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Lucas Energy

Gloucester Coal Seam Gas Project

Concept Plan and Preliminary Assessment Report

July 2008

INFRASTRUCTURE | MINING & INDUSTRY | DEFENCE | PROPERTY & BUILDINGS | ENVIRONMENT

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Glossary

Abbreviation	Description
ABS	Australian Bureau of Statistics
AGO	Australian Greenhouse Office
AHD	Australian Height Datum
AS	Australian Standard
ASS	Acid Sulphate Soils
CEMP	Construction Environmental Management Plan
CSM	Coal Seam Methane
DEWHA	Department of the Environment, Water, Heritage & the Arts (Commonwealth)
DOP	Department of Planning
DPI	Department of Primary Industries
EA	Environmental Assessment
EEC	Endangered Ecological Community
EMP	Environmental Management Plan
EPA	Environmental Protection Authority
EPL	Environment Protection Licence
EP&A Act	Environmental Planning and Assessment Act 1979
EPBC Act	Environment Protection and Biodiversity Conservation Act 1997
FEED	Front End Engineering and Design
ha	Hectares
HDD	Horizontal Directional Drill
kPa	Kilo Pascal
LALC	Local Aboriginal Land Council
LGA	Local Government Area
MPa	Mega Pascal
NES	National Environmental Significance
Pigging	Term describes internal cleaning, shape checking & integrity of a pipeline.

Abbreviation	Description
PFM	Planning Focus Meeting
ROW	Right of Way
RTA	Roads and Traffic Authority
SCADA	Supervisory Control and Data Acquisition
TD	Total Depth

Executive Summary

Introduction

The Gloucester Basin coal seam gas project is the joint venture of Lucas (70% interest) and Molopo (30% interest). The Project consists of three key components to produce, compress and transport coal seam gas from the Gloucester region to Newcastle. The current conventional coal seam gas exploration and assessment activities have been underway since 1993. These activities involve drilling exploration core holes at various locations within Petroleum Exploration Licence (PEL) 285.

The key components of the proposed Project are firstly the coal seam methane wells, secondly the associated central processing facility and thirdly, a high pressure pipeline to transport the gas from Stratford to link into the existing Sydney to Newcastle infrastructure at Hexham in the outskirts of Newcastle. The Concept Plan Area is shown in Figure 1-1.

Rationale for the Project

The Concept Plan is proposed as a means of commercially developing the coal seam gas resources of the Gloucester Basin. The development of the Project will provide benefit to the region, New South Wales as a whole and in particular to meet the energy needs for the future of New South Wales.

Project Objectives

The overall objective of the Project is to develop a coal seam methane (CSM) gas field from the coal measures within the Gloucester Basin and transfer the gas via a pipeline for delivery into the Sydney Newcastle trunk pipeline and Sydney Gas Network. The gas from the Gloucester region is available to support development of new energy infrastructure for electricity generation and other industrial development in the Hunter region.

Planning Provisions and Legislative Regime

The proposal has been declared to be development to which Part 3A of the *Environmental Planning and Assessment Act 1979* (EP&A Act) applies. This report is a Concept Plan for the entire project, which includes multiple stages of gas field development, and also a preliminary assessment for the Concept Plan and the following three separate but integrated and dependent components:

- The first stage (Stage 1 – Gas Field Development) of the gas field development;
- The central processing facility; and
- The high-pressure pipeline.

Preliminary investigations have been carried out on the preferred route for the high-pressure pipeline, and alternative options are to be investigated as part of the detailed investigations and consultation phases for the Project.

Preliminary Assessment

Preliminary investigations have been undertaken as part of the corridor selection process and in order to inform the Concept Plan Application and Project Applications. The Environmental Assessment (EA) will be undertaken for the three project components and the Concept Plan once the Director General's requirements have been issued. Key potential constraints identified for the Project are summarised in this document and presented below in Table E-1. All issues are relevant for the Concept Plan and where indicated for the three project components.

Table E-1 Key Issues for the Concept Plan and Project Components

Key Issue	Proposed Assessment and / or Management
Soil Management and Erosion Control	Vegetation clearance can lead to dust and erosion issues. This is an issue relevant to all three projects components. The presence of high risk Acid Sulphate Soils (ASS) are potentially an issue for the Pipeline Project where the corridor passes through the Newcastle, Maitland and Port Stephens LGAs. ASS assessment and specific management measures are required.
Protected Areas	Field assessments are required to assess the impact of the Project on the identified protected and sensitive areas. This issue is relevant to all project components and will be addressed in the EA for each project component.
Vegetation Clearing	The effect of vegetation clearance during the construction of the three components of the Concept Plan Project is a potential environmental issue that will be addressed in the assessment for each project component. Such assessments will identify key vegetation communities (including EECs), their condition and abundance. Mitigation measures may be required, including rehabilitation of the effected vegetation after construction.
Habitat Disturbance	Clearing of vegetation during the construction of each component part of the Project has the potential to disturb fauna and the habitat for threatened species. Further assessments will identify key fauna species and the likelihood of their presence, ecology and habitat requirements, in order to develop a management strategy. This will be required for each project component.
Threatened Species	Due to the large number of threatened species records (84) found within the study area, ecological surveys are proposed as part of the assessments for each Project component.
Air and Noise	Air and Noise impacts (including any potential impacts from 'flaring') will occur during the construction of all three project components. Desktop assessments for air quality and noise will be undertaken to identify all the potential impacts and recommended mitigation measures for each project component of the assessment process.

