Linc Energy UCG/CTL and Power Generation Project

Chinchilla

INITIAL ADVICE STATEMENT

- December 2006

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Sinclair Knight Merz
ABN 37 001 024 095
369 Ann Street, Brisbane 4000
PO Box 246
Spring Hill QLD 4004 Australia
Tel: +61 7 3244 7100
Fax: +61 7 3244 7305
Web: www.skmconsulting.com

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Abbreviations

AUD	Australian Dollars
bpd	Barrels per day
CTL	Coal to Liquids
EMP	Environmental Management Plan
EIS	Environmental Impact Statement
EPC	Exploration Permits for Coal
EPA	Queensland Environmental Protection Agency
CTL	Gas to Liquid
IAS	Initial Advice Statement
MDL	Mineral Development License
ppm	Parts per million
RNE	Registered National Estates
SDPWO Act	*State Development and Public Works Organisation Act 1971*
ToR	Terms of Reference
UCG	Underground Coal Gasification
USD	United States Dollars

1. Introduction

The Project is seeking declaration as 'significant project' under Section 26 of the *State Development and Public Works Organisation Act 1971* (SDPWO Act) based on the information provided in this Initial Advice Statement (IAS) and summarised in **Table 1**. Declaration will require an Environmental Impact Statement under Part 4 of the SDPWO Act.

- **Table 1 - Items for Consideration in Determining Declaration as a Significant Project**

Item for Consideration	Reason
IAS	
Planning Schemes or Policy Framework	The Project presents no identified conflicts with any Commonwealth, State or Local planning schemes or policy frameworks at this state. The EIS will cover details on the applicable requirements for the Project. There are Commonwealth Greenhouse Policies and Initiatives, as well as Energy and Fuel Security Policies being developed by the Federal Government at that impact on the project.
Potential Effect on Relevant Infrastructure	The UCG/CTL and power generation project will impact on a wide range of State and Local Government Infrastructure. These issues also impact on multiple councils and are as follows: • The need for road paving and upgrades from the Chinchilla site to the Warrego Highway; • Frequency of traffic through Dalby, Toowoomba and access to Brisbane Refinery Facilities; • The possibility of a commuting to a rail link; • and • Power and water infrastructure impacts. The potential impacts on infrastructure is significant and complex as it deals with multiple State Departments and Local Governments. It is our view that the single stop approach of having this project within the jurisdiction of the Co-ordinator General is important to the success of the project, particularly from an infrastructure an planning point of view.
Employment Opportunities	The Project will employ a peak workforce of 400 people for up to 36months in construction and more than 200 people during the operation of the CTL and power plant. The Project will result in a further diversification of the existing industrial base in the area meaning that there will be increased numbers of technical services, product suppliers and customers for industries. In addition, the Project will increase demand for skilled and unskilled labour in the region.

Potential Environmental Impacts	The EIS will need to address the existing environmental and potential impacts of the Project on land and water resources, including the impact of the UCG process on regional aquifers. The CTL and power generation process and the cumulative impact on noise, air and water will also be considered and addressed. There are also potential cultural heritage, hazard and risks, flora and fauna issues. Social impacts (both beneficial and any potential adverse impacts) will be considered and community consultation will be conducted. The EIS will include Environmental Management Plans for the control of environmental impacts to acceptable levels.
Complexity of local, State and Australian Government Requirements	The potential for the Project to impact on matters of national environmental significance is being examined. The Project will be 'Referred' to the Commonwealth Minister for Environment and Heritage, indicating that Linc Energy believes that the Project will not trigger the *Environmental Protection and Biodiversity Conservation Act 1999*. However, the role of the Commonwealth Government in the assessment of the project has not yet been determined. In addition, the approval process from the State and Local Government will be complex. We will need approvals, co-operation and planning decisions from the Departments responsible for transport, roadwork's, infrastructure, energy, environment, and water. In addition we will be dealing with at least four local governments.
Investment Requirements	The exact cost of the UCG/CTL and power generation project is yet to be determined as this will depend on the size and output of the CTL plant. It is possible to build the plant on a modular, scaleable level to reach the output level of 20,000 bpd. Current costings for the UCG/CTL plant are at the bottom level $200million and can be scaled to $1billion for maximum production levels.
Strategic Significance of the Project	Existing industries will benefit from the development of the Project. The Project will also benefit future industry both directly and indirectly. Location of another major industrial facility in the region will facilitate the construction of infrastructure that will enable new and existing downstream enterprises to develop. An increase in industrial activity in the area will also generate wealth for the company and staff employed

	in these enterprises (direct impacts) and in the many sectors of the economy that comprises the local and regional economies (indirect impacts). It is a good example of regional development based on value adding and comparative advantage. The project will also: ▪ Demonstrate the world-first integration of UCG and CTL processes at a commercial scale; ▪ The production of ultra clean, sulphur free diesel and aviation fuels, which are virtually odourless on combustion, and have low emissions of nitrogen oxides and particulates; ▪ The UCG process is a more environmentally friendly method to exploit coal resources in comparison to traditional open cut mining methods; ▪ The UCG process in a more environmentally friendly way of providing feedstock for a power generation facility; ▪ Facilitating Australian experience and knowledge in UCG and CTL technologies that will create new job and export opportunities; ▪ The production of low cost and abundant syngas from standard coal reserves; ▪ The UCG process will ensure that the site is totally self sufficient in generation sufficient power in order to operate the CTL plant; ▪ A cost effective way to produce liquid hydrocarbon fuels by combining UCG and CTL; ▪ Enhancing Australia's fuel security; ▪ Raising the awareness of the benefits of these technologies among key stakeholders; Finally, the Chinchilla and surrounding regional communities are likely to benefit significantly from the Project largely due to the direct and indirect economic and employment benefits expected to arise as a result. Up to $ 1 billion will be spent on the Project during the construction period of 36 months. A peak of around 400 workers will be employed during construction and more than 200 staff will be required during operation (the UCG, CTL and power generation).

1.1 The Proponent

The project will be undertaken by Linc Energy Ltd ('Linc'). Linc is a Queensland company with its head office located in Brisbane. The company is poised to become a leading producer and supplier of ultra clean synthetic fuels to the Australian and world markets. Linc has established a partnership with an internationally recognised company which has expertise in the research and development of the Gas to Liquids (CTL) process. Linc will draw on this expertise in the development and operation of their proposed CTL plant at Chinchilla. In addition to this, Linc has also entered into a Memorandum of Understanding with the world's foremost technology developer and user relating to the use of Underground Coal Gasification (UCG) technology.

1.2 Project Overview

Linc Energy's corporate vision is to become a world-leading producer of ultra-clean transportation fuels. Linc Energy aims to achieve this vision by bringing together, as a world first, the two technologies known as UCG and CTL.

Linc Energy intends to use the UCG process to harness stranded coal deposits that are considered sub-economic as they are too far from market, too deep or not of the quality required for traditional coal markets. UCG has the potential to overcome these issues, enabling Linc Energy to develop significant tracts of coal that are regarded as having sub-economic value.

The UCG process can be used to turn stranded coal reserves into energy by gasifying the coal "in situ" (underground). The resulting gas, called Syngas, will initially be used as feedstock for a CTL processing plant to produce diesel and jet fuels. There is possibility of expansion to also use the gas in a power generation turbine to generate electricity.

