Preliminary Environmental Assessment

Kerrawary Power Station

15 MARCH 2011

Prepared for
Origin Energy

43177738

URS

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Executive Summary

This Preliminary Environmental Assessment (PEA) has been prepared under the Provisions of the Part 3A of the Environmental Planning and Assessment (EP&A) Act 1979 for a project to construct a nominally 1000 MW gas turbine power station, 60 km north-east of Goulburn. The purpose of this document is to provide sufficient information on the proposed project (hereafter known as the "Project") and its potential environmental impacts to allow the NSW Department of Planning (DoP) to issue environmental assessment requirements for project approval.

The Project proponent is Origin Energy Power Limited (Origin). Origin is Australasia's leading integrated energy company focused on gas and oil exploration and production, power generation and energy retailing. A leading producer of gas in eastern Australia, Origin is the largest owner and developer of gas-fired electricity generation in Australia, and is a leading wholesaler and retailer of energy and has a strong focus on ensuring the sustainability of its operations. Origin is the largest green energy retailer in Australia and has significant investments in renewable energy technologies.

Peak demand has steadily increased over the past decade and Origin is proposing this Project to anticipate continued growth in demand for electricity. The Project addressed in this PEA would also allow Origin to manage supply through effectively supplementing the renewable energy from sources such as wind. Origin identified the Kerrawary site from a shortlist of eight sites selected for proximity to the Moomba to Sydney Gas Pipeline, major transmission infrastructure and with consideration of significant environmental constraints. The site was selected due to proximity to the Bannaby substation, being a key node in the NSW electricity transmission system. The site also benefits from good visual separation from local residents, availability of water supply and adequate supply of flat land zoned rural or industrial.

The Project would include a gas pipeline, water pipeline, two stages of up to eight Open Cycle Gas Turbines (OCGT) and ancillary plant and infrastructure. A high voltage switch yard would also be included that would allow connection to the high voltage transmission network.

The Kerrawary Project is anticipated to cost approximately $1 billion based on Origin's similar Open Cycle Gas Turbine developments.

Environmental considerations that would be addressed in a full Environmental Assessment include impacts on air quality, noise amenity, greenhouse emissions, indigenous heritage, ecology, visual amenity, hazard and the impact of traffic on the existing road infrastructure. These assessments would address, as appropriate, impacts during construction and operation.

Upon receipt of the environmental assessment requirements, Origin Energy will prepare an environmental assessment addressing the Director General's Requirements once issued.

At this stage it is anticipated that the Project would not require the approval of the Commonwealth Minister for Sustainability, Environment, Water, Populations and Communities under the *Environment Protection and Biodiversity Conservation Act 1999*. However, further studies carried out as part of the Environmental Assessment would confirm this.

1

Introduction

1.1 Background

Origin Energy (Origin) is proposing to construct a nominal 1000 MW gas turbine power station in NSW, 60 kilometres (km) NE of Goulburn. The proposed Kerrawary Power Station (the Project) would be situated at a site near the Big Hill locality, 60 km north-east of Goulburn in the Upper Lachlan Shire Council area (refer to **Figure 1-1**). The 20 hectare (ha) Kerrawary site is on approximately 900 ha of land which has an extensive buffer zone around it. It is currently grazing land of an undulating character, mostly steep and rugged with cleared areas on the flatter grades. The area has proximity to both the Moomba to Sydney Gas Pipeline system and the TransGrid high voltage transmission network. The gas-fired power station would be connected to the grid at a purpose built 330 kV switching station and transmission lines located within the study area. This site has been selected to minimise the need to augment the existing transmission network, to optimise gas supply from Origin's own pipeline and with consideration for social and environmental impacts.

The selection of this site is in line with Origin's responsible long term development strategy to consolidate gas generation in one location, with a lower cumulative impact than numerous smaller generation sites located at acceptable points in the transmission system. Construction would take approximately two years and the power station would have a minimum design life of 30 years. The project will be constructed in stages. The proposed power station would consist of the installation of two to four "E" class turbines, or two "F" class units in the first stage. Each "E" class turbine would have a capacity of between 125 and 200 MW each run in open cycle mode, and each "F" class turbine would have a nominal generation capacity range between 200 and 300 MW. Further, additional open cycle gas turbine units would be installed in the power station to bring the maximum number of turbines to eight, and the nominal generating capacity to 1000 MW.

The power station would be supplied with gas through a dedicated 30 km underground gas pipeline leading from the Moomba Sydney Pipeline (MSP) system which would require an easement of approximately 25 m. Associated infrastructure would include a compression, metering and gas delivery station located at the connection point to the Moomba to Sydney Gas Pipeline and proposed power station, respectively. The gas storage provided by the 30 km distance from the Moomba to Sydney Gas Pipeline would allow the Kerrawary Power Station to operate independently from the gas supply network at times of peak gas demand. The gas pipeline easement may also be utilised to convey the required water supply. Access roads, as well as a transmission line easement from the proposed power station to the high voltage network would also be part of the Project.

Origin develops new power generation opportunities to capitalise on a growing market for electricity and renewable energy. The challenge for the Australian energy industry is to meet demand with generation capacity at least cost to the consumer and the environment. Gas fired peaking generation is likely to play an increasing role in balancing the intermittency of current renewable technology.

A gas-fired power station would produce less carbon emissions than a typical coal-fired power station when generating electricity.

N
W E
S

Bangadilly

Wollondilly River

Bannaby Substation

Tarlo River

Kerrawary Site

Tarlo River National Park

Big Hill

Canyonleigh

Road

Greenwich Park

Brayton Rd

Wollondilly River

Canyonleigh Rd

Brayton

Paddys River

Moomba to Sydney Gas Pipeline

Hume Hwy

Brayton Rd

Carrick

Main Southern Rly

Marulan

LEGEND:

- KERRAWARY SITE
- TRANSMISSION LINES*
- ROADS / TRACKS
- RAILWAY LINE
- WATERWAYS

Source: * Geosciences Australia 2010

0 5.000

kilometers

Client: ORIGIN ENERGY	Project: KERRAWARY POWER STATION PROJECT		Title: **LOCAL AREA MAP**
URS	Drawn: AO/SB	Approved: KT	Date: 02/05/2011
	Job No: **43177738**	File No: 43177738.001.wor	Figure: **1-1**

1.2 Proponent

Origin Energy is Australasia's leading integrated energy company focused on gas and oil exploration and production, power generation and energy retailing.