Key Issue	Proposed Assessment and / or Management
Aboriginal Heritage	The Project may impact two types of identified Aboriginal Heritage items: the Bora/Ceremonial, and open campfire. Field investigations together with consultation with representatives from the relevant Local Aboriginal Land Councils (LALC) will be required as part of the assessment processes.
Non-Indigenous Heritage	Reviews of non-indigenous heritage databases indicate that the proposed pipeline route has the potential to impact heritage listed properties. Further field investigation will provide an indication of the extent of the impacts on these heritage properties.
Social and Land Use	Potential social impacts from the Project include alterations to property access, the short-term severance of communities during the construction phase, increased or altered traffic movements and reduced amenity. These issues will primarily be associated with the construction phase of the project components and will be addressed in their assessments.
Visual	The Central Facility Development and the Gas Well sites will generally represent the greatest potential for visual impacts to be created. These impacts will be assessed and landscaping and other mitigation measures considered to limit the scale of the impacts.
Hazards and Risks	A Hazard and Risk analysis will be undertaken for all three project components. The EA for each project component would detail the methodology, results and recommendations from this analysis.
Bushfire	The field area and pipeline corridor includes areas that could be bushfire prone land. A Bushfire Constraints Assessment will be carried out for each of the project components providing an analysis of the possible bushfire constraints as part of the assessment process.
Water	The gas field development involves extracting water from the coal seam during production and de-watering the extracted gas to allow transmission through the Pipeline. A water treatment and management plan will be formulated for the water produced from the de-watering process and detailed in the Central Processing Facility EA. The Pipeline Project will impact waterways where the route crosses these waterways. Environmental management measures during construction will be developed at the preferred route refinement and detailed design stage, and will be detailed in the Pipeline Project EA.

1. Introduction

Lucas Energy Pty Ltd (Lucas) and Molopo (Gloucester) NL (Molopo) have established an unincorporated joint venture (the Joint Venture) to explore and develop petroleum resources in PEL 285 in the Gloucester region of New South Wales, referred to as the Gloucester Basin. Exploration activities in the Gloucester Basin have reached the stage that the Joint Venture is now planning the commercial production of coal bed methane from the PEL 285 area.

This report describes the Concept Plan and the key components of the proposed development of the Gloucester Basin and associated infrastructure to produce coal bed methane and transport to the New South Wales gas market. The proposed development comprises gas production and gathering to a central facility for compression and delivery of gas via a high-pressure pipeline from Stratford to Hexham.

The Project was declared to be a Major Project under Part 3A of the NSW *Environmental Planning and Assessment Act 1979* (*EP&A Act*) on the 21 May 2008 and is thus subject to determination by the NSW Minister for Planning. The purpose of this Report is to support the application of the Joint Venture to obtain approval of the Concept Plan and each of the three project components that make up the entire proposal pursuant to Part 3A of the *EP&A Act*.

1.1 The Proponent

The Proponent for this Project is the Joint Venture comprised of Lucas and Molopo who hold ownership interests in PEL 285 of 70% and 30% respectively.

Lucas is a subsidiary of AJ Lucas Group Limited (AJL), an ASX listed group with activities in construction drilling and petroleum exploration. Molopo is a special purpose subsidiary of Molopo Australia NL (MPO), an ASX listed oil and gas company focussing on coal seam gas exploration and development.

1.2 Concept Plan Overview

PEL 285 covers approximately 1,600 km^2 across the region around Gloucester and Stroud, north of Newcastle in New South Wales. The Joint Venture is now proposing the commercial development of the coal seam gas resources over a sub-area within PEL 285, described below as the Field Area. (See Section 2.4).

The Gloucester Coal Seam Gas Project consists of three separate but integrated and dependent components being:

- Gas Field Development – Gas wells and gathering within the Field Area;
- Central Processing Facility - Compression and treatment facility at the inlet to the Gas Pipeline; and
- Gas Pipeline – High-pressure gas pipeline from Stratford to Hexham.

Initial estimates are that each component will cost between $60 m and $80 m to complete for the initial project stages. Concept Plan approval for the whole project and concurrent Project Approval for elements of the project components (where sufficient detail is available), are sought under Sections 75O and 75J of the *EP&A Act*.

The Concept Plan Area is comprised of three overlapping areas specified for each of the components of the Concept Plan as set out below:

- Gas Field Area, incorporating the area of the known coal measures within part of PEL 285, for development of gas production wells and associated gathering infrastructure;
- Central Facility site, located on land owned by the Joint venture called the Tiedmans Property, located north of Stratford; and
- Pipeline Corridor, an approximately 100 km corridor of land based upon the current preferred pipeline route, from Stratford (Tiedmans Property) to the gas receiving facility at Hexham, north-western outskirts of Newcastle.

The Concept Plan Area is shown in Figure 1-1 and includes land within six local government areas (LGAs).

Concept approval is being sought to allow for the staged nature of some elements of the project. As noted however, concurrent project approval will be sought where there is sufficient detail for the initial project. These include:

- A part of the gas field area between Craven and Gloucester within PEL 285 which will be the first stage of the gas field to be developed (Stage 1 Gas Field Development);
- The Central Processing Facility; and
- The pipeline (intended to be a 100m wide corridor within the 1km wide concept corridor sought for concept approval).

1.3 Project Development Approvals Approach

As described above, the overall proposed project comprises three significant components making up one overall project for which one EA and one application will be submitted.

Early discussions with the Department of Planning for advice on the matter found that a Concept Plan covering the whole development would provide the most efficient, practical and logical approach to obtaining necessary approvals for the development under the *EP&A Act*. The approach for the Concept and Project approval is as follows:

- Submit a Concept Plan for the whole development comprising each component including the Gas Field Area Development, Central Processing Facility and Gas Pipeline;
- Receive one set of Director-General Requirements (DGRs) for one concept approval and the project approval elements; and
- Prepare and lodge one Environmental Assessment based upon the DGRs.