The unique combination of UCG and CTL has the potential to become a significant alternative energy source. The gas is cheap, the resources abundant and there is capacity for the application process to be further duplicated in Australia and around the world. Combining UCG and CTL has the potential to create a new and reliable source of ultra-clean environmentally responsible fuels.

UCG also provides the opportunity to use Combined Cycle electricity generation technology, which is significantly more efficient than conventional coal fired power stations, therefore resulting in lower Greenhouse Gas Emissions (GGE). As part of the same project, UCG synthesis gas will also be used as feedstock in a Power Generation Plant. This plant will be a 200 MW Gas Turbine and will be implemented to ensure all the power needs of the CTL plant will be met at the site without the need to import power. It is also possible that Linc Energy will generate surplus power to the needs of the CTL plant and the exporting of power will be an option.

The cheap and abundant syngas that can be delivered by the UCG process is the key that Linc Energy will seek to exploit to enable it to produce cost effective, ultra-clean diesel fuels.

1.3 Purpose of the initial Advice Statement

This Initial Advice Statement (IAS) will:

- assist the Coordinator General in making a decision on the declaration of this project as a 'significant project' under Section 26 if the SDPWO Act;
- enable the preparation of the Terms of Reference (ToR) for the Environmental Impact Statement (EIS); and
- provide information to all stakeholders.

The ToR has been developed based on the impacts that are identified in this report together with inputs and requirements from government agencies. As part of the approval process an EIS and Environmental Management Plan (EMP) will be prepared for the project.

1.4 Background to the Project

1.4.1 Chinchilla UCG Trial

In 1999 Linc Energy established a UCG facility at its Mining Development Licence (MDL 309), 20 kilometres south-west of Chinchilla, Queensland. Linc Energy first produced Syngas at this site on 26 December 1999 and achieved the following significant milestones during a period of 30 months of continuous gas production:

- 95% recovery of coal resource;
- 75% of total energy recovery;
- Installation of nine injection / production wells;
- 13 monitoring wells; and

Approximately 32,000 metric tonnes of coal were gasified during this trial, and 100% availability of gas production was demonstrated over this period. The UCG operation in Chinchilla is by far the largest and the longest run trial in the Western World. The process displayed high efficiency and consistency in providing gas of stable quality and quantity, and the cost of the UCG gas produced proved to be comparable (on a per unit of energy basis) with the low cost of thermal coal in the Australian market.

In late 2001, the decision was taken to shut down the operation at Chinchilla in a controlled manner, and implement a program of ongoing monitoring at the site. The gasifier is currently in preparation for restoration of gas production. The site will then be further developed to feed the gas into a Gas-to-Liquid plant to produce hydrocarbon fuels via Fischer-Tropsch technology (discussed in Section 3.2.2).

Throughout the period of operation, the gasifier was operated such that pressure within the gasifier remained below the pore pressure of the groundwater in the surrounding coal aquifer. As such, groundwater flow will have locally been towards the gasifier, and product gas will have generally been contained within the gasifier. The controlled shut-down procedure was designed to decrease pressure within the gasifier, and thus enhance groundwater flow towards the gasifier.

1.4.2 UCG and CTL Development - Worldwide

This gasification process produces a gas that can be used for commercial purposes, such as the production of diesel and jet fuels. The main advantage of UCG is that there is no need to mine the coal resource by bringing it to the surface by traditional means. The gasification of the coal to turn it into gas takes place completely “in situ”.

The process of UCG was developed in the former Soviet Union where it has been used for power generation for more than 40 years. There are currently two UCG plants of significant size still operating in the former Soviet Union, one in Siberia and the other in Uzbekistan.

Linc Energy is in a unique position to now advance UCG in the western world as:

- it has been at the forefront of UCG application in the western world for the last 6 years; and

The development of commercially viable CTL plants requires one fundamental component – “cheap and abundant” gas. Linc Energy aims to access cheap and abundant Syngas through application of the UCG process.

Over the past year there has been a steady increase in the price of oil. The cause of this price rise has been attributed to the increased demand for oil by developing countries, such as China and India. The solution to this “oil scarcity” problem is the development of alternative energy sources.

CTL serves as a proven alternative energy source and is currently used in various countries around the world. Currently Sasol (a South African fuel company) is providing over 25% of South Africa’s fuel requirements by CTL and Coal to Liquids (CTL). Shell has one CTL plant in Malaysia and is intending to build a 140,000 barrel per day facility in Qatar in the Middle East. The Sasol Chevron joint venture is also building a large CTL plant in Qatar, which is near completion. At present the following facilities exist, commercially producing CTL products:

Year Commenced	Company	Capacity (barrels/day)	Location
1955	Sasol	8,000	Sasolburg, South Africa
1979	Sasol	70,000	Secunda, South Africa
1982	Sasol	70,000	Secunda, South Africa
1991	Mossgas	22,500	Mosselbay, South Africa
1993	Shell	14,700	Bintulu, Malaysia

Whilst at present the following CTL facilities are being implemented with a larger number being considered at various places around the world. Several of these are in the advanced stages of engineering, others are in feasibility review. Feed stocks for these new developments are generally either stranded gas or coal reserves.

Technology	Capacity (barrels/day)	Location (Project)	Status
Sasol	34,000 – 100,000	Qatar (Oryx)	Construction
Sasol Chevron	34,000	Nigeria (Escravos)	Detailed design
Sasol	5,000	Gilberton, PA, USA, (WMPI)	Planned for 2007
Shell	140,000	Qatar (Pearl)	Design
Shell	70,000 – 75,000	Iran, Indonesia, Argentina, Egypt, Trinidad & Tobago	Planning
Conoco Phillips	80,000 – 160,000	Qatar	Planned for 2010
Marathon Oil	140,000	Qatar	Planning
Exxon Mobil	80,000 – 150,000	Qatar	Planned for 2011
Exxon Mobil	100,000	Alaska	Planning
Exxon Mobil	50,000	Angola	Planning

Over the past 12 months the price of natural gas in North America has fluctuated between US$6.5 to US$13 per gigajoule. Linc Energy believe that it is not viable to undertake CTL with natural gas feedstock at these prices because it is not economical to recover the high capital expenditure involved in CTL plants without large amounts of cheap feedstock gas.

By utilising the UCG process, Linc intends to gasify coal reserves to turn that coal into cheap and abundant Syngas. Importantly, Linc Energy research indicates that the Syngas can be produced at Chinchilla for US$0.50 cents per gigajoule.

1.5 Project Site and Location

The project site is located in the Darling Downs region of southeast Queensland, centred 20 km south east of Chinchilla and approximately 300 km west of Brisbane as shown in **Figure 1**. The Warrego Highway and Great Western railway are located north of the site and link the region to Toowoomba and Brisbane. The site is accessed by well maintained sealed and unsealed roads and private tracks.

The area is centred within the Darling Downs agriculture belt with the surrounding area having been extensively cleared and used primarily for the growing of table grapes, pasture for beef cattle, broad acre cropping for cotton and grain crops, such as sorghum and barley.

1.6 Objectives of the Project

The key objectives of the project are to:

- establish and operate a sustainable and profitable UCG and CTL operation to enhance commercial opportunities for ultra clean diesel and aviation fuels;
- construct and operate a UCG and CTL operation that minimises adverse impacts on the surrounding bio-physical and social environments;

- construct and operate a UCG and CTL operation that complies with all relevant statutory obligations and continues to improve processes which enhance best practice environmental management;
- construct, design and operate a UCG /CTL operation and generate sufficient energy from the UCG process to meet all the energy needs of the CLT plant; and
- construct, design and operate a UCG and CTL operation successfully, which allows for future expansion that does not compromise environmental and social indicators and standards.