Listed in the ASX top 20, the company has approximately 4,400 employees, is a leading producer of gas in eastern Australia. Origin is Australia's largest energy retailer servicing 4.6 million electricity, natural gas and LPG customers accounts and has one of the country's largest and most flexible generation portfolios with more than 5,800 MW of capacity, through either owned generation or contracted rights.

Over the past decade, Origin Energy has grown through acquiring interests throughout Australia and New Zealand to become one of the leading suppliers of energy to homes and businesses throughout Australia, New Zealand and the Pacific. Origin has a strong focus on ensuring the sustainability of its operations, is the largest green energy retailer in Australia and has significant investments in renewable energy technologies. The Kerrawary Power Station project is aligned with Origin's pursuit of a portfolio of gas and renewable energy opportunities in Australia and abroad.

Origin's other NSW assets and developments include Uranquinty Power Station in Wagga, Cullerin Range Wind Farm near Gunning and the proposed Yass Valley Wind Farm.

Origin supplies natural gas, electricity and LPG to customers[1] across Australia, New Zealand and the Pacific. In Australia, Origin has a broad customer base including large industrial, commercial, small business and residential connections across metropolitan and regional areas. The recent completed acquisition of Integral Energy and Country Energy's retail businesses and the Eraring Energy Gen Trader arrangements, secures a leading position for Origin in NSW, the nation's largest energy market. Origin is the leader in green energy sales in Australia with more than 500,000 customers using GreenPower. Origin has three times as many GreenPower customers as its closest competitor and remains the only provider of a green gas product. Origin is also one of Australia's largest suppliers and installers of solar PV systems for domestic, commercial and industrial customers.

Within the NSW retail mass market, Origin's experience in retailing electricity, natural gas, serviced hot water and solar PV product to over 250,000 customers, ensures that NSW customer needs, regulatory compliance, community and business obligations and preferred industrial relations approaches are each understood and embraced

1.2.1 Project Development Expertise

Over the last decade, Origin has been a primary contributor to the development of new power generation facilities in markets in which it has a significant retail presence. This section describes recently completed and under construction projects in the areas of gas fired, coal, wind, geothermal and solar, demonstrating that Origin is committed to the development of renewable energy opportunities.

Recently completed and under construction projects are outlined in **Table 1-1**.

[1] Including Origin's subsidiary, Contact Energy Ltd, in which Origin has a 51.8% interest

1 Introduction

Table 1-1 Origin's recently completed projects and projects under construction

Project	Commissioning Date	Fuel Type	Generation Method	Nameplate Capacity	Location and Other Details
Quarantine power station	January 2009 (Brownfield Expansion)	Gas	OCGT	216MW (expansion was 120MW)	Origin currently owns and operates the Quarantine power station on Torrens Island, Adelaide, South Australia.
Cullerin Range wind farm	July 2009 (Greenfield)	Wind	Wind Turbine	30MW	Origin's first wind farm, Cullerin Range, successfully commenced renewable energy generation in 2009. Located 30 km west of Goulburn in NSW, Cullerin Range wind farm is one of the most competitive projects of its kind in Australia based on its high wind capacity.
Darling Downs power station	October 2009 (Greenfield)	Gas	CCGT	630MW	In 2007, Origin gained development and regulatory approval to build the 630MW Darling Downs power station, Australia's biggest CCGT power station. Commissioning was carried out in 2009 and following successful performance testing and reliability runs, commercial operations commenced on 1 July 2010. It is one of Australia's cleanest baseload power stations, emitting less than half of the greenhouse gas and requiring less than three per cent of the water used by a typical coal-fired power station of the same capacity. This project was developed on a site that was purchased by Origin as part of its acquisition of Sun Retail from the Queensland Government in 2007.
Uranquinty power station	January 2009 (Brownfield expansion)	Gas	OCGT	640MW	At the time Origin announced the acquisition of Uranquinty power station in July 2008, construction activity was well underway but Origin completed the project and achieved commercial operation on 1 January 2009, with all four of the station's open cycle gas turbine units coming online.
Kupe Gas Project NZ	April 2010 (Production field offshore)	Gas	Oil and gas production facility	n/a	The Kupe Gas Project was successfully commissioned in April 2010. The gas field lies approximately 30 km offshore southwest of Hawera (North Island) in New Zealand, in 34 m deep water.
Mount Stuart power station	December 2009 (Brownfield expansion)	Kerosene (Jet A-1)	OCGT	408MW (expansion was 120MW)	Origin currently owns and operates the Mount Stuart power station on the outskirts of Townsville in Queensland.

1 Introduction

Project	Commissioning Date	Fuel Type	Generation Method	Nameplate Capacity	Location and Other Details
Mortlake power station	Under Construction (Greenfield)	Gas	OCGT	550MW	Origin is constructing a 550MW gas-fired power station located 12 km west of Mortlake in western Victoria which will help to meet the growing and future demand for electricity in Australia and is expected to be commissioned during the 2011 calendar year.
Geodynamics	Under Construction (Greenfield)	Geothermal	n/a	n/a	Origin established a joint venture with Geodynamics to explore for shallow geothermal resources in the Eromanga Basin, with a focus on developing renewable energy generation. The joint venture will be operated by Origin.

Source: Origin, 2011

Origin has a potential gas-fired power station development portfolio of more than 3,670 MW. These gas options can be deployed in fuel switching from coal to gas and can be used to increase supply to retail markets.

Gas-fired development projects currently under consideration are shown in **Table 1-2.**

Table 1-2 Origin's gas development projects currently under consideration

Project	Fuel Type	Generation Method	Nameplate Capacity	Location	Development Type
Spring Gully	Gas	CCGT approved	1,000MW	Queensland	Brownfield Expansion
Darling Downs power station 2	Gas	OCGT approved	500MW	Queensland	Brownfield Expansion
Quarantine power station expansion	Gas	OCGT approved	120MW	SA	Brownfield Expansion
Mortlake power station stage 2	Gas	CCGT approved	550MW	Victoria	Brownfield Expansion
Mortlake power station stage 3	Gas	OCGT	500MW	Victoria	Brownfield Expansion
Kerrawary power station project	Gas	OCGT	1,000MW	NSW	Greenfield Development

Source: Origin, 2011

Development of renewable energy opportunities, including wind, geothermal and solar PV energy, continues to be a key component of Origin's generation strategy.