1.4 Project Rationale and Objectives

The Concept Plan is proposed as a means of commercially developing the coal seam gas resources of the Gloucester Basin. The development of the Project will provide benefit to the region, New South Wales as a whole and in particular to meet the energy needs for the future of New South Wales.

The Project is an important development of New South Wales's resources because:

- New South Wales currently imports approximately 90% of its natural gas usage from other states – this Project will initially represent some 10% of NSW gas market, reducing reliance on imports;
- Natural gas has been identified as the transition fuel for power generation in response to climate change – this Project provides potential fuel for new gas fired peak and intermediate generation; and
- The Gloucester Basin is located close to markets, and in particular the fast growing region of Newcastle and the Hunter – adding a source of supply and providing back-up to gas supplies into the region.

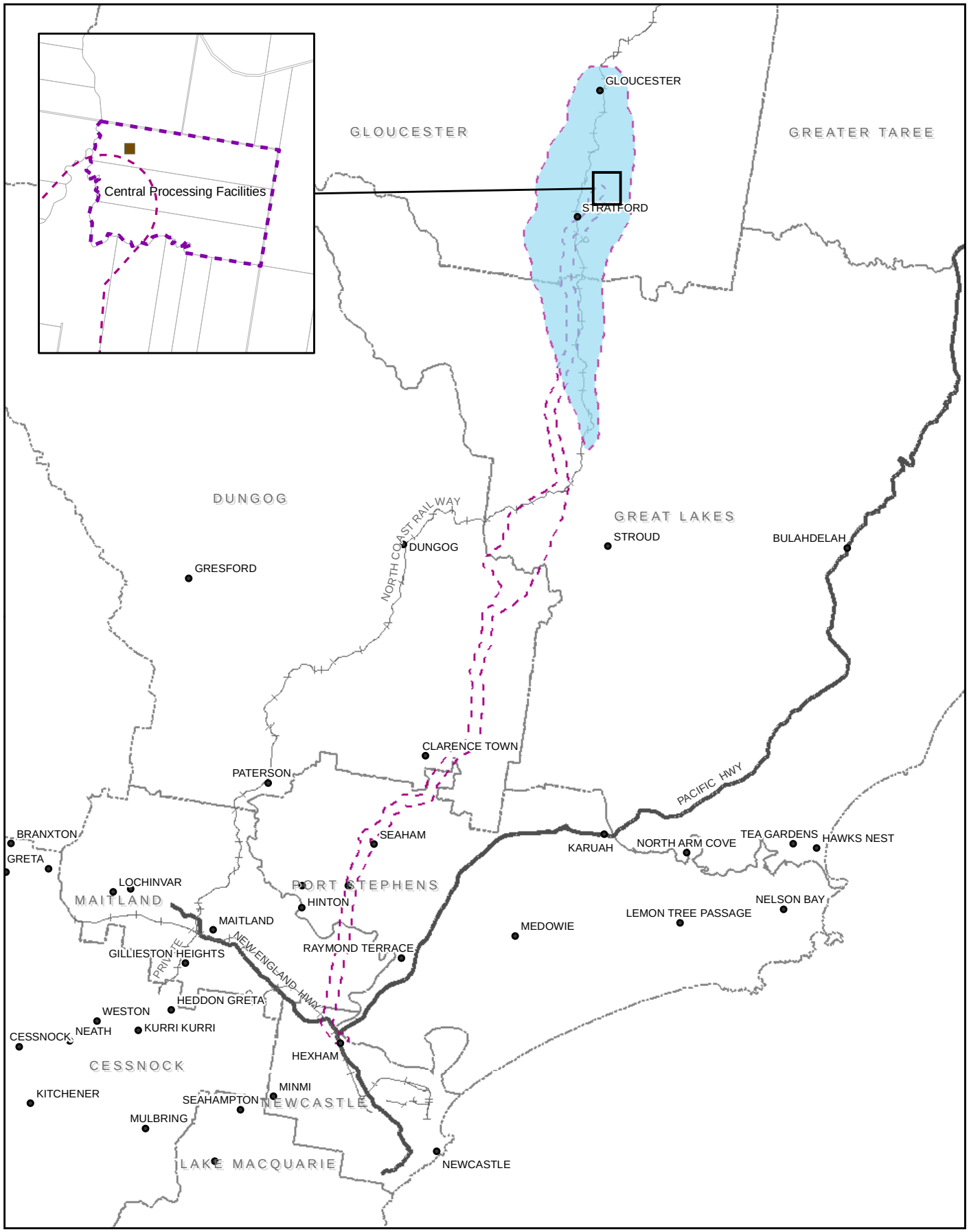
As a consequence, the proposed development will provide an important and significant new energy source for New South Wales.

1.4.1 Project Objectives

The overall objective of the Project is to develop a coal seam methane (CSM) gas field from the coal measures within the Gloucester Basin and transfer the gas via a pipeline for delivery into the Sydney-Newcastle trunk pipeline and Sydney Gas Network. The gas from the Gloucester region is available to support development of new energy infrastructure for electricity generation and other industrial development in the Hunter region.

The Project aims to achieve the following:

- Commercial production of methane gas from coal for energy supply to the NSW gas market;
- Local production and regional economic development– employment and service;
- Develop NSW's natural resource of energy (whilst leaving the coal resource intact);
- Promote low greenhouse gas emission power generation in the Hunter region using gas;
- Design and construct a pipeline that has minimal impact on both the natural and built environment and communities within those environments; and
- Provide a commercially successful and competitive energy source.



N

LEGEND

Highway
Railway
Cadastre
LGA
Gas Field Area
Concept Plan Area
Approx. Location of Central Processing Facilities
Central Processing Site

1:500,000 for A4

0 2 4 8 12 16
Kilometers

Map Projection: Universal Transverse Mercator
Horizontal Datum: Geodetic Datum of Australia 1994
Grid: Map Grid of Australia, Zone 56

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Lucas Energy Pty Ltd
Gloucsester Coal Seam Gas Project
Concept Plan Area

job no. 22-13715
rev no. C

Figure 1-1

29 July 2008

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2. Gloucester Concept Plan Description

2.1 Overview of Proposed Activities

The Proponents are currently undertaking significant exploration and assessment activities within the Gloucester Basin, including a six well Production Pilot Project at Stratford. These activities are directed at gathering additional data to allow the commercial planning of the development for the Field Area.

Currently, it is envisaged that the first stage of the Gas Field Area to be developed (Stage 1-Gas Field Development) will be centred around the Central Processing Facility (CPF). It will contain approximately 60 to 120 proposed well locations (envelopes), connected to the CPF through gathering lines. The gathering lines are buried polyurethane pipe through which the gas free flows to the CPF. The gas will be treated and compressed at the CPF and subsequently injected into the Stratford to Hexham Pipeline.

2.2 Location

The PEL 285 area is primarily centred on the township of Stratford covering the geological basin known as the Gloucester Basin. The Gloucester Basin contains approximately 200 km^2 of Permian coal measures. PEL 285 overlies the Gloucester Shire and Great Lakes Council LGAs. The Field Area is situated in the Gloucester and Great Lakes LGAs at the northern end of PEL 285.

The CPF is proposed to be located on land owned by the Joint Venture, referred to as the Tiedman's Property, situated to the west of the Stratford Colliery, within the existing PEL 285 and within the Gloucester LGA.

The Pipeline is to stretch from Stratford, located approximately 100 km north of Newcastle, to Hexham on the north-western outskirts of Newcastle, crossing six local government areas.

2.3 Concept Plan Components

The three key components are separated below for clarity and project management purposes. These key components are described under separate headings below with an outline of the construction and operation details.

The three components are:

- Gas Field Development Project – the gas production development within the known coal measures of PEL 285;
- Central Processing Facility Project – the facility compresses and dehydrates the gas; and
- Pipeline Project –Stratford to Hexham high-pressure gas transmission pipeline.

2.4 Gas Field Development Project

Gas Field Development Project of the Concept Plan involves the construction and subsequent operation of a number of gas wells together with the associated infrastructure and post development activities, which deliver gas to the CPF described in Section 2.5 of this document.

The fieldwork is proposed to be carried out within part of PEL 285 identified as the Gas Field Area. The exploration and appraisal activities of the Joint Venture carried out in the investigative phase have been wholly within the Field Area.

At present, the Proponent is not in a position to provide supporting information as to the exact location of the new wells and associated infrastructure within the Gas Field Area, as the well location is dependant upon geology, resource availability, environmental constraints, and land access issues. This information will be provided within the EA for the Project application for the Gas Field Development component.

2.4.1 Gas Field Area

The Gas Field Area shown in Figure 2-1 is approximately 200 km^2. It was determined based on the delineated prospective coal measures within PEL 285. The entire PEL 285 is approximately 1,600 km^2.

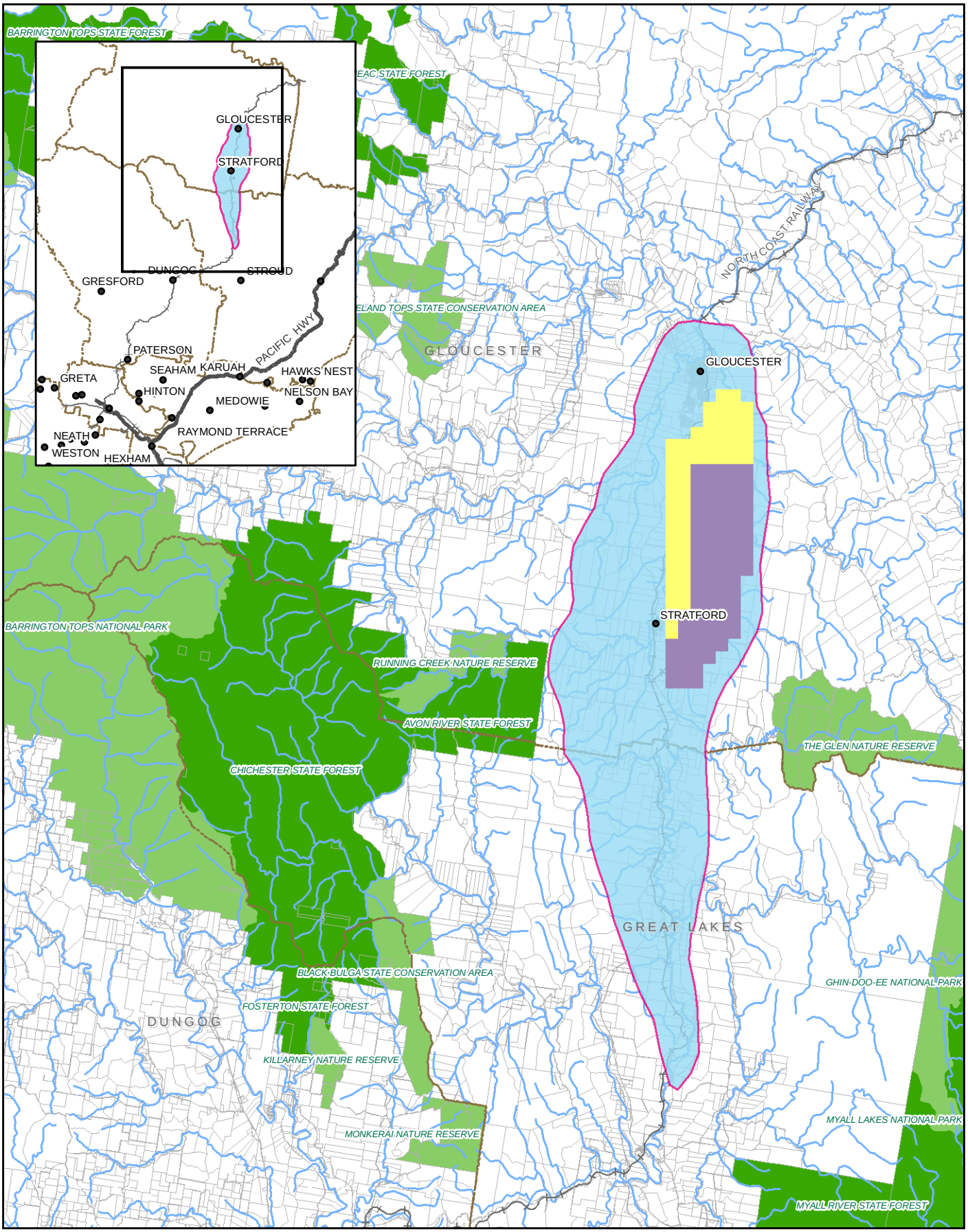
The original open-forest vegetation, which once covered most of this landscape, has already been cleared and replaced with improved pasture. Land use includes improved and semi-improved pasture to predominantly support beef cattle production, and some dairy farms.

2.4.2 Field Development

The principal activities that comprise the Gas Field Development are the drilling, completion and connection of production wells. At this stage the area of initial development within the Gas Field Area has not been determined, but is likely to be to the north and east of the PEL 285 as shown in Figure 2-1 where most of the exploration and appraisal development activity has been undertaken to date.

Within the Gas Field Area, there will be “pods” of development, where clusters of between 15 and 30 vertical production wells spaced at approximately 600- 800 meters apart, drilled on a notional “grid pattern”. The wells are interconnected by buried polyurethane pipe for the purposes of gas and water gathering. Water, produced as a by-product is captured separately for treatment and disposal and interconnected similarly to the gas gathering system.

This field layout is common for coal seam gas developments, allowing production wells to “drain” the gas from the entire coal field. Set out in Figure 2-2 for illustrative purposes is the layout of a “pod” of 24 wells, spaced on a 600 m x 600 m grid (85 acres).



N

LEGEND

- Highway
- Railway
- LGA
- Gas Field Area
- Nature Conservation Reserve
- State Forest
- Stage 1 - Gas Field Development Area
- Stage 1 - Possible Extension
- Water Course
- Cadastre

1:250,000 for A4

0 1 2 4 6 8 Kilometers

Map Projection: Universal Transverse Mercator
Horizontal Datum: Geodetic Datum of Australia 1994
Grid: Map Grid of Australia, Zone 56

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Gloucsester Coal Seam Gas Project
Concept Plan -
Gas Field Development Project **Figure 2-1**
29 July 2008

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rev no. F

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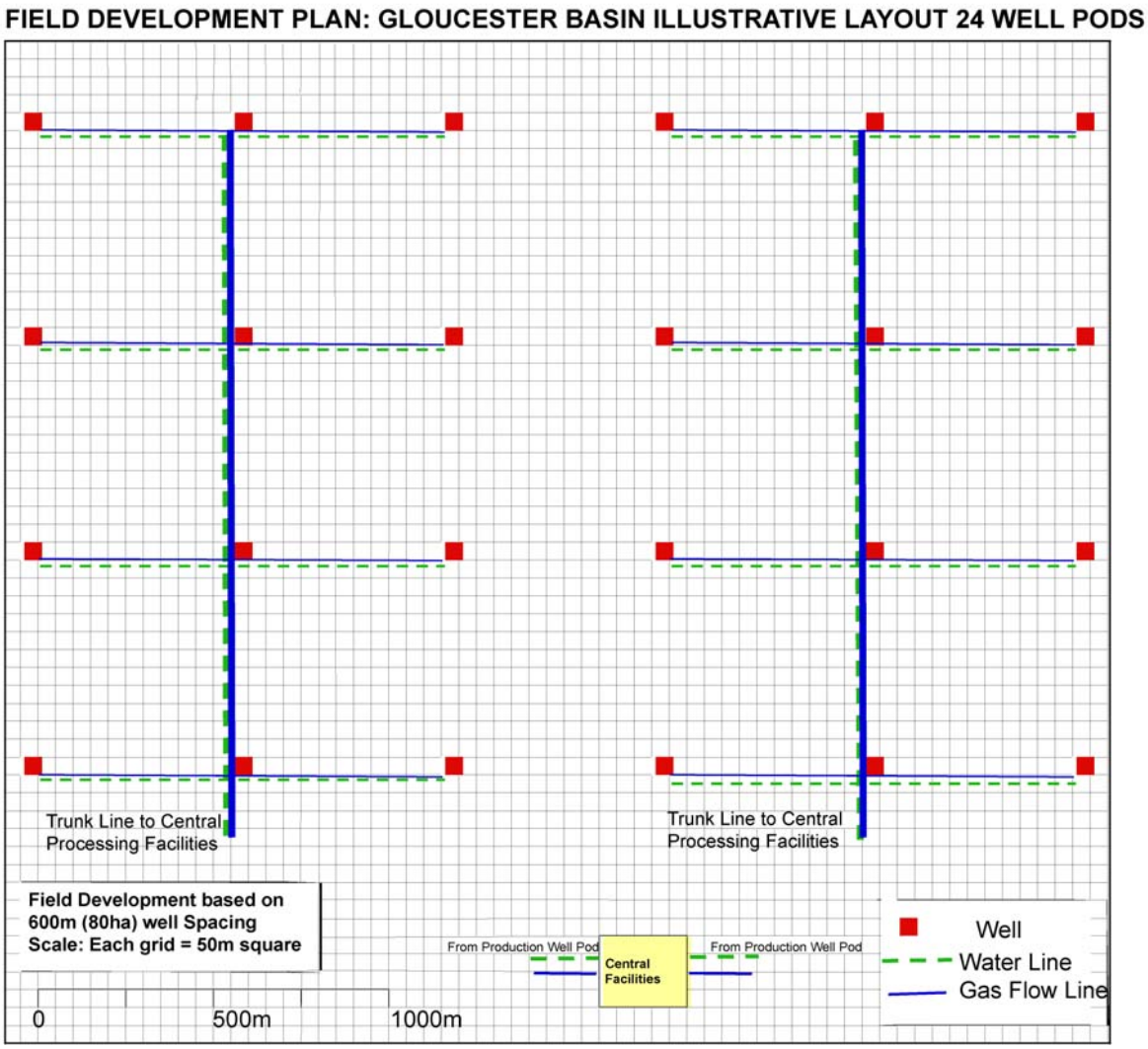


Figure 2-2 Indicative Gas Field Development Plan

2.4.3 Well Site Selection Criteria

The selection of each well location within the notional grid pattern would be guided by a number of site criteria, which will be outlined within the EA.

2.4.4 Production Well Construction

At each Production Well location a single vertical well is anticipated, although in some circumstances it may be more efficient to locate more than one well at the same location. Wells will be drilled using conventional drilling rigs and completed with required down hole and surface equipment after being “fracced” to stimulate gas and water flow. However other drilling and completion technologies such as under-reamed completions, surface to in seam may be utilised where appropriate.

The process of completing a Production Well comprise of the following activities:

- Site Preparation;
- Borehole Drilling;
- Borehole Geophysical Logging;
- Production Casing Running and Cementing;
- Completion which may include perforating and fracture stimulation, or an alternative completion;
- Installation of pumps and surface facilities, and
- Site Cleanup.

The drilling and associated activities for the completion of a new Production Well would occur over a period of about 4 - 6 weeks and is generally scheduled to take place in daylight hours, however 24 hour drilling maybe required which is dependent upon geology and hole conditions.

2.4.5 Gas and Water Gathering

It is anticipated that the gas and water gathering system will consist of separate main trunk lines connecting the central processing facility. Smaller gas and water gathering lines from the production wells will tie into the main trunk lines. This is shown indicatively in Figure 2-2 above.

Gas produced will be treated at the CPF ready for pressurisation into the Pipeline. Water will be collected at the wellhead and transported for treatment and disposal at a central water treatment facility.

The gas and water gathering lines will be constructed simultaneously using polyethylene pipe and co-located in the same trench. The following criteria is likely to be utilised for locating the gathering lines, where possible:

- Adjacent to existing fence lines;
- Adjacent to access tracks; and
- Within previously disturbed land.

In parts of the field, if wells are at some distance away from the CPF, it may be necessary to install additional compression plant to form a “node” so the gas produced by a “pod” can be transported under higher pressure. If required, these facilities will be the subject of a new Project Application and will be designed and evaluated further when detailed field layout and associated engineering design occurs as part of the environmental assessment. Note for clarity there is no intention to include nodal compression in the initial project applications.

2.4.6 Produced Water Management and Disposal

Water, produced as a by-product of this process, will be temporarily stored on site in dams. The sizing of the dams is not determined at this point in time as it is dependant on the quantity of water expected from the production wells. Exploration is currently being completed to further assist in quantifying the anticipated water.

The quality and quantity of the water produced will underpin the most appropriate site water management and disposal. Currently, the water produced at the Stratford Pilot after settling within the evaporation pond, is of a suitable quality for irrigation. Further exploration and water monitoring is being completed to further understand the water quality across the basin, as it is likely to vary in quality across the field area.

2.4.7 Ongoing Operational Activities

The well operational activities are anticipated to involve minor disruption to existing land and landowners. Operator involvement at the well site is minimised by the installation of a SCADA system, which provides automated and remote controlled functions.

Operational activities anticipated during the production well life includes:

- Routine inspections and maintenance of the well head facilities;
- Well work over, which may include replacing pumps and other downhole equipment; and
- Removal of surface facilities and plugging and abandonment of the well at the expiration of the life of the well.

2.5 Central Processing Facility Project

The CPF is required at the inlet to the proposed gas pipeline to treat and compress the gas produced from the Field Area, prior to being injected into the pipeline for transmission to Hexham, at the Sydney-Newcastle link.

The CPF will consist primarily of reciprocating compressors, which will, in stages, compress the gas from low pressures of less than 300 kPa up to a maximum of 15.3 MPa for injection into the pipeline.

2.5.1 Site

The proposed location of the CPF is within the Tiedmans Property, on land owned by the proponent. This land was acquired in 2007 and is where the Stratford Production Pilot is located that currently comprises five production wells and a water and gas gathering system. The approximate location where the CPF would be sited is shown in Figure 2-3. Typically, the CPF will require a site no larger than 200 metres square. Figure 2-4 illustrates a typical CPF layout.

2.5.2 Central Processing Facility Design

The engineering design and specification of the CPF is underway. The major components anticipated for the CPF include:

- Inlet filtration to remove contaminants from the gas;
- Multistage gas engine driven gas compression and water removal, to compress the gas to the required transmission pipeline pressure;
- Gas dehydration using a glycol based dehydration system to absorb water and dry the gas to the transmission pipeline dew point specification;
- Water treatment facility to process produced water and remove contaminants;
- Fire and Gas detection system that initiates a plant depressurisation; and
- Gas vent system to safely dispose of gas in emergency situations.

Noise and emissions studies will be required as part of the design process to determine if any noise attenuation will be required. The studies will form part of the environmental assessment process.

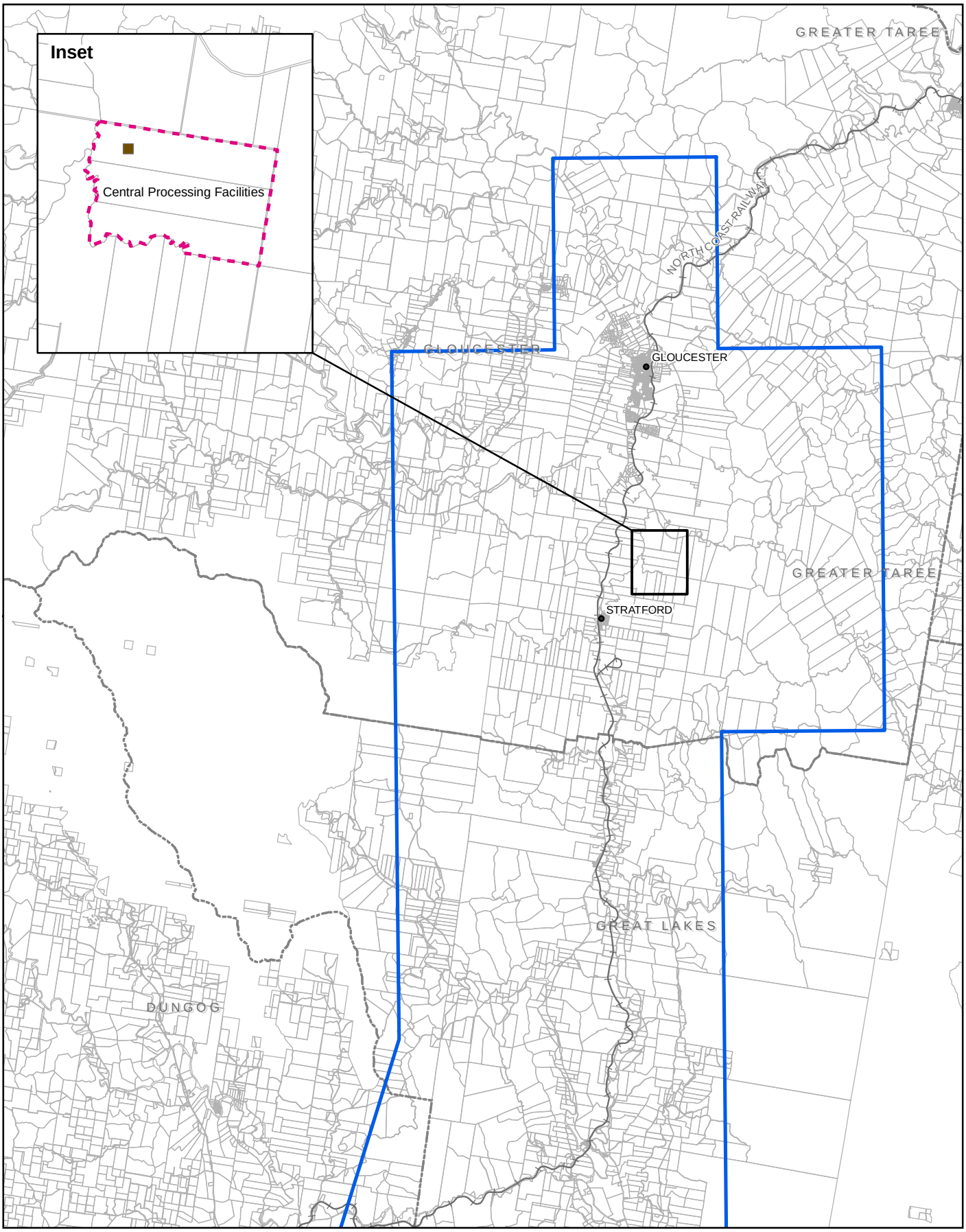
2.5.3 Central Processing Facility Construction

Construction of the CPF will be undertaken over a period of 12 months. The hours of work are typically during daylight hours, 6 days a week.

The components for the CPF will need to be transported by road to site. Road transportation would be on articulated vehicles with extended trailers where required, to the proposed construction site using the existing road network. The approximate number of trips and period of haulage will be determined in the design phase of the Project.

2.5.4 Central Processing Facility Operations

The main operating and maintenance centre for the CPF will include a workshop, office, control room, toilet facilities and a car park and will be located within the CPF compound as shown in Figure 2-4. This facility will be manned during daylight hours, 5 days a week. Outside normal working hours, in the event of shutdown or system failure, operations staff will be automatically notified via paging service.



N

LEGEND

Highway | Railway | Cadastre | LGA | Central Processing Site | Approx. Location of Central Processing Facilities

1:250,000 for A4

0 1 2 4 6 8
Kilometers

Map Projection: Universal Transverse Mercator
Horizontal Datum: Geodetic Datum of Australia 1994
Grid: Map Grid of Australia, Zone 56

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Lucas Energy Pty Ltd
Gloucester Coal Seam Gas Project
Concept Plan -
Central Processing Facilities

job no. 22-13715
rev no. E

Figure 2-3

23 June 2008

GIS Filename: 22\13715\GIS\Maps\Planning\2213715_FIG2-3_ProcessingPlant_20080623_E.mxd

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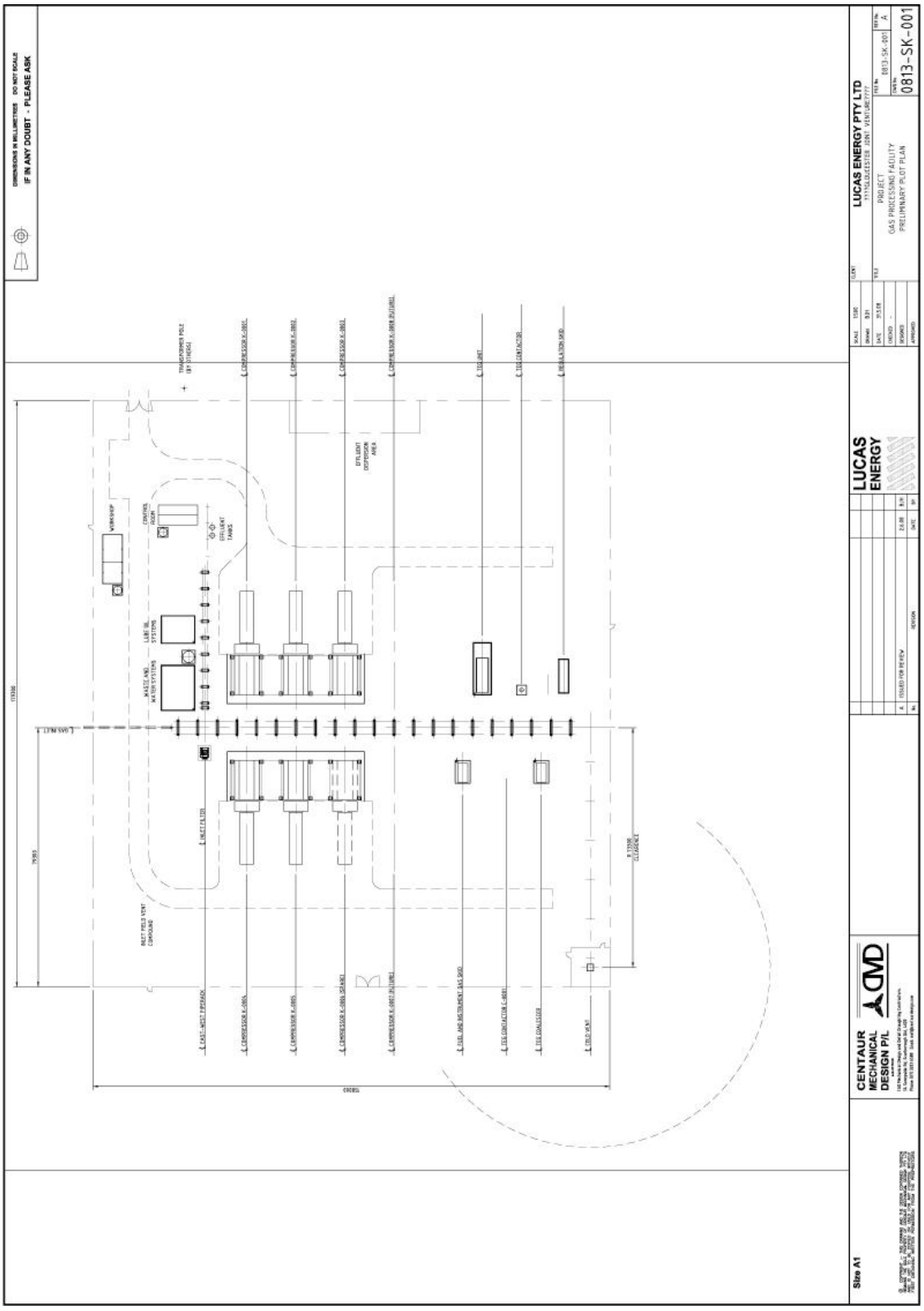


Figure 2-4 Typical Central Processing Facility Layout

2.6 Pipeline Project

The proposed gas transmission pipeline will commence at the CPF and connect to the Gate Station facilities on the Sydney Newcastle trunk pipeline at Hexham. Preliminary investigations determined a preferred pipeline corridor and the likely constraints relating to existing land use, environmentally sensitive areas and constructability. Early investigation of this component was considered necessary as the Preferred Pipeline Corridor transverses approximately 250 parcels of land and therefore will involve careful community consultation.

2.6.1 Route Selection Process

Due to the land use, land ownership and physical constraints that could potentially arise for the Pipeline Project, considerable investigation has already been carried out to scope the likely issues and to refine the route for the Preferred Pipeline Corridor. To this end, a preliminary corridor selection report was prepared. The route options investigated are shown in Figure 2-6. This process used the following methodology:

Step 1 – Desktop establishment of a study corridor derived from 10 km wide straight-line buffer from Stratford to Hexham for use as part of the "Initial Study Area".

Step 2 – Identification of four corridor route options within this 10 km wide corridor. The four options are:

- Straight Line (Stratford to Hexham);
- Computer Model generated using ArcMap modelling with input of criteria that avoided slopes >10%, sensitive areas (National Parks, State Forest etc) and parcels < 2 ha;
- Preliminary Corridor Route - a computer generated model refined to include further constraints; and
- Initial Preferred Pipeline Corridor - determined by review and reconnaissance of the preliminary corridