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1. INTRODUCTION

1.1 Project Overview

Galilee Power proposes to construct and operate a 900 MW (nett) coal-fired power station that incorporates carbon capture and storage (CCS) technologies. The power station will be designed to incorporate the latest clean-coal low emission technologies such that the project is consistent with the Queensland Government's "Smart Energy Policy". The power station will initially be constructed to generate nett 450 MW, with a second 450 MW module to be added as demand requires.

The power station will be situated approximately 30 km to the north-west of Alpha, and immediately to the east of Waratah Coal's proposed mine in the Galilee Basin, Central Queensland (see **Figure 1**). The power station will utilise waste coal from Waratah Coal's tenements as power station feedstock. The Galilee Basin coal has ideal characteristics for use in Integrated Gasification Combined Cycle (IGCC) power stations and as such this is the preferred power generation technology. A simplified explanation of the IGCC process is:

1. Pulverised coal is fed into a gasifier that, a result of a sequence of chemical reactions, produces a synthetic gas (syngas);
2. The pollutants are then removed from the syngas;
3. The syngas is then fed into a gas turbine generator;
4. Steam is created by combining the heat from the gasification and the exhaust heat from the gas turbine; and
5. The steam is then used to power a steam turbine generator.

IGCC technology provides the Australian Government a mechanism to utilise Queensland's abundant coal resources to provide long-term, low cost and secure energy whilst minimising CO_2 contributions. Underground gasification and open cycle technology will also be considered in the feasibility studies.

It is intended that the power station would ultimately provide base load power for the Queensland grid, and would provide energy support for industrial development in the Northern Economic Triangle (NET). The power station will make a positive contribution to the achievement of the State Government's Central Queensland Regional Growth Management Framework. **Figure 2** shows the relationship between the proposed power station and future energy markets.

Galilee Power proposes to incorporate CCS technologies into the power station design and sequest the compressed CO_2 produced from the power station at one or more sites in the Galilee Basin. The gas will be transported via a conventional primary transmission pipeline and secondary transmission pipelines to the injection wells. Studies undertaken by independent scientific organisations have already identified that the Galilee Basin is within the top 10 locations for geosequestration in Australia. Galilee Power intends to build further on these initial studies in partnership with the Australian and Queensland State Governments and the broader scientific community.

The power station will involve an initial construction expenditure of approximately A$1.25 billion and recurring operational expenditure of A$265 million. The costs associated with the CO_2 capture, transport and sequestration will be better known once the pre-feasibility studies are completed. The station's construction would require a maximum workforce of approximately 1,000 persons and the operation of the power station will support 60 plus permanent jobs.

Figure 1: Power Station and Geosequestration Concept

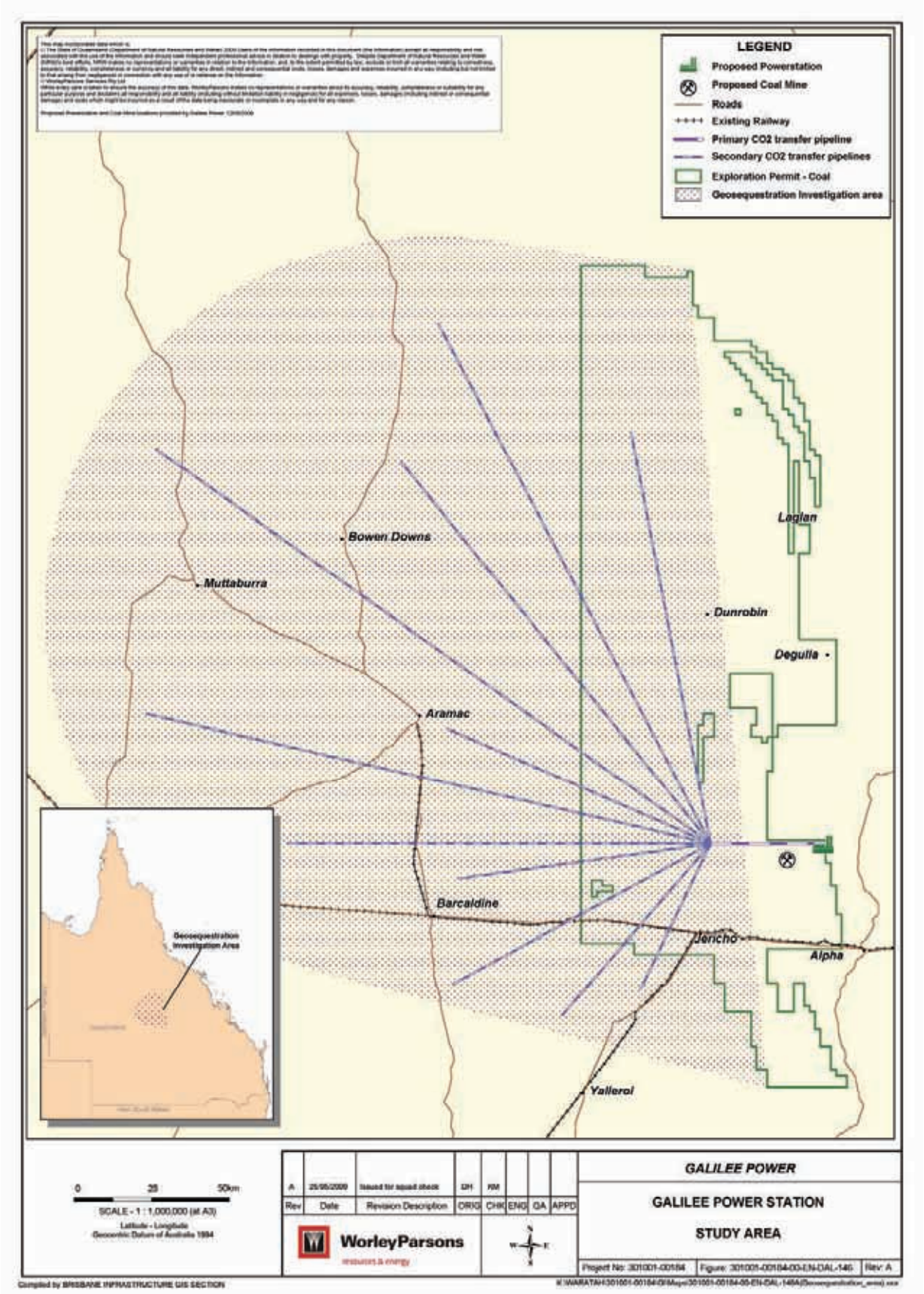
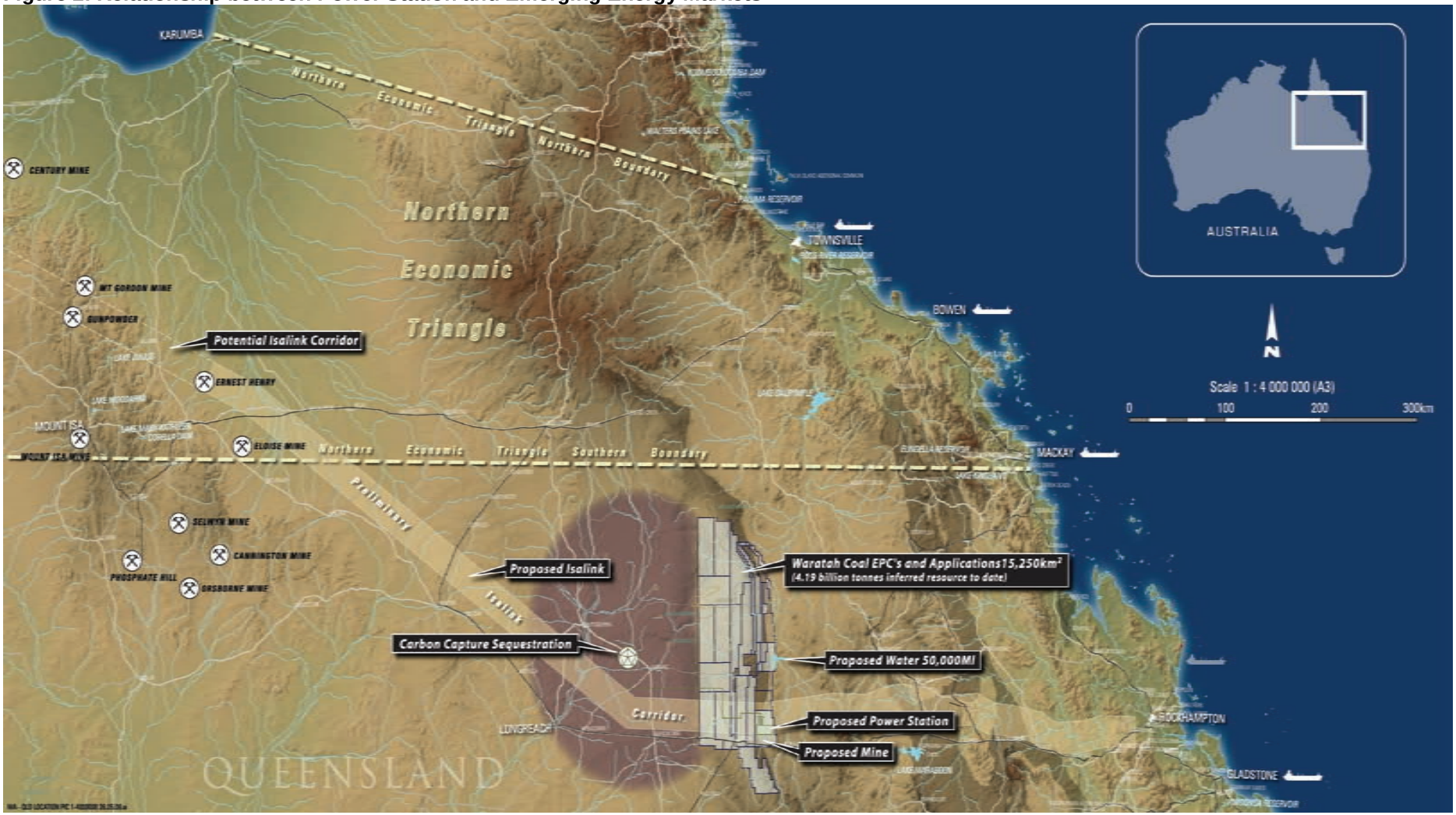


Figure 2: Relationship between Power Station and Emerging Energy Markets



1.2 Project Proponent

The project proponent will be Galilee Power. Galilee Power will; however, look to enter into partnerships with one or several clean coal technology providers to deliver the project. Galilee Power's association with specialist clean coal technology companies will ensure that the project has access to relevant up-to-date clean coal technology and the specialist technical expertise needed to establish and operate the project.

Galilee Power is a fully owned subsidiary of Waratah Coal Pty Limited. Waratah Coal is a fully owned subsidiary within the Mineralogy Pty Limited group of companies. Mineralogy is a mineral resource development company owned by Executive Chairman Professor Clive Palmer. In addition to the Waratah Coal resource, Mineralogy has extensive iron ore deposits in Western Australia estimated to be up to 160 billion tonnes. Mineralogy also has joint interests in Western Australia, Northwest Shelf, Gulf of Papua and Timor Sea oil and gas projects. There are additional holdings of nickel in Western Australia and Queensland and additional iron ore in South Australia.

The contact details for Galilee Power are as follows:

Galilee Power
GPO Box 89
Brisbane Qld 4001.

1.3 Need for the Project

The Galilee Power Project will be developed to supply power to the coal mine proposed by Waratah Coal and to supply low-cost base load power to the Queensland electricity grid to help meet the growing demand for power in the State. This demand has been forecast by Powerlink to grow at an average rate of 3.8% per annum over the next ten year period.

The Queensland Government has highlighted its desire to move towards a low carbon future through the *Climate Smart 2050 Queensland climate change strategy 2007: a low carbon future initiative*. This document outlines *inter alia* a long term strategy to secure a clean energy future for the State based on investing in the development of clean coal technologies. In doing so, the Queensland Government has identified that "coal based energy sources will continue to be a significant part of Queensland's energy mix as we move to a low-carbon future". To support this initiative $300 million has been set aside from the Queensland Future Growth Fund to develop clean coal technologies, with a further $600 million to be provided by the coal industry towards clean coal technology over the next ten years. An additional $10 million has been set aside by the Queensland Government to assess the geosequestration suitability of a number of sites in Queensland (source: Queensland Government ClimateSmart 2050 Strategy).

The ClimateSmart 2050 strategy highlights the Government's interest towards balancing the need to provide low-cost electricity to maintain the quality of life of individuals with the need to reduce greenhouse emissions. Moreover, the strategy clearly articulates that coal-fired generation will inevitably remain a major contributor to the generation mix, supplemented by other measures such as gas and a range of renewable resources. To provide this balance, new coal fired power stations will be required to "deploy newly emerging clean coal technologies, which provide for carbon capture and storage, and efficient water practices".

The Queensland Government has acknowledged that there is a lag lead time between the development and commercial-scale application of clean coal technologies. As such the Government

has established the following criteria to be demonstrated before new coal fired power station proposals will be considered:

- The integration of electricity generation with carbon capture or with carbon capture and storage, e.g. clean coal technology demonstration plants;
- They are associated with foreign direct investment in a major energy-intensive project in Queensland, which might otherwise be attracted to a nation that is a non-Annex 1 country under the Kyoto Protocol, and they adopt best-practice generation technology; or
- Security of electricity supply in Queensland is compromised, cannot be economically met by alternative sources in the relevant timeframe and the project utilises best-practice generation technology.

As can be seen in the following sections, the proposed Galilee Power project clearly meets each of these criteria.

1.3.1 Carbon Capture and Geosequestration Potential

The process of separating CO_2 during fossil fuel conversion is already in use throughout the world by energy generation companies. The three applications used to separate and ultimately capture CO_2 for the fuel burning process are **pre-combustion** - the separation of carbon from a fuel before being burnt during the gasification process, **post-combustion** – the separation of CO_2 from combustion products via a combined solvent and steam process and **oxy-fuel combustion** - a process that burns the fuel in pure or enriched oxygen to create a flue gas composed primarily of CO_2 and water (ZeroGen, 2009).

The likely scenario for this power station will be a separation and capture process that strips CO_2 from the system as a pre-combustion process and would potentially be similar to the 900 MW low emission power station with CCS technology proposed to be built in Yorkshire, England and the 531 MW power station proposed to be built in Minesota, USA. The range of CO_2 separation and capture processes will be assessed as part of the pre-feasibility assessment, as will alternate existing and developing technologies being developed in Australia and overseas.

In regard to Geosequestration potential, the Australian Petroleum Cooperative Research Centre's GEODISC program undertook a broad study of over 300 sedimentary basins in Australia to establish the potential of each basin to support CO_2 geosequestration. From the study, Bradshaw *et al.* (2005) found that 50 basins proved to be viable study areas for potential Environmentally Sustainable Sites for Carbon Dioxide Injection (ESSCIs).

Six coal basins (some including multiple sites) in Australia were further evaluated by Bradshaw *et al*. (2005) for their potential to support geosequestration, with each basin assessed using five key parameters: storage capacity, injectivity, containment, existing natural resources and site economics. The Galilee Basin was ranked in the top 10 ESSCI sites with Bradshaw *et al.* (2005) finding the thick, continuous, high rank coal from the Galilee Basin as having the necessary potential to store large volumes of CO_2. In particular, Bradshaw *et al.* (2005) found that the Crossmore and Rodney Creek Anticlines in the southern Galilee Basin have excellent geological conditions for sequestering CO_2. The distance to the Collinsville and Townsville power stations, and the absence of another large-scale emission source, was identified by Bradshaw *et al.* (2005) as a limiting factor for the potential use of the Galilee Basin for geosequestration.

At present there are no commercial scale geosequestration projects operational in Australia. Studies undertaken overseas, and in particular the San Juan Basin in the United States (see Stevens *et al.*,

1999 and 2001), have demonstrated that CO_2 injected into coal seems will preferentially adsorb onto the coal. The favourable findings from overseas studies, together with presence of deep un-mineable coal seems (i.e. approximately 1,000 m at a distance of 20 kms from the proposed power station) within the Galilee Basin highlights the definite potential of the Galilee Basin to develop into a large scale geosequestration opportunity to support a coal fired power station.

1.3.2 Project Financing and Foreign Investment

Galilee Power has sufficient equity finance to fund the project through to the completion of a formal pre-feasibility study. During the pre-feasibility phase, various options will be progressed to provide the additional funding required for completion of a bankable feasibility study. Establishment of the financial requirements to achieve financial close in readiness for construction to commence will form part of the feasibility study. The project may be financed using non-recourse bank debt covering both the construction and operational phases of the project. The market for non-recourse bank debt financing of power sector assets in Australia is well established with financiers having considerable experience in financing greenfield power generation assets.

The project will generate significant economic benefits on a regional, state and national scale as a result of:

- provision of additional base load power generation capacity to the Queensland electricity grid;
- end use of local coal resources and support for local coal mining enterprises;
- the employment of up to 1,000 people during construction and 60 plus permanent employees for the operation of the project;
- government revenue collected through taxes;
- expenditure in the local economy through the purchase and use of local resources, wherever practical, for the construction and operation of the project components;
- the local expenditure of employee's disposable incomes; and
- the power station's role as part of the critical infrastructure that will underpin private sector investment in minerals processing and industrial development over the next half century in the NET.

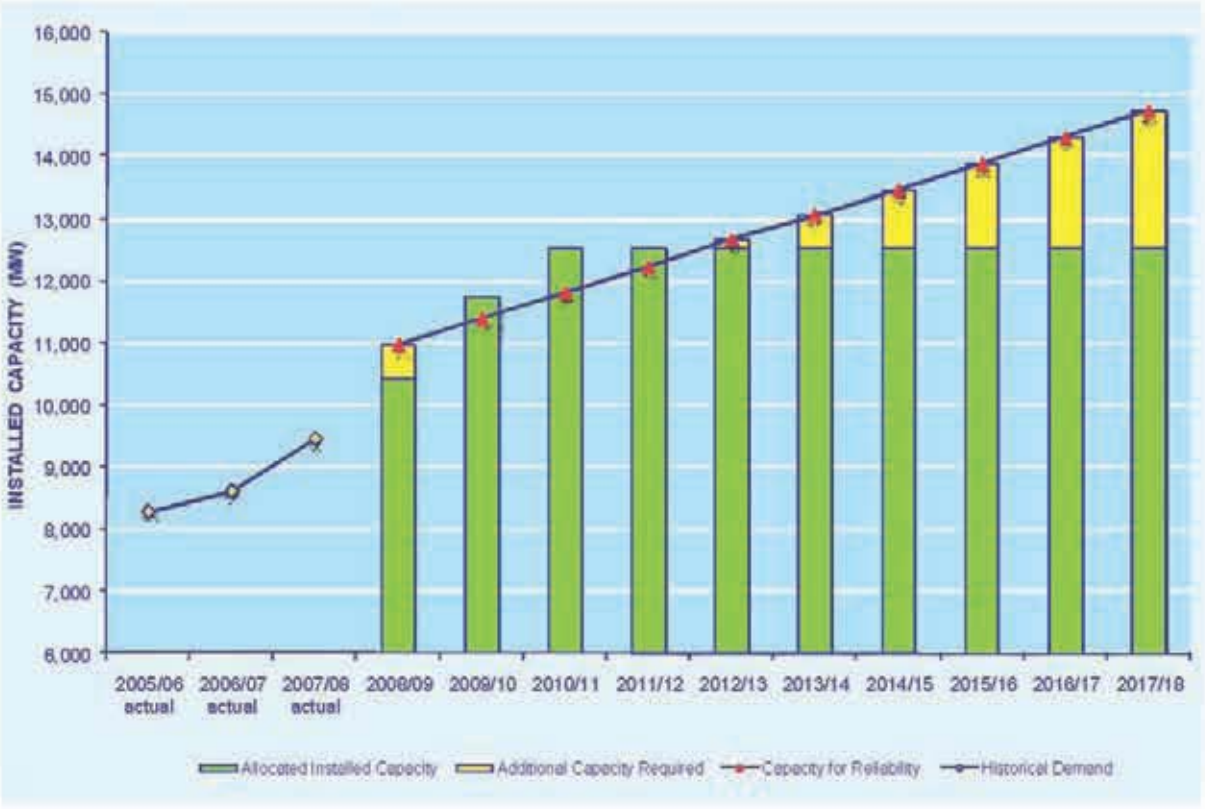
1.3.3 Securing Low-cost Energy Supply

The level of new generation already committed to enter the Queensland market is capable of meeting demand up to 2011/12. From 2012/13 onwards there is a projected shortfall in generating capacity. By 2017/18, it is forecast that Queensland will require an additional 2,000 MW of new generating capacity, as indicated in **Figure 3**. Whilst the current economic downturn may have resulted in additional capacity at the present moment, the establishment of the Galilee Coal Basin will see the existing capacity significantly reduced. The installation of the proposed Galilee Basin Power Station would help secure Queensland's electrical supply until at least 2017/18.

The project's location, adjacent to the proposed IsaLink DC transmission line, also provides an opportunity to supply power to the Mt Isa region. Electrical demand in this region is expected to grow to 500-600 MW over the coming years as production from surrounding mines increases to meet future ore exports. The proposed IsaLink DC interconnector will connect the virtually electrically isolated, region of Mt Isa to the rest of the NEM, and will have a transfer capability of around 1,000 MW. With the aging of the existing power station in Mt Isa, a significant injection of capital will be required in the

coming years to meet the expected demand. The need for additional generating capacity to supply the Mt Isa region could be met by the Galilee Basin Power Station should IsaLink be constructed.

Figure 3: Projected Queensland Electricity Supply Demand Balance



(Source: Roam Consulting Pty Ltd)

1.4 Document Purpose and Scope

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

- assist the Coordinator-General to make a decision on a declaration of the project as a "Significant Project" under Section 26 of the Queensland *State Development and Public Works Organisation Act 1971* (SDPWOA) which would initiate the statutory impact assessment procedures of Part 4 of the Act;
- enable stakeholders (including the general community) to determine the nature and level of their interest in the proposal; and
- assist the Department of Infrastructure and Planning on behalf of the Coordinator-General to prepare draft Terms of Reference (ToR) for an Environmental Impact Statement (EIS) for the proposed project.

This IAS has been developed to provide a preliminary overview of the nature and extent of the potential social, economic and environmental impacts that may be associated with the construction and operation of the proposed project as far as they can be foreseen at the concept stage of project planning. The IAS also identifies the key statutory approvals that may be required for the project to proceed and identifies environmental studies that may be required to support the project.

2. PROJECT PROPOSAL

2.1 Location

The power station site is situated within EPC 1040 which is one of Waratah Coal's mining tenements located in the Galilee Basin in Central Queensland. The power station will utilise waste coal from this tenement as power station feedstock. The primary CO_2 transfer pipeline will span EPC 1040, 1079 and 1156 in locations that avoid mine operations and potential issues associated with subsidence from underground mine activities. Secondary pipelines will deviate from the primary pipeline to injection wells located throughout the geosequestration field/s generally to the southwest and northwest of EPC 1156 (see **Figure 1**).

The geosequestration field/s will be located in proximity to deep bed coal seams that due to their depth are not proposed to be mined. The location of the geosequestration fields will be established during detailed assessment of the regional strata during the feasibility stage of the project.

2.2 Site Alternatives

The pre-concept development phase of the project examined several sites for the power station within EPC 1040. These were a location to the east of the coal outcrop zone and the proposed mine site, and a site to the west of the exploration tenements where mineable coal reserves would not be sterilised by the project.

The proposed site was selected on the basis that the power station location was within the boundary of EPC 1040, where it would not interfere with current and future mine planning and operations. It was also desirable to have the power station as close as is practicable to the mine to avoid any high value environmental areas and to maintain the economic viability of the power station feedstock.

The primary CO_2 transfer pipeline will be located so as to avoid the proposed Waratah Coal mine and associated infrastructure. The preferred easement will not be decided until the mine arrangement is finalised. Secondary transmission lines will transport the CO_2 to the sequestration fields.

A broad area to the west of the proposed power station is under consideration as suitable sequestration fields. The final site/s will be located above deep coal seams that are outside the mine footprint and therefore make them viable options for sequesting CO_2. The final location of the sequestration field/s will be established after detailed studies and sequestration trials have been completed.

2.3 Power Station Components

The proposed power station will have an initial capacity of 450 MW (nett) with the ability to be upgraded to 900 MW (nett) to meet increased NEM demands. The power station will be developed as a base load station with a minimum annual capacity factor of 85%.

It is expected that the power station will consist of coal stockpiles, coal milling plant, pulverised coal boilers, steam turbine generators, condensers, cooling towers, switchyard, water treatment plants, administration and workshop buildings.

The proposed power station will also incorporate CCS technology into the design. This will include a pipe and injection-well network to take the captured CO_2 to the sequestration fields. The injection

wells will likely be standard petroleum wells; however, the specifications will not be finalised until a detailed review of existing technology is completed.

2.4 Supply, storage and handling

Coal for the power station will be sourced from Waratah Coal's mining tenements in the Galilee Basin. This will typically consist of thermal coal separated from the export market stream. The thermal coal will be transported directly to the power station's stockpiles by conveyor from the mining operations to the south west. The coal will be blended at the mine site to meet power station specifications prior to delivery to the power station's stockpile area and long term storage area. It is expected that coal slot bunkers and / or stacker / reclaimers will be used to transport fuel from the coal storage to boiler bunkers. It is estimated that approximately 6 Mt/yr of coal will be required to supply the power station.

Table 1 outlines the expected quality of coal feedstock sourced from Waratah Coal's South Alpha mine.

Table 1: Typical Coal Quality Specification for Power Station

Coal Parameter	
Ash % (ad)	25-35
Volatile Matter % (ad)	20-39
Sulphur % (ad)	<0.5
Energy (MJ/kg (ad))	26.6

2.5 Power Generation

The technology for the power station has not been confirmed at this time. The selection of an appropriate clean coal technology will follow the completion of pre-feasibility design studies.

Based on the current set of greenhouse gas environmental policies set out by both the Federal and State Governments, and likely power station construction and operating costs, it is probable that an IGCC power station will be the best technology option. IGCC technology has matured to the point where it is now commercially competitive to other generation options.

Other plant technology options that will be considered include:

- Supercritical;
- Oxy-fired Supercritical;
- Ultrasupercritical; and
- Oxy-fired Ultrasupercritical.

The project's location in the Galilee Basin supports the use of CCS as the sedimentary strata in this basin are considered potentially suitable for CO_2 sequestration. Therefore all options will be considered for their potential integration with existing or developing CCS technology.

2.5.1 IGCC Process

To commence the IGCC process, coal is pulverised and fed into a gasifier along with oxygen that is produced in an air separation unit. The pulverised coal feedstock is broken down through a combination of heat, pressure and steam resulting in the production of hydrogen, carbon monoxide and syngas. The syngas is then cooled and fed to a gas turbine where it is processed (burnt) to drive the power generation turbine.

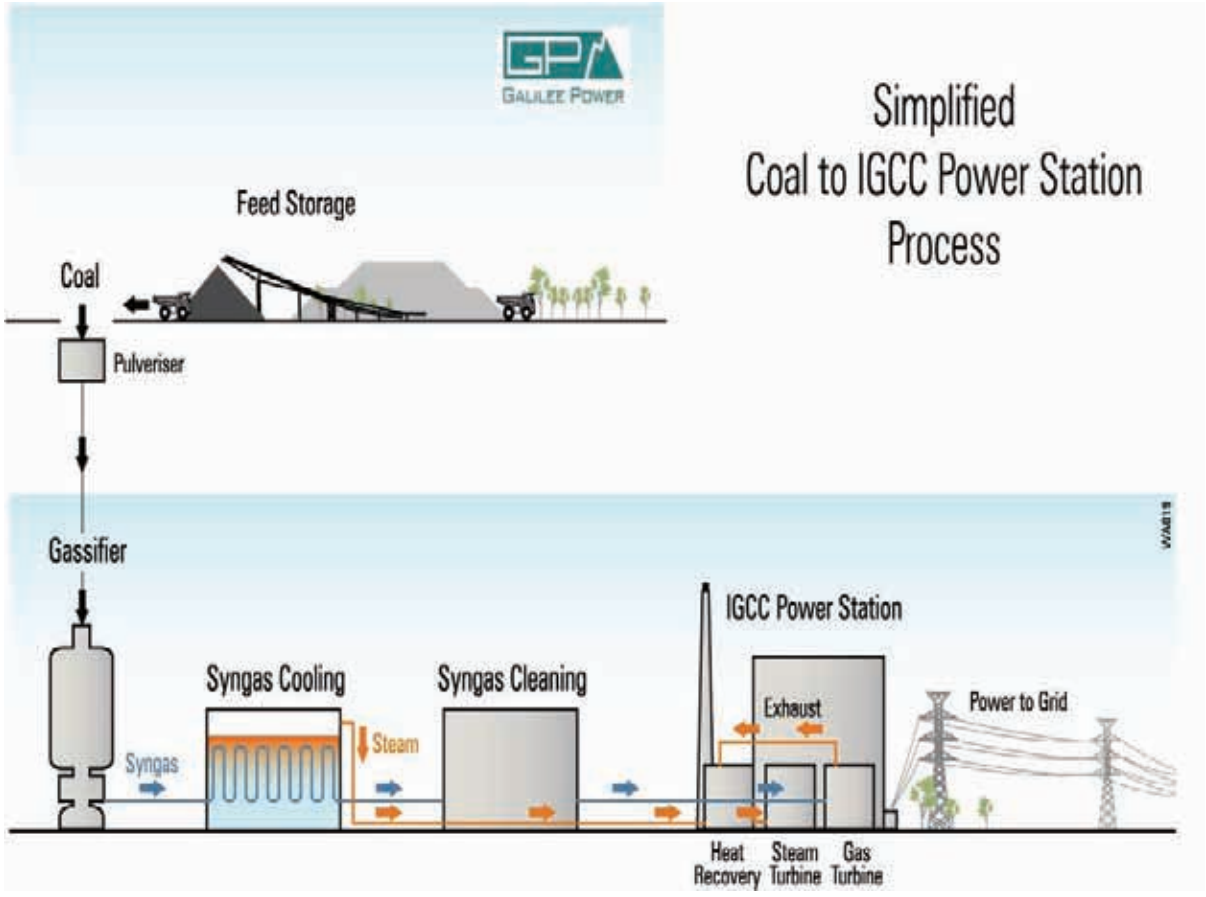
A highly pressurised steam is also generated through the gasification process. This high pressure steam is combined with the steam produced through the syngas turbine heat recovery system and fed to a steam turbine to generate another power source.

During this process nitrogen can be recovered from the air separation unit and fed into the system to enhance power generation and reduce the production of NOx.

CO_2 is captured and removed from the energy generation system and fed to a compressor, whereby it is distributed to sequestration fields for injection via a network of pipes.

A simplified schematic of the IGCC process is shown at **Figure 4**.

Figure 4: Simplified IGCC Process



2.5.2 The "clean" benefits of the IGCC Process

IGCC power stations provide a range of benefits over the traditional coal fired power plants and they are recognised globally as being part of the climate change solution. Coal IGCC is considered to be the cleanest of the solid fuel technologies, providing superior performance in all key metrics of total

environment performance – criteria pollutants, organic hazardous air pollutants (HAPS), inorganic HAPS and waste generation (Shilling and Lee, 2003). This performance is largely derived from removing the pollutants pre-combustion phase which is in contrast to the conventional plants where pollutants are removed post-combustion. The benefits from the clean combustion approach include:

Emission Reduction: IGCC SO_x, NO_x, and particle emissions are fractions of those of a conventional pulverized coal boiler power plant. As such IGCC is generally recognised as the best environmental solution for power from coal;

Nitrogen Oxides: To moderate NO_x emissions, steam, water, carbon dioxide and/or nitrogen can be injected into the gas turbine's combustor. Nitrogen is usually available from the cryogenic air separation unit, so it is convenient to use in the IGCC process. Fuel moisturization using low-level process heat is also used frequently. These techniques can achieve NO_x emissions that are similar to dry low NO_x technology;

Air Pollutants: During the IGCC process, harmful pollutants are removed from the synthetic gas before they reach the gas turbine, so exhaust gas cleanup is unnecessary; and

Carbon Dioxide: In IGCC plants, CO_2 can be removed from the syngas before combustion to create a high-hydrogen fuel, effectively eliminating CO_2 emissions. In conventional boiler plants, CO_2 is removed from the exhaust gas after combustion.

2.6 Water Requirements

The power station water requirements will depend upon whether the station will be air cooled or water cooled. Both options are under investigation; however, due to the potential to use significantly less water than is the case for an equivalently sized, wet cooling system, air cooling is the preferred option. Air cooling is; however, less efficient in tropical climates and is more costly to install and operate. A decision will be made on the cooling technology to be employed following the completion of project pre-feasibility studies.

Should a water cooling system be adopted for the project, a sizable and reliable water supply will be needed for the following purposes:

- demineralised water for use in the closed power plant steam cycle;
- the power plant cooling system;
- dust suppression at the coal stockpiles and operational areas;
- service water for washdown and other miscellaneous uses;
- fire system make-up water; and
- potable water for the project workforce and project operations and maintenance.

In order to reduce the project's use of raw water, opportunities for water re-use and recycling will be explored and implemented wherever possible. Water re-use options include sourcing dust suppression water from site settlement / evaporation ponds, and re-use of blowdown water from the power plant's steam cycle and cooling processes. Stormwater from the site's system of settlement / evaporation ponds will also be used where appropriate.

2.6.1 Supply Sources

Detailed water demand modelling will be undertaken as part of future engineering design and EIS studies. It is estimated that a water cooled power station will require approximately 720 ML per annum of raw water for the power station. If the preferred air cooled option is the selected technology, water consumption will be considerably less.

It is proposed to obtain raw water from a combination of sources should they prove feasible. These sources may include local bores, mine dewatering, or the construction of a new water supply pipeline between the mine and power station that connects into the water pipeline supplying the mine. A raw water supply dam will be constructed near the power station site to provide supply buffer storage. The location and required size of this storage will be determined as part of pre-feasibility studies; however, it will be located nearby to the power station within EPC 1040.

2.7 Waste Management

The waste streams associated with the project will include solid and liquid wastes, air emissions, sewage effluent and contaminated runoff water.

The main solid waste streams will be created during construction and are likely to comprise materials such as timber, scrap steel, concrete, insulation, plastic pipe work and conduit, packing materials and office wastes.

Liquid wastes will include oily wastes, effluent from the demineralisation plant, dirty stormwater from operational and process areas, waste oil and sewage. Drilling mud associated with the drilling of the CO_2 storage wells will be managed on site in accordance with extant legislative requirements.

It is proposed to investigate the reuse of power station waste water streams as part of the project feasibility studies.

2.7.1 Fly Ash

Fly ash from the boilers will be blended with raw water treatment solids from onsite water treatment plants to form dense phase slurry. This slurry will be pumped to an ash disposal area. These areas will be lined to prevent the escape of leachate and will be ultimately capped and rehabilitated. It is also proposed to examine the feasibility of reusing fly ash in regional road construction and as an admixture to concrete production.

2.7.2 Sulphur

Sulphur will be transferred from the removal process to a purpose built sulphur storage area. The sulphur storage area will be double lined to prevent leaching of material and will ultimately be capped and revegetated. Consideration will also be given to identifying potential uses for the extracted Sulphur. These may include use in the fertiliser industry or as part of the manufacturing of Sulphuric acid.

2.7.3 Sewage

Sewage will be processed through an onsite treatment plant with the treated effluent being utilised to irrigate plant landscaping. Sewage sludge will be dried and blended with mulch for future use on site as a soil improver.

2.7.4 Air Emissions

The power station will produce gaseous and particulate emissions as a consequence of coal handling and combustion. These emissions are likely to comprise sulphur oxides (SO_x), carbon dioxide (CO_2), nitrogen oxides (NO_x), volatile organic compounds (VOC), polyaromatic hydrocarbons (PAH), metals and minimal particulates (PM_{10}). Methods to remove SO_x, NO_x and CO_2 from the emissions stream prior to release to the atmosphere will be examined as part of pre-feasibility studies.

It is intended that particulates will be removed from the flue gas through the use of bag house filters. The fugitive dust around the plant site and coal handling areas will be managed through water sprays.

2.8 Greenhouse Gases Management

The opportunity exists to sequest CO_2 underground in the sedimentary strata to the immediate west of the probable coal mining areas. This will significantly reduce the amount of emitted greenhouse gases (GHGs) arising from the operation of the power station. Preliminary drilling results have indicated that the geology is supportive of this approach. It is proposed to further review the geology of the western part of the Galilee Basin to provide further confirmation of the potential to provide long term and secure storage of large volumes of CO_2.

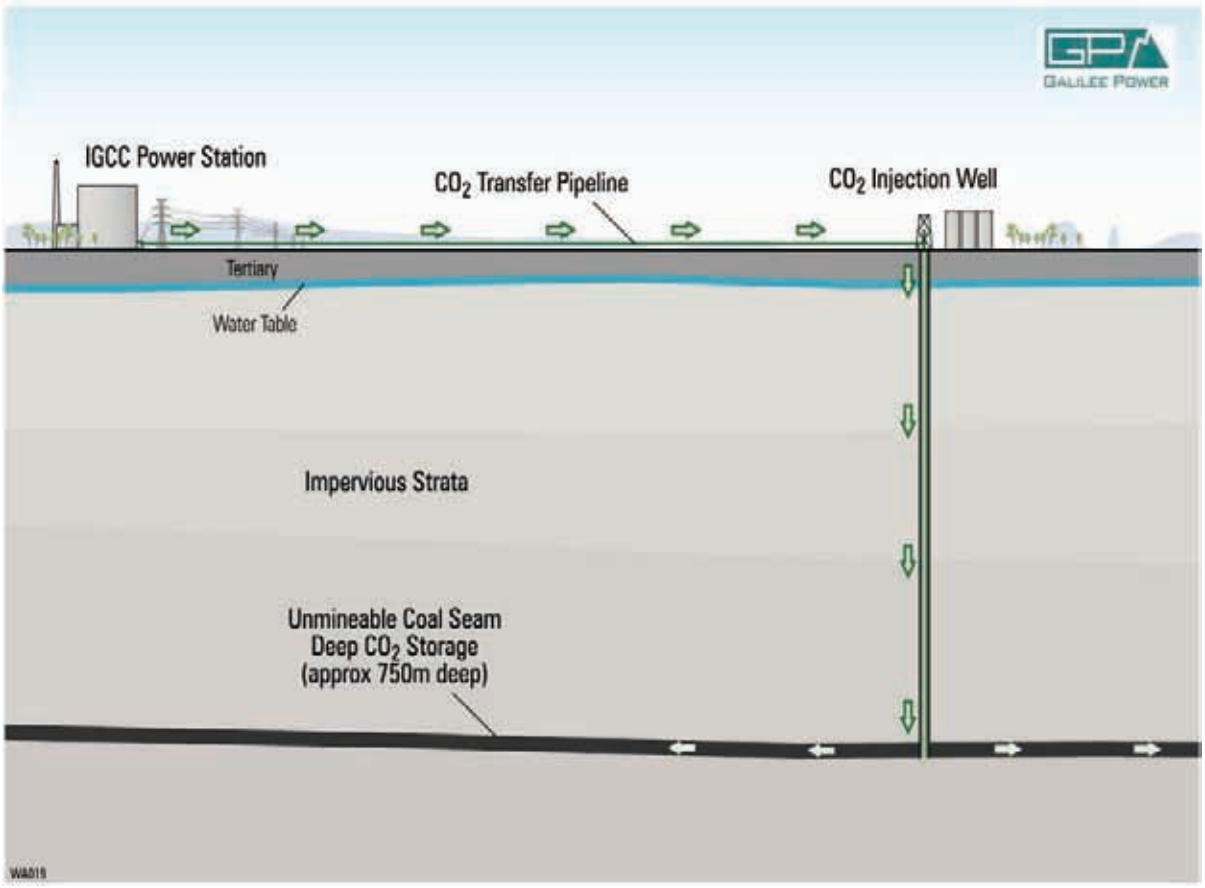
Key components of the CCS include a compression plant, booster pump/s, primary and secondary transmission lines. **Figure 5** shows the CO_2 geosequestration process.

Further extensive modelling will be undertaken as part of pre-feasibility studies in order to identify an optimal planning outcome for a Galilee Basin Power Station. This modelling will include but not be limited to performing an Integrated Resource Planning Study in order to ascertain the optimal type of power plant, and the optimal time to install plant under the Emissions Trading Scheme to be introduced from 2011. Factors to be incorporated in the Integrated Resource Modelling will include:

- emissions modelling;
- evaluation of emissions trading outcomes;
- assessment of the impact of new generation technology on market outcomes;
- government policy development;
- the long term impact of renewable schemes;
- transmission options and connection points; and
- assessment of the long term costs and benefits of transmission interconnection.

The choice of power plant will recognise the available technologies for low emissions, coal - fired, generation that are being developed in Australia and overseas.

Figure 5: Schematic Showing the CO_2 Sequestration Concept



2.9 Power Transmission

The transmission requirements for the proposed power plant are twofold. Firstly, the power plant will supply the Waratah Coal's mine projects with the energy needed to operate, and secondly will supply low cost energy to the NEM and / or to the Mt Isa region.

The export of electricity will require the construction of new power transmission lines. It is proposed to investigate all feasible options to deliver the power to the NEM, and to the proposed Isalink HVdc power transmission line.

The Isalink project has been declared a "significant project" under Section 26(1)(a) of the SDPWOA. This project involves the construction of 1,100 km of transmission line a section of which is proposed to cross the Galilee Basin in the vicinity of the power station location (as shown in **Figure 2**). It therefore provides a potential opportunity for Galilee Power to directly access this transmission line should it proceed.

2.10 Workforce

2.10.1 Workforce composition

The construction of the power station is expected to involve approximately 1,000 persons over a three year period. The size and composition of the workforce will; however, vary throughout the construction phase. The majority of the construction workforce will be recruited and managed by the

project's construction contractors. In addition to the power station, construction of support infrastructure is expected to involve additional workers. Details on the number and location of these workers are yet to be determined.

Once constructed, it is estimated that the power station will require a permanent operational workforce of approximately 60 persons.

The final figures for the construction and operation of the power station, including upgrades and modifications will not be known until the completion of the pre-feasibility stage and the selection of the preferred process. Moreover, the workforce figures pertaining to the CCS process cannot be fully determined until that process has been further delineated and designed. Notwithstanding, the EIS will consider in detail the impact that the workforce will have on the existing social structure of the project area.

2.10.2 Accommodation

The construction and operation of the power station would be undertaken using staff housed in the accommodation village for the mine. The temporary construction workforce would be housed in relocatable buildings and the operational staff would be housed in permanent, townhouse style units incorporated into the mine village. The village would be supported by a permanent water supply and sewerage system, and permanent recreational facilities.

2.11 Support Infrastructure Requirements

2.11.1 Road Network

A road network study will be completed to identify all requirements for the project, through all phases from construction to operation.

2.11.2 Rail Network

Alpha is situated on the Longreach-Rockhampton railway line. This may be utilised to transport some of the construction materials to Alpha for transhipment by road to the power station site. In addition, the proposed coal railway associated with the Waratah Coal Project may also be used to move materials to the project site.

2.11.3 Power Supply

It is intended to obtain power for the construction phase from the existing Lilyvale-Clermont-Barcaldine 132 kV powerline owned by Ergon Energy. This will likely require a new transmission line link and substation.

2.11.4 Project Timetable

It is expected that the project development work for the power station will be completed and the first power will be available to the grid from 2017. This outcome assumes the project will be fast-tracked through all project stages. A schedule of key milestones is presented in **Table 2**.

Table 2: Key Project Milestones

Key Milestones	Target Dates
Commencement of development approvals processes (EIS, network connection, construction power connection, FEED studies, etc.)	Q3 2009
Completion of Development Approvals (including financial close)	Q2 2011
Commencement of detailed design and manufacture	2011
Notice to proceed	2011
Commencement of onsite construction works	2012
Power to minesite operations	2013
Commercial power generation to grid	2017

3. ENVIRONMENTAL AND PLANNING APPROVAL REQUIREMENTS

Due consideration of the likely environmental impacts of the proposed development under various Australian Government, State and Local legislation, guidelines and policies is a project requirement. This section identifies key legislation and identifies other documents and guidelines relevant to the environmental management and compliance of the Project.

3.1 Commonwealth Government

Environment Protection and Biodiversity Conservation Act 1999

At the Commonwealth level, the *Environment Protection* and *Biodiversity Conservation Act 1999* (EPBC Act) is applicable to those developments / actions that are likely to impact on a matter of National Environmental Significance (NES). Matters of NES may be affected by the project include threatened species and communities, and migratory species protected under international agreements.

A referral will be submitted to the Federal Environment Minister to seek a determination on the existence of controlled actions under the Act and the level of environmental assessment required. It is likely the action will be declared a controlled action and that an Environmental Impact Statement will be required.

Native Title Act 1993

The *Native Title Act 1993* (NTA) provides recognition and protection of native title, establishes ways in which future dealings affecting native title may proceed and acts a mechanism for determining claims to native title.

3.1.1 State Government

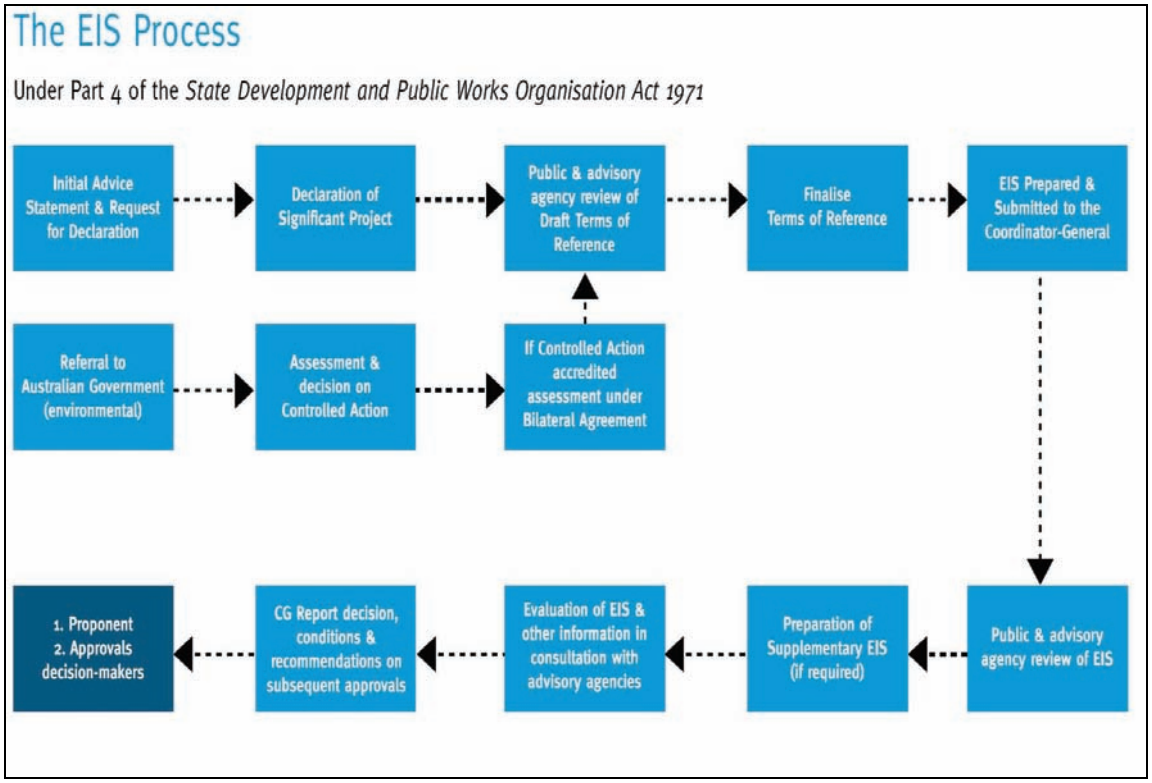
State Development and Public Works Organisation Act 1971

Galilee Power is seeking to have the project declared a “significant project” under the SDPWOA and to follow the EIS process defined by this Act. The important stages of the EIS assessment under this are shown in **Figure 6**.

Integrated Planning Act 1997

Approvals for development will be sought under the *Integrated Planning Act 1997* (IPA) for various project components. It is expected that these approvals will involve a material change of use of premises, reconfiguring a lot and the carrying out of building, operational works, and plumbing and drainage work.

Figure 6: The SDPWO Act EIS Process



Environmental Protection Act 1994

Approvals will be sought for Environmentally Relevant Activities (ERAs) under this Act. It is expected that the project may require Environmental Authorities for the following ERAs:

- ERA 7 - Chemical storage—storing chemicals (other than crude oil, natural gas and petroleum products), including ozone depleting substances, gases or dangerous goods under the dangerous goods code in containers having a design storage volume of 10m³ or more;
- ERA 9 Gas Producing – commercially producing hydrocarbon gas by any method, including reforming of hydrocarbon gases;
- ERA 17 – Fuel Burning;
- ERA 18 - Power station—generating power by consuming fuel at a rated capacity of 10 MW electrical or more;
- ERA 21C – The construction of a new transmission pipeline under a pipeline licence issued under any petroleum legislation;
- ERA 21E – A petroleum activity not otherwise prescribed (operation of a pipeline);
- ERA 22 – Screening, washing, crushing, grinding, milling, sizing or separating material extracted from the earth (other than under a mining authority); and
- ERA 62 - Concrete batching—producing concrete or a concrete product by mixing cement, sand, rock, aggregate or other similar materials in works (including mobile works) having a design production capacity of more than 100 t a year.

Confirmation of CO_2 storage approval requirements will be undertaken with the EPA as currently there are no ERA's for CO_2 storage.

Vegetation Management Act 1999

The proposed development will involve the clearing of native vegetation listed under this Act and will require a clearing permit approved by the Department of Natural Resources and Water.

Nature Conservation Act 1992

The proposed development has the potential to affect lands included in a National Park and habitats containing endangered, vulnerable and rare species listed under this Act. The project may also result in the removal of, or interference with, protected animals, plants or areas and may require relevant licences and permits under this Act.

Aboriginal Cultural Heritage Act 2003

This Act outlines the duty of care a proponent has when carrying out an activity that will or has the potential to harm Aboriginal cultural heritage. The project intends to undertake the preparation of a Cultural Heritage Management Plan in consultation with the traditional owners affected by the project.

Other Queensland Legislation

It is expected that the project will be subject to the requirements of other Acts, policies and regulations including:

- *Electricity Act 1994;*
- *Petroleum and Gas (Production and Safety) Act 2004;*
- *Land Act 1994;*
- *Queensland Heritage Act 1992;*
- *Transport Infrastructure Act 1994;*
- *Transport Operations (Road Use Management) Act 1995;*
- *Water Act 2000;*
- *Fisheries Act 1994;*
- *Land Protection (Pest and Stock Route Management) Act 2002; and*
- *Workplace Health and Safety Act 1995.*

3.2 Local Government

Local Government Act 1993

It is expected that Local Authority approvals under Barcaldine Regional Council Local Laws will be required. Ongoing consultation with the Barcaldine Regional Council will be undertaken during the detailed design and environmental studies to ensure all necessary approval requirements are met.

3.3 Proposed Environmental Studies

It is proposed to undertake a number of environmental studies to support the application process and to provide input to the project design process. It is expected that the following studies will be undertaken:

- air quality modelling and assessment;
- greenhouse gas assessment;
- environmental noise assessment;
- ecological assessments (terrestrial and aquatic);
- soil and groundwater contamination assessment;
- water supply and transport;
- CO_2 geo-sequestration investigation;
- water quality monitoring and assessment;
- traffic and transportation study;
- socio-economic assessment;
- hazard and risk assessment; and
- cultural heritage assessments.

4. EXISTING ENVIRONMENT AND POTENTIAL IMPACTS

4.1 Biogeographical Setting

The project will be located primarily within the Desert Uplands Bioregion (see **Figure 7**). Depending on the results of geosequestration trials there may; however, be some expansion into the Mitchell Grass Downs and / or the Brigalow Belt North bioregions. The following sections provide a brief description of the biogeographical setting of each bioregion.

4.1.1 Desert Uplands Bioregion

The power station site, CO_2 pipeline network and geosequestration fields will be located predominantly within the Desert Uplands Bioregion. The bioregion is one of 85 bioregions recognised in Australia and one of 13 located in Queensland. The land area of the bioregion covers approximately 69,000 $km^{2,}$ or approximately 4% of the State of Queensland. Barcaldine and Aramac are the major population centres and Prairie, Torrens Creek, Pentland and Jericho are smaller centres within the region.