Wind Generation

Origin has a potential wind development portfolio of more than 3,400 MW. Key wind development projects currently under consideration are shown in **Table 1-3.**

1 Introduction

Table 1-3 Origin's wind development projects currently under consideration

Project	Fuel Type	Location	Development Phase	Development Type
Lexton wind farm	Wind	Victoria	Approved	Greenfield
Stock Yard Hill wind farm	Wind	Victoria	Approved	Greenfield
Yass Valley wind farm	Wind	NSW	In development stage	Greenfield
Collaby Hills wind farm	Wind	SA	In development stage	Greenfield

Geothermal

Origin continues to invest in the research and development of geothermal energy in the Innamincka region of central Australia. Origin entered into an agreement with Geodynamics to evaluate the potential of the shallower sections of the Cooper and Eromanga basins to complement Origin's existing arrangements to explore the potential of the deeper hot fractured rock zones. In addition, Origin entered into a new joint venture with Eden Energy to explore a large geothermal tenement adjacent to the Geodynamics tenements.

Solar

Origin has taken an important step forward with the development of solar photo-voltaic technology, establishing a joint venture with Micron Technology Inc of the United States. The joint venture, called Transform Solar, will examine opportunities for the commercialisation of large-scale solar photo-voltaic technology by combining Origin's solar research and development work with Micron's capabilities in semiconductors.

2 Project Need and Consideration of Alternatives

2.1 Project Need

The justification of the Kerrawary Power Project can be set out in three major factors:

- the status of the supply demand balance in NSW;
- the role of peaking generators to manage Origin's trading risk; and
- the influence of the Mandatory Renewable Energy Target scheme (and new wind variable wind generation).

During the next decade, NSW will experience growth in electricity demand that will exceed existing generation capacity. The TransGrid Annual Planning Report 2010 indicates that over the last 10 years the peak summer demand has increased by an average of about 340 MW per annum and peak winter demand by an average of about 190 MW per annum. TransGrid conclude that despite concerted efforts to curb demand through demand management initiatives, options still need to be developed to meet the expected demand growth to ensure reliability of supply to support the expected economic and population growth of New South Wales.

Open Cycle Gas Turbine plant is required to manage the trading risk in Origin's retail portfolio, with the plant operating at times of extreme temperature and demand events, to address volatility in the market due to conditions such as drought and reliability of existing plant in the region.

Origin estimates that the southern states will be required to deploy around 7,000 to 9,000 MW of wind generation in order to meet the Mandatory Renewable Energy Target. Growing demand for power between is forecast to be in the order of 7,000 MW between now and 2020. The fluctuations in wind speed and therefore wind generation provides an intermittent power source. A significant quantity of firm generation, such as coal plant spinning reserve, hydro and open cycle gas turbines will be required to balance out the intermittency of wind. The new build wind scenario will see open cycle gas turbine plant combining with wind to produce the lowest emissions intensive power generation.

2.2 Site Selection

The power station would be situated at a site located in NSW, 60 km north east of Goulburn near Big Hill in the Upper Lachlan Shire Council area. The detailed review of sites considered for the Origin Kerrawary Power Station Project in NSW was based on an assessment of key selection parameters including environment, infrastructure connections and land use.

Origin identified the Kerrawary site from a shortlist of eight sights selected for proximity to the Moomba Sydney Pipeline, major transmission infrastructure and significant environmental constraints. The site was selected due to proximity to the Bannaby substation, being a key node in the NSW transmission system. Other notable features of the proposal are:

- 330 kV transmission line traverses the property;
- the site is within a 30 km direct line to the Moomba Sydney Pipeline, sufficiently distant to provide linepack (gas storage) potential;
- the location and the topography of the proposed site provide a physical and visual separation from rural communities in the area;
- the 900 ha land holding containing significant areas of cleared land, with the power development site located on open agricultural land;
- a preliminary constraints analysis has indicated no notable environmental constraints on the site.

2 Project Need and Consideration of Alternatives

2.2.1 Availability of land

Based on known impacts of gas turbines and previous installations in Australia, land based factors which need to be considered include:

- the existence of adequate undeveloped land available for a power station site;
- land zoning compatible with the proposed development; and
- adequate separation from sensitive neighbours such as existing residential housing.

These issues are generally satisfied by potential site locations which:

- contain areas greater than 100 ha that are reasonably flat and level;
- are zoned industrial or rural; and
- are ideally located more than 3 km from existing residential housing.

The proposed location is on a 54 ha portion of land on which the final site foot print of approximately 20 ha would be located. This 54 ha portion is located on approximately 900 ha of land providing an extensive buffer (refer **Figure 2-1**).

N
W E
S

Tarlo River

Wollondilly River

LEGEND:

- KERRAWARY SITE
- POTENTIAL POWER STATION FOOTPRINT OPTIONS
- TRANSMISSION LINES*
- WATERWAYS

Source: * Geosciences Australia 201)

0 1.000

kilometers

Client: ORIGIN ENERGY	Project: KERRAWARY POWER STATION PROJECT		Title: INDICATIVE FACILITY LOCATION
URS	Drawn: AO	Approved: KT	Date: 02/05/2011
	Job No: **43177738**	File No: 43177738.011.wor	Figure: **2-1**

2.2.2 Gas and Electricity Network Connection

The area was selected due to its proximity to both the Moomba to Sydney Gas Pipeline system and the TransGrid high voltage transmission network. The power station would be connected to the grid through a new purpose built 330 kV switching station and transmission lines located within the study area.

2.2.3 Availability of water

Potential sources of water being considered for the proposal include:

- drinking water (or raw water) sourced from the Wingecarribee reservoir;
- drinking water from a pipeline from Marulan Water Treatment Plant (WTP);
- reclaimed water from a pipeline from Moss Vale Sewage Treatment Plant (STP); and
- reclaimed water from the Taralga STP.

Origin will evaluate the supply options during the assessment period according to the following criteria:

- volume of water available for use (daily, monthly and yearly); and
- quality of the water and the treatment requirements.

2.3 Technology Selection Criteria

Electricity demand typically fluctuates throughout the day, meaning that power networks are not in constant supply. Power demand relies largely on the time of the day or week, and can also vary significantly throughout the seasons.

During winter months, peak power demand usually occurs early to mid-morning, can continue during the day and recede in the early evening. During summer months, there is typically a significant spike in demand in the late afternoon and early evening. Peak load power plants also play a significant role in covering outages of base load plant; periodic increases in demand; and utilisation of excess quantities of gas from the market. Any of these events can require OCGT plant like Kerrawary Power Station to operate at higher capacity factors, including overnight and 24 hour, continuous operation.

Origin has selected Open Cycle Gas Turbines (OCGT) for the Kerrawary Power Station Project to meet the peak electricity demands. Peak generators typically require fast start capabilities (approximately 10 - 20 minutes for gas fired generators) allowing them to respond quickly and reliably to peaks in demand to ensure supply security. The Kerrawary Power Station Project will consider a wide range of Gas Turbine options from a variety of manufacturers. The ultimate selection will be based on the most appropriate machine that satisfies the criteria of the project.

