two halves due to the range of longitude.

Wildlife Online Extract

Search Criteria: Species List for a Defined Area

Species: Plants (including other non-animals such as fungi and protists)

Status: Rare and threatened species

Date: All

Latitude: 23.2600 to 23.8900

Longitude: 150.4000 to 150.8000

Email: dcjohnson@wbmpl.com.au

Date submitted: Tuesday 17 Apr 2007 15:33:05

Date extracted: Tuesday 17 Apr 2007 15:46:04

The number of records retrieved = 22

Kingdom	Class	Family	Scientific Name	Common Name	NCA	EPBC	Recs
plants	cycads	Cycadaceae	*Cycas megacarpa*		E	E	22
plants	cycads	Cycadaceae	*Cycas ophiolitica*	Marlborough blue	E	E	14
plants	higher dicots	Acanthaceae	*Graptophyllum excelsum*		R	.	8
plants	higher dicots	Apocynaceae	*Alyxia magnifolia*		R	.	2
plants	higher dicots	Apocynaceae	*Parsonsia lenticellata*	narrow-leaved parsonsia	R	.	4
plants	higher dicots	Asclepiadaceae	*Marsdenia brevifolia*		V	V	1
plants	higher dicots	Combretaceae	*Dansiea elliptica*		R	.	1
plants	higher dicots	Combretaceae	*Macropteranthes fitzalanii*		R	.	1
plants	higher dicots	Combretaceae	*Macropteranthes leiocaulis*		R	.	10
plants	higher dicots	Euphorbiaceae	*Actephila sessilifolia*		R	.	1
plants	higher dicots	Lamiaceae	*Callicarpa thozetii*		R	.	1
plants	higher dicots	Mimosaceae	*Acacia pubicosta*		R	.	1
plants	higher dicots	Myrtaceae	*Eucalyptus raveretiana*	black ironbox	V	V	2
plants	higher dicots	Myrtaceae	*Decaspermum struckoilicum*		E	.	10
plants	higher dicots	Myrtaceae	*Choricarpia subargentea*	giant ironwood	R	.	3
plants	higher dicots	Proteaceae	*Hakea trineura*		V	V	1
plants	higher dicots	Sapindaceae	*Atalaya rigida*		R	.	7
plants	higher dicots	Sapindaceae	*Cossinia australiana*		E	E	4
plants	higher dicots	Sapindaceae	*Atalaya calcicola*		R	.	5
plants	higher dicots	Stackhousiaceae	*Stackhousia tryonii*		R	.	4
plants	lower dicots	Hernandiaceae	*Hernandia bivalvis*	cudgerie	R	.	10
plants	monocots	Arecaceae	*Livistona drudei*	Halifax fan palm	V	.	2

CODES

NCA - Indicates the conservation status of each taxon under the *Nature Conservation Act 1992.*
The codes are Presumed Extinct (PE), Endangered (E), Vulnerable (V), Rare (R), Common (C) or Not Protected ( ).

EPBC - Indicates the conservation status of each taxon under the *Environment Protection and Biodiversity Conservation Act 1999.*
The codes are Conservation Dependent (CD), Critically Endangered (CE), Endangered (E), Extinct (EX), Extinct in the Wild (XW) and Vulnerable (V).

Recs - Indicates the number of records of the species contained within the database for the area searched.

Queensland Government
Environmental Protection Agency
Queensland Parks and Wildlife Service

Wildlife Online Extract

Search Criteria: Species List for a Defined Area

Species: Plants (including other non-animals such as fungi and protists)

Status: Rare and threatened species

Date: All

Latitude: 23.2600 to 23.8900

Longitude: 150.8000 to 151.2200

Email: dcjohnson@wbmpl.com.au

Date submitted: Tuesday 17 Apr 2007 15:34:23

Date extracted: Tuesday 17 Apr 2007 15:46:26

The number of records retrieved = 19

Kingdom	Class	Family	Scientific Name	Common Name	NCA	EPBC	Recs
plants	cycads	Cycadaceae	*Cycas megacarpa*		E	E	3
plants	ferns	Aspleniaceae	*Asplenium pellucidum*		V	V	2
plants	higher dicots	Acanthaceae	*Graptophyllum excelsum*		R	.	7
plants	higher dicots	Apocynaceae	*Alyxia magnifolia*		R	.	7
plants	higher dicots	Apocynaceae	*Parsonsia larcomensis*		V	V	4
plants	higher dicots	Apocynaceae	*Parsonsia lenticellata*	narrow-leaved parsonsia	R	.	8
plants	higher dicots	Celastraceae	*Denhamia parvifolia*		V	V	1
plants	higher dicots	Combretaceae	*Dansiea elliptica*		R	.	9
plants	higher dicots	Combretaceae	*Macropteranthes fitzalanii*		R	.	3
plants	higher dicots	Combretaceae	*Macropteranthes leiocaulis*		R	.	3
plants	higher dicots	Euphorbiaceae	*Actephila sessilifolia*		R	.	8
plants	higher dicots	Mimosaceae	*Acacia storyi*		R	.	2
plants	higher dicots	Rutaceae	*Zieria sp. (Mt Larcom N.Gibson TOI8)*		V	.	4
plants	higher dicots	Sapindaceae	*Atalaya rigida*		R	.	11
plants	higher dicots	Sapindaceae	*Atalaya calcicola*		R	.	1
plants	higher dicots	Sapindaceae	*Cupaniopsis shirleyana*		V	V	10
plants	higher dicots	Sapindaceae	*Atalaya collina*		E	E	3
plants	higher dicots	Simaroubaceae	*Quassia bidwillii*	quassia	V	V	2
plants	lower dicots	Hernandiaceae	*Hernandia bivalvis*	cudgerie	R	.	8

CODES

NCA - Indicates the conservation status of each taxon under the *Nature Conservation Act 1992.*
The codes are Presumed Extinct (PE), Endangered (E), Vulnerable (V), Rare (R), Common (C) or Not Protected ( ).

EPBC - Indicates the conservation status of each taxon under the *Environment Protection and Biodiversity Conservation Act 1999.*
The codes are Conservation Dependent (CD), Critically Endangered (CE), Endangered (E), Extinct (EX), Extinct in the Wild (XW) and Vulnerable (V).