The climate of the bioregion is semi-arid with variable summer-dominant rainfalls that decline from east to west. Average annual rainfall in the region ranges from 400 mm to 800 mm rainfall declining from east to west. Mean temperatures range from 23 – 35.8ºC in summer to 7.7 – 22.5ºC in winter.

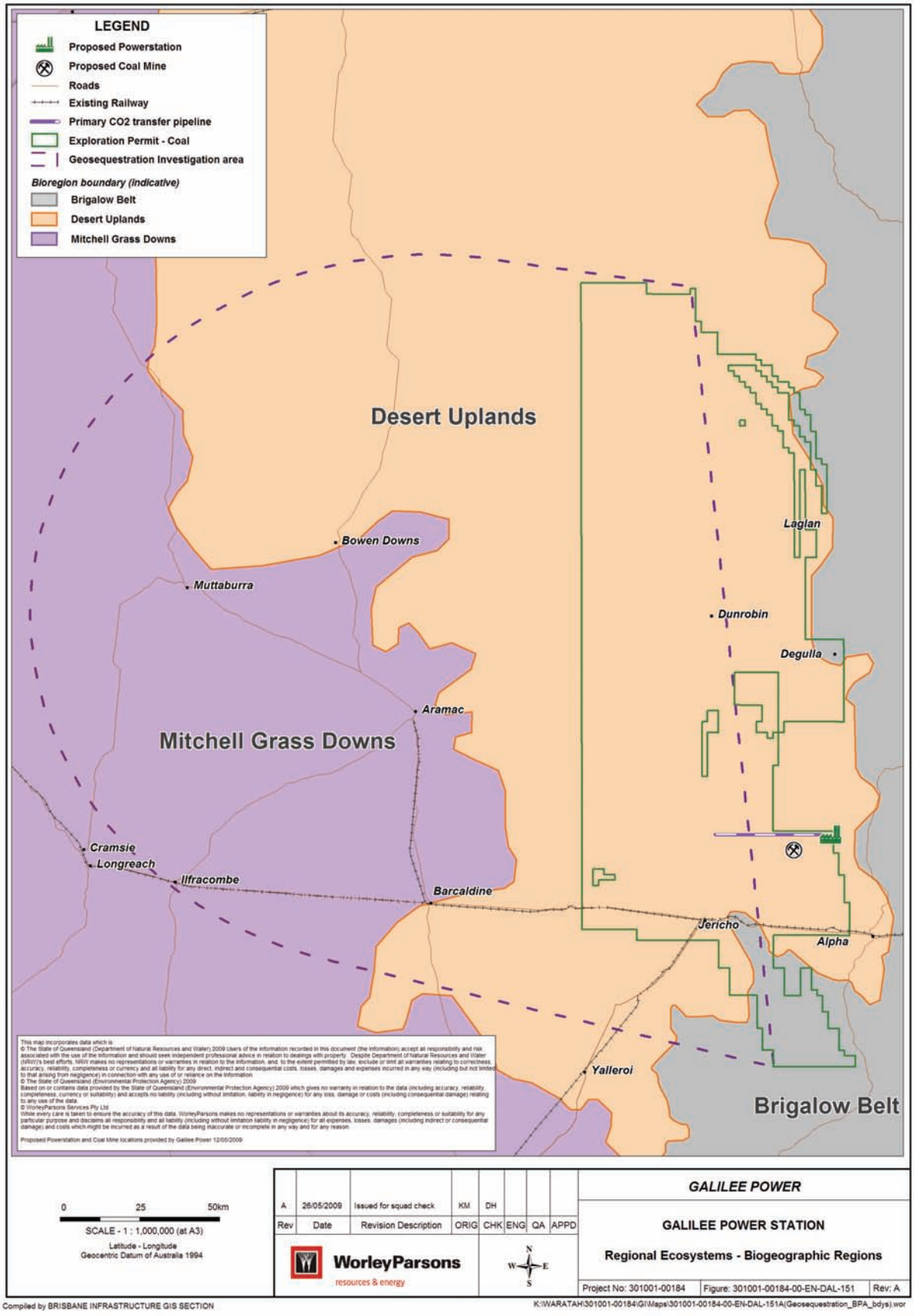
The bioregion straddles the low hills of the Great Dividing Range and is dominated by sandstone ranges and sand plains. It lies on the eastern margins of the Great Artesian Basin (GAB) and encompasses two major internal drainage basins, Lake Galilee and Lake Buchanan. The main waterways draining the Desert Uplands are the Belyando, Cape, Campaspe, Barcoo and Alice Rivers and Aramac and Torrens Creeks.

The bioregion partly lies within the Galilee and Eromanga Basins. These basins consist of Mesozoic to Tertiary (less than 251 million years ago) sediments including major coal and gas deposits. The soil of the bioregion is generally very well drained but structurally poor and of low fertility (Ahern *et al.*, 1994). Uniform clay soils occur in association with old lakebed deposits and as extensions of the western plains into the Desert Uplands bioregion. The soils in general are very low in essential mineral and trace elements, particularly phosphorus. The biodiversity of the soil-vegetation association is regarded as being high with approximately 80% of the bioregion remaining uncleared (EPA, 2005).

The vegetation within the bioregion ranges from brigalow in the east to gidgee and blackwood and open grasslands in the west. The bioregion includes 29 vulnerable and 14 endangered Regional Ecosystems (REs) that support habitat for 21 threatened species. There are five national important wetlands and another 45 wetlands of regional significance present in the bioregion. The Galilee and Buchannan Lakes, in addition to numerous other smaller lakes are the dominant landscape features within the bioregion.

The principal land use within the bioregion is beef-cattle production on native pastures. Land-clearing to support grazing productivity has increased since about 1995, leading to a range of land degradation issues in the bioregion. In some parts of the bioregion the rate of land clearing is considered to be the highest in Queensland.

Figure 7: Bioregions Within the Project Area



4.1.2 Mitchell Grass Downs Bioregion

The Mitchell Grass Downs bioregion forms a band of 335,100 km^2 spanning across the central west of Queensland and Northern Territory with over 70% of the bioregion located within Queensland. Major towns in the region include Longreach, Hughenden, Blackall, Winton, Richmond, Julia Creek and Boulia.

The bioregion is dominated by largely treeless plains of Mitchell grasses with some occasional ridges, rivers and gorges. The region is generally gently undulating with the major geological units being the Dunmara / Barkly Basin in the north-west and the Georgina Basin in the south-east.

The bioregion experiences a dry monsoonal climate merging to arid conditions to the south and south-west and sub-humid tropics along the north (Kerle, 1996). The climate is controlled largely by high pressure cells travelling east, except during the summer months when the north-west monsoons impact on the northern parts of the region. Rainfall across the region decreases from north to south and from east to west. The project area receives approximately 30% of annual rain in summer. Mean temperatures at Tambo Post Office range from 19°C - 35°C in summer and about 3.5°C - 21°C in winter.

Most of the bioregion features heavy soils resulting from swamp and other alluvial deposition during the Tertiary period. Mitchell Grass Downs is characterised by cracking clay soils that are thought to contribute to the lack of native trees in the area and support distinctive fauna. Smaller areas of limestone with calcareous desert soils and lateritic plains with red earths and red sands are also present (Kerle, 1996, Mills 1980 and Mills and Lee 1990).

The bioregion is dominated by Mitchell grass (*Astrebla* spp.) tussock grasslands on rolling plains with some low tree overstorey of gidgee and other species. The bioregion is generally characterised by a lack of tree and shrub cover. There is approximately 150 REs identified within the bioregion including one endangered and 31 vulnerable REs.

Vertebrate species diversity is generally low and there is an absence of most arboreal birds. There are 32 species listed as threatened in the bioregion, one that is considered extinct, eight endangered and 24 listed as vulnerable. Several species found within the region experience a 'boom-bust' population cycle as their population density peaks and declines dramatically in response to rainfall patterns.

There are nine wetlands of national significance and 137 other wetlands of regional significance within this bioregion that include shallow drainage lines and artesian mound springs. These wetlands are of value for their uniqueness and rare ecosystems. The seasonally flooded shallow lake systems provide rich habitat for waterfowl and migratory waders. These are nationally and internationally significant for breeding waterbirds including pelicans, ibis, herons, terns and ducks. The grasslands also form a major summering ground for some migratory birds.

The principal land use within the bioregion is grazing on native pastures. The Mitchell grass pastures are generally considered relatively resilient to grazing (Tothill and Gillies, 1992) however land degradation is evident and is mostly associated with the widespread occurrence of artificial waters and land-clearing.

4.1.3 Brigalow Belt North Bioregion

The Brigalow Belt North bioregion covers an area of approximately 135,500 km^2 in central eastern Queensland. Major towns within the bioregion include Townsville, Bowen, Clermont, Emerald and Collinsville.

The bioregion is characterised by a mixture of undulating to rugged ranges and alluvial plains. Soil types within the bioregion are diverse and this is due to the complex geology and geomorphology (Bailey, 1984). The rangelands soils ain the vicinity of the project area consist generally of red and yellow earth deep alluvium soils associated with the Belyando River flood plain (Gunn *et al.,* 1967, Isbell, 1962, and Sattler and Williams, 1999). Cracking and non cracking clay soils are also found within the study area.

The bioregion has a semi-arid to tropical climate with dry winters and wetter summers. Average annual rainfall ranges from 400 mm in the south-west to 1,200 mm on the eastern coast and generally decreases from north to south and with distance inland. Temperatures in the bioregion range from 22 – 38ºC in summer to 8 – 22ºC in winter.

The bioregion contains of matrix of rangelands, savannas, brigalow, grasslands and eucalypt woodland intermixed with improved pasture and cropping lands. The bioregion contains 105 different REs, including 32 that are listed as being endangered and 53 listed as being vulnerable. The large ecosystem variation within the bioregion supports habitat for a diverse range of flora and fauna including a large number of threatened species.

The project may affect three main watercourses in the locality – the Belyando River, Companion Creek and Sandy Creek. There are 14 wetlands of national significance and 160 regionally significant wetlands present in the bioregion. These wetlands include the Burdekin floodplain which is the largest delta on the east coast of Australia and are of significant importance for waterfowl, migratory waders and for threatened marine species.

The principal land use within the bioregion is cattle production with approximately 90% of the bioregion under grazing. The bioregion has been extensively cleared to support grazing, and cropping, which has seen the general condition of the bioregion decrease, including that of the nationally significant wetlands.

4.2 Terrain

4.2.1 Description

The topography of the proposed project study area is gently undulating and is traversed by some minor creek systems.

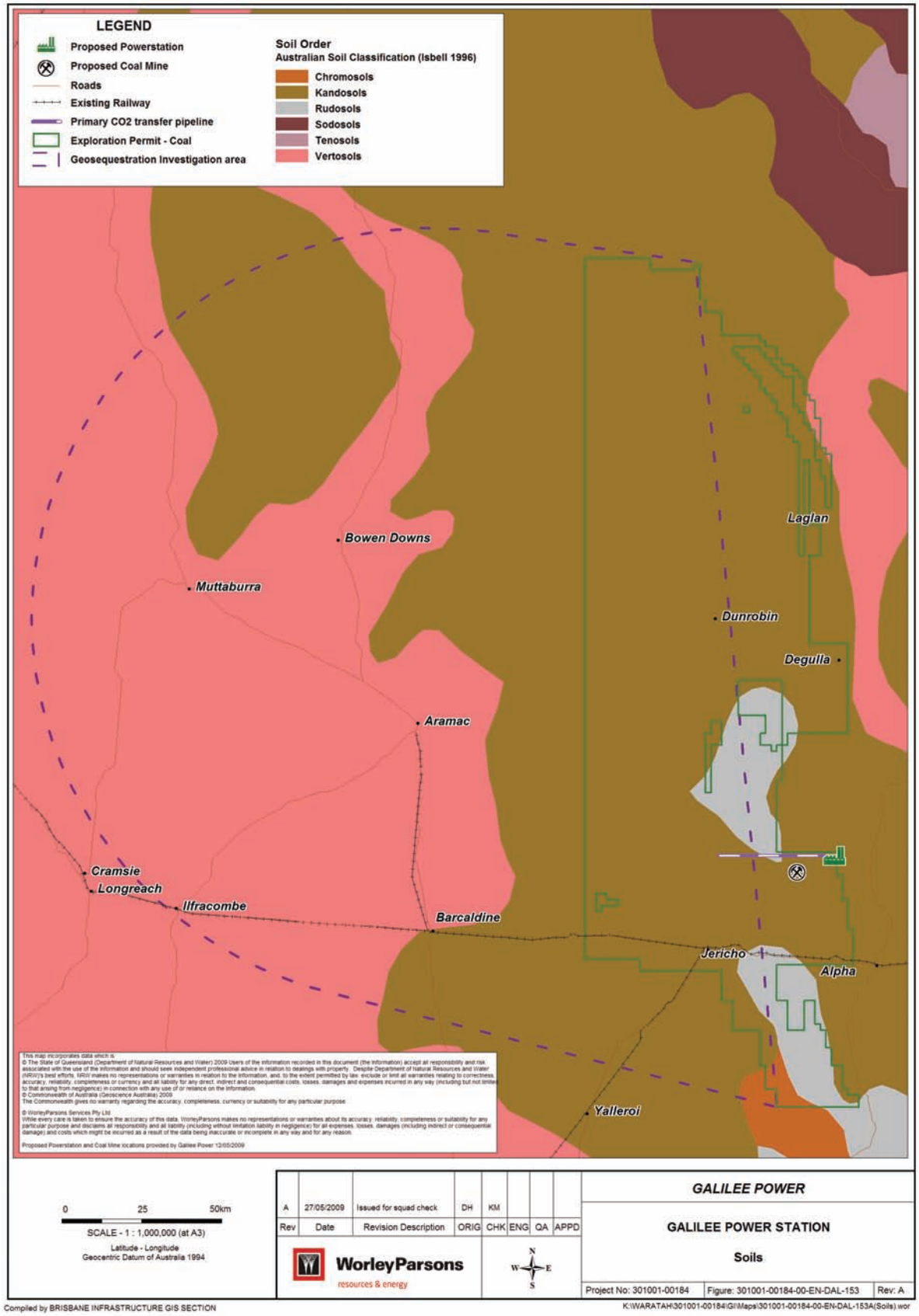
Geologically, the Galilee Basin covers an area of 247,000 km² in Central Queensland and is entirely intracratonic, filled with Late Carboniferous to Middle Triassic sediments. These rocks are dominantly fluvial in origin with minor glacial material developed at the base of the succession. The Galilee Basin contains extensive coal deposits, largely at depth, except for the eastern margin near where the proposed power station is to be situated.

The soils of the locality typically consist of loams interspersed with pockets of cracking clays, sandy duplex and gilgai clay soils (see **Figure 8**).

4.2.2 Potential Impacts and Mitigation Measures

Geological and geochemical studies will be carried out over the proposed power station site to confirm sites for the various power station components such as the power block and ash disposal areas. The power block requires a solid stable foundation and the ash disposal areas need to be constructed in materials that will contain leachate.

Figure 8: Soils Within the Project Area



A soil survey of the proposed project areas will be undertaken as part of the EIS to confirm soil characteristics and to plan the future rehabilitation of disturbed areas.

Vegetation clearing will be minimised where practicable, and construction planning will take into account weather conditions to minimise soil disturbance and erosion. Root stock will be retained in cleared areas to maintain soil stability and vehicle movement will be restricted where practicable to existing roads, tracks and cleared areas to minimise disturbance to adjoining areas. Unsealed access tracks and hardstand areas will be graded and sediment control devices (e.g. contour banks) installed to minimise erosion and sediment loading to local waterways. Sediment control devices will be implemented and maintained and erosion prone areas will be monitored to identify issues of soil disturbance and erosion and enable appropriate mitigation measures to be undertaken.

Topsoil and subsoil will be stripped separately and stockpiled in reverse order in dumps. Soil stockpiles will be shaped to a gentle gradient and covered with material or replanted with native pastures to minimise erosion and retain the biological activity in the soil. Topsoil and subsoil will be replaced in disturbed in reverse order and ripped to reduce compaction, as appropriate. Replanting of these areas will be undertaken using native pasture grasses to improve soil stability and reduce erosion. Native shrubs and trees will be planted in areas where ongoing maintenance or operation works are not proposed and once the pasture grasses have become established.

Issues relating to land management of farming properties acquired for the project will be addressed and strategies developed prior to construction to ensure the ongoing productivity of this land and reduce erosion and weed dispersal. Management of these properties will be incorporated into the rehabilitation and decommissioning programs.

The rehabilitation process will be developed as part of the EIS process and will be designed to return disturbed land to a stable, self-sustaining and maintenance-free state.

4.3 Land Use, Tenure and Native Title

4.3.1 Description

The proposed power station site is situated on leasehold land and is currently used for cattle production (**Figure 9**). The geo-sequestration investigation area is predominantly used for cattle grazing on native pasture. The north-eastern part of the area contains sizable areas of remnant vegetation and major water storages. Several parcels of land have also been set aside for nature conservation purposes.