The most common machines used for peaking stations are E class machines due to their fast starting capability. Although this is the case, F class machines are becoming more widely used for this application as new model variants become more proven and reliable.

Given the limited hours of operation associated with an OCGT, it is critical to minimise capital costs. This is partially achieved in locating such plants in close proximity to both existing sources of fuel and connection into the transmission network. Both of these apply for this development.

3

Project Description

3.1 Study Location and Existing Land Uses

3.1.1 Overview of study area

The Kerrawary site is located 60 km north east of Goulburn in NSW on approximately 900 ha of land with an extensive buffer zone around it.

3.1.2 Geographical boundaries

There are three relevant Local Government Areas (LGAs) for the Project: Upper Lachlan Shire Council; Goulburn-Mulwaree Council; and Wingecaribee Shire Council. The Project site is situated within the Upper Lachlan LGA, and the closest town is Marulan which is located within the Goulburn-Mulwaree LGA. The Wingecaribee LGA is located to the east of the Upper Lachlan LGA and borders the Project site.

3.2 Site Description

Table 3-1 describes the lots affected or potentially affected by the Project footprint.

Table 3-1 Lots affected or potentially affected by the Project footprint

Lot identifier	Comment	Proposed Use
Lot 4, 81 and 88 DP750023,	Approximately 20 ha required for Facility footprint. Origin has purchased an interest in the property.	Facility footprint
Lots A and B DP 386504, Lot 80 and 85 DP 750023		Traversed by access road / infrastructure corridor
Refer to **Figure 3-1** for the area of consideration for location of infrastructure.	Currently negotiating with landowners. Refer to **Section 3.5.1** for criteria for selection.	Part infrastructure (gas, water, transmission connection, access road)

N
W E
S

Bangadilly

Wollondilly River

Bannaby Substation

Tarlo River

Kerrawary Site

Wingecarribee

Tarlo River National Park

Big Hill

Canyonleigh

Upper Lachlan Shire

Road

Brayton Rd

Greenwich Park

Wollondilly River

Canyonleigh Rd

Goulburn Mulwaree

Paddys River

Brayton

Moomba to Sydney Gas Pipeline

Hume Hwy

Brayton Rd

Carrick

Marulan

LEGEND:

- KERRAWARY SITE
- TRANSMISSION LINES*
- ROADS / TRACKS
- RAILWAY LINE
- WATERWAYS
- LOCAL GOVERNMENT AREA^
- PROPOSED PIPELINE CORRIDOR ASSESSMENT AREA
- TRANSMISSION LINE OPTIONS

Source: * Geosciences Australia 2010
^ ABS 2006 - Australian Bureau of Statistics

0 5.000
kilometers

Client	Project	Title
ORIGIN ENERGY	KERRAWARY POWER STATION PROJECT	**AREA OF CONSIDERATION FOR GAS PIPELINE AND ELECTRICITY TRANSMISSION LINE**

URS

Drawn: AO/SB	Approved: KT	Date: 02/05/2011
Job No: **43177738**	File No: 43177738.012.wor	

Figure: **3-1**

3.3 General Layout of the Power Station

The Power Project comprises the following key components:

- Facility:
  - power plant comprising up to eight gas turbines, generators and ancillary plant;
  - high voltage switchyard comprising high voltage transformers, switchgear and communications equipment;
  - transmission line connection to the 330 kV network;
  - oil separation and catchment tank
  - control room, administration, amenities, car parking and workshop facility;
  - connecting gas pipelines, gas receiving station and gas conditioning station;
  - fire protection tank;
  - process water tank;
  - lined process water dam;
  - domestic/rainwater tank(s);
  - domestic wastewater treatment and disposal system;
  - sedimentation pond and associated earth bund and diversion drain;
  - evaporation pond to accommodate waste water discharges from the evaporative air inlet cooler;
  - air compressor plant;
  - switch room;
  - emergency generator and transformers;
  - landscaping and tree planting to provide visual screening of the facility;
- Infrastructure within the Site:
  - internal roads;
  - lateral gas pipeline;
  - Pressure Reduction Metering Station (PRMS);
  - transmission connection to existing transmission lines;
  - 40 m microwave communication tower;
  - access road for the Facility;
  - water supply pipeline; and
  - security and general fencing and gatehouse.
- Infrastructure beyond Site:
  - lateral gas pipeline from the Site to the Moomba to Sydney Gas Pipeline;
  - gas off-take, compressor station and Pressure Reduction Metering Station (PRMS) at the connection with the Moomba to Sydney Gas Pipeline;
  - water pipeline and associated infrastructure; and
  - high voltage transmission infrastructure to the Bannaby substation located to the north of the site.

3.4 Gas turbines

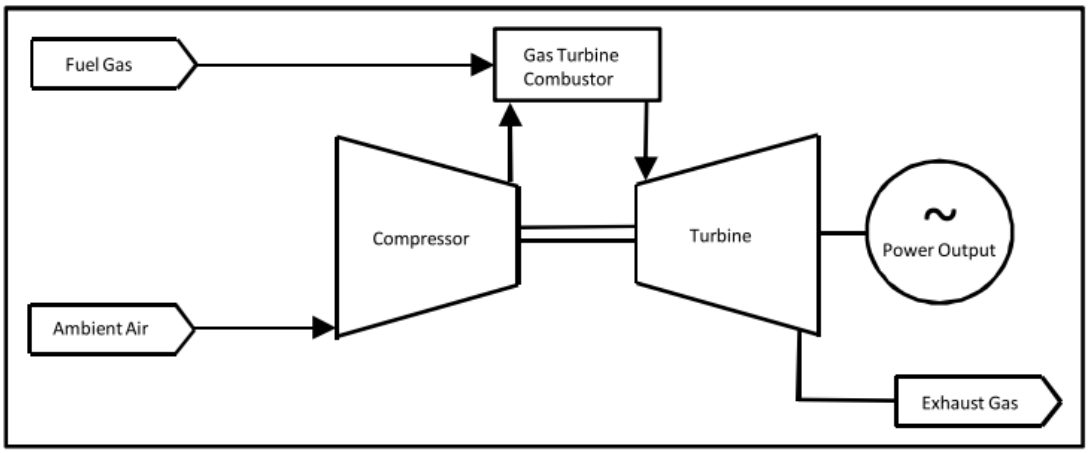
The main components of an OCGT plant can be seen in **Figure 3-2**. These components include the gas turbine, exhaust stack, transformer and generator.