Recs - Indicates the number of records of the species contained within the database for the area searched.

APPENDIX D: EPBC PROTECTED MATTERS REPORT

-

Department of the Environment and Water Resources home page

Skip navigation links About us | Contact us | Publications | What's new

header imagesheader imagesheader images

Protected Matters Search Tool

You are here: Environment Home > EPBC Act > Search

17 April 2007 15:41

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.

You may wish to print this report for reference before moving to other pages or websites.

The Australian Natural Resources Atlas at http://www.environment.gov.au/atlas may provide further environmental information relevant to your selected area. Information about the EPBC Act including significance guidelines, forms and application process details can be found at http://www.environment.gov.au/epbc/assessmentsapprovals/index.html

---

Map of Search Region including any Buffer

Search Type:	Area
Buffer:	0 km
Coordinates:	-23.4015,150.4725, -23.4218,150.5206, -23.4724,150.5788, -23.5610,150.6345, -23.6192,150.6674, -23.6470,150.7205, -23.6571,150.7914, -23.7179,150.8800, -23.7634,150.9610, -23.7913,151.0091, -23.8039,151.0825, -23.8039,151.1280, -23.8267,151.1634, -23.8571,151.1609, -23.8799,151.1154, -23.8925,151.0698, -23.8900,151.0015, -23.8394,150.9357, -23.7837,150.8547, -23.7331,150.7788, -23.7078,150.6927, -23.6673,150.6168, -23.6015,150.5586, -23.5281,150.5181, -23.452,150.4877 Thumbnail Map of Search Region

Report Contents:

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 - see http://www.environment.gov.au/epbc/assessmentsapprovals/guidelines/index.html.

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Significance: (Ramsar Sites)	1
Commonwealth Marine Areas:	None
Threatened Ecological Communities:	2
Threatened Species:	24
Migratory Species:	18

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 and the heritage values of a place on the Register of the National Estate. Information on the new heritage laws can be found at http://www.environment.gov.au/heritage/index.html.

Please note that the current dataset on Commonwealth land is not complete. Further information on Commonwealth land would need to be obtained from relevant sources including Commonwealth agencies, local agencies, and land tenure maps.

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. Information on EPBC Act permit requirements and application forms can be found at http://www.environment.gov.au/epbc/permits/index.html.

Commonwealth Lands:	None
Commonwealth Heritage Places:	None
Places on the RNE:	None
Listed Marine Species:	17
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves:	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
Other Commonwealth Reserves:	None
Regional Forest Agreements:	1

Details

Matters of National Environmental Significance

Wetlands of International Significance [Dataset Information] (Ramsar Sites)		
SHOALWATER AND CORIO BAYS AREA		Within same catchment as Ramsar site
Threatened Ecological Communities [Dataset Information]	Status	Type of Presence
Brigalow (*Acacia harpophylla* dominant and co-dominant)	Endangered	Community known to occur within area
Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions	Endangered	Community likely to occur within area
Threatened Species [Dataset Information]	Status	Type of Presence
Birds		
*Epthianura crocea macgregori** Yellow Chat (Dawson)	Critically Endangered	Species or species habitat known to occur within area
Erythrotriorchis radiatus * Red Goshawk	Vulnerable	Species or species habitat likely to occur within area
*Geophaps scripta scripta** Squatter Pigeon (southern)	Vulnerable	Species or species habitat likely to occur within area
*Neochmia ruficauda ruficauda** Star Finch (eastern), Star Finch (southern)	Endangered	Species or species habitat likely to occur within area
Rostratula australis * Australian Painted Snipe	Vulnerable	Species or species habitat may occur within area

Turnix melanogaster * Black-breasted Button-quail	Vulnerable	Species or species habitat likely to occur within area
Mammals		
Chalinolobus dwyeri * Large-eared Pied Bat, Large Pied Bat	Vulnerable	Species or species habitat may occur within area
Dasyurus hallucatus * Northern Quoll	Endangered	Species or species habitat may occur within area
Nyctophilus timoriensis (South-eastern form) * Eastern Long-eared Bat	Vulnerable	Species or species habitat may occur within area
Xeromys myoides * Water Mouse, False Water Rat	Vulnerable	Species or species habitat likely to occur within area
Reptiles		
Denisonia maculata * Ornamental Snake	Vulnerable	Species or species habitat likely to occur within area
Egernia rugosa * Yakka Skink	Vulnerable	Species or species habitat likely to occur within area
Furina dunmalli * Dunmall's Snake	Vulnerable	Species or species habitat may occur within area
Paradelma orientalis * Brigalow Scaly-foot	Vulnerable	Species or species habitat likely to occur within area
Rheodytes leukops * Fitzroy Tortoise	Vulnerable	Species or species habitat may occur within area
Plants		
Atalaya collina *	Endangered	Species or species habitat likely to occur within area
Bosistoa selwynii * Heart-leaved Bosistoa	Vulnerable	Species or species habitat likely to occur within area
Bosistoa transversa * Three-leaved Bosistoa	Vulnerable	Species or species habitat likely to occur within area
Bulbophyllum globuliforme * Miniature Moss-orchid	Vulnerable	Species or species habitat likely to occur within area
Cupaniopsis shirleyana * Wedge-leaf Tuckeroo	Vulnerable	Species or species habitat likely to occur within area
Eucalyptus raveretiana * Black Ironbox	Vulnerable	Species or species habitat likely to occur within area
Leucopogon cuspidatus *	Vulnerable	Species or species habitat likely to occur within area
Parsonsia larcomensis *	Vulnerable	Species or species habitat likely to occur within area
Quassia bidwillii * Quassia	Vulnerable	Species or species habitat likely to occur within area
Migratory Species [Dataset Information]	Status	Type of Presence
Migratory Terrestrial Species		

Birds

Haliaeetus leucogaster White-bellied Sea-Eagle	Migratory	Species or species habitat likely to occur within area
Hirundapus caudacutus White-throated Needletail	Migratory	Species or species habitat may occur within area
Hirundo rustica Barn Swallow	Migratory	Species or species habitat may occur within area
Merops ornatus * Rainbow Bee-eater	Migratory	Species or species habitat may occur within area
Monarcha melanopsis Black-faced Monarch	Migratory	Breeding may occur within area
Monarcha trivirgatus Spectacled Monarch	Migratory	Breeding likely to occur within area
Myiagra cyanoleuca Satin Flycatcher	Migratory	Species or species habitat likely to occur within area
Rhipidura rufifrons Rufous Fantail	Migratory	Breeding may occur within area

Migratory Wetland Species

Birds

Ardea alba Great Egret, White Egret	Migratory	Species or species habitat may occur within area
Ardea ibis Cattle Egret	Migratory	Species or species habitat may occur within area
Gallinago hardwickii * Latham's Snipe, Japanese Snipe	Migratory	Species or species habitat may occur within area
Nettapus coromandelianus albipennis Australian Cotton Pygmy-goose	Migratory	Species or species habitat may occur within area
Numenius minutus Little Curlew, Little Whimbrel	Migratory	Species or species habitat may occur within area
Rostratula benghalensis s. lat. Painted Snipe	Migratory	Species or species habitat may occur within area

Migratory Marine Birds

Apus pacificus Fork-tailed Swift	Migratory	Species or species habitat may occur within area
Ardea alba Great Egret, White Egret	Migratory	Species or species habitat may occur within area
Ardea ibis Cattle Egret	Migratory	Species or species habitat may occur within area

Migratory Marine Species

Reptiles

Crocodylus porosus Estuarine Crocodile, Salt-water Crocodile	Migratory	Species or species habitat likely to occur within area

Other Matters Protected by the EPBC Act

Listed Marine Species [Dataset Information]	Status	Type of Presence
Birds		
Anseranas semipalmata Magpie Goose	Listed - overfly marine area	Species or species habitat may occur within area
Apus pacificus Fork-tailed Swift	Listed - overfly marine area	Species or species habitat may occur within area
Ardea alba Great Egret, White Egret	Listed - overfly marine area	Species or species habitat may occur within area
Ardea ibis Cattle Egret	Listed - overfly marine area	Species or species habitat may occur within area
Gallinago hardwickii * Latham's Snipe, Japanese Snipe	Listed - overfly marine area	Species or species habitat may occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle	Listed	Species or species habitat likely to occur within area
Hirundapus caudacutus White-throated Needletail	Listed - overfly marine area	Species or species habitat may occur within area
Hirundo rustica Barn Swallow	Listed - overfly marine area	Species or species habitat may occur within area
Merops ornatus * Rainbow Bee-eater	Listed - overfly marine area	Species or species habitat may occur within area
Monarcha melanopsis Black-faced Monarch	Listed - overfly marine area	Breeding may occur within area
Monarcha trivirgatus Spectacled Monarch	Listed - overfly marine area	Breeding likely to occur within area

Myiagra cyanoleuca Satin Flycatcher	Listed - overfly marine area	Species or species habitat likely to occur within area
Nettapus coromandelianus albipennis Australian Cotton Pygmy-goose	Listed - overfly marine area	Species or species habitat may occur within area
Numenius minutus Little Curlew, Little Whimbrel	Listed - overfly marine area	Species or species habitat may occur within area
Rhipidura rufifrons Rufous Fantail	Listed - overfly marine area	Breeding may occur within area
Rostratula benghalensis s. lat. Painted Snipe	Listed - overfly marine area	Species or species habitat may occur within area
Reptiles		
Crocodylus porosus Estuarine Crocodile, Salt-water Crocodile	Listed	Species or species habitat likely to occur within area

Extra Information

Regional Forest Agreements [Dataset Information]
Note that all RFA areas including those still under consideration have been included.

South East Queensland RFA, Queensland

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 Heritage and Register of National Estate properties, Wetlands of International 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 migratory and marine provisions of the Act have been mapped.

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.

Acknowledgments

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

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

ANUCliM Version 1.8, Centre for Resource and Environmental Studies, Australian National University

was used extensively for the production of draft maps of species distribution. Environment Australia is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Top | About us | Advanced search | Contact us | Information services | Publications | Site index | What's new

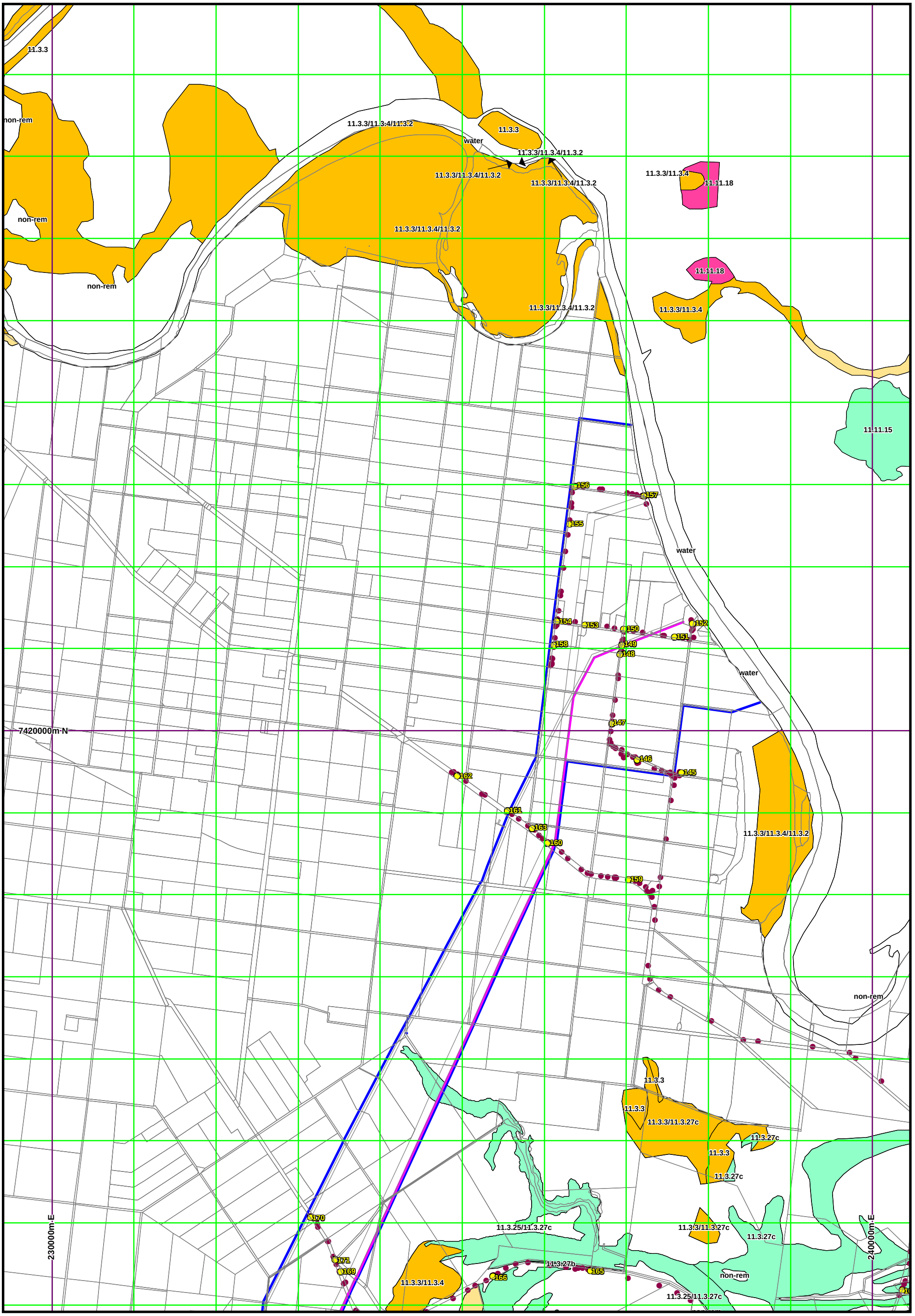
Accessibility | Disclaimer | Privacy | © Commonwealth of Australia 2004