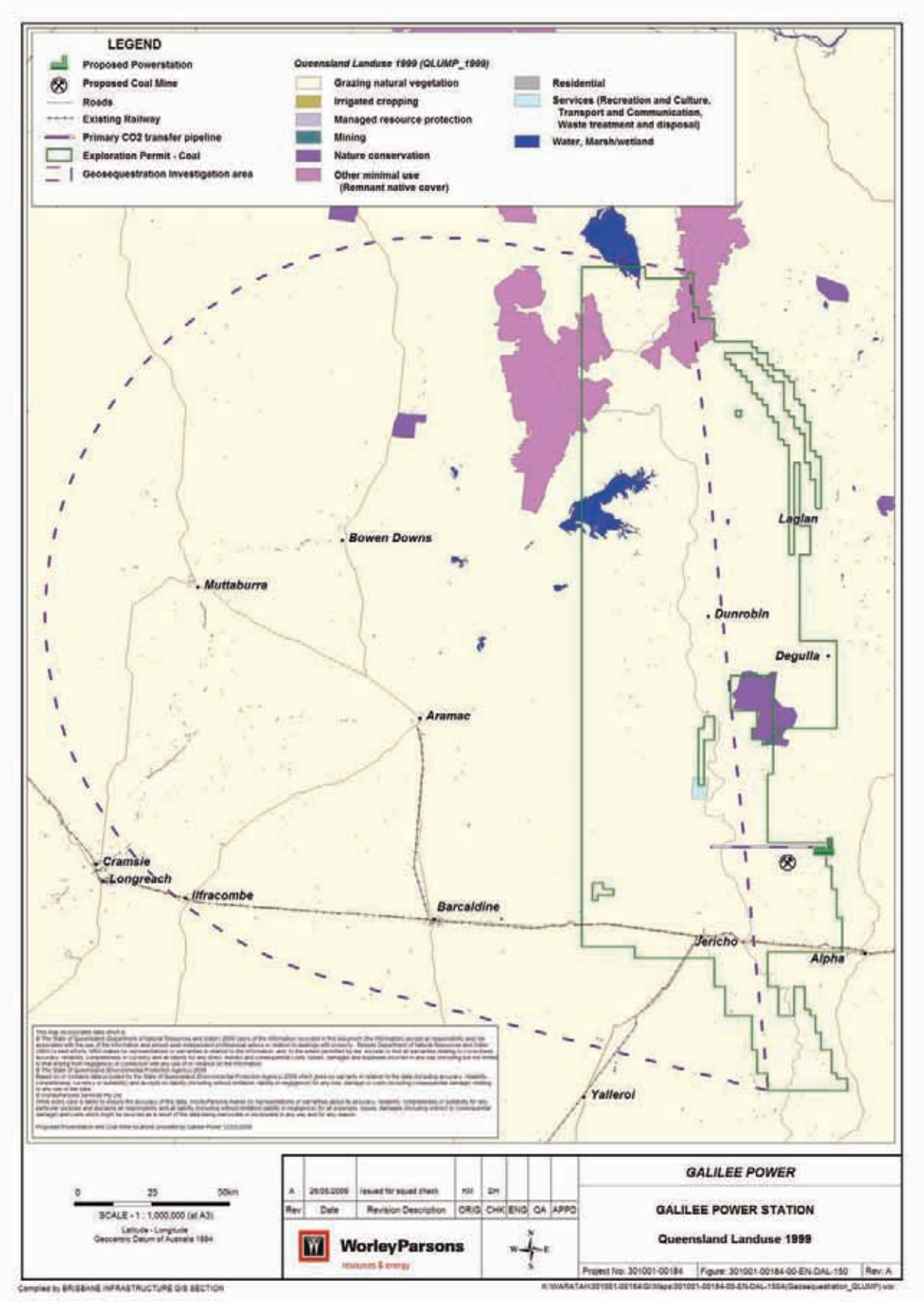
Several native title claims has been submitted over land required for the project. The claims: Wangan and Jagalingu People (QC04/6) and Bidjarra QC08/005 and QC 97/049 are all currently active.

4.3.2 Potential Impacts and Mitigation Measures

The proposed power station site is expected to be situated on convertible leasehold land purchased for the project. The tenure of the proposed geo-sequestration site is not known as the site has yet to be determined. Investigations undertaken to identify feasible locations for CO_2 injection wells may result in some disturbance to existing land uses. These potential effects will be examined as part of the EIS process.

A native title assessment of lands required for the Project will be undertaken in accordance with the NTA and where native title is found to exist, appropriate land use and access agreements will be negotiated with the relevant traditional owners of the lands in question.

Figure 9: Land Use Within the Project Area



4.4 Air Quality

4.4.1 Description

The region surrounding the proposed power station and associated CO_2 transfer infrastructure is predominantly rural in character supporting cattle grazing and some crop farming. Air emissions from these activities will generally consist of dust from cultivation and harvesting activities, exhaust emissions from farm machinery, and greenhouse gases from cattle raising. Smoke can also be an occasional source of dust emissions in rural areas. No emission sources producing gaseous emissions similar to those produced in a coal-fired power station are located in the district.

4.4.2 Potential Impacts and Mitigation Measures

There is no existing air-shed, air quality model available for the project area. An examination of existing and predicted air quality will be undertaken as part of the EIS process. The information obtained will be used to assess the potential impact of the project on air quality during construction and operation and to determine appropriate air emission limits to be used for the detailed design of the project.

Air emissions will be generated by equipment and vehicle operation during construction activities, and from power station operations.

Dust generation will be the main impact associated with construction activities. Watering trucks will be used to suppress dust on the construction site to minimise this impact. Management procedures for the use and maintenance of all equipment and vehicles used on construction sites will be developed and implemented to mitigation this impact. Regular monitoring and inspection of vehicles and equipment will be undertaken to ensure they are in sound working order. Given the isolated nature of potential emission generation, the impacts on air quality associated with construction activities are expected to be low.

Typical gaseous emissions expected as a result of power station operations are discussed in section 2.7. It is anticipated that fly ash will be removed from the stack gases prior to the release of such gases to the atmosphere. The need for SO_2 removal will be determined by emissions modelling.

The EIS will consider direct greenhouse gas emissions associated with the construction and operation of the project infrastructure. Measures to reduce greenhouse gas emissions will be identified and integrated into the operational procedures for the project as part of the EIS process.

The technology to remove CO_2 gas from the emissions stream is currently the subject of technical studies being undertaken by research organisations. The detailed engineering studies will consider the existing technologies to ensure the most appropriate CCS process is incorporated in the station design.

4.5 Noise and Vibration

4.5.1 Description

The existing noise environment is typical of rural areas. Noise sources usually comprise vehicle and machinery noise, animal noise and insect noise, together with wind noise. At this stage there is no existing noise emission data for the project study area. Noise levels will; however, be monitored to quantity typical existing background noise levels as a baseline for impact assessment.

4.5.2 Potential Impacts and Mitigation Measures

During construction, project noise sources are likely to comprise earthmoving machinery, rock breaking machinery, rock blasting, power tools and generators, cranes, pumps and road transport vehicles. Should concrete be manufactured onsite, a concrete batching plant would contribute substantial noise.

During the operation of the power station, the primary noise sources will be the coal conveyor system and coal handling machinery (eg. dozers and front end loaders), boilers, turbines, and stack and cooling tower fan systems. Transient noise emissions may occur during plant commissioning and during upset conditions. These emissions are typically significantly higher than normal operating noise conditions. These atypical noise sources include the steam blow through, the steam bypass on the turbine, and other steam pressure relief devices.

Noise emissions have the potential to impact upon neighbouring properties, communities and local wildlife through disruption. Noise emissions will be managed in accordance with the guidelines outlined by EPA (2004). Mitigation measures to reduce noise emissions will be identified during the EIS process. A complaint resolution process will also be implemented to manage any noise nuisance generated by the proposed project.

4.6 Terrestrial Ecology

4.6.1 Description

The ecological values of the project study area have been identified through a desktop review of existing baseline information. Database searches were used to identify threatened ecological and vegetation communities, flora and fauna species and other protected areas (including wetlands) with a 5 km radius (the wider study area) of the power station site, geosequestration area and the sites of associated infrastructure (the project study area).

Protected Areas

Several protected areas lie within the wider study area including the Lake Galilee, Lake Buchanan and Aramac Springs wetlands (see **Figure 10**). These wetlands are listed under the Directory of Important Wetlands. The project study area also lies within the catchment of Coongie Lakes, a wetland of international significance (Ramsar). Coongie Lakes is situated near Innamincka in northern South Australia and is unlikely to be significantly impacted upon by the proposed project.

National Parks and Nature Refuges also lie within the wider study area including Cudmore and Forest Den National Parks and Bimblebox, Belview and Ightham Nature Refuges. The layout of the proposed Project will be designed as to avoid these protected areas where possible to minimise potential impacts of the Project.

Threatened Ecological Communities and Regional Ecosystems

Database searches identified four threatened ecological communities from the wider study area (5 km radius of project study area); however, only three of these communities correspond to current RE mapping for the wider study area. Threatened ecological communities and their corresponding REs are listed in **Table 3.** A total of 197 REs are mapped within the wider study area and their management status is outlined in **Table 4.** Threatened Ecological Communities (TEC) and REs found within the broad study area are shown on **Figure 11** and **Figure 12** respectively.

Figure 10: Other Protected Areas

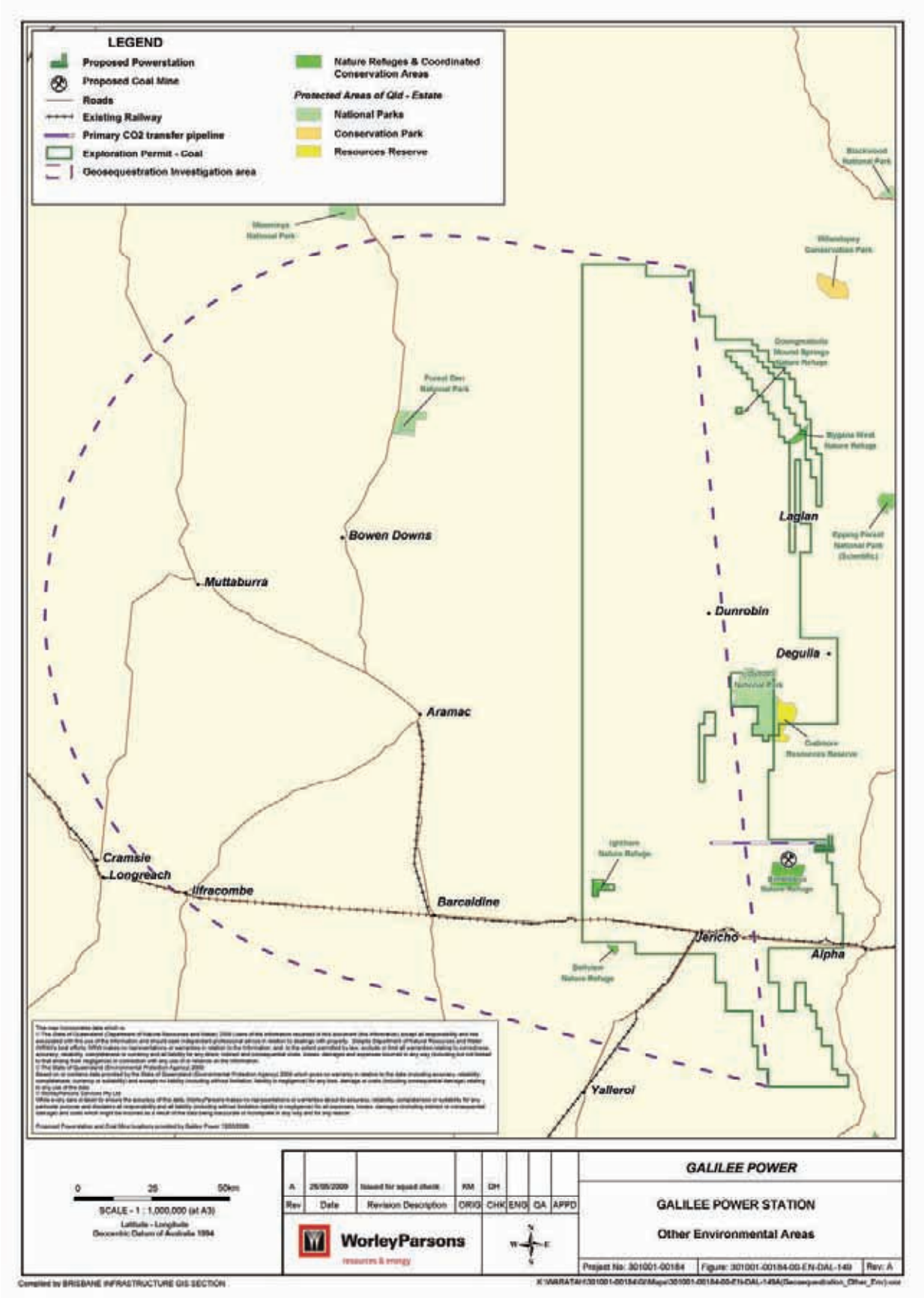


Table 3: Threatened Ecological Communities Mapped within Wider Study Area

Threatened Ecological Community	Status
Brigalow (*Acacia harpophylla* dominant and codominant) • 11.3.1 Brigalow and / or Belah (*Casuarina cristata*) open forest on alluvial plains • 11.4.8 Dawson Gum woodland to open forest with Brigalow or Black Gidgee (*Acacia argyrodendron*) on Cainozoic clay plains • 11.9.1 Brigalow-Dawson Gum open forest to woodland on fine-grained sedimentary rocks • 11.9.5 Brigalow and / or Belah forest on fine-grained sedimentary rocks	Endangered
Natural Grasslands of the Queensland Central Highlands and the northern Fitzroy Basin • 11.9.11 Brigalow shrubland on fine-grained sedimentary rocks	Endangered
Weeping Myall Woodlands • 11.3.2 Poplar Box (*Eucalyptus populnea*) woodland on alluvial plains*	Endangered
The Community of Native Species Dependent on the Natural Discharge of Groundwater from the Great Artesian Basin**	Endangered

*11.3.2 may contain patches of vegetation that are analogous to the Weeping Myall Woodlands community.

**This TEC was identified by the DEWHA Protected Matters Search Report; however, REs mapped within the wider study area do not correspond to this community as per the Legal Status description provided on the SPRAT website.

Table 4: Regional Ecosystems Transected by the Wider Study Area

Regional Ecosystem Description	No. REs mapped in Wider Study Area
Total REs Mapped within Wider Study Area	197
REs listed as Endangered under the EPBC Act	6
REs listed as Endangered under the VMA	7
REs listed as Of Concern under the VMA	22
REs listed as Not Of Concern under the VMA	168
REs listed as Endangered Biodiversity Status by DERM	32
REs considered At Threshold by DERM	9

Figure 11: Listed Threatened Ecological Communities

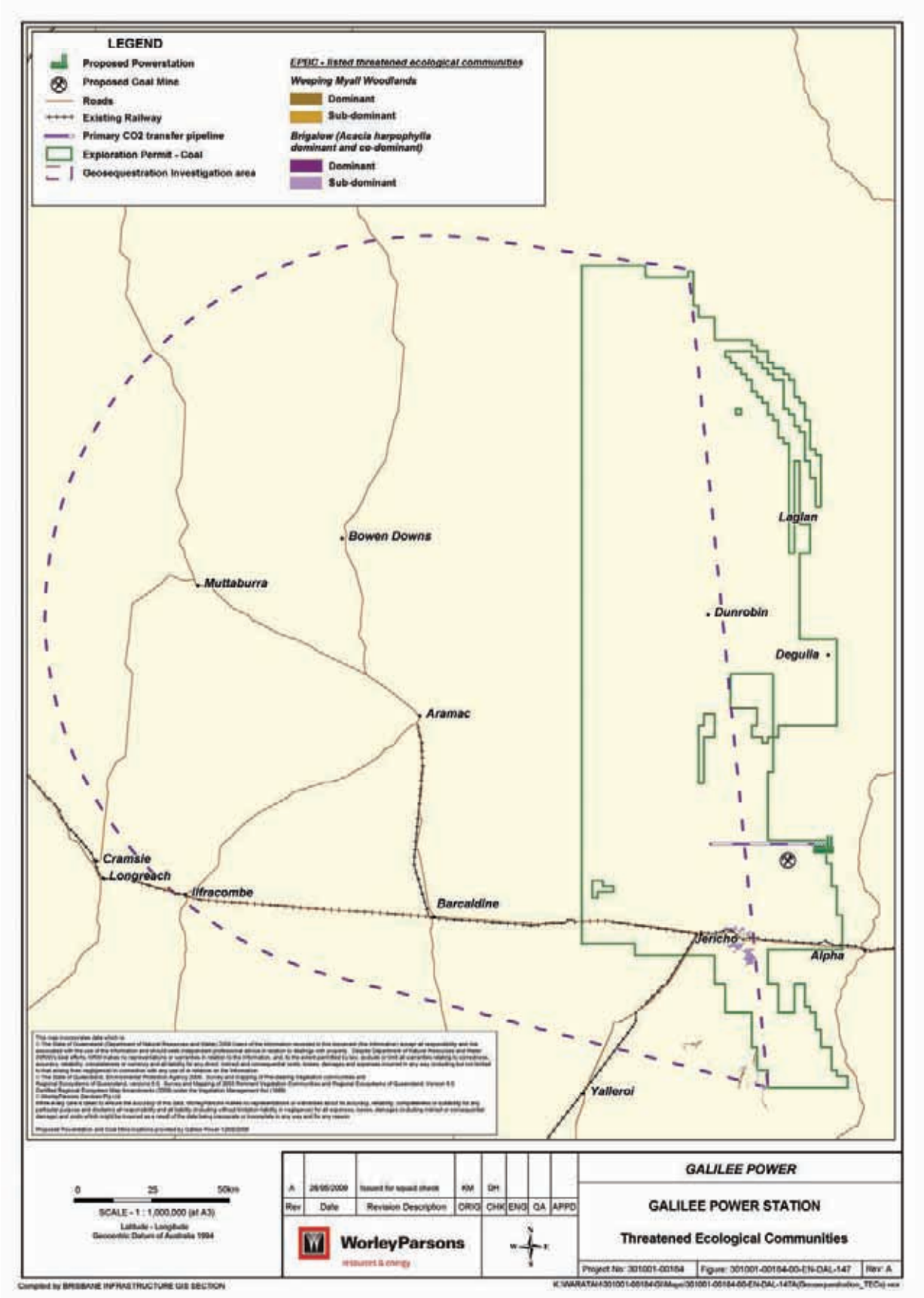
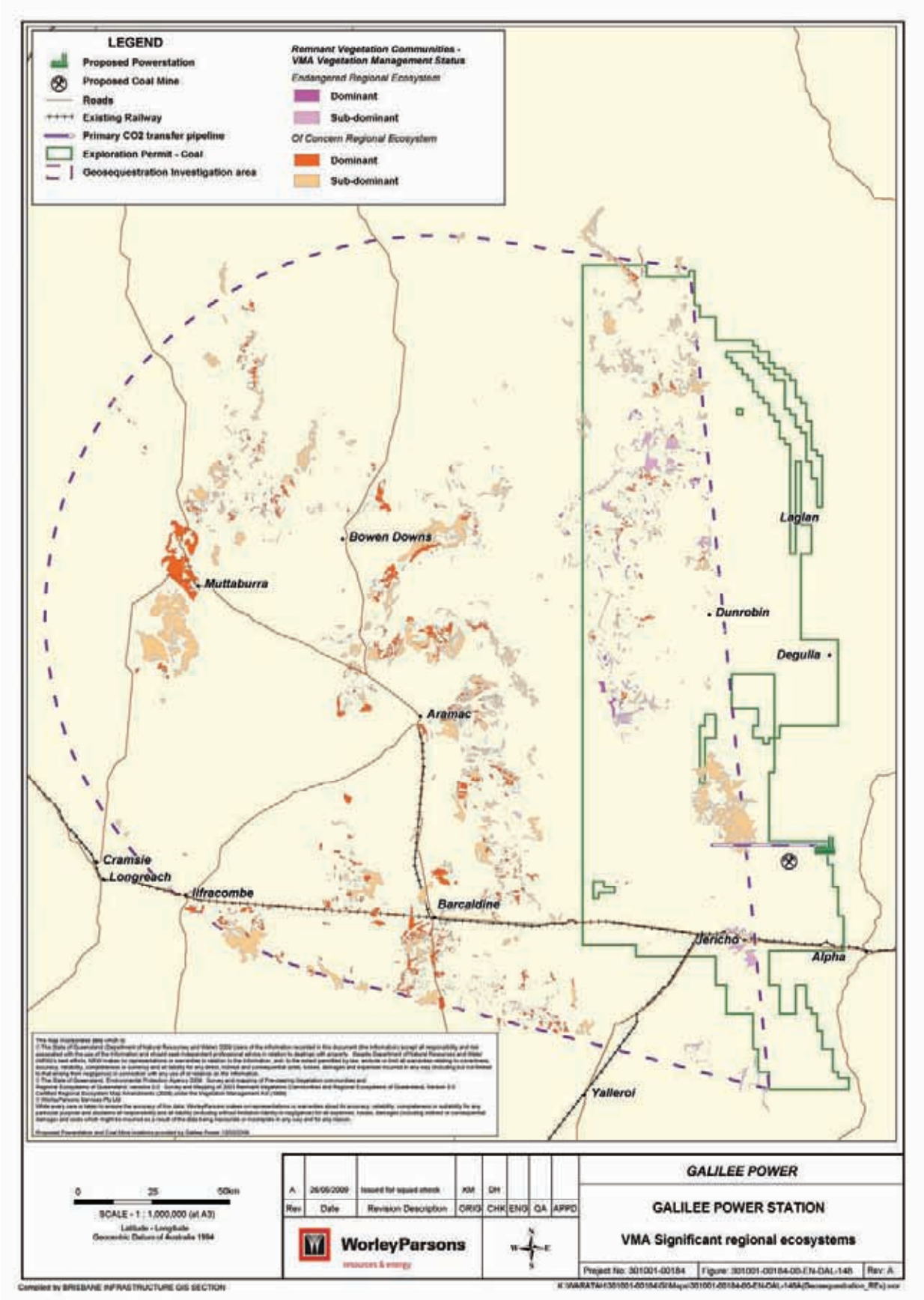


Figure 12: Threatened Regional Ecosystems



Threatened Flora and Fauna Species

Database searches identified 1,747 flora and 543 fauna species from the wider study area. Of these, 24 flora species and 28 fauna species are listed under the EPBC Act and NCA. Based on habitat preference, 21 flora species may potentially occur within the project study area and 21 fauna species may potentially occur within the project study area including two fishes, three reptile, 13 bird and three mammal species (see **Appendix A** for a detailed list).

Fauna Species of Other Conservation Significance

In addition to threatened species, 82 bird species identified by database searches are listed as Migratory and / or Marine under the EPBC Act including 26 species are listed as Migratory only, 26 species listed as Marine only and 30 species are listed as both under the EPBC Act. Based on habitat preference, the project study area may provide some habitat value for 73 of these species including all Migratory only listed species, 25 species listed as Marine only and 22 listed as both. (see **Appendix A** for a detailed list).

Declared Weed and Animal Pest Species

A total of 130 weed species (including 13 declared species) and 16 animal pest species (including five declared species) have been identified from the region and may be potentially encountered within the project study area.

4.6.2 Potential Impacts and Mitigation Measures

Potential impacts on regional ecosystems and threatened flora and fauna species will be associated with the clearing of vegetation for the project, and the release of possible contaminants into the air and water.

The clearing of vegetation has the potential to impact upon flora and fauna species through direct loss or injury to species during construction activities and indirectly through the loss or degradation of habitat areas, fragmentation of habitat areas and loss of connectivity. Notwithstanding the project footprint includes large areas mostly cleared of remnant vegetation, any required vegetation clearing will be undertaken in accordance with best practice to minimise the potential impact. Rehabilitation programs will be developed and implemented to revegetate and regenerate native vegetation as necessary.

Construction activities may also potentially impact upon fauna species through increased disturbance from construction noise, vehicle movements and dust production.

The air emissions released by the power station will include SO_2 and NO_2. These gases may cause impacts on some local native vegetation when exposed to high concentrations. The effects vary among species according to natural tolerance levels, length of exposure and gas concentration levels. This matter will be examined as part of the EIS investigations.

Detailed flora and fauna studies will be undertaken as part of the EIS process to confirm communities and species that may be impacted by the project.

4.7 Water Resources

4.7.1 Description

Surface Water

The proposed power station study area (including the geosequestration investigation area) is situated within three catchments, Belyando River, Thomson River and Barcoo River (**Figure 13**).

The Belyando River catchment encompasses an area of approximately 73,300 km² and is bounded to the west by the Great Dividing Range and to the east by the Denham and Drummond Ranges. The Belyando River flows in a northerly direction to join the Suttor River in its lower reaches. The Suttor River discharges into Lake Dalrymple.

The Thomson River catchment covers approximately 95,300 km². The geosequestration investigation area falls predominantly within the Thomson River catchment. Several tributaries, including Cornish, Aramac, Towerhill, and Landsborough Creek traverse the study area flowing in a south and south westerly direction to the Thomson River. The Thomson Rivers flows south into Cooper Creek.

The Barcoo River catchment covers approximately 53,300 km². The geosequestration investigation area covers the northern end of the catchment. The Alice River and Jordan Creek flow through the investigation area to the southwest into the Barcoo River. The Barcoo River flows south into Cooper Creek.

Groundwater

The proposed project site is situated in the Tasman Basin. Reliable information is not available on the extent and quality of groundwater resources within the area. The extent and distribution of groundwater resources will be identified and discussed in further detail as part of the EIS process.

4.7.2 Potential Impacts and Mitigation Measures

Surface Water

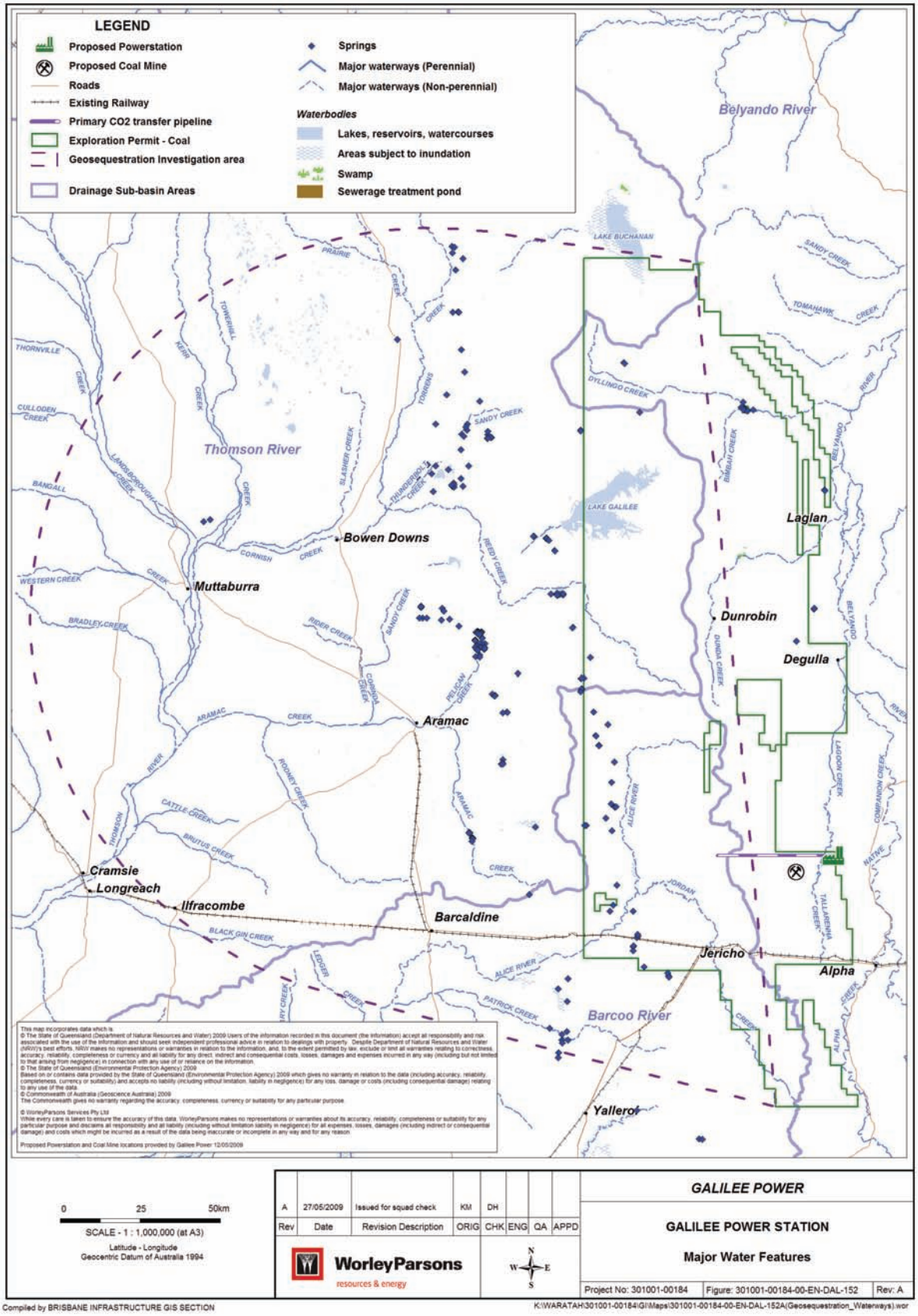
Studies on surface water hydrology and water quality will be undertaken as part of the EIS process. Project activities will be designed to maximise the recycling of power plant water, and water harvesting from the project site where practical.

Water quality and flow regimes of potentially-affected watercourses downstream of the power station will be monitored to assess the impact of activities on these watercourses. Mitigation measures to maintain acceptable water quality levels and reduce algal blooms in pond / dam water will be identified during the EIS process.

Hazardous substances, wastewater and other waste materials used and generated by the power station project will be handled, stored and disposed of in accordance with EPA guidelines. Procedures for the management of these materials will be further discussed as part of the EIS.

Onsite treatment facilities for wastewater generated by the project will be designed and constructed in accordance with the EPA requirements. The water quality of treated effluent will be monitored regularly to maintain compliance with EPA guidelines.

Figure 13: Major Waterways Within the Project Area



Groundwater

Incorrect handling and disposal of waste materials during the construction and operation phases have the potential to contaminate groundwater resources through seepage particularly in areas where groundwater comes to the surface. Groundwater resources may also be impacted as a result of aquifer disturbance by site earthworks.

4.8 Cultural Heritage

4.8.1 Description

Indigenous Heritage Values

The proposed project area includes land under Native Title claim by the Wangan and Jagalingou People and the Bidjara. Studies to identify indigenous heritage values relating to the project study area will undertaken as part of the EIS process.

European Heritage Values

A number of European heritage sites are listed on heritage registers within the project study area. The region has a diverse and rich history of mining and agriculture and it is possible that sites may be present. Detailed heritage studies will be undertaken as part of the EIS to identify potential sites and their significance.

4.8.2 Potential Impacts and Mitigation Measures

Construction and operational activities have the potential to disturb or damage heritage sites and artefacts. Project infrastructure will be designed and located to minimise the potential impact on identified culturally significant areas and any areas of European heritage value. Cultural Heritage Management Plans will be developed with the relevant indigenous stakeholders to ensure the ongoing protection of any Aboriginal heritage sites of significance.

4.9 Waste

4.9.1 Description

Construction and operational activities associated within the project are expected to generate waste materials. Potential waste materials are outlined in **Table 5**.

Table 5: Potential Waste Generated by Project Activities

Construction Phase	Operational Phase
General domestic garbage from onsite construction workers	Minor waste hydrocarbons and oily rags
Paper, cardboard and timber from packaging	General garbage, including putrescibles from the onsite staff facilities (kitchen, offices)
Scrap steel	Grey water and sewage from onsite amenities
Grey water and sewage from onsite amenities	Paper, cardboard and timber from occasional packaging for spare parts etc
Dirty drains	Dirty drains
Water treatment effluents	Water treatment effluents
Waste oils and oily rags from equipment maintenance and refuelling	

4.9.2 Potential Impacts and Mitigation Measures

Waste materials have the potential to contaminate soil, habitat and water resources, and have the potential to harm or injure neighbouring communities and fauna and flora species. The management of wastes generated by the project will be addressed in the project Environmental Management Plan (EMP), which will be developed during the EIS process. The EMP will identify controls, which target the reduction of generated wastes and which will ensure that onsite wastes do not enter the environment.

4.10 Traffic and Transport

4.10.1 Description

The roads likely to be utilised to transport materials to the project area are the Clermont-Alpha Road, and the Capricorn and Bruce Highways. In addition a number of lesser Local Authority roads will be utilised to gain site access during the construction phase of the project in particular. It is expected that the Central Queensland rail network may also be used to transport some construction materials where appropriate. It is understood the Rockhampton to Longreach railway is able to carry heavy freight between Gladstone and Emerald and light freight west of Emerald.

The ability of the existing infrastructure in the region to meet project transport needs will be examined as part of future project design activities. This will include an assessment of the capacity of the existing Alpha airport to support workforce movements.

4.10.2 Potential Impacts and Mitigation Measures

Transport and traffic issues associated with the construction phase of the project will include the transport of heavy and oversize loads, construction plant and equipment, construction materials and camp accommodation, together with workforce movements.

At this stage of the project design, no estimates are available for the likely number and type of transport trips required for the project. Procedures for the movement and transport of vehicles and personnel during the construction and operation of the mine will be prepared to ensure that these traffic movements do not cause unnecessary damage to local or regional roads. Traffic movement on regional and local roads will be minimised where practicable and restricted in areas of high sensitivity. Where the project is likely to affect the operation of road or transmission infrastructure, the relevant authority will be contacted to discuss the potential impact of the proposed project activities on these areas to minimise disturbance or disruption to services and traffic.

4.11 Socio-economic Aspects

4.11.1 Description

The power station project is situated in a sparsely populated rural area some distance from Alpha, the closest established township. The ability of Alpha to provide services to, and accommodation for, the project are very limited. The town's existing facilities are minimal with little spare capacity. The towns of Emerald and Jericho which are located a considerable distance away from the project site may be able to assist with the supply of goods and services but are to distant from the project site to be feasible locations for workforce housing.

4.11.2 Potential Impacts and Mitigation Measures

The socio-economic impacts of the project during the operational phase are expected to be manageable due to the relatively small permanent workforce associated with the power station. An accommodation strategy for the power station and the adjacent mine's workforce has yet to be determined. It is anticipated that the mine and the power station will be built concurrently and hence accommodation will be required for up to 3,300 construction workers for the construction period.

The impacts during construction will be significant, particularly as labour will need to be brought in from other regions and will need to be housed locally. It is probable that a fly-in/fly-out approach will be utilized to address this situation. These impacts, including any effects on housing, employment and public services will be assessed during the EIS process.

Interference to land holder activities as a result of the proposed project activities will be discussed with each affected landholder and their particular individual needs noted. Galilee Power is committed to working closely with affected landholders to mitigate potential impacts on local land use. Project construction activities are not expected to result in the displacement of residents, and any displacement to existing forms of land use within these areas is expected to be minor. The sites for the proposed gas pipelines and injection wells will be selected having regard to local environmental constraints to minimize potential disturbance to flora and fauna, watercourses and agricultural facilities and activities.

5. ENVIRONMENTAL AND RISK MANAGEMENT SYSTEMS

The approach to be implemented by Galilee Power will be espoused in its environmental and occupational health safety and welfare policy statements. An EMP will be developed for the project during the EIS process. This EMP will address the relevant environmental risks associated with the construction, operation and decommissioning phases of the project, and will establish monitoring requirements. Compliance with the project EMP, development approvals and environmental permits will be a contractual requirement for construction contractors. Galilee Power will maintain compliance with the EMP and relevant approval conditions through a program of risk-based tools, including onsite audits, documentation reviews and key performance targets.

5.1 Operation and Maintenance Contract

Galilee Power proposes to establish an Environmental Management System (EMS) that incorporates the following objectives:

- safety performance: Ensure that the highest standards of occupational health, safety and risk management are employed at the project sites;
- environmental performance: Ensure that the highest standards of environmental responsibility are employed at the project sites. Compliance with legislation will be considered the minimum standard and full acceptance by the community in which Galilee Power operates will be actively pursued;
- aligned business objectives: Ensure that both Galilee Power and its contractors' business objectives are aligned to achieve Galilee Power's business objectives; and
- meet reliability and availability goals: Through the utilisation of competent personnel and best practice maintenance, Galilee Power will achieve the target reliability and availability for the various project components.

At an early stage, Galilee Power will ensure that the project's contractors will become involved in:

- hazard identification and Hazard and Operability processes;
- risk assessment and identification of risk reduction measures;
- development of an integrated management system and facility operating procedures;
- developing health, safety and environmental management systems and procedures; and
- establishing community liaison processes.

By commencing the above tasks in partnership with the project's contractors, and in advance of the commencement of operations at the project sites, Galilee Power intends to proactively seek to identify, manage and mitigate environmental, health and safety, technical and other pertinent risks.

6. STAKEHOLDER ENGAGEMENT

Galilee Power is committed to a public consultation program as part of the project approvals process and intends to formulate a consultation program, which will provide opportunities for active community involvement and education through an inclusive program.

The public consultation process would identify broad issues of concern to local community and interest groups at all stages including project planning, construction, commissioning, operations and final decommissioning.

The key objectives of the developed consultation program will be to:

- inform the different interest groups about the project proposal;
- seek an understanding of interest group concerns about the proposal;
- explain the environmental impact assessment process and indicate how public input might influence the final recommendations for the project;
- provide an understanding of the regulatory approval process;
- seek local information and input into the project; and
- provide the community with a sense of ownership in the project.

The public consultation program would include public meetings, interest group meetings, production of regular summary information and updates and other consultation mechanisms for encouraging and facilitating active public consultation. A list of affected persons and interested stakeholders would be developed.

Ultimately, the consultation would establish:

- the project's ongoing program for communicating and consulting with the public and stakeholder groups during the course of the project; and
- appropriate project responses to the issues and suggestions of stakeholders and members of the public, including potential project design modifications aimed at mitigating or managing environmental impact issues.

To date, Galilee Power has undertaken preliminary consultation with select Queensland government agencies (Queensland Premier's Department, Department of Infrastructure and Planning).

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8. ABBREVIATIONS

CSS	Carbon Capture and Storage
DEWHA	Commonwealth Department of Environment, Water, Heritage and the Arts
DMR	Department of Main Roads
EIS	Environmental Impact Statement
EMP	Environmental Management Plan
EMS	Environmental Management System
EPA	Environmental Protection Agency
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
ERA	Environmentally Relevant Activity
ESSCI	Environmentally Sustainable Sites for Carbon Dioxide Injection
FEED	Front End Engineering Design
GAB	Great Artesian Basin
GHG	Greenhouse Gas
HAPS	Hazardous Air Pollutants
IAS	Initial Advice Statement
IGCC	Integrated Gasification Combined Cycle
IPA	*Integrated Planning Act 1997*
NCA	*Nature Conservation Act 1992*
NEM	National Energy Market
NES	National Environmental Significance
NET	Northern Economic Triangle
NTA	*Native Title Act 1993*
QR	Queensland Rail
RE	Regional Ecosystem
SDPWOA	*State Development and Public Works Organisation Act 1971*
Syngas	Synthetic Gas
ToR	Terms of Reference

Appendix A – Ecological Data

Table 6: Threatened Flora Species Identified by Database Searches as Known or Likely to Occur in the Wider Study Area (5 km radius)

Family Name	*Scientific Name** Common Name	Status**		Preferred Habitat	Likelihood of Occurrence^
		EPBC	NCA		
Eriocaulonaceae	*Eriocaulon carsonii* [1] Salt Pipewort	E	E	Active or flowing artesian mound springs or the margins of the GAB of inland region of QLD, NSW and SA on fen soils.	Possible
Apiaceae	*Eryngium fontanum* [1] Blue Devil	E	E	Permanent spring-fed wetland complexes with a groundwater source from the GAB within a 5 km radius of Doongmabulla and Edgbaston / Myross Springs in central west QLD.	Possible
Curcurbitaceae	*Austrobryonia argillicola* [1] (syn. *Mukia* sp. Longreach) Tobermorey Station Mukia	E	E	Creeklines and in poorly drained areas in grasslands, swamps, shrublands and riparian woodlands in cracking clay soils in inland northern Australia.	Possible
Mimosaceae	*Acacia crombiei* [1] Pink Gidgee	V	V	Restricted to Muttaburra in central QLD in basalt and other heavy soils.	Possible
Malvaceae	*Lawrencia buchananensis* [1]	V	V	Restricted to Lake Buchanan in central west QLD.	Possible
Eriocaulonaceae	*Eriocaulon carsonii* ssp. *orientale* [1] a Salt Pipewort		E	Vents and tails of artesian mound springs on the margins of the GAB in association in central west QLD.	Possible
Haloragaceae	*Myriophyllum artesium* [2] Artesian Water-milfoil		E	Wetlands associated with springs emanating from the Great Artesian and associated basins in the Boulia, Clermont-Aramac, Taroom, Quilpie and Eulo districts of central and southern QLD.	Possible
Lythraceae	*Nesaea robertsii* [2] Robert's Nesaea		E	Little known species restricted to acacia woodlands in alluvial soils in central western QLD.	Possible
Poaceae	*Sporobolus pamelae* [2] Spring Dropseed		E	Edges of artesian springs and grasslands in sandy and clayey soils in the South Kennedy region of central and northern QLD.	Possible

Family Name	*Scientific Name** Common Name	Status**		Preferred Habitat	Likelihood of Occurrence^
		EPBC	NCA		
Myrtaceae	*Micromyrtus rotundifolia* [2] Round-leaved Honey-myrtle		V	Shrubland with heath-myrtles and acacia and in acacia – eucalypt woodlands, on breakaways associated with the Great Dividing Range in shallow and sandy red soils in central west QLD.	Possible
Mimosaceae	*Acacia spania* [2] Western Rosewood		R	Monotypic stands surrounded by open eucalypt woodland in shallow red soils in the Emerald district of central QLD.	Unlikely
Euphorbiaceae	*Bertya pedicellata* [2] Long-stalked Bertya		R	Open and closed forests on rocky hills of central QLD with shallow skeletal or sandy soils at 320 – 840 m altitude.	Unlikely
Asteraceae	*Calotis suffruticosa* [2] a Burr-daisy		R	Little known species of central west and south western QLD.	Possible
Apocynaceae	*Cerbera dumicola* [2] Native Frangipani		R	Open woodlands and forests and occasionally semi-evergreen vine thickets in red and sandy clay soils to 884 m altitude.	Possible
Fabaceae	*Desmodium macrocarpum*[2] Large-podded Tick-trefoil		R	Open forests and woodlands and semi-evergreen vine thickets in red earths, rarely sandy clay soils throughout the coastal ranges of eastern QLD and at altitudes to 884 m.	Possible
Myrtaceae	*Eucalyptus gilbertensis* [2] Gilbert River Ghost Gum		R	Little known species restricted to north west QLD.	Possible
Euphorbiaceae	*Euphorbia sarcostemmoides* [2] Climbing Caustic		R	Rocky hillsides in skeletal soils and on sand dunes in inland regions of Australia.	Possible
Cyperaceae	*Fimbristylis vegans* [2] Wandering Fringe-rush		R	Wetlands in wet sandy soils of southern and central QLD.	Possible
Fabaceae	*Leptosema chapmanii* [2] Dwarf Dogwood		R	Gidgee communities; open heathlands and shrublands and in skeletal, sandy to lateritic, gravelly soils on	Possible

Family Name	*Scientific Name** Common Name	Status**		Preferred Habitat	Likelihood of Occurrence^
		EPBC	NCA		
				sandstone plateau. Restricted to North Kennedy, Leichhardt and Mitchell districts of central QLD.	
Myrtaceae	*Melaleuca chisholmii* [2] Chisholm's Honey-myrtle		R	Open eucalypt woodlands in sandstone ridges and hills and brown sandy loams on metamorphic rock.	Possible
Haloragaceae	*Myriophyllum implicatum* [2] Water-milfoil		R	Freshwater seepage areas of sand dunes, on damp mud and rarely, shallow, flowing water in central western and south eastern QLD.	Possible
Aristolochiaceae	*Pararistolochia praevenosa* [2] Richmond Birdwing Vine		R	Notophyll vine forests and moist araucarian vine forests at the base of rocky hills and gorges of lowlands (< 600 m elevation), frequently on colluvial soils derived from basalts in subtropical coastal regions.	Unlikely
Asteraceae	*Perpleura scabra* [2] Tall Fuzzweed		R	Open eucalypt woodlands often with a grassy understorey on rocky slopes and ridges derived from granite. Found in central and north QLD.	Possible
Chenopodiaceae	*Sclerolaena everistiana* [2] a Gidgee Burr		R	Gidgee dominated vegetation in stony lateritic soils and plains and lower slopes in brown soils and cracking clays.	Possible
Poaceae	*Sporobolus partimpatens* [2] Smooth Dropseed		R	Open grasslands and chenopod forblands associated with artesian mound springs of the GAB in the Galilee Basin in central QLD.	Possible

*Source: 1 – EPBC Protected Matters Search Report. **Status: EPBC: E = Endangered, V = Vulnerable; NCA: PE = Presumed Extinct, E = Endangered, V = Vulnerable, R = Rare. ^Likelihood of Occurrence: Likely = suitable habitat mapped on site, Possible = sub-optimal habitat or preferred habitat components present on site, Unlikely = no suitable habitat present on site or well outside known range of taxon.

Table 7: Threatened Fauna Species Identified by Database Searches as Known or Likely to Occur in the Wider Study Area (5 km radius)

Family Name	*Scientific Name** Common Name	Status**		Preferred Habitat	Likelihood of Occurrence^
		EPBC	NCA		
Fishes					
Pseudomugilidae	*Scaturiginichthys vermeilipinnis* [1] Redfin Blue Eye	E	E	Restricted to freshwater springs of Edgbaston Springs in Aramac district of central western QLD.	Possible
Gobiidae	*Chlamydogobius squamigenus* [1] Edgbaston Goby	V	E	Restricted to freshwater springs of Edgbaston Springs in Aramac district of central western QLD.	Possible
Reptiles					
Scincidae	*Egernia rugosa* [2] Yakka Skink	V	V	Broad habitat range including forests and woodlands dominated by eucalypts, cypress, belah and mulga in south eastern QLD. Occupying cracks in bark, log piles, sand and rabbit warrens, this species is not highly mobile.	Possible
Elapidae	*Furina dunmalli*[1] Dunmall's Snake	V	V	Open dry sclerophyll forests and woodlands, especially brigalow, with fallen timber and ground litter on floodplains of cracking clay soils. Highly cryptic species intolerant of long-term disturbance of habitat.	Possible
Pygopodidae	*Paradelma orientalis* [1] Brigalow Scaly-foot	V	V	Broad habitat range on a variety of soils in the Brigalow Belt region of southern central QLD.	Unlikely
Scincidae	*Ctenotus capricorni*[2] Capricorn Ctenotus		R	Semi-arid sandy open woodlands with spinifex. Restricted to southern Desert Uplands Bioregion. Poorly known.	Possible
Scincidae	*Ctenotus schevilli* [2] Black Soil Ctenotus		R	Low open shrublands and tussock grasslands in the northern Gulf and north eastern coastal regions and Lake Eyre basin in QLD.	Unlikely
Anatidae	*Nettapus coromandelianus albipennis* [1] Australian Cotton Pygmy-goose		R	Coastal wetlands, preferring deep permanent pools and swamps with abundant aquatic grasses, roosting on logs in water.	Unlikely

Family Name	*Scientific Name** Common Name	Status**		Preferred Habitat	Likelihood of Occurrence^
		EPBC	NCA		
Elapidae	*Pseudechis colletti* [2] Collet's Snake		R	Restricted to grasslands and woodlands on cracking clay blacksoil plains in central Qld.	Unlikely
Elapidae	*Simoselaps warro* [2] Robust Burrowing Snake		R	Distributed along the coast and adjacent ranges of north eastern Queensland. Found in sclerophyll forest and woodlands habitats.	Unlikely
Birds					
Passeridae	*Neochmia ruficauda ruficauda* [1] Star Finch (eastern and southern)	E	E	Dense coastal forests, scrub and tall rank grass along watercourses, rush margins of swamps and moist green crops. Very few records since 1990, scattered across central Qld, centred on Rockhampton area.	Possible
Passeridae	*Poephila cincta cincta* [1] Black-throated Finch (southern and white-rumped subsp.)	E	V	Open woodlands, scrubby plains and Pandanus flats with dense grass cover close to water.	Possible
Accipitridae	*Erythrotriorchis radiatus*[1] Red Goshawk	V	E	Broad habitat range especially near water in tropical and warm-temperate Australia.	Possible
Columbidae	*Geophaps scripta scripta* [1] Squatter Pigeon (southern)	V	V	Open grassy woodlands. Preference for areas on sandy soil with low gravel ridges close to water.	Possible
Rostratulidae	*Rostratula australis* [1] Australian Painted Snipe	V	V	Surrounds and shallows of well vegetated wetlands with dense low cover.	Possible
Accipitridae	*Accipiter novaehollandiae* [2] Grey Goshawk		R	Rainforests, gallery forests, tall mangroves and eucalypt forests, woodlands and river edge forests.	Possible
Ciconiidae	*Ephippiorhynchus asiaticus*[2] Black-necked Stork		R	Open freshwater wetlands including margins of billabongs, swamps, shallow floodwaters over grasslands, wet heathlands, watercourse pools and dams. Nests in trees or large bushes, often over swamps.	Possible
Falconidae	*Falco hypoleucos* [2] Grey Falcon		R	Lightly timbered country, especially stony plains and lightly timbered Acacia scrublands and eucalypt-lined river channels.	Possible

Family Name	*Scientific Name** Common Name	Status**		Preferred Habitat	Likelihood of Occurrence^
		EPBC	NCA		
Meliphagidae	*Grantiella picta* [2] Painted Honeyeater		R	Forests, woodlands and dry scrublands, dependent on mistletoe berries. Distributed from central Qld to SA, nomadic but rare in inland Australia.	Possible
Accipitridae	*Lophoictinia isura* [2] Square-tailed Kite		R	Sparsely distributed in open eucalypt forests, woodlands and sand plains.	Possible
Meliphagidae	*Melithreptus gularis* [2] Black-chinned Honeyeater		R	Open eucalypt woodland in eastern and northern Australia, especially ironbarks and box, paperbarks, and tree-lined watercourses of arid areas.	Possible
Pardalotidae	*Pyrrholaemus bruneus* [2] Redthroat		R	Acacia and chenopod shrublands such as those dominated by Mulga in association with chenopods or eremophilas and often along watercourses or drainage lines.	Possible
Anatidae	*Stictonetta naevosa* [2] Freckled Duck		R	Open water species but breeds in densely vegetated freshwater lakes, swamps, creeks and floodwaters with thickets of paperbark, she-oaks and tea-trees as well as inland areas of canegrass and lignum.	Possible
Mammals					
Dasyuridae	*Smithopsis douglasi* [1] Julie Creek Dunnart	E	E	Restricted to Mitchell Grass grasslands on cracking clay soils in western QLD.	Unlikely
Thylacomyidae	*Macrotis lagotis* [2] Greater Bilby	V	E	Wide range of soil and vegetation types and land forms in Tanami Desert, NT, the Great Sandy and Gibson Deserts, WA, and between Boulia and Birdsville in south western QLD.	Unlikely
Dasyuridae	*Dasyurus hallucatus* [2] Northern Quoll	E		Most abundant in rocky eucalypt woodlands but occurs in a variety of habitats, often near creeklines. Dens in tree hollows and rock crevices.	Possible
Vespertilionidae	*Chalinolobus picatus* [2] Little Pied Bat		R	Dry open forests, open and mulga woodlands, chenopod shrublands, pine forests and mallee close to water. Roosts in caves, rock outcrops, mines, tree hollows and buildings.	Possible

Family Name	*Scientific Name** Common Name	Status**		Preferred Habitat	Likelihood of Occurrence^
		EPBC	NCA		
Tachyglossidae	*Tachyglossus aculeatus* [2] Echidna		LC	Broad habitat range where shelter and food resources are present including forests, woodlands and open grassland areas.	Possible

*Source: 1 – EPBC Protected Matters Search Report. **Status: EPBC: E = Endangered, V = Vulnerable; NCA: PE = Presumed Extinct, E = Endangered, V = Vulnerable, R = Rare. ^Likelihood of Occurrence: Likely = suitable habitat mapped on site, Possible = sub-optimal habitat or preferred habitat components present on site, Unlikely = no suitable habitat present on site or well outside known range of taxon.

Table 8 Migratory and Marine Species Identified by Database Searches as Known or Likely to Occur in the Wider Study Area (5 km radius)

Family Name	*Scientific Name** Common Name	Status**		Preferred Habitat	Likelihood of Occurrence^
		Mi	Ma		
Accipitridae	*Accipiter fasciatus* [2] Brown Goshawk	✓	✓	Forests and woodlands, dry scrublands and farmlands.	Possible
Scolopacidae	*Actitis hypoleucos* [2] Common Sandpiper	✓	✓	Narrow muddy edges of billabongs, river pools, mangroves and among rocks and snags, reefs and rocky beaches of varied coastal and interior wetlands. This widespread but uncommon species avoids wide open mudflats.	Possible
Apodidae	*Apus pacificus* [1] Fork-tailed Swift	✓	✓	Fly-over species with broad habitat range from rainforests to semi-desert.	Unlikely
Ardeidae	*Ardea alba* [1] Great Egret	✓	✓	Permanent and temporary wetlands, flooded pastures, dams, estuarine mudflats, mangroves and reefs, nesting in trees in standing water. Breeding migrant.	Possible
Otididae	*Arenaria interpres* [2] Ruddy Turnstone	✓	✓	Beaches and coasts with exposed rock, stony or shell beaches, mudflats, exposed reefs and wave platforms.	Unlikely
Anatidae	*Biziura lobata* [2] Musk Dusk	✓	✓	Deep permanent lakes, swamps and dams having areas of dense reedbeds and open waters.	Possible
Ardeidae	*Bubulcus ibis* (syn. *Ardea ibis*) [1] Cattle Egret	✓	✓	Moist pastures with tall grass, shallow open wetlands and margins and mudflats.	Possible
Scolopacidae	*Calidris acuminata* [2] Sharp-tailed Sandpiper	✓	✓	Coastal freshwater and saline wetlands, intertidal mudflats of estuaries, muddy edges of lagoons, mangrove channels, swamps, lakes, dams, soaks, sewage farms and temporary floodwaters.	Possible

Family Name	*Scientific Name** Common Name	Status**		Preferred Habitat	Likelihood of Occurrence^
		Mi	Ma		
Scolopacidae	*Calidris ferruginea* [2] Curlew Sandpiper	✓	✓	Inter-tidal mudflats of estuaries, lagoons, mangrove channels and around lakes, dams, floodwaters and flooded saltbush surrounds of inland lakes.	Possible
Scolopacidae	*Calidris ruficollis* [2] Red-necked Stint	✓	✓	Diverse habitats including tidal and inland mudflats, salt marshes, beaches, saltfields and temporary floodwaters.	Possible
Charadriidae	*Charadrius ruficapillus* [2] Red-capped Plover	✓	✓	Inland on salt lakes, salty edges of waterways, brackish pools and claypans and coastal on sheltered estuaries and salt marsh lagoons.	Possible
Charadriidae	*Charadrius veredus* [2] Oriental Plover	✓	✓	Open grasslands, claypans and gibberstone plains of inland, semi-arid regions and less often, tidal mudflats in marine environments. Non-breeding migrant.	Possible
Laridae	*Chlidonias leucopterus* [2] White-winged Black Tern	✓	✓	Coastal marine and near-coastal freshwater wetlands and tidal habitats including estuaries, lagoons and harbours. Non-breeding common and abundant migrant.	Unlikely
Accipitridae	*Circus approximans* [2] Swamp Harrier	✓	✓	Wetlands, swamps and lakes, vegetated or with open waters, mangroves, saltmarshes, temporary floodwaters and less typically marine waters, heathlands, grasslands and pastures.	Possible
Anatidae	*Dendrocygna arcuata* [2] Wandering Whistling-dusk	✓	✓	Wetlands with permanent water and aquatic vegetation including billabongs, floodplain pools and tidal creeks.	Possible
Falconidae	*Falco cenchroides* [2] Nankeen Kestrel	✓	✓	Open woodlands, grasslands, mulga and other sparse scrublands, heathlands, farmlands, roadsides, coastal dunes and heaths.	Possible
Scolopacidae	*Gallinago hardwickii* [1] Latham's Snipe	✓	✓	Low vegetation around wetlands in shallows, sedges, reeds, heaths, saltmarshes and irrigated crops.	Possible

Family Name	*Scientific Name** Common Name	Status**		Preferred Habitat	Likelihood of Occurrence^
		Mi	Ma		
Accipitridae	*Haliaeetus leucogaster*[1] White-bellied Sea-eagle	✓	✓	Broad habitat range in coastal and near coastal areas of Australian Territorial pairing species, feeding on aquatic animals and nesting in trees up to 30 m above the ground.	Unlikely
Accipitridae	*Haliastur indus* [2] Brahminy Kite	✓	✓	Mangrove swamp and estuaries and sometimes over forests and along rivers in coastal regions of northern and eastern Australia. Resident breeding and nomadic species nesting in living trees near water and feeding on carrion and small animals.	Unlikely
Accipitridae	*Haliastur sphenurus* [2] Whistling Kite	✓	✓	Wetlands and near watercourses in open woodlands, scrublands, farmlands, estuaries and littoral mudflats.	Possible
Recurvirostridae	*Himanotopus himantopus* [2] Black-winged Stilt	✓	✓	Shallow freshwater wetlands, interior claypans, flooded paddocks and salt lakes.	Possible
Apodidae	*Hirundapus caudacutus* [1] White-throated Needletail	✓	✓	Fly-over species with broad habitat range including oceans.	Unlikely
Meropidae	*Merops ornatus* [1] Rainbow Bee-eater	✓	✓	Open country of woodlands, open forests, semi-arid scrub, grasslands, clearings in heavier forests, farmlands avoiding dense forests.	Possible
Dicruridae	*Monarcha melanopsis* [2] Black-faced Monarch	✓	✓	Rainforests, mangroves, wet eucalypt forests and woodlands where it forages for insects in the denser parts of midstorey. Non-breeding migrant.	Possible
Dicruridae	*Myiagra cyanoleuca* [1] Satin Flycatcher	✓	✓	Wetter habitats in tall forests in coastal eastern Australia.	Unlikely
Scolopacidae	*Numenius minutus* [1] Little Curlew	✓	✓	Bare dry sub-coastal plains, floodplains, billabongs, freshwater swamps, sports fields and lawns.	Unlikely

Family Name	*Scientific Name** Common Name	Status**		Preferred Habitat	Likelihood of Occurrence^
		Mi	Ma		
Threskiornithidae	*Plegadis falcinellus* [2] Glossy Ibis	✓	✓	Shallows of swamps, floodwaters, sewage ponds, flooded or irrigated pastures and occasionally moist pastures and sheltered marine habitats.	Possible
Recurvirostridae	*Recurvirostra novaehollandiae* [2] Red-necked Avocet	✓	✓	Salt and freshwater wetlands, large, shallow salt lakes, swamps and lakes, claypans and dams.	Possible
Turnicidae	*Tringa nebularia* [2] Common Greenshank	✓	✓	Diverse habitat range including permanent and temporary wetlands, billabongs, swamps, lakes, floodplains and sheltered estuaries and bays with extensive mudflats, mangrove swamps and muddy shallows.	Possible
Turnicidae	*Tringa stagnatilis* [2] Marsh Sandpiper	✓	✓	Coastal and inland salt and freshwater wetlands, estuarine and mangrove mudflats, beaches, shallows of swamps, lakes, billabongs, temporary floodwaters, sewage farms and saltworks ponds. Summer migrant.	Possible
Accipitridae	*Accipiter cirrhocephalus* [2] Collared Sparrowhawk	✓		Forests and woodlands across most of Australia.	Possible
Anatidae	*Anas castanea* [2] Chestnut Teal	✓		Wetlands, coastal estuaries, lakes, saltmarshes, tidal mudflats and coastal islands.	Possible
Anatidae	*Anas gracilis* [2] Grey Teal	✓		Most wetlands and temporary floodwaters across Australia.	Possible
Anatidae	*Anas rhynchotis* [2] Australasian Shoveler	✓		Various wetlands, prefers large permanent lakes and swamps with abundant shrubby cover.	Possible
Anatidae	*Anas superciliosa* [2] Pacific Black Duck	✓		Freshwater and marine wetlands with shallow, well-vegetated swamps.	Possible

Family Name	*Scientific Name** Common Name	Status**		Preferred Habitat	Likelihood of Occurrence^
		Mi	Ma		
Accipitridae	*Aquila audax* [2] Wedge-tailed Eagle	✓		Broad habitat range from forests to scrublands. Requires open country for foraging and forest for roosting.	Possible
Accipitridae	*Aviceda subcristata* [2] Pacific Baza	✓		Margins and spaces of gallery forests, monsoon forests, swamp forests, rainforest-woodland margins, tropical and subtropical open forests and woodlands.	Possible
Anatidae	*Aythya australis* [2] Hardhead	✓		Large, deep lakes and swamps with abundant aquatic vegetation, creeks, inundated floodplains.	Possible
Anatidae	*Chenonetta jubata* [2] Australian Wood Duck	✓		Open woodlands, farmlands, flooded pastures, close to dams, lakes, estuaries and ponds.	Possible
Accipitridae	*Circus assimilis* [2] Spotted Harrier	✓		Open grasslands, spinifex, open shrublands, saltbush, open woodlands, crops and low vegetated areas.	Possible
Anatidae	*Cygnus atratus* [2] Black Swan	✓		Large areas of shallow water with aquatic vegetation including lakes, estuaries and flooded pastures.	Possible
Anatidae	*Dendrocygna eytoni* [2] Plumed Whistling-duck	✓		Grasslands close to water near swamps, lakes, floodwaters and dams.	Possible
Accipitridae	*Elanus axillaris* [2] Black-shouldered Kite	✓		Broad habitat range from open country to forests, woodlands and farmlands with scattered trees across Australia.	Possible
Charadriidae	*Elseyornis melanops* [2] Black-fronted Dotterel	✓		Freshwater wetlands, shallow, muddy bottomed swamps, billabongs, lake margins and temporary claypan pools.	Possible
Charadriidae	*Erythrogonys cinctus* [2] Red-kneed Dotterel	✓		Well-vegetated freshwater wetlands, swamps, lakes, billabongs and interior claypans.	Possible

Family Name	*Scientific Name** Common Name	Status**		Preferred Habitat	Likelihood of Occurrence^
		Mi	Ma		
Falconidae	*Falco berigora* [2] Brown Falcon	✓		Most open habitats across Australia – woodlands, farmlands, mallee, alpine, heathlands.	Possible
Falconidae	*Falco longipennis* [2] Australian Hobby	✓		Woodlands and open forests, lakes and swamps, vegetated watercourses, heathlands and farmlands with scattered trees.	Possible
Falconidae	*Falco peregrinus* [2] Peregrine Falcon	✓		Broad habitat range from rainforests to arid scrublands. Requires abundant prey and secure nesting sites.	Possible
Falconidae	*Falco subniger* [2] Black Falcon	✓		Semi-arid and arid interior along tree-lined watercourses and in isolated stands of trees. Forages in low vegetation of surrounding plains, grasslands, saltbush and bluebush.	Possible
Gruidae	*Grus rubicunda* [2] Brolga	✓		Freshwater swamps, flooded grasslands, margins of billabongs, lagoons, dry grasslands, floodplains and irrigated pastures.	Possible
Accipitridae	*Hamirostra melanostemon* [2] Black-breasted Buzzard	✓		Semi-arid to arid regions, nesting in large trees along vegetated watercourses and foraging in open scrub and grassland plains.	Possible
Accipitridae	*Hieraaetus morphnoides* [2] Little Eagle	✓		Forests, woodlands, shrublands, tree-lined rivers across most of mainland Australia.	Possible
Anatidae	*Malacorhynchus membranaceus* [2] Pink-eared Duck	✓		Shallow, open, muddy wetlands and temporary floodwaters.	Possible
Accipitridae	*Milvus migrans* [2] Black Kite	✓		Woodlands, scrublands, tree-lined watercourses, mangroves, mudflats and swamps.	Possible

Family Name	*Scientific Name** Common Name	Status**		Preferred Habitat	Likelihood of Occurrence^
		Mi	Ma		
Charadriidae	*Vanellus miles* [2] Masked Lapwing	✓		Open short-grassed natural and modified habitats, often beside water, across most of Australia.	Possible
Charadriidae	*Vanellus tricolor* [2] Banded Lapwing	✓		Open grassland and woodland with scattered trees, farmland, parks and golf courses, close to water.	Possible
Anseranatidae	*Anseranas semipalmate* [2] Magpie Goose		✓	Tropical floodplains, shallows of dams, irrigated crops, swampy well-vegetated margins of deep waterways.	Possible
Motacillidae	*Anthus novaeseelandiae* [2] Richard's Pipit		✓	Grasslands, forest clearings, grassy woodlands, semi-open scrublands and beaches and hind-dunes.	Possible
Ardeidae	*Ardea intermedia* [2] Intermediate Egret		✓	Freshwater wetlands with abundant vegetation, floodwaters, rivers, intertidal mudflats.	Possible
Cucilidae	*Cacomantis flabelliformis* [2] Fan-tailed Cuckoo		✓	Wet eucalypt forests, rainforest edges and open forests including river gum forests, in southern and eastern Australia.	Unlikely
Laridae	*Chlidonias hybridus* [2] Whiskered Tern		✓	Inland regions in shallow freshwater wetlands, permanent and temporary floodwaters, interior claypans, irrigated pastures and occasionally, estuarine or marine wetlands.	Possible
Laridae	*Chrricocephalus novaehollandiae* [2] Silver Gull		✓	Surf and cliffs of ocean coasts, offshore islands, inland rivers, lakes, temporary floodwaters, cultivated farmlands and ponds.	Possible
Campephagidae	*Coracina novaehollandiae* [2] Black-faced Cuckoo-shrike		✓	Rainforests, eucalypt forests and woodlands, tree-lined watercourses of the interior, farmland, gardens.	Possible
Campephagidae	*Coracina papuensis* [2] White-bellied Cuckoo-shrike		✓	Rainforests, gallery forests, eucalypt forests, woodlands, mangroves and riverside tree belts.	Possible

Family Name	*Scientific Name** Common Name	Status**		Preferred Habitat	Likelihood of Occurrence^
		Mi	Ma		
Phasianidae	*Coturnix pectoralis* [2] Stubble Quail		✓	Short and tall grasses, stubble, pastures, spinifex, saltbushes and bluebushes.	Possible
Dicruridae	*Dicrurus bracteatus* [2] Spangled Drongo		✓	Open woodlands, often on margins of lowland rainforests and vine scrubs, mangrove and paperbark swamps, riverside thickets and gardens in coastal regions of northern and eastern Australia.	Possible
Ardeidae	*Egretta garzetta* [2] Little Egret		✓	Freshwater and marine wetlands, foraging in shallows of open waters including swamps, billabongs, floodplain pools, mudflats and mangrove channels. Nomadic or migratory species breeding in trees in standing water.	Possible
Caprimulgidae	*Eurostopodus argus* [2] Spotted Nightjar		✓	Eucalypt, acacia and mulga woodlands favouring stony ridges.	Possible
Caprimulgidae	*Eurostopodus mystacalis* [2] White-throated Nightjar		✓	Forests, woodlands and heathlands, often among rocks, leaves and fallen timber.	Possible
Coraciidae	*Eurystomus orientalis* [2] Dollarbird		✓	Woodlands, open country, vegetated watercourses and farmlands.	Possible
Rallidae	*Gallirallus philippensis* [2] Buff-banded Rail		✓	Dense, damp vegetation around swamps, lakes, creeks, coastal lagoons, tidal mudflats, rainforest margins, moist paddocks and sewage farms.	Possible
Dicruridae	*Grallina cyanoleuca* [2] Magpie-lark		✓	Broad habitat range from semi-desert to forests close to water and trees for nesting.	Possible
Hirundinidae	*Hirundo neoxena* [2] Welcome Swallow		✓	Broad habitat range avoiding very heavy forests and the most arid of desert country.	Possible

Family Name	*Scientific Name** Common Name	Status**		Preferred Habitat	Likelihood of Occurrence^
		Mi	Ma		
Ardeidae	*Nycticorax caledonicus* [2] Nankeen Night Heron		✓	Swamps, lakes, billabongs, mangroves and tidal channels. Roosts in dense vegetation during the day.	Possible
Pelecanidae	*Pelecanus conspicillatus* [2] Australian Pelican		✓	Large or small areas of water from sheltered coastal bays to temporary pools in desert.	Possible
Rallidae	*Porphyrio porphyrio* [2] Purple Swamphen		✓	Wetlands, swamps and well vegetated lakes and river margins.	Possible
Cuculidae	*Scythrops novaehollandiae* [2] Channel-billed Cuckoo		✓	Rainforests, monsoon forests, eucalypt forest and woodlands, river-edge thickets and swamp woodlands.	Possible
Threskiornithidae	*Threskiornis molucca* [2] Australian White Ibis		✓	Shallow fresh and tidal wetlands and pastures, parks and gardens, rubbish tips.	Possible
Threskiornithidae	*Threskiornis spinicollis* [2] Straw-necked Ibis		✓	Swamps, irrigated pastures, wet or dry grasslands.	Possible
Halcyonidae	*Todiramphus macleayii* [2] Sacred Kingfisher		✓	Open forests, woodlands, margins of rivers, swamps and billabongs, mangroves, farmlands.	Possible
Halcyonidae	*Todiramphus sanctus* [2] Sacred Kingfisher		✓	Open forests, woodlands, semi-arid scrublands and mangroves.	Possible
Zosteropidae	*Zosterops lateralis* [2] Silvereye		✓	Broad habitat range from woodlands and forests to mangroves and coastal heath.	Possible

*Source: 1 – EPBC Protected Matters Search Report, 2 = DERM Wildlife Online. **Status: Mi = Migratory, Ma = Marine. ^Likelihood of Occurrence: Likely = suitable habitat mapped on site, Possible = sub-optimal habitat or preferred habitat components present on site, Unlikely = no suitable habitat present on site or well outside known range of taxon.