3 Project Description

The steps of operation for a gas turbine are outlined below:

1. Air is drawn into the compressor.
2. The air is compressed and mixed with fuel (i.e. natural gas).
3. The fuel/air mixture is then burnt in the combustion chamber.
4. The hot, high pressure gas is then run through the turbine section of the gas turbine, turning the shaft.
5. The shaft turns the compressor and electrical generator.
6. Exhaust gas exits the gas turbine from the turbine and out the stack to the atmosphere.

Figure 3-2 Schematic of open cycle gas turbine



As the plant would only be run during peak times a multiple turbine configuration will be installed to increase reliability.

Origin's selection criteria for design of turbines are:

- best available control technology for air emissions and noise; and
- low emission generation technology – greenhouse gas emissions.

3.5 Linear Infrastructure

3.5.1 Gas Pipeline

The project would include construction of an underground gas transmission pipeline to provide a gas supply to the proposed power station and associated infrastructure including metering and gas delivery stations located at the connection point to the Moomba to Sydney Gas Pipeline and proposed power station, respectively. The instantaneous gas storage provided by the additional distance from the Moomba to Sydney Gas Pipeline would allow the power station to operate independently from the gas supply network at times of peak gas demand. Origin's selection criteria for location and design of the pipeline are:

- individual landowner preferences;
- local community and land use;
- constructability, pipeline diameter, pipeline material considerations; and
- planning and environmental considerations.

Origin is currently identifying options for the gas pipeline route.

3.5.2 Transmission Line Connection and Access

A range of potential connection strategies are currently being considered. Origin is currently identifying options for the connection into the Bannaby substation by either connecting to the existing transmission line or building a new transmission line (located adjacent to the existing transmission line) from the power station to the substation (refer to **Figure 3-1**).. Consultation with TransGrid will determine feasibility of connection options. The transmission connection and associated infrastructure will be assessed further.

3.5.3 Water Pipeline

The project would include the construction of a water pipeline/s to service the power station's water requirements. The pipeline/s are to connect one or more of the sources as mentioned in **Section 2.2.3** to the power station. Depending on the water source, the water pipeline may be able to be collocated in the same easement as the gas pipeline.

Origin's selection criteria for the design and location of the water pipeline are:

- environmental impact of the infrastructure required to supply the water to the power station;
- cost of the infrastructure , including the pipeline and treatment facility;
- constructability of the infrastructure;
- impact on the local community and land use;
- synergies with other infrastructure for the power station; and
- waste management implications for the power station.

Origin is currently identifying options for the water pipeline.

3.6 Project Cost Estimate

The Kerrawary Project is anticipated to cost approximately $1 billion based on Origin's similar Open Cycle Gas Turbine developments.

4

Planning Considerations

4.1 Introduction

Approval of the Kerrawary Power Station Project is subject to compliance with the provisions of both NSW and Commonwealth planning and environmental law. While a comprehensive assessment of all relevant planning provisions will be undertaken as part of the detailed Environmental Assessment for the Project, the information presented below provides a general assessment against the appropriate State and Commonwealth Acts and Environmental Planning Instruments.

4.2 Planning Framework and Statutory Requirements

4.2.1 NSW Planning Legislation

The *Environmental Planning and Assessment Act 1979* (EP&A Act) and its supporting Regulation, the *Environmental Planning and Assessment (EP&A) Regulation 2000*, provide the framework for the assessment and approval of proposed developments within NSW. Assessment provisions are provided in three parts of the EP&A Act, Part 3A, Part 4 and Part 5.

The proposed development for the purpose of gas fired power stations falls under the provisions of Part 3A of the EP&A Act. Part 3A of the EP&A Act provides a process for the assessment of developments, which are considered to be “Major Projects” as declared by State Environmental Planning Policy 2005 (SEPP) Major Projects or by order of the Minister in the Government Gazette.

If a project has been declared as a Part 3A project, the Minister can make an additional declaration that the project is also a "critical infrastructure project" if the Minister is of the opinion that the project is essential for the State for economic, environmental or social reasons.

State Environmental Planning Policy (Major Development) 2005

The Major Projects SEPP provides that development referred to as a ‘Major Project’ requires assessment and approval of the Minister for Planning in accordance with Part 3A of the EP&A Act. The Major Projects SEPP defines certain types of development as comprising major projects.

The provisions of Schedule 1 of the Major Projects SEPP pursuant to clause 24(a). Clause 24 (Electricity Generation) provides that a major project is development for the purpose of a facility for the generation of electricity or heat or their co-generation (using any energy source, including gas, coal, bio-fuel, distillate and waste and hydro, wave, solar or wind power), that:

- has a capital investment value of more than $30 million, or
- has a capital investment value of more than $5 million and is located in an environmentally sensitive area of State significance.

The proposed works comprise gas fired electricity generation and would have a capital investment of over $30 million and therefore the proposal is considered a Major Project by virtue of Clause 24(a) of Schedule 1 of Major Projects SEPP.

4 Planning Considerations

Critical Infrastructure Projects

On 26 February 2008 the Minister for Planning declared certain power generating facilities to be 'critical infrastructure projects' being development that has capacity to generate at least 250 MW and is the subject of an application lodged pursuant to Section 75E or Section 75M of the EP&A Act prior to 1 January 2013.

The Project has the capacity to generate in excess of 250 MW and it is understood that an application would be lodged for the Project pursuant to Section 75M prior to 1 January 2013.

Therefore the project is considered to fall within the definition of a critical infrastructure project.

4.2.2 Environmental Planning and Assessment Regulations 2000

Clause 8F of the Environmental Planning and Assessment Regulations 2000 outlines the requirements for owner's consent or notification.

- Section 8F (1) states that for a critical infrastructure project or a linear infrastructure project consent of the owner of the land on which a project is to be carried out is not required.
- Section 8F(3) requires that where consent is not required the proponent is required to give notice to the landowner of the application.

For a critical infrastructure project, notice needs to be given to the landholder within 14 days after the application is made.

For a linear infrastructure project or a project that relates to land with multiple owners notice is to be given to the public by advertisement published in a newspaper circulating in the area of the project before the start of the public consultation period for the project.

4.2.3 Other Acts

While the EP&A Act provides the framework for the planning and development approvals system within NSW, there are several other Acts and Regulations which must be considered. While the Integrated Development provisions do not apply to Part 3A projects, the provisions of these Acts still need consideration in the preparation of the Environmental Assessments.

Relevant Acts include:

- ***Protection of the Environment Operations Act 1997*** – The Protection of the Environment Operations (POEO) Act 1997 relates to pollution and waste disposal in NSW and provides for the licensing of certain types of pollution caused by development or operation of developments. It is anticipated that the proposed facility would require licensing under the provisions of the POEO Act.
- ***Water Management Act 2000*** – provides for the protection of river and lakeside land in NSW, formerly held under the River and Foreshore Improvements Act 1948 for areas covered by a Water Sharing Plan. The proposed site is located approximately 2km from the Talo River and 4 km from the Wollondilly River. Under the WM Act it is necessary to consider any development within 40 metres of any watercourse onsite, and DoP and the Department of Natural Resources would need to consider this in the preparation of the Major Project Environmental Assessment for the final option.
- ***Threatened Species Conservation Act 1995*** – provides for the conservation of threatened species, populations and ecological communities of animals and plants. It provides a framework for the assessment of any action that may impact on threatened species.

- ***Waste Avoidance and Resource Recovery Act 2001*** – aims to encourage the most efficient use of resources, to reduce environmental harm and to provide for the continual reduction in waste generation in line with the principles of ecological sustainable development.
- ***Heritage Act 1977*** – provides for the protection of items of local, regional and State heritage significance. It contains a list of State Heritage Items and outlines processes assessment of development which may impact items of heritage significance.
- ***Native Vegetation Act 2003*** – provides for the conservation of native vegetation through the prevention of inappropriate clearing and promotion of rehabilitation practices. For developments being considered under Part 3A (section 75U(e)) of the Environment Planning and Assessment Act, section 12 the Native Vegetation Act does not apply.
- ***The Roads Act 1993 –*** Section 138 of the Roads Act 1993 requires consent for certain action in relation to public and classified roads including disturbing the surface of a public road. Should the project or any ancillary component there of impact the surface of any public road, a permit may be required.
- Preliminary investigations have indicated that licences/approvals may also be required under the ***Occupational Health & Safety Regulation 2001, Electricity Supply Act 1995, Pipelines Act 1967***.
- ***National Parks and Wildlife Act 1974 –*** provides for the preservation of land and the protection of that land, as well as the protection of flora and fauna and Aboriginal heritage. For approved projects under Part 3A (s75U(d)) of the Environment Planning and Assessment Act, a permit under section 87 or a consent under section 90 does not apply.
- ***Noxious Weeds Act 1993 –*** All private landowners, occupiers, public authorities and councils are required to control noxious weeds on their land under Part 3 Division 1 of the NW Act.

4.2.4 State Environmental Planning Policies

State Environmental Planning Policies (SEPPs) are planning instruments under the EP&A Act that address more specific planning matters, where it is not considered appropriate for the Act to provide the detail.

According to section 75R(3) of the EP&A Act, environmental planning instruments, approval for a project may (but is not required to) take into account the provisions of any environmental planning instrument for projects subject to Part 3A of the Act.

This section addresses SEPPs other than the Major Projects SEPP discussed above.

SEPP 33 Hazardous Industries

This applies to development for the purpose of potentially hazardous industries, and potentially offensive industries. The proposed development would constitute a potentially hazardous and offensive industry as defined under clauses 3 and 4 of SEPP 33.

As SEPP 33 would apply the Minister must consider the proposal within the context of its compliance with current circulars and or guidelines published by the DoP and Australian Standards relating to hazardous or offensive development.

4 Planning Considerations

SEPP 44 Koala Habitat Protection

This Policy aims to 'encourage the proper conservation and management of areas of natural vegetation that provide habitat for koalas to ensure a permanent free-living population over their present range and reverse the current trend of koala population decline:

a) by requiring the preparation of plans of management before development consent can be granted in relation to areas of core koala habitat, and
b) by encouraging the identification of areas of core koala habitat, and
c) by encouraging the inclusion of areas of core koala habitat in environment protection zones.

The policy potentially applies to land in the Upper Lachlan LGA, Goulburn-Mulwaree Council and Wingecaribee Shire Council as listed under Schedule 1 of SEPP 44.

Given the presence of remnant native woodland, there is the potential for Koala habitat to be present in the study area. The presence or absence of Core Koala habitat would be assessed during the flora and fauna investigations.

4.2.5 Regional Environmental Plans

According to section 75R(3) of the EP&A Act, environmental planning instruments, approval for a project may (but is not required to) take into account the provisions of any environmental planning instrument for projects subject to Part 3A of the Act.

Drinking Water Catchments Regional Environmental Plan No. 1

The Regional Environmental Plan addresses the environmental, social and economic future of the catchments that supply drinking water to Sydney, Blue Mountains and the Illawarra extend over 16,000 square kilometres of land. The plan commenced on 1 January 2007 and repealed State Environmental Planning Policy 58 - Protecting Sydney's Water Supply.

As the project is proposed to be assessed under Part 3A of the EP&A Act, this REP does not strictly apply to the development however the site is located within the Sydney Water Drinking Catchment to which the plan applies. The plan aims:

a) to create healthy water catchments that will deliver high quality water while sustaining diverse and prosperous communities, and
b) to provide the statutory components in Sustaining the Catchments that, together with the non-statutory components in Sustaining the Catchments, will achieve the aim set out in paragraph (a), and
c) to achieve the water quality management goals of:
    (i) improving water quality in degraded areas and critical locations where water quality is not suitable for the relevant environmental values, and
    (ii) maintaining or improving water quality where it is currently suitable for the relevant environmental values.

An assessment of these aims and the manner in which the proposal satisfies them would be undertaken as part of the Environmental Assessment. Other projects in the region have demonstrated that Sydney Catchment Authority (SCA) requires buffer distances for any soil, water, waste water and/ or water effluent management structures. SCA would likely require that these structures be located beyond 150 m from the Wollondilly River, 100 m from any creek, and 40 m from any drainage depression. Origin Energy are striving to avoid the location of any project component within these buffer zones and are committed to open dialogue with SCA throughout the design stage of the Project.

4.2.6 Local Environmental Planning Instruments

There are potentially three Local Government Areas (LGAs) which may apply to the Project, depending on proposed infrastructure easement routes. The Kerrawary Site itself is located wholly within the Upper Lachlan Shire Council area. The infrastructure easement from the Site to the Moomba to Sydney gas pipeline is likely to traverse the Goulburn Mulwaree LGA. Land east of the Wollondilly River would fall under the Wingecarribee LGA. Easement routes have not been defined as yet, however a route selection assessment is underway. Consideration of local legislation for the purposes of the ancillary infrastructure route will continue as the Project progresses.