Last updated:

Department of the Environment and Water Resources
GPO Box 787 Canberra ACT 2601 Australia
Telephone: +61 (0)2 6274 1111

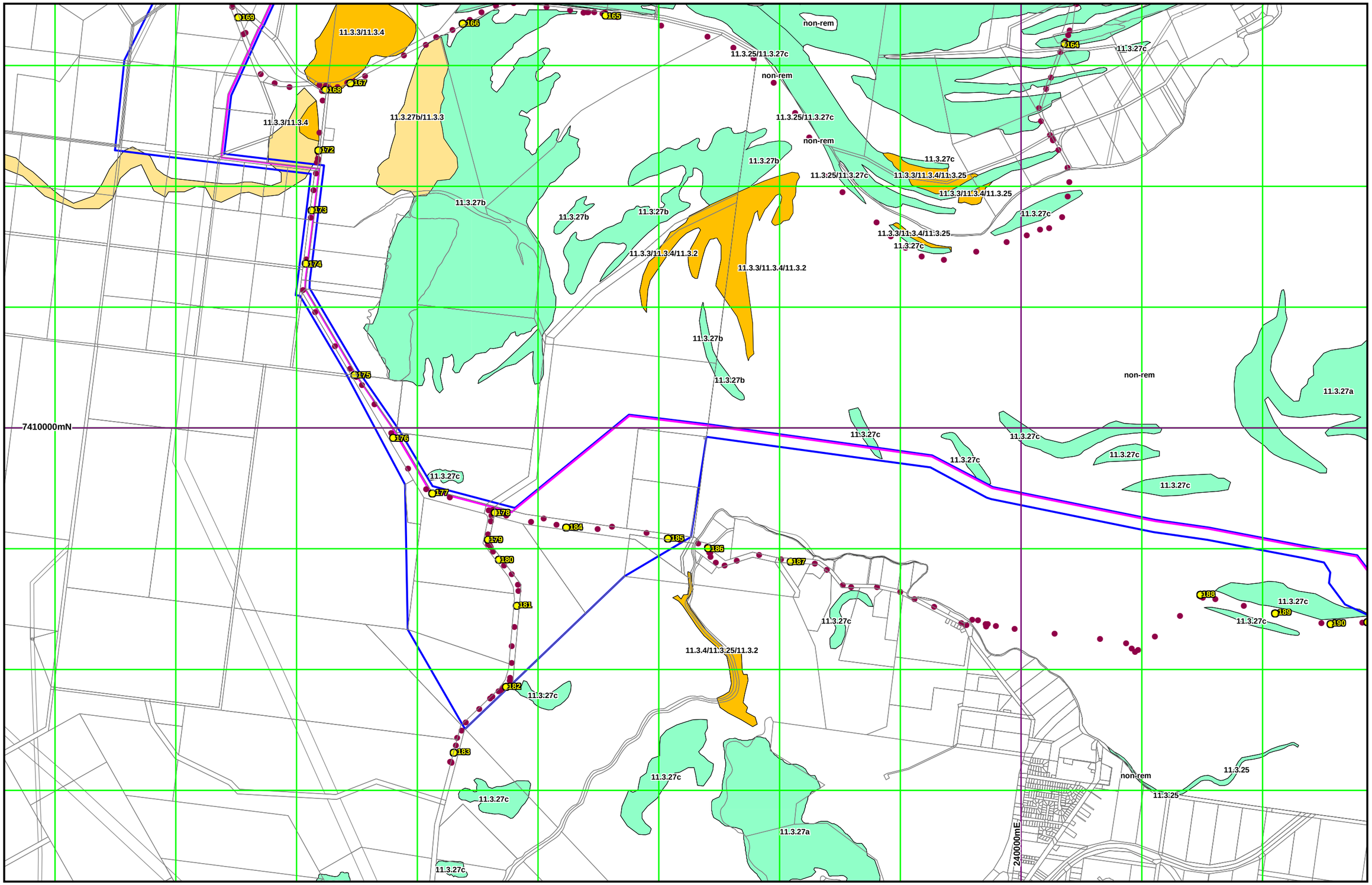
APPENDIX E: REGIONAL ECOSYSTEM MAPPING

There are eight separate maps, of varying scale, in order to fit A3 sized pages in hard copy. A 1km grid is provided, for MGA94 projection.