1.7 Stakeholder Consultation

Linc will involve all parties who have relevant interest in the project. Linc is planning a stakeholder consultation program for the project including:

- identification of stakeholders, including the local and regional community;
- discussions with landholders and members of the community directly affected by the project;
- discussion with Local, State and Federal Government representatives;
- implementation of a comprehensive communication program; and
- finalisation of mitigation measures through consultation and negotiation.

- **Figure 1 Linc Energy Regional Site Location**

GIS image

2. Project Benefits and Costs

2.1 Project Benefits

There are a range of regional, state and national benefits from the Linc Energy UCG & CTL Project. Key benefits include:

- Demonstrating the world-first integration of UCG and CTL processes at a commercial scale;
- The production of ultra clean, sulphur free diesel and aviation fuels, which are virtually odourless on combustion, and have low emissions of nitrogen oxides and particulates;
- UCG process is a more environmentally friendly method to exploit coal resources in comparison to traditional open cut mining methods;
- Facilitating Australian experience and knowledge in UCG and CTL technologies that will create new job and export opportunities;
- The production of low cost and abundant syngas from standard coal reserves;
- The generation of sufficient power on site to meet all the energy needs of the CLT plant;
- A cost effective way to produce liquid hydrocarbon fuels by combining UCG and CTL;
- Enhancing Australia’s fuel security;
- Raising the awareness of the benefits of these technologies among key stakeholders;
- Directly employing approximately 400 construction and 200 operating jobs in Chinchilla and stimulating consumption and flow-on employment arising from the Project’s capital and operating expenditures; and
- The potential to duplicate the production processes in other areas of Australia and overseas.

2.2 Synfuels in the Current Markets

The primary drivers for the interest in synfuels technologies are :

- The monetisation of stranded gas;
- The increase in oil prices, currently (October 2006 in the region of US$60.00 per barrel); and
- Environmental pressures to reduce gas flaring and reduce auto emissions, the latter resulting in ever more stringent specifications with respect to sulphur content, particulate emissions, aromatics content, polynuclear aromatics and NO_x emissions resulting from the combustion of hydrocarbon fuels.

Synthetic products, as produced by the Fischer- Tropsch processes, whether from gas or coal feedstock’s, have unique properties which will ensure a demand for them in the future. One of the key drivers for this demand is environmental pressure which ultimately relates to improved quality and premium products.

Synthetic diesel has essentially zero sulphur, a high cetane index (in excess of 70), and less than 5% polynuclear aromatics. One study (US EIA "International Energy Outlook" 2004) has estimated that synthetic diesel will result in 40 to 50% reduction in hydrocarbon emissions, 9% reduction in nitrogen oxides, and a 30% reduction in particulate emissions as compared to conventional refinery low sulphur diesel. It is therefore seen as a highly desirable fuel from an environmental standpoint. The primary market is expected to be for use as a blend component, and it is anticipated that it could command a premium price over conventional diesel.

Indeed, Shell's Pura brand diesel sells at a premium relative to standard brands in Thailand (Iraj Rahmim Oil and Gas Journal, March 2005). The global middle distillates market is currently estimated at about 27 million barrels/day, of which automotive diesel accounts for roughly 51%.

Growth is expected to continue at some 3% per annum, driven largely by increasing sales of diesel driven automobiles. The Chinese market is less certain, but with the rapid developments in that country, growth rates will be at least 3% per annum. Synthetic diesel supply will depend upon the number of proposed projects that reach fruition in the near future. Sasol suggest an expected synthetic diesel capacity of 600,000 bpd by the period 2016 to 2019. If the expected growth in the diesel market continues at 3% per annum, then by 2016 the overall market would be of the order of 37 million bpd, and the synthetic diesel production would only represent 1.6% of the market. These projections demonstrate there is little chance of an oversupply in this market.

Thus CTL processes are capable of producing premium products at competitive prices to those derived from crude oil, and unless the crude price drops to below USD$25 per barrel which seems highly unlikely in the near future, the market for these products will be assured.

2.3 Estimated Project Costs

Typical estimates indicate CTL projects are commercial at oil prices above US$25 per barrel, based on stranded gas or equivalent. The projects currently being implemented are generally large to mega scale (from several hundred million dollar to multi billion dollar) and involve multiple stake holders: these projects take a long time (48+ months) to implement.

Capital cost estimates for natural gas based CTL plants are in the range of USD$20,000 to USD$40,000 per daily barrel produced. Therefore considering the Chinchilla plant is being designed for 20,000 barrels per day, the project cost could reasonably be in the realm of USD$400 to USD$800 million (AUD$533 to AUD$1,066 million). Approximately 40% of this is for F-T and power generation, 25 to 35% for clean up and 25 to 35% for gasification. The specifications required and the technologies selected play a significant role in determining the cost break down. Demonstration size units fall outside the range to directly extrapolate costs.

Significant investments have been made in developing lower cost syngas units (eg. gasification, partial oxidation), which has helped bring down capex and improve economics of projects currently in design or planning. Also, the learning curve from the current second generation facilities, in engineering, fabrication and construction, will substantially reduce project costs.

3. Description of the Project

3.1 Demonstration Plant

Linc Energy is currently in the detailed design phase for a demonstration CTL plant utilising the UCG gas at Chinchilla. This plant is for testing purposes only and will produce approximately 5 to 10 barrels/day of liquids. The process design will be conducted by MegChem, using their process. Supplementary design data will be obtained from the current and future test work at the University of Kentucky and, if required, by Syntroleum at their research facilities in Tulsa, Oklahoma.

This will permit the operation of a test unit on the actual syngas as produced by the UCG system at Chinchilla, and data obtained will be more exact than that obtained from simulated gas on a bench scale. It will also allow Linc Energy to obtain reliable scale-up data for the development of a commercial reactor design based on this test work.

This facility will represent one of only a few semi-commercial demonstration units worldwide, and one of even fewer operating directly on coal gas (other than the Sasol and Shell commercial plants).

Please note that this EIS will not address the environmental impacts of the demonstration plant as this is operated under the current Environmental Authority held by Linc Energy and administered by the Environmental Protection Agency.