4.2.7 Upper Lachlan Shire Council Local Environmental Plan 2010

The Upper Lachlan Local Environmental Plan 2010 commenced operation 9th July 2010. The site is Zoned Rural Landscape RU2 under the Upper Lachlan Local Environmental Plan 2010.

Zone RU2 Rural Landscape

Objectives of zone are;

- to encourage sustainable primary industry production by maintaining and enhancing the natural resource base;
- to maintain the rural landscape character of the land;
- to provide for a range of compatible land uses, including extensive agriculture;
- to preserve environmentally sensitive areas including waterways and prevent inappropriate development likely to result in environmental harm;
- to protect the Pejar catchment area from inappropriate land uses and activities and minimise risk to water quality;
- to minimise the visual impact of development on the rural landscape;
- to minimise the impact of development on the existing agricultural landscape character;
- to protect and enhance the water quality of watercourses and groundwater systems and to reduce land degradation; and
- to maintain areas of high conservation value vegetation.

The proposed development is permissible subject to the granting of consent by the relevant consent authority. However, section 75R(3) of the EP&A Act provides that environmental planning instruments (other than State environmental planning policies) do not apply to or in respect of an approved project.

4.3 Commonwealth Legislation

Under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), approval from the Commonwealth Minister for Sustainability, Environment, Water, Populations and Communities is required for an action that is:

- likely to have a significant impact on a “matter of national environmental significance”;
- carried out on Commonwealth land and is likely to have a significant impact on the environment;
- carried out outside of the Commonwealth land and is likely to have a significant impact on the environment on Commonwealth land; or
- carried out by the Commonwealth government.

4 Planning Considerations

The EPBC Act provides for the establishment of Bilateral Agreements between the Commonwealth and a State or Territory to accredit existing development assessment and approval processes. Such a bilateral agreement was made between the NSW Government and the Commonwealth in January 2007 to cover the assessment components of development/activity related proposals under Parts 3A, 4 and 5 of the EP&A Act.

It is anticipated that the Project would not require the approval of the Commonwealth Minister for Sustainability, Environment, Water, Populations and Communities. However, further studies carried out as part of Environmental Assessment would confirm this.

4.3.1 Matters of National Environmental Significance

The EPBC Act identifies seven matters of National Environmental Significance (NES):

- Act World Heritage properties
- National heritage places
- Wetlands of international importance (Ramsar wetlands)
- Threatened species and ecological communities
- Migratory species
- Commonwealth marine areas
- Nuclear actions (including uranium mining)

A search of the EPBC Act Protected Matters database has revealed that the site is not located within a World Heritage area, a Commonwealth marine environment, nor does the proposed development involve nuclear activities. The preliminary review of the database revealed that threatened ecological communities, threatened species, migratory species may occur on the site.

5

Key Environmental and Social Issues

5.1 Introduction

This section provides a preliminary assessment of environmental impacts and matters for further consideration. The matters referred to in this section comprise a preliminary assessment identifying the likely environmental issues, in accordance with DoP guidance.

All potential environmental impacts associated with the proposed Project will be mitigated and managed through the design process and in accordance with a Site Environmental Management Plan for both the construction and operational phases.

5.2 Consultation

In order to undertake a comprehensive Environmental Assessment of the proposed Kerrawary Power Station Project, Origin respects the rights and interests of the community and will assess those issues of greatest significance to the local environment, neighbouring landowners and the wider community. To ensure this occurs, a program of community and Government consultation commenced in December 2010 to identify any concerns.

The objectives of the community consultation program are to notify and inform the community of the proponent's proposal and encourage the provision of feedback to assist in the identification of key environmental and community issues.

A range of consultative and assessment mechanisms are being implemented to engage the community, from the preliminary environmental assessment stage and throughout the preparation of the Environmental Assessment, as outlined below:

- newsletters distributed to the community;
- letters distributed to regulatory stakeholders;
- scheduling a Planning Focus Meeting;
- a website (kerrawarypowerstation@originenergy.com.au);
- a dedicated contact number (1800832233);
- a regional Community Relations Advisor to liaise with the affected community; and
- one on one meetings with landowners in the region held with Project Executive, Environmental Advisor, Project Engineer, Safety Advisor and Community Relations Advisor according to area of interest.

5.3 Land use and Topography

The Project is located in rural NSW. The nearest settlement is Marulan which is approximately 20 km to the south and is located on the Hume Highway. The current land use at the site is pastoral land, and the site of the proposed works is largely level.

5.4 Soils and Geology

The physical nature of the existing soils and subsurface geology will be determined during the assessment. These qualities will be assessed to assist in developing the design of the proposed facility and indentify control measures required during construction to reduce adverse environmental impacts. Geotechnical investigations have commenced at the site and will inform the design process.

5.5 Noise Assessment

The proposed Kerrawary Power Station Project includes the construction period typified by daily vehicle movements to the site, operation of construction machinery and vehicles; and operating noise from plant and equipment such as turbines, pumps and associated plant and equipment. The noise assessment will take into consideration the topography of the area, background levels, meteorological conditions and noise mitigation devices on proposed equipment.

The potential noise impacts of the proposed development relating to construction and operational noise will be further investigated during the Environmental Assessment process.

5.6 Air Quality and Greenhouse Gas Emissions

When operational, the Kerrawary Power Station Project would generate air emissions. All power stations emit the products of combustion through exhaust stacks which typically include oxygen, nitrogen, carbon dioxide, nitrogen oxides and trace levels of carbon monoxide and sulphur dioxide. Key criteria for selection of turbines include the best available control technology available for air emissions. An assessment will be carried out as part of the Environmental Assessment to model the dispersion of emissions from the power station.

There are no residential buildings within 3 km of the site, with the nearest significant grouping of residences at Marulan, approximately 20 km south of the site. Odour emissions from the operation of the Kerrawary Power Station Project are not anticipated to impact on the amenity of these areas. Accordingly, it is not proposed to undertake detailed modelling of potential odour emissions.

An air quality assessment will be undertaken together with an evaluation of the anticipated quality and quantity of emissions to the atmosphere as a result of the construction and operation of the proposed Kerrawary Power Station Project. The extent of this impact and potential mitigation measures will be identified during the assessment process. An assessment of greenhouse gas emissions will also be undertaken with the level of emission compared to the average emission intensity for electricity generation for NSW.

Additionally, a plume rise assessment will also be undertaken for the Project.

5.7 Traffic and Transport

Initial investigations have been undertaken to consider the possible access routes for the Site, analysing in particular, the way in which heavy loads would be able to use these particular roads.