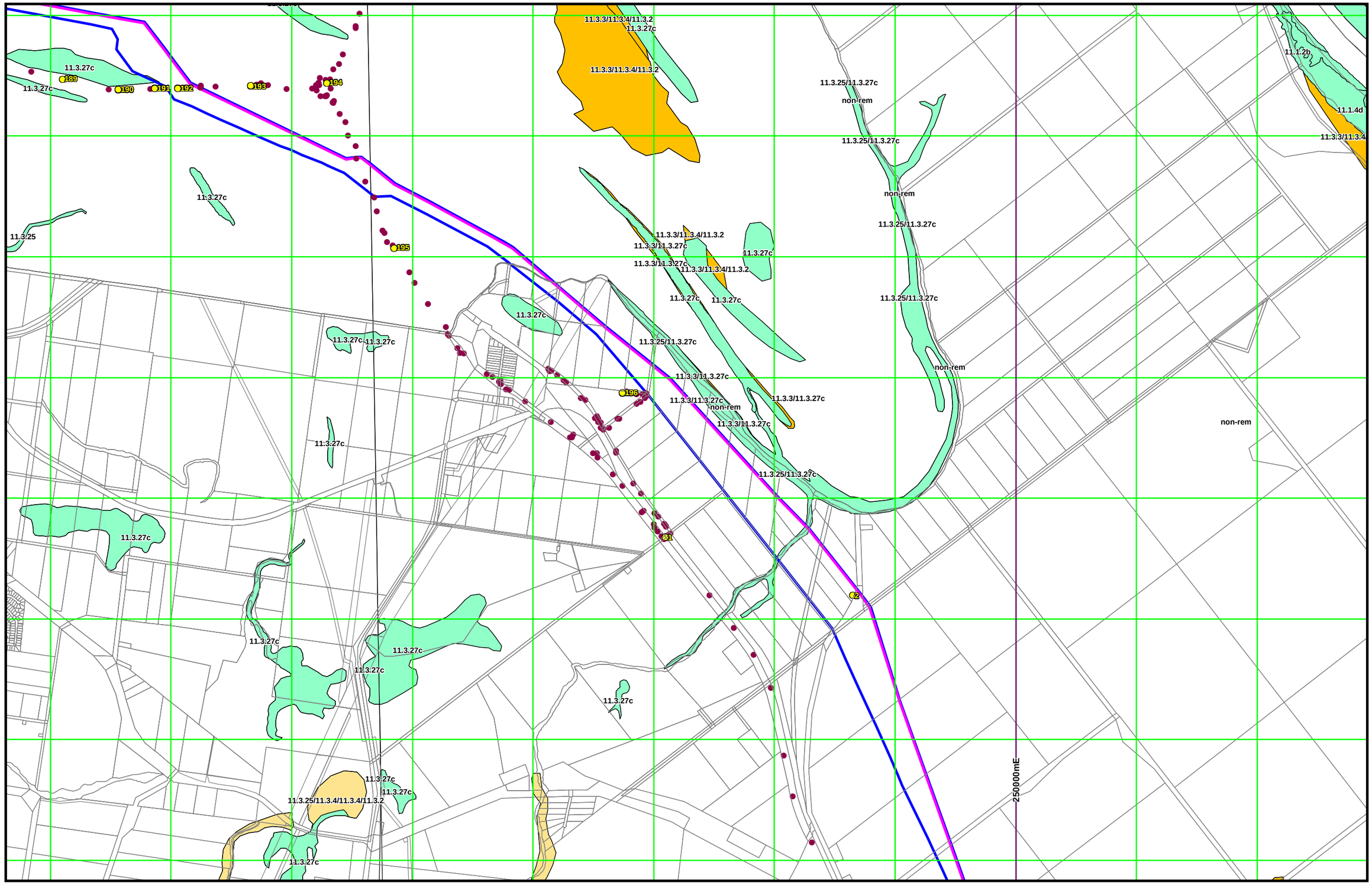
I:\B16476_I_dcj_Gladstone-Fitzroy_pipeline\DRG\ECO_001_070328_Field map with RE.WOR

Field Map with RE -1



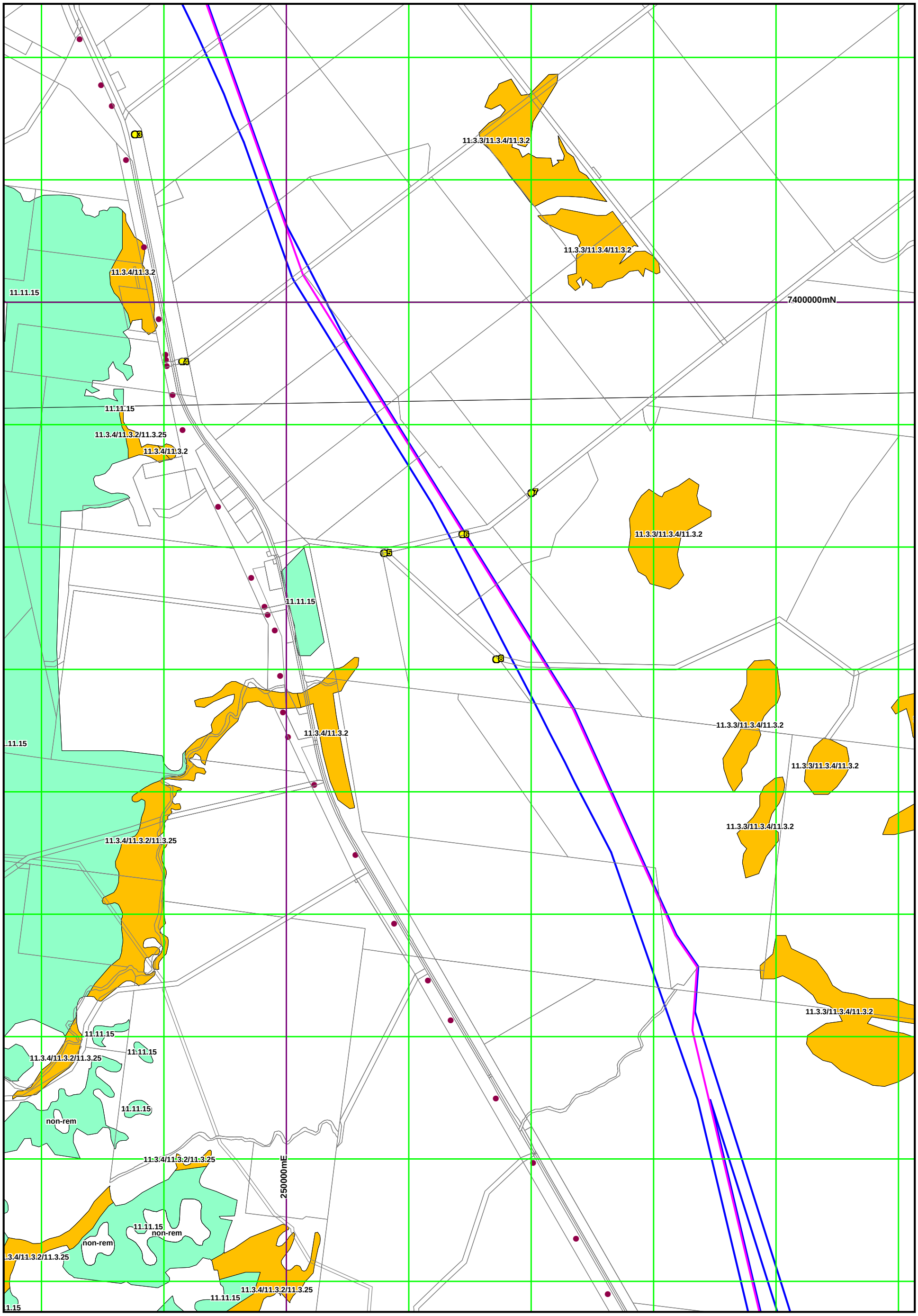
I:\B16476_I_dcj_Gladstone-Fitzroy_pipeline\DRG\ECO_002_070329_Field map with RE.WOR

Field Map with RE -2



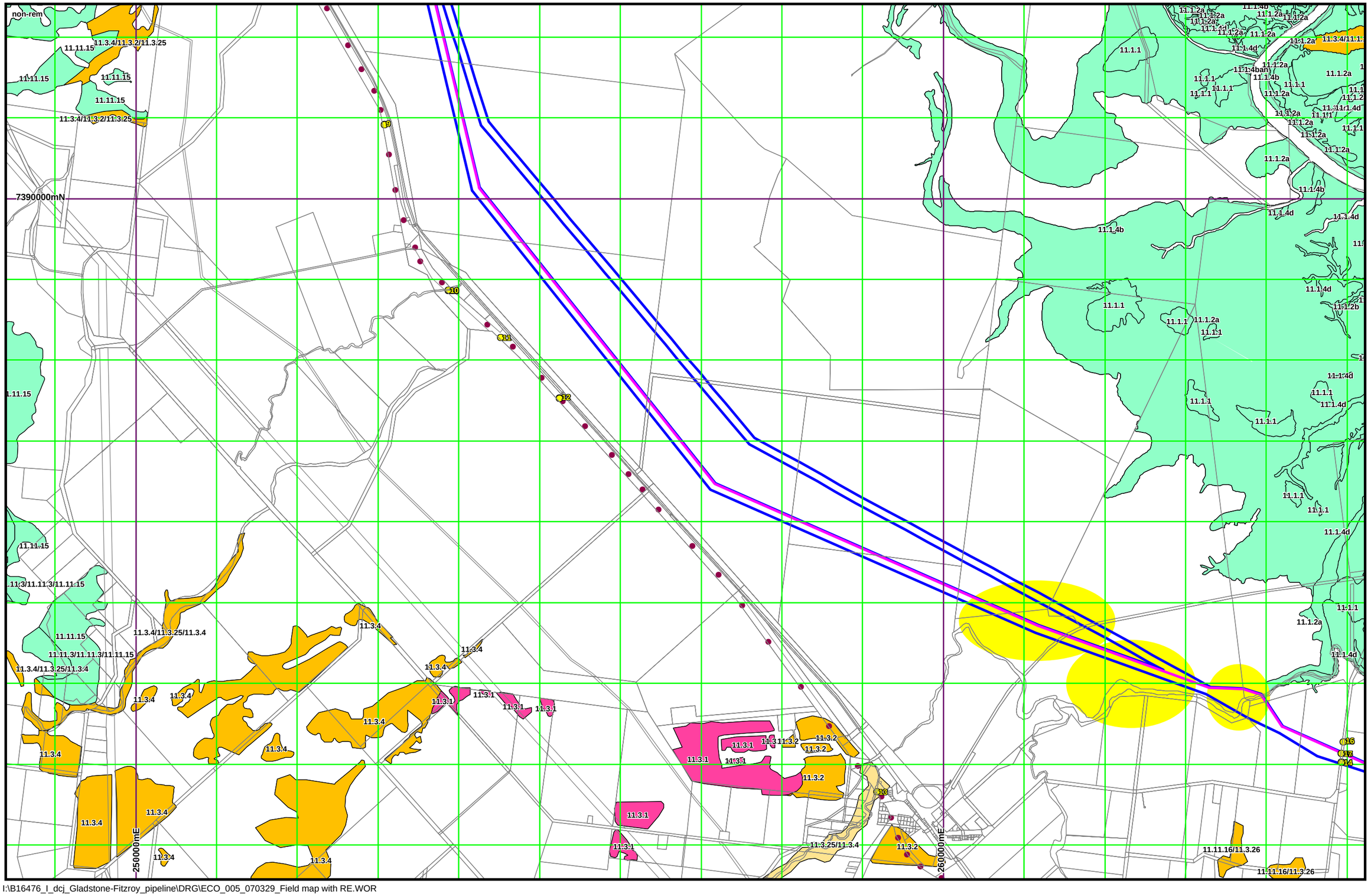
I:\B16476_I_dcj_Gladstone-Fitzroy_pipeline\DRG\ECO_003_070329_Field map with RE.WOR

Field Map with RE -3



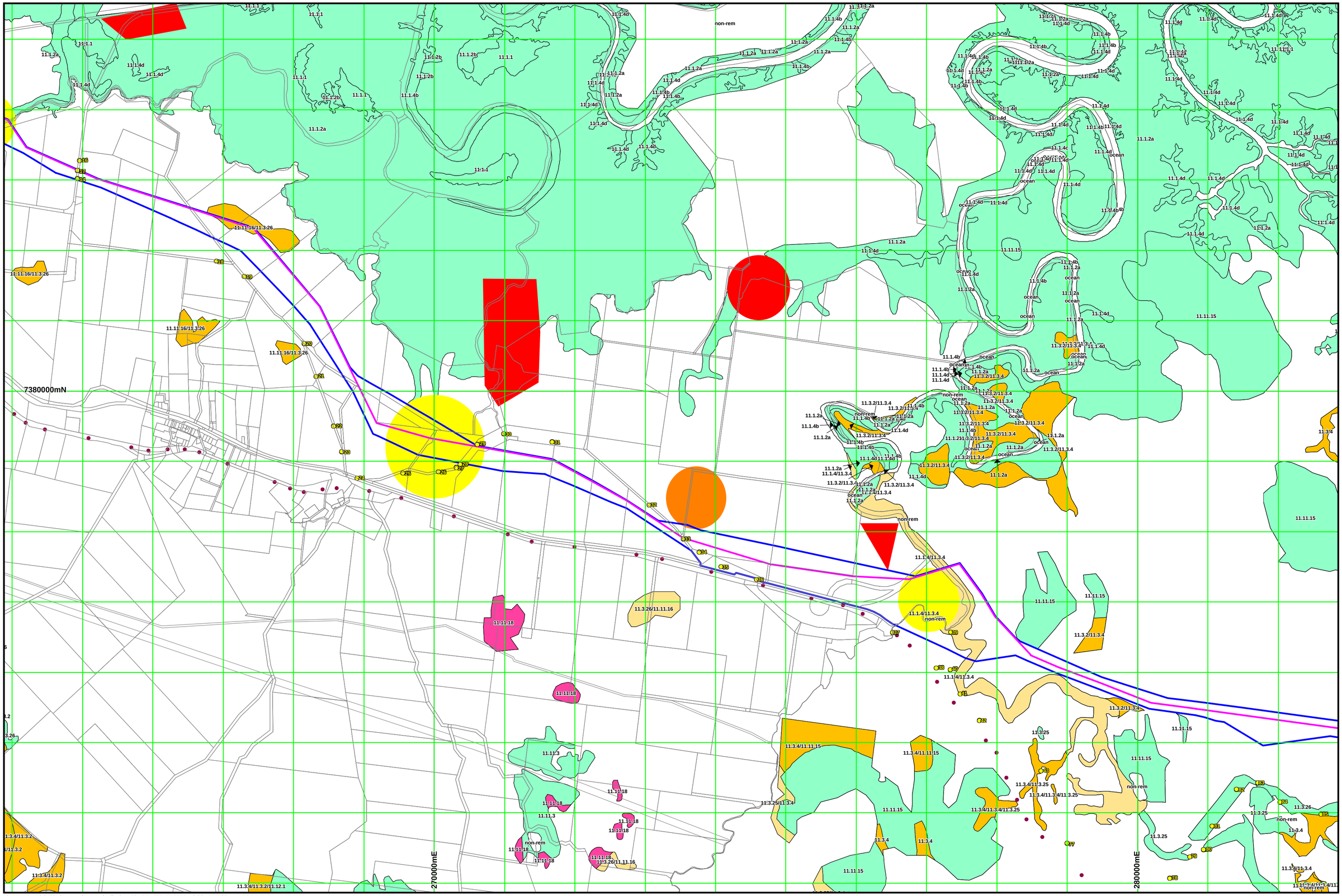
I:\B16476_I_dcj_Gladstone-Fitzroy_pipeline\DRG\ECO_004_070329_Field map with RE.WOR

Field Map with RE -4



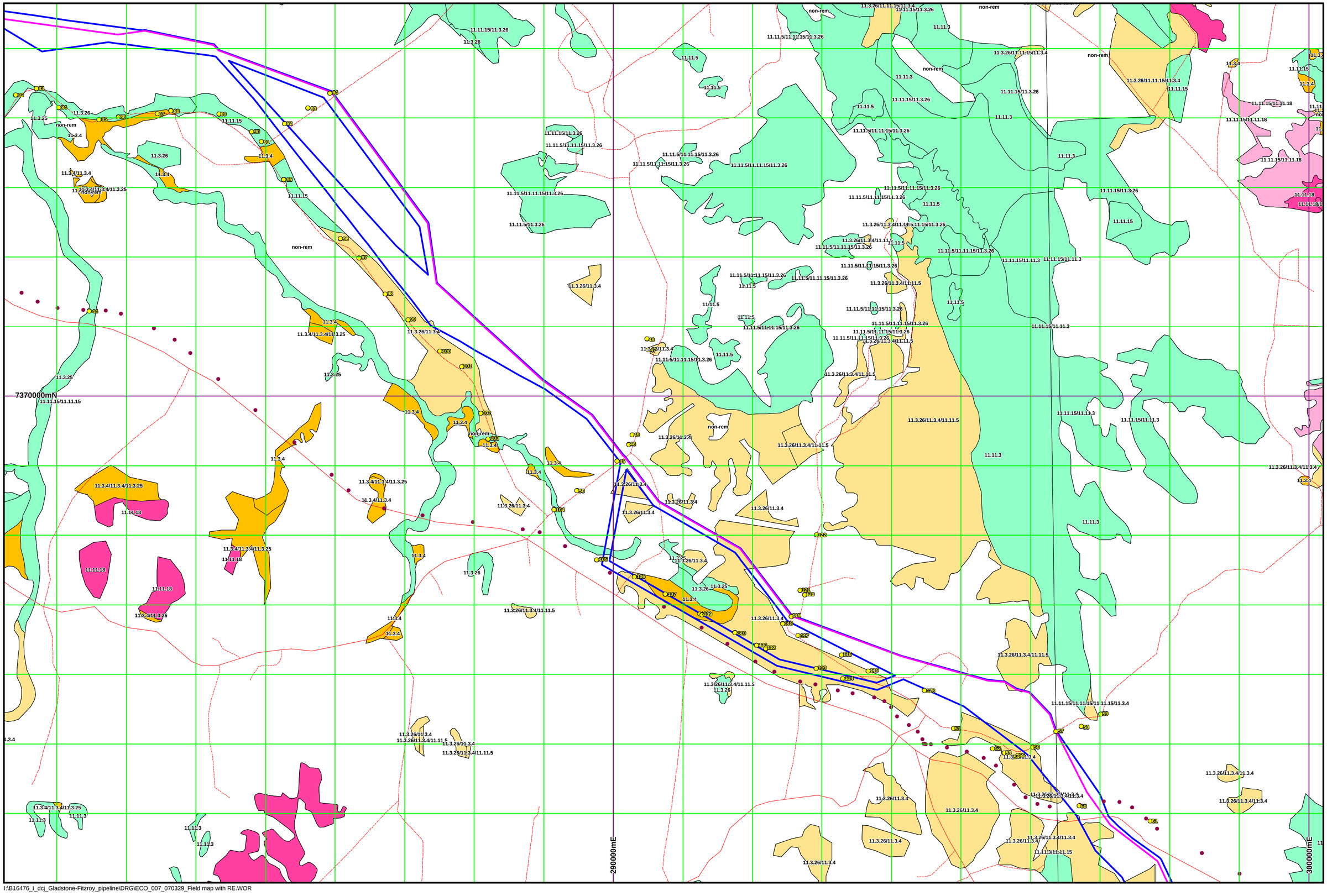
I:\B16476_I_dcj_Gladstone-Fitzroy_pipeline\DRG\ECO_005_070329_Field map with RE.WOR

Field Map with RE -5



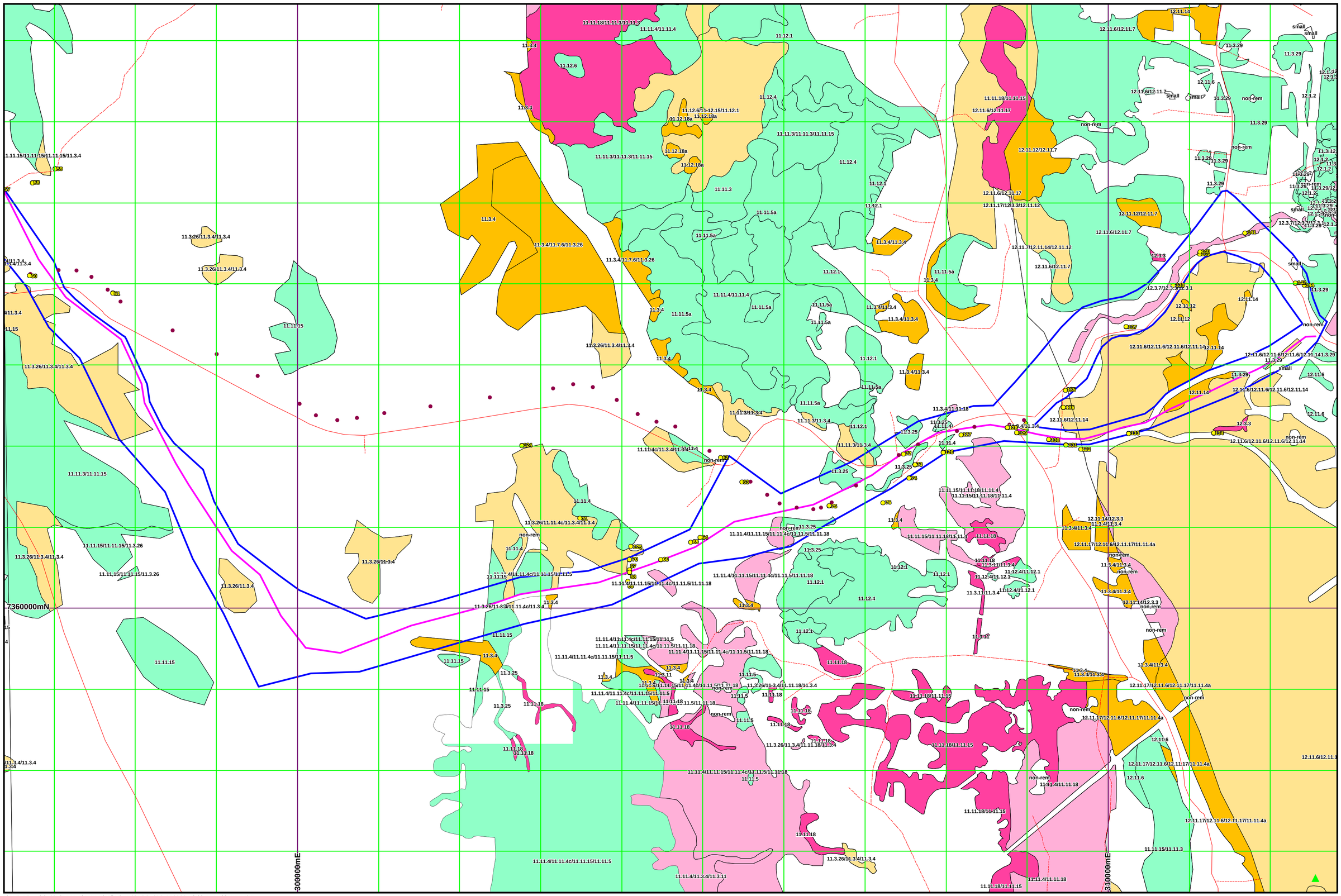
I:\B16476_I_dcj_Gladstone-Fitzroy_pipeline\DRG\ECO_006_070329_Field map with RE.WOR

Field Map with RE -6



I:\B16476_I_dcj_Gladstone-Fitzroy_pipeline\DRG\ECO_007_070329_Field map with RE.WOR

Field Map with RE -7



I:\B16476_I_dcj_Gladstone-Fitzroy_pipeline\DRG\ECO_008_070329_Field map with RE.WOR

Field Map with RE -8