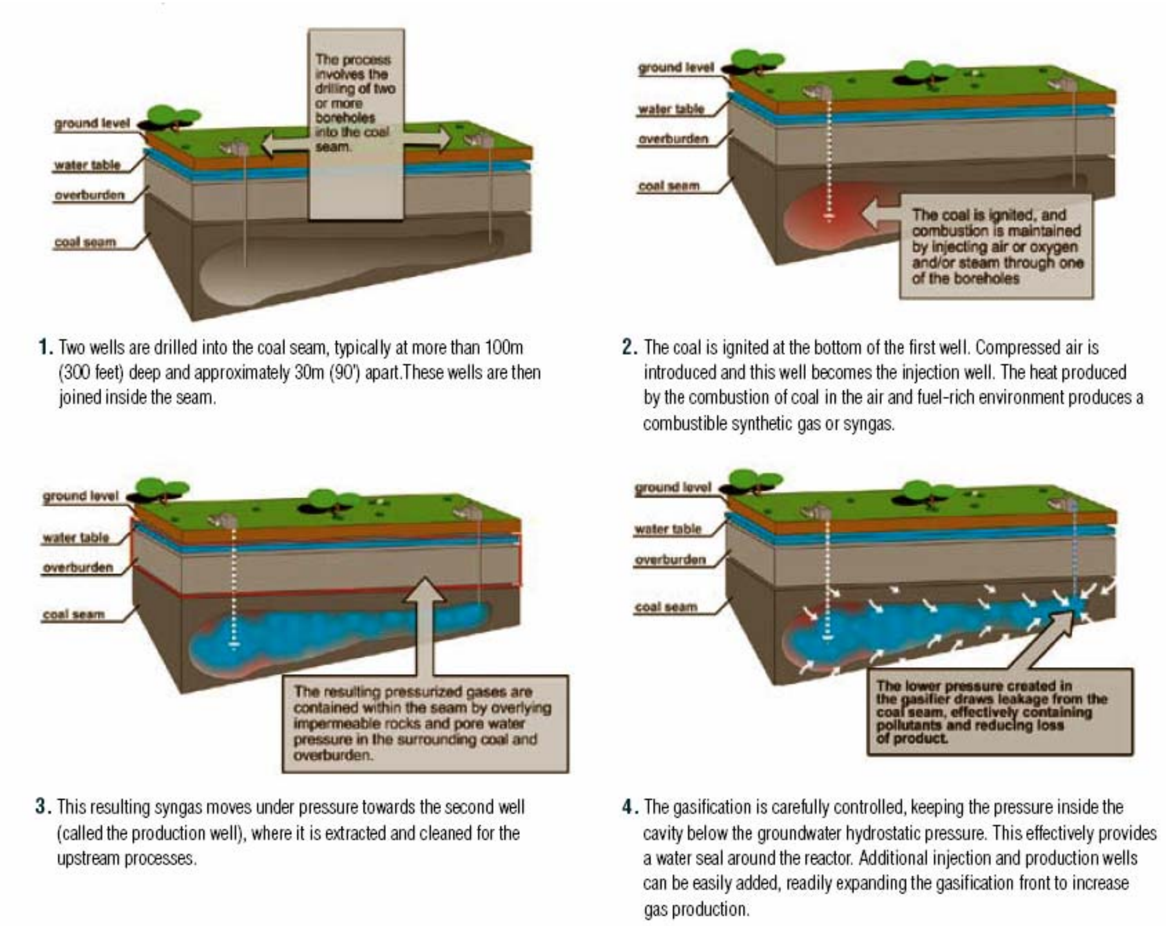
3.2 Proposed Operations

3.2.1 Underground Coal Gasification

The UCG process involves construction of two wells into the coal seam at approximately 30m apart. The link between the injection and production well can be established via any one, or a combination of directional drilling, hydrofracturing, electrolinking, or reverse combustion (Shedden Uhde Australia 2006). The coal is ignited in-situ and compressed oxidants are introduced (air, oxygen and steam). The burn rate is controlled by pressure, airflow and temperature. The gasification takes place near the injection well and the gas moves toward the production well where it is extracted (**Figure 2**).

As the coal is consumed, a cavity is formed resulting in the roof collapsing. The possible land subsidence will be modelled, and measures addressed within the EIS. As the gasification progresses, the cavity grows laterally towards the production well (Shedden Uhde Australia 2006). This cavity growth is allowed to continue until the product gas drops sufficiently in quality where its downstream use is limited. As the gas cools, heavier hyrdrocarbons are broken down into small chained hydrocarbons (methane) leaving the steam with the syngas. When the coal in the cavity is exhausted, new production and injection wells are drilled to exploit a new section of the coal seam.

The syngas and steam remain together due to the pore water pressure in the surrounding coal and overburden. The raw syngas is extracted and 'cleaned up' removing wastes including, water, salts and organic liquids.



- **Figure 2 UCG Process**

Based on analysis of gas from the UCG trial at Chinchilla, the major components of syngas were found to be carbon dioxide, carbon monoxide, hydrogen and methane and water vapour. Typical gas composition of raw gas exiting from the Chinchilla UCG, following water removal is displayed in **Table 2**.

- **Table 2 Raw UCG Gas Quality**

	Gas Component	Value	Unit
Gas Components	Methane (CH_4)	5.90	Vol %
	C2 +	0.39	Vol %
	Carbon Monoxide (CO)	4.92	Vol %
	Carbon Dioxide (CO_2)	15.73	Vol %
	Hydrogen (H_2)	14.26	Vol %
	Hydrogen Sulfide (H_2S)	0.10	Vol %
	Oxygen (O_2)	0.20	Vol %
	Nitrogen (N_2)	39.89	Vol %
Calorific Value	HHV	4.0 – 5.5	MJ/kg
	HHV	4.32–6.48	MJ/kg (25°C)
	LHV	3.6–5.0	MJ/kg
	LHV	3.80–5.83	MJ/kg (25°C)

These gas components were typical results displayed during surface gasification of coal. They are able to be effectively managed and appropriate safety and design procedures have been developed for this purpose. Iron and nickel carbonyls may be present in the syngas (as vapour) in small quantities (ppm) where iron and nickel are present in an atmosphere of carbon monoxide. Carbonyls tend to be most problematic in liquid feedstock surface gasifiers where the formation of soot is an integral part of the process. The soot contains the ash components, such as iron and nickel, and therefore a large surface area of metal is exposed to carbon monoxide; hence the formation of significant quantities of the metal carbonyl (Shedden Uhde Australia 2006). Metal carbonyls are not likely to be present in significant quantities in UCG due to the reduced presence of soot and ash at the temperatures where carbonyls can form.

The raw synthesis gas from UCG contains primarily Hydrogen (H_2), Carbon monoxide (CO), Carbon Dioxide (CO_2), Methane (CH_4) and water vapour. The gas will also contain smaller amounts of other components, including impurities that need to be removed to meet specifications for processing in the CTL process. The following impurities are generally encountered:

- particulate matter (ash, unconverted carbon);
- acid gas (hydrogen sulfide, formic acid);
- metals (mercury, carbonyls); and
- condensable hydrocarbons & water

The gas clean up step may also include unit operations to adjust the ratios of bulk components to meet requirements of the CTL for optimised plant performance.

For the initial phase to begin production, approximately 20 injection and production wells will be drilled in the coal seam to support the UCG process, and to provide the required flow of gas to the CTL plant. After this, at least 10 more wells will be drilled each year to maintain production, with the average life of a well being between six months and four years.