The proposed site is within close proximity to Losebys Road which stems from Brayton Road. Brayton Road stems north from the Hume Highway. During operation, the Project would require very small number of traffic movements directly off Losebys Road.

During the construction phase of the Project, upgrade work is likely to be required to the existing routes to the Project site in order to allow the component parts to be delivered safely. These works may include improvements to bridges over waterways and railways as well as correcting the horizontal and vertical curve of some of the rural roads. Traffic investigations to date indicate it may be necessary to construct a 3 km extension to the existing road network in order to reach the Site, depending on which access route is progressed. It may also be necessary to provide traffic management during the movement of large vehicles such as those needed to transport gas turbines.

Consultation has established that the condition of the roads leading to the Site are of a particular concern to the local residents around Big Hill. Community consultation has identified that road safety improvements would be required to enable safe access to the Site, and would be received by the local community as a valuable contribution and necessary for the ongoing safety of the community.

An assessment of the potential traffic generated by the construction and operation of the development would be carried out as part of the Environmental Assessment. Once the potential impacts from the Project on the local road network are fully understood, appropriate mitigation measures would be incorporated into the Project to address these impacts.

5.8 Visual and Landscape Assessment

The Site is located in a remote, rural setting with topographical features, providing a physical and visual separation from rural communities in the area.

A visual assessment of the final infrastructure locations proposed would be carried out as part of the Environmental Assessment. Design options such as the height, bulk and scale of the buildings and structures, tree planting, colour schemes and choice or materials will be considered during the design phase of the project

The extent of this impact on the existing visual character and quality of the surrounding area together with potential mitigation measures will be addressed during the detailed Environmental Assessment phase.

5.9 Hazard and Risk Analysis

The operation of the Project may result in the potential for isolated risks and hazards. Origin intends to undertake a hazard identification for the Project and a process hazard analysis will be completed during the design stage. A quantitative risk assessment for the Project will be conducted in accordance with *Hazardous Industry Planning Advisory Paper No.4* (Department of Urban Affairs and Planning). Specific attention will be given to mitigation of risks on the health and safety of the workforce and local community.

The risks and hazards outlined in the assessment would be generally in accordance with the provisions of *State Environmental Planning Policy 33 – Hazardous and Offensive Development*. It is anticipated that this assessment would assist in identifying the scope and nature of control measures including emergency and fire response plans, fire and rescue training and natural disaster contingency plans.

A preliminary hazard analysis (PHA) would be undertaken as part of the Environmental Assessment, in accordance with the provisions of SEPP 33.

5.10 Water

The Project would have water process requirements for power generation. Water may also be required for inlet air cooling (to optimise hot weather operational efficiency) and control of air emissions (for environmental compliance).

Preferred water sources are identified in the project description in **Section 2.2.3**.

During the construction and operation of the phases of the development, surface water runoff from the site would have the potential to impact surrounding water bodies. To address these issues, an assessment of potential water quality and surface water issues would be undertaken for the site. Consultation would be carried out with all relevant authorities to ensure that the proposed development complies with the relevant guidelines and legislation. Mitigation measures would be recommended to address any potential impacts identified on surrounding water bodies, with particular consideration of maintaining adequate buffers from waterways forming part of Sydney's drinking water catchment.

5.11 Waste

The power station would not generate significant quantities of waste during its operation. Origin will consider waste management strategies to deal with the different wastes from the site. The strategies will endeavour to reduce the volume of traffic to and from the site, by considering the construction of a waste water pipeline to a local water treatment plant.

Oil bunds would be designed to Australian Standards and operated according to government regulations. The design and management of sewage and grey water systems would be in also in accordance with relevant standards and regulations.

5.12 Heritage

The Project would be constructed on land that has been previously cleared for agricultural purposes. Whilst the likelihood for items of indigenous and non indigenous heritage significance being present on the site is considered to be low, a cultural heritage assessment would be undertaken for the proposed site and immediate surrounds.

A preliminary desk based survey, consulting AHIMS web search, was conducted over an area of GDA Zone 56, Easting 225000 – 234000 Northing 6161000 – 6186000 with a buffer of 50 m. The search identified 44 Aboriginal sites.

A more extensive search identified 43 sites in the study area (some sites listed in the AHIMS search are located at the same location although it is unable to be determined at this level of investigation if these sites are the same site). All of these sites except one are open artefact scatters or isolated finds. One site (52-4-0262) is an earth mound.

A detailed heritage assessment would be carried out, including consultation with local indigenous groups in order to address potential impacts on heritage for the Project.

5.13 Flora and Fauna

The power station is proposed in an area that has been extensively cleared for agricultural purposes. Preliminary database investigations to date have identified known or likely threatened animal or plant species within the broader locality. Potential ecology constraints identified at the desktop level have informed the pipeline route options being further assessed.

The existence of isolated but significant tracts of native bushland in the locality have the potential to provide habitat for vulnerable or endangered species as well as many other native and exotic species. The current state of the proposed Project site as pastoral land provides limited habitat value in comparison to surrounding scrubland.

Detailed ecological investigations would be carried out to inform the Environmental Assessment for the Project.

5.14 Social and Economic

The Project is likely to have positive impacts on the existing social and economic environment of the area, in particular, for the towns of Marulan, and Goulburn as well as the regional community adjacent to the proposed Kerrawary site. The construction phase would involve the expenditure of a significant proportion of the estimated total project cost on local goods and services and generate associated employment. The operation of the power station would generate, albeit at a lower level, ongoing expenditure and employment opportunities for local communities.

The Environmental Assessment will include an analysis of the social impacts that the Project would have on local and regional industries, employment, infrastructure and demography. Origin has undertaken preliminary social impact studies to inform the community consultation process and to inform the development of the Project.

6

Conclusion

Origin is proposing to construct a peaking power station with a nominal capacity of 1000 MW approximately 60 km north east of Goulburn in NSW known as the Kerrawary Power Station Project.

The proposed development would assist in meeting critical peak demand in the regional and inter regional electricity grid. The operation of the facility would be intermittent as it is a peaking power plant.

This document acts as a formal request to the DoP to issue environmental assessment requirements for the Project. The preliminary environmental assessment of the proposal outlined in this document indicates that given the remote location of the proposed facility, the key environmental issues associated with the proposal comprise potential greenhouse gas emissions, impacts on air quality, heritage and potential ecological impacts. These issues would be assessed in detail as part of the environmental assessment of the proposal.

Upon receipt of the environmental assessment requirements, Origin will prepare an Environmental Assessment and submit the assessment to the DoP in support of this Project Application to construct and operate the proposed Kerrawary Power Station Project.

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