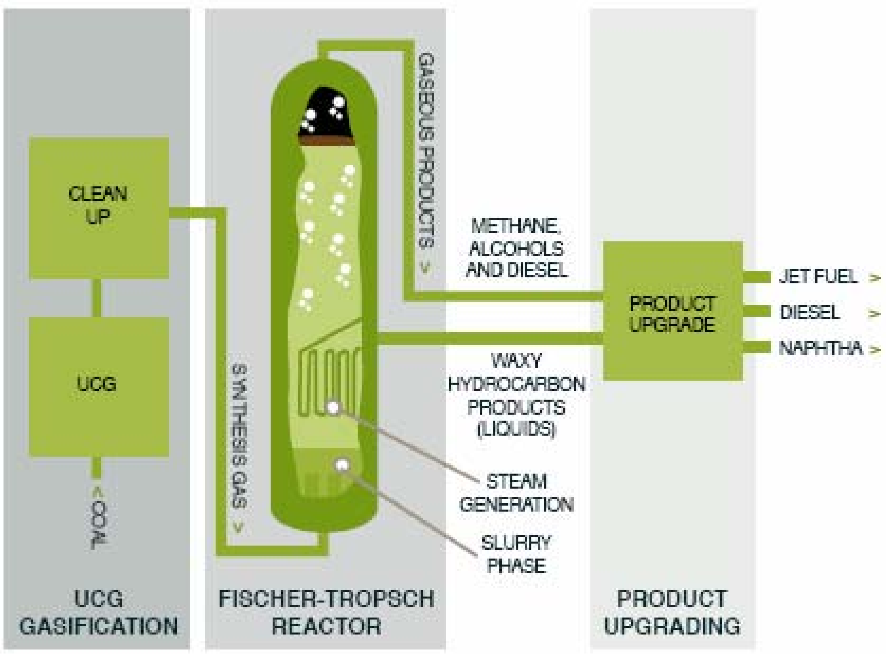
The wells will be linked by piping, to a header from where the gas is sent at 10 bar pressure to the gas clean-up plant.

3.2.2 Gas to Liquid Plant

The syngas is converted from gas to liquid via a Fischer-Tropsch (F-T) reaction. The basis of the reaction is the growth of carbon chains by reacting carbon monoxide with hydrogen ($nCO + n2H2 \rightarrow CnH2n+2 + nH2O$). The F-T synthesis is in essence a polymerisation reaction that takes place over a catalyst, which is typically iron, cobalt or ruthenium based. Depending on operating conditions, longer or shorter chains are produced, with longer chained hydrocarbons being more valuable.

Products from F-T reactions will be a mix of hydrocarbons. Large new generation CTL plants are aimed primarily at producing middle distillates for transportation fuels, of which the proposed Chinchilla plant is aimed at. Smaller plants may focus on specialty markets for e.g. chemicals, base oils and waxes. Upgrading of F-T reactor effluent to end products generally involves fractionation, hydro treating, hydrocracking and isomeriation. All these steps have been widely used in the oil refining industry for many decades. **Figure 3** below describes the process flow.

- **Figure 3 UCG to CTL Process**



3.2.3 Power Generation

UCG also provides the opportunity to use Combined Cycle electricity generation technology, which is significantly more efficient than conventional coal fired power stations, therefore resulting in lower Greenhouse Gas Emissions (GGE). As part of the same project, UCG synthesis gas will also be used as feedstock in a Power Generation Plant. This plant will be a 200 MW Gas Turbine and operate solely on the UCG gas and will meet the entire energy needs of the CLT process.

Once the gas has been extracted from the UCG wells and then gone through the clean-up phase, it will be recompressed and used for power generation by combustion in a GTG. The Combined Cycle plant will be a standard model with a modified combustion system to allow for dual fuel operation, and combustion of the low calorific gas produced from the UCG process. Distillate fuel will be used during start up and shut down of the plant.

Based on the experience of UCG plants in the former Soviet Union, the supply of gas will be fairly constant, and therefore the GTG is expected to generate a constant supply of electricity operating at base load. The combustion technology of the power plant ensures that low NOx emissions will be achieved.

Expected emissions from the fired with UCG Syngas (GE Report) will be:

Nox	375ppmvd@15%0z
CO	300ppmvd
Particulates	3kg/h

3.3 Proposed Construction

Clearing and site preparation works will be limited to those areas required to provide an adequate working area for the CTL plant, Combined Cycle Plant, fuel storage tank farm and infrastructure.

It is proposed that vegetation on the site, access roads, water treatment ponds and gas gathering pipeline routes will be cleared, mulched and used on site for landscaping where possible.

Where required topsoil will be stripped to a depth of 100 mm and stockpiled for later use.

The construction areas will be levelled by standard cutting and filling practices.

The remainder of the site will have minimal clearing, however drill pads will require clearing and levelling allowing the drill rig safe access.

3.4 Subsidence

Surface subsidence is expected from any UCG operation but with planning and appropriate surveying of the proposed site, this risk is manageable.

In general terms, subsidence over the void created by a UCG operation has the potential to cause two kinds of impacts:

1) disruption to surface infrastructure as a result of surface settlement; and
2) disruption to the integrity of the overburden, leading to possible leakage of gas in to the overburden, aquifers overlying the coal seam or in to the atmosphere.

Development of underground gasifiers can be managed to avoid sensitive surface infrastructure. Subsidence that causes disruption to the integrity of the overburden has the potential to cause groundwater contamination and loss of product gas, and to severely impact on the ability to control the UCG process (Golder Associates Pty Ltd 2006). The amount of surface subsidence, and the potential for leakage of product gas into the overburden or overlying aquifers will depend on the depth and thickness of the coal seam, and the geotechnical properties of the overburden materials. Effective control of environmental impacts as a result of subsidence requires a detailed geotechnical characterisation of the area to be gasified, and avoidance of areas which do not have favourable geotechnical conditions. In addition to detailed geotechnical characterisation in advance of gasification, subsidence modelling and monitoring of the extent of caving in the roof of the gasifier will be carried out during gasification to verify theoretical predictions (Golder Associates Pty Ltd 2006). Linc Energy has undertaken characterisation of the rock behaviour of the overburden as well as subsidence monitoring since the beginning of the project. This approach is expected to continue during expansion of operations and will be further investigated in the environmental impact statement.

3.5 Air Emissions

The region surrounding the project site at Chinchilla is rural, with the current major emissions to the atmosphere likely to occur during the burning of land, forest fires, or during high winds when soil erosion can give rise to high levels of particulate matter. The Queensland Environmental Protection Agency carries out annual air quality monitoring at various locations throughout Queensland and reports the data. The closest monitoring point to the site is at Toowoomba North, some 150 kilometres to the east. The 2005 data for Toowoomba North is presented in **Table 3** and it represents the likely range of background pollutant concentrations in the region.

- **Table 3 Estimated Background Air Quality for the Darling Downs Region**

Pollutant	Maximum	95^{th} Percentile	Annual Average
Carbon Monoxide (8 hour)	2.3 ppm	0.4 ppm	0.1 ppm
Nitrogen dioxide (1 hour)	0.057 ppm≈	0.020 ppm	0.006 ppm
Ambient PM_{10} (24 hour)	111.6 $\mu g/m^3$	27.6 $\mu g/m^3$	15.2 $\mu g/m^3$
Ambient $PM_{2.5}$ (24 hour)	26.3 $\mu g/m^3$	12.8 $\mu g/m^3$	6.5 $\mu g/m^3$
Ozone	0.057 ppm (4 hour) 0.064 ppm (1 hour)	0.039 ppm (4 hour) 0.040 ppm (1 hour)	0.022 ppm

(Source: Qld Environmental Protection Agency, Technical Report No. 61, 2005)

3.5.1 Construction

Potential impacts on air quality during construction are possible from dust generation resulting from construction vehicles and machinery. The control of dust will be mitigated in the EMP by a range of measures that may include sweepers and bobcats for roads, water sprays and sprinklers on site and other controls measures where necessary.

3.5.2 Operation

Air emissions from the plant are primarily:

- cooling tower vapour plume; and
- stack emissions from small fired heaters (steam generation).
- stack emissions from Combined Cycle power generator

Modelling and assessment of air quality impacts will be undertaken to ensure compliance with the *Environmental Protection Act 1994*, and *Environmental Protection (Air) Policy 1997.*

With regards to odours from the proposal, the UCG process has the potential to emit odours from the UCG process as the phenols contained in the raw product gas are considered odorous compounds. However, there presence is likely to be negligible as this will be a closed system. Emergency pressure venting of odours compounds may occur during isolated periods of system testing and malfunction.

Based on the composition of the product gas from the Chinchilla UCG trial, projected Greenhouse Gas Emissions for the burning of the final hydrocarbon liquid will result in approximately 40 percent lower carbon dioxide emissions, zero sulphur emissions and lower particulates than the burning of standard commercially available transportation fuels (diesel and aviation fuels).

3.6 Noise & Vibration

Initial observation has identified no noise sensitive places are located adjacent to the project site. A homestead is currently located adjacent to the property, however, Linc have purchased this residence and it will form the site office from 2007.

During EIS studies the area will be further analysed including having noise receptors placed along transportation routes.

Potential noise sources on site will include:

- construction noise;
- air compressors (24hr operation);
- water pumps;
- stack;

- occasional drilling operations; and
- vehicle movements during construction; and
- vehicle movements for product transportation.

The pieces of equipment anticipated to generate the greatest amount of noise are the air compressors, which will operate continuously for feeding compressed air / oxygen underground to the UCG.

All plant and equipment will be located over 300m from the site office. At this distance with appropriate controls in place, no significant noise impacts should be discernible.

To ensure this, noise attenuation equipment will be fitted on appropriate equipment including compressors as required to meet sound power level limits.

All other noise sensitive activities (residents, schools, offices etc) are not within the vicinity. Notwithstanding this, all noise sources and receptors will be modelled in the completion of the EIS to determine the potential local impacts from the UCG, CTL and power generation activities. In addition any complaints received regarding noise will be logged and responded to immediately.

3.6.1 Construction

Noise during construction will be managed as part of the construction Environmental Management Plan. Likely construction management measures include:

- where possible obtain plant equipment designed with inbuilt attenuation (silences / mufflers, etc);
- plant equipment to be maintained correctly, including the replacement of engine covers, tightening of rattling components, etc; and
- limited construction hours.

3.6.2 Operation

Due to the remoteness of the site and lack of noise sensitive places adjacent to the site the noise impacts are anticipated to be minimal. However, impacts to those located on access routes will be further investigated during the EIS process.

3.7 Waste Management

3.7.1 Construction

Wastes generated during construction will include domestic and putrescible (from kitchens), paper, cardboard and timber from packaging, scrap steel, grey water from ablutions, sewage, drilling muds, waste oils from workshop and vegetation, which has been removed during clearing operations.

The treatment, storage and disposal of wastes will be addressed in the EIS and supporting EMPs. Methods of waste disposal during construction will be closely managed to avoid adverse impacts from solid or hazardous wastes. This is likely to include:

- the use of recyclable materials where possible;
- provision of on-site waste collection bins and recycle bins and serviced by an approved waste contractor;
- removal and disposal of all waste construction material from the site on completion;
- separate storage and disposal of regulated and hazardous wastes; and
- training of all site employees on waste minimisation and management.

3.7.2 Operation

Liquid effluents are generated from gas scrubbing and water condensate. The effluent consists of produced formation water, with particulates and dissolved gases, hydrocarbons and numerous salts. Dissolved gases and volatile hydrocarbon's can be removed by steam assisted stripping. Off gases from sour water stripper and vents are sent to flare.

Solids are recovered from the slurry by filtration.

Liquid effluents will be directed to water treatment. Linc are presently assessing options for treating this water via reverse osmosis / activated carbon and using this water in a beneficial way, such as stock watering. Alternative water reuse options will be considered during the EIS process.

Gaseous effluents (such as from water flash) will be directed to atmosphere, post treatment.

Solid wastes from water treatment will be treated and sent to Chinchilla landfill. Spent catalyst is returned to catalyst suppliers or disposed of (Hg guard, COS hydrolysis).

No ash or slag removal and handling are necessary since they will remain at the point of gasification in the underground cavities.

At the completion of gasification, residual condensate and solid residue will remain in the areas where gasification has taken place. Past experience at the Chinchilla site has indicated that flushing of the gasifier after completion of gasification by the inward groundwater flow has the potential to reduce the concentrations of hydrocarbon contaminants over time. No information is available from Chinchilla or from other operations regarding the concentrations of metals or other trace elements that may leach from the solid residue (Golder Associates Pty Ltd 2006).

3.8 Hazard and Safety

Linc Energy seeks to demonstrate the integration of available technologies to ensure safe and efficient operations on-site of UCG,CTL and power generation.

Linc Energy will have a comprehensive risk management system that will be implemented for this project. This includes a series of risk assessment workshops to identify and assess potential risks in all activities, of the project, and then to develop appropriate control measures. Information that is collected will form the project risk register and risk maps. The control measures identified in the early phases of the Project will be enacted upon immediately with the intention of reducing the Project risk.

The Project will progress through all stages of development utilising current Linc Energy policies, systems and ideals for health and safety. Linc Energy has significant health and safety policies and procedures and training of employees.

3.8.1 Construction

The construction contractor will be required to prepare and operate in accordance with a Health and Safety Management Plan to control health and safety risks associated with construction and commissioning activities. The approach for risk control will also be further addressed and detailed in the Project Health and Safety Management Plan and Risk Register to ensure a detailed plan is implemented.

3.8.2 Operation

Operational health and safety risks will be identified and incorporated into the risk register and operational processes and procedures for the facility. Control measures will be identified and implemented. The strategies for risk control are to be further addressed and detailed by the operational Health and Safety Management Plan and Start Up and Operations Strategy to ensure the operation is safely and effectively implemented.

3.9 Workforce and Housing

The majority of the workforce will be housed in existing accommodation in the Darling Downs Region, such as Chinchilla, Kogan, Dalby and Brigalow.

3.10 Environmental Management Plan

An Environmental Management Plan (EMP), an integral component of the environmental management system, will be prepared for the construction and operating phases of the project.

The following actions are considered part of the plant EMP:

- compliance with environmental laws and regulations;
- ensure that all employees undertake safety, health and environmental training;

- integration of environmental protective measures in day-to-day activities and facility procedures;
- development of programs to check compliance with the EMP;
- prevent or limit the generation and accumulation of waste;
- keep abreast of social and technological developments;
- ensure that third parties observe environmental standards that are consistent with the proponent’s own standards;
- promotion of a good understanding with regulatory authorities and third parties in environmental matters; and
- regular performance of environmental audits.

The EMP will include, but not be limited to:

- ground and surface water;
- flora (including weed) and fauna;
- air quality (including greenhouse gases);
- noise;
- road use;
- chemicals and dangerous goods;
- waste management;
- cultural heritage; and
- health and safety incidents and complaints.

4. Description of the Existing Environment

4.1 Topography, Climate, Geology and Soils

4.1.1 Existing Environment

Topography

The Mineral Development Lease (MDL) is located on relatively flat land. The Condamine River flows to the north and northwest in a single deep meandering channel cut through alluvium. The surrounding terrain consists of major draining floors that encounter seasonal flooding, especially in late summer (Sinclair Knight Merz 1999).

Climate

The climate of the study area can be classified as subtropical with hot, wet summers and warm, dry winters. The closest Bureau of Meteorology station to the study site is Dalby. A summary of the climatic averages measured by the Bureau of Meteorology is presented in **Table 4**.

- **Table 4 Climatic Averages for Dalby**

Parameter	Average
Maximum Temperature (January)	32.4
Maximum Temperature (July)	19.7
Minimum Temperature (January)	18.6
Minimum Temperature (July)	4
Relative Humidity (annual average)	70 %
Annual Rainfall	643mm
Number of Rainy Days / year	69.6
Number of Clear Days / year	126.5
Number of Cloudy Days / year	89.2

Source: Bureau of Metrology (2006)

Winds in the region tend to be light to moderate. During autumn and summer winds tend to blow predominantly from the east to south east. Winds from winter through to spring are generally from the south with an increasing proportion coming from the north from spring to summer.

Geology

The mining lease boundary is dominated by Quaternary geology, specifically sandy formations. The local area also includes alluvium relating to the Condamine River, Wambo and Sixteen Mile Creeks. Specifically, the tenement area contains a subcrop of the Springbok Sandstone and Westbourne Formation. This is overlayed by Cainozoic sediments, perched alluvial sediments deposited by the Condamine River floodplain. The area of coal deposit occur within the tenement area at depths between 60-300m (Coalsearch Consultants 2006). The Juanah Coal Measures contain a coal seam (named Macallister Interval) near to the top of the formation. The Macallister Coal Seam occurs within the entirety of the MDL 120-140m below the ground surface. The coal reserve is split into two seams, the average thickness of the seams are 6.18 and 3.75m respectively (Coalsearch Consultants 2006).

Soils

The area around the mining lease has been classified as Province 32, Inglewood Sandstones of the Brigalow Belt Bioregion, which contains areas of solodic soils. The soil at the site has been observed to have a highly reactive grey or black clay content with high shrink-swell characteristics.

4.2 Surface Water

4.2.1 Existing Environment

The Condamine River rises in the Cunningham Gap region of south east Queensland and flows in a north west direction towards the Murray Darling Basin. The Condamine has cut a single deep meandering channel through the shallow alluvium formation (Sinclair Knight Merz 1999). The Condamine River meanders to the north of the site, with the closest point approximately 6km.

Sixteen Mile Creek is a tributary of the Condamine River and forms part of the larger Condamine River catchment. Sixteen Mile Creek connects to the Condamine approximately 5km to the west of the site. Sixteen Mile Creek passes through the southern section of the mining lease. Two unnamed tributaries of Sixteen Mile Creek also pass through the site, one to the north and the other to the south.

Environmental Protection and Biodiversity Conservation Act 1999 'Protected Matters Search' identified the Condamine River catchment to be a catchment for Narran Lake Nature Reserve, a Ramsar listed site. This reserve is located over 400km southwest of the project site and doesn't share a catchment with the site.

The site also has a small holding dam located within the mining lease area. This has been used for storage and evaporation of groundwater that was collected during the pilot plant UCG process.

4.2.2 Potential Effects and Mitigation

Alteration of the existing drainage and topography will be minimised during construction of the Project. Potential effects on watercourses due to subsidence have not been determined at this point in time. Any potential effects will be further investigated and modelled in the EIS. All ablutions from the site will be treated in a septic tank as per industry standards. Other surface water and wastewater collected on site will be treated for reuse.

4.3 Groundwater

4.3.1 Existing Environment

Groundwater quality at the Chinchilla site is generally poor. The elevated concentrations of total dissolved solids (salts) make the groundwater generally unsuitable for human consumption. However it is generally suitable for livestock watering (Golder Associates Pty Ltd 2006). The results of ground water sampling are consistent with regional monitoring results of the Department of Natural Resources, and Water groundwater database (Golder Associates Pty Ltd 2006).

The geology of the region suggests there is no direct hydraulic connectivity between the coal seam and the near surface alluvium or the seam and deeper aquifers (Golder and Associates 2006).

An annual groundwater monitoring program has been carried out at the Chinchilla site since mid 1999 in accordance with the requirements of the site's Environmental Management Plan. A number of monitoring wells have been installed in the target coal seam on site, and are being sampled for groundwater quality on a monthly basis.

Historical level data indicates groundwater flows towards the south west. The regional groundwater flow direction within the coal aquifers is likely to be north-east to south-west.

4.3.2 Potential Effects and Mitigation

Current groundwater studies suggest that although groundwater is impacted upon through the underground coal gasification process, current information and monitoring suggests that groundwater has no direct hydraulic connection above or below aquifers.

Studies to be carried out as part of the EIS will further investigate the connectivity and movement of groundwater.

Current pollutant sampling found that groundwater was of poor quality prior to site operation. Operation of the pilot burn resulted in increased levels of phenol benzene and PAH in the condensate (Golder Associates Pty Ltd 2006).

4.4 Nature Conservation

4.4.1 Existing Environment

Vegetation in the study area is predominately cropping lands and paddocks for cattle grazing. A baseline survey of vegetation, of part of the site, was undertaken on the 9th December 1999, by Ecotone Environmental Services prior to the initial pilot investigations at MDL 309. Follow up vegetation and weed monitoring surveys were also undertaken in 2003 and 2004 by Ecotone Environmental. The survey's identified three (3) vegetation associations occurring in the MDL:

- grassed area within the pilot burn area;
- cropping area surrounding the pilot burn area; and

- woodland vegetation mapped as RE11.3.4 located approximately 600m north of MDL 309.

The Regional Ecosystem mapping for the site is not consistent with the field investigations. Vegetation mapped as RE11.4.3, Brigalow community, when ground truthed on site had the species composition of RE11.3.4, Eucalyptus community. As only part of the site was surveyed it cannot be ruled out completely that there is no Brigalow (RE11.4.3) occurring on the site to the far north and the far south. The part of the site is already cleared, however five (5) RE's have been listed in **Table 5**. Of these two (2) are listed as Of Concern and one (1) as endangered. Regional Ecosystem mapping, version 5.0 is provided in **Figure 4**.

- **Table 5 Regional Ecosystems within the project area**

Regional Ecosystem	Short Description	Conservation Status
RE11.3.4	*Eucalyptus tereticornis* and/or Eucalyptus spp. tall woodland on alluvial plains	Of Concern
RE11.4.3	*Acacia harpophylla* and/or *Casuarina cristata* shrubby open forest on Cainozoic clay plains	Endangered
RE11.5.1	*Eucalyptus crebra*, *Callitris glaucophylla*, *Angophora leiocarpa, Allocasuarina luehmannii* woodland on Cainozoic sand plains/remnant surfaces	Not of Concern
RE11.5.20	*Eucalyptus moluccana* and/or *E. microcarpa/ E. pilligaensis* ± *E. crebra* woodland on Cainozoic sand plains	Not of concern
RE11.9.7	*Eucalyptus populnea, Eremophila mitchellii* shrubby woodland on fine-grained sedimentary rocks	Of concern

Two threatened ecological communities were listed in the EPBC Act Protected Matters Search, one as endangered and the other as critically endangered. These are detailed in **Table 6**.

- **Table 6 Threatened Ecological Communities Listed on the EPBC Protected Matters Search Report**

Species	Status*	Type of Presence
Brigalow (*Acacia harpophylla* dominant and co-dominant)	Endangered	Community known to occur within area
White Box-Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland	Critically endangered	Community may occur within area

*Status- under the EPBC Act

As discussed above, previous flora survey of the site did not identify any Brigalow communities as occurring on the site and found that the area mapped as Brigalow, actually contained Eucalypts. The White Box-Yellow Box- Blakely's Red Gum community presence is considered unlikely. No Regional Ecosystems referred to in the listing advice for this community occur in the vicinity of the project site. In addition the survey of part of the site did not find any of the predominant species for this community.

Queensland Museum and Wildnet database fauna searches have no records of fauna within the vicinity of the project site. This is likely to be a result of the remoteness of the site. Results of the EPBC Act Protected Matters Search indicates five (5) birds, two (2) mammals, five (5) reptiles, one (1) fish and eight (8) plants are likely to have habitat or may have habitat within the project area. Fauna habitat within the project area is limited due to the extensive clearing and resulting lack of vegetation coverage present. Fauna habitat would exist within the remnant vegetation, located approximately 600m from the direct project area. Presence or absence of these species will be confirmed during EIS studies.

4.4.2 Potential Effects and Mitigation

The project will require clearing of Regional Ecosystems, shrubs and pasture for site operation. The pasture area is unlikely to provide core habitat for fauna species. As full details of site operation are not available at this early stage the exact extent of clearing of remnant vegetation can't be determined, however, estimations of impacts have been undertaken. Vegetation to the north has been mapped as RE11.4.3 and as RE11.5.1 (ground truthed to be 11.3.4). Vegetation in this area will be protected from project operations. Where Brigalow communities are confirmed during flora surveys they will be fenced.

Other flora occurring over the remainder of the site will be impacted upon during borehole drilling, access tracks and pad areas will need to be cleared (where vegetation occurs) for drilling and placement of rigs. The majority of the project area is already cleared. It is likely that the patch of RE11.4.3 located in the centre of the site will need to be cleared for plant operations.

Other potential impacts on vegetation include the removal of groundwater and through gasification processes and possible subsidence. The full extent of clearing, groundwater and subsidence impacts will be determined in EIS studies.

There is a possibility that a number of EPBC listed fauna could occur in the vicinity of the project area. Due to the protection of Brigalow communities there is not expected to be an impact on those species associated with Brigalow. Species identified as having an association with Briaglow include *Nyctophilus timoriensis* (Eastern long-eared bat), *Furina dunmalli* (Dunmall's Snake) and *Paradelma orientalis* (Brigalow scaly-foot). This habitat will be protected and fenced. Full impacts will be identified during the EIS Studies.

- **Figure 4 Regional Ecosystems**

INSERT GIS Image

4.5 Landscape and Visual Amenity

4.5.1 Existing Environment

The project site was previously used for grazing and has been cleared for pasture and cropping. Cattle grazing areas exist around the project area. Areas of native vegetation occur to the north and south of the direct project area.

The project area already contains pilot plant equipment and associated buildings. Some farming buildings, sheds and associated infrastructure also remain within the surrounds.

4.5.2 Potential Effects and Mitigation

Visual impacts are minimal due to the remote location of the project area. Additionally, the project site presently contains pilot plant equipment and buildings and is already cleared. Vegetated areas adjacent to the site area will be retained.

4.6 Social and Economic Environment

4.6.1 Existing Environment

Local Government Area

The town of Chinchilla was established in 1878 when the railway pushed west and the population grew to approximately 3,700 people. Chinchilla boasts a high standard of education, recreation, retail and professional services.

The economy of the Shire is comprised of primary production including agriculture, beef and pork production, wool growing, horticulture and timber resources. The Shire is well resourced with abundant quantities of good quality coal, with much interest in the development of those resources. This has been shown in the commissioning of the Kogan Creek Power Station and associated coal mine by CS Energy to the east of the Linc Energy site. Companies such as Arrow, Santos and Origin Energy are also showing a keen interest in the region in developing coal seam gas projects

Demography

The majority of residents in Chinchilla are aged between 15 and 44 years old at 36.9%, this is followed closely by the 45 to 64 age group at 24.1% and the 14 and younger age group at 23.9% (Australian Government 2006). Results show a relatively even spread of population between age groups within the Chinchilla Region.

Population Growth

Chinchilla was home to 6,078 people in June of 2003, with a slowly increasing birth rate of 13.8%. Population of the area is slowly increasing and has increased by 133 persons between 1999 and 2003 (Australian Government 2006).

Employment

Chinchilla has an unemployment rate of 5.5% in 2003. Of the employed persons 59% of people work for an employer, while 14% work for themselves. The average total wage income for the region was $26,458 (Australian Government 2006).

4.6.2 Potential Effects and Mitigation

A proportion of this workforce will be recruited from the local population, providing opportunities to the township. Where employees can not be sourced from the local area they will be brought to the project. The construction and operation of the project will source staff from both the local area and externally, the project is expected to bring an additional 200-400 people to Chinchilla region.

There will be an increasing demand on health, education and recreation facilities of the Chinchilla township. The increased workforce expenditure will be of benefit to the local community and local business operators. Further research into the social environment will be undertaken as part of the EIS.

4.7 European and Cultural Heritage & Native Title

4.7.1 Existing Environment

Two Registered National Estates (RNE), were identified in close proximity to the site. The Boonarga Cactoblastis Memorial Hall was constructed as a memorial for the insect which combated prickly pear. The hall is located on the Warrego Highway approximately 11 km from the Chinchilla township. The second conservation area is the Chinchilla Sands Local Fossil Fauna site, which has the last remaining traditional fauna fossils with intact profile. The fossil fauna site exists 3 km southeast of Chinchilla on the Condamine River bank.

Linc are in the process of preparing a Cultural Heritage Management Plan with the traditional owners of the site. They are the

The mining lease is freehold land and therefore under the *Native Title Act 1993.* Native title claims have been extinguished from the site.

4.7.2 Potential Effects and Mitigation

The location of the Cactoblastis Memorial Hall is not located along the proposed route for product transportation from the site. As such the project will not have any impact on this RNE. Similarly, the fossil record site located on the Chinchilla township is approximately 20km from the project site. As such there are no foreseen impacts on this site. However, the EIS will address these issues.

Cultural heritage items and areas will be managed through an agreed Cultural Heritage Management Plan.

5. Community Consultation

5.1 Consultation Objectives

The objectives of stakeholder and public consultation are to:

- Ensure the conduct of an open and accountable community consultation program which meets and where possible exceeds all requirements under the *State Development and Public Works Organisation Act 1971* and *Environmental Protection and Biodiversity Conservation Act 1999*;
- Build relationships and information channels between the project team and stakeholders;
- Obtain qualitative measures of community support and relative levels of concern about particular issues;
- Assist the EIS project team to understand and accommodate community issues where necessary; and
- Ensure all feedback is captured and incorporated into the EIS and supplementary materials.

5.2 Community and Stakeholder Consultation

The community views and attitudes toward the project are important. The community needs to have a clear understanding of the proposed project and the proponent needs to have a clear understanding of community view.

A stakeholder consultation program is underway and includes the following elements:

- individual meetings with landholders;
- development of fact sheets to be made available to the public;
- advertisements in Chinchilla News to provide information on consultation activities
- public displays to coincide with the release of the draft TOR and draft EIS
- project information line; and
- use of Linc Energy's website where possible for dissemination of project information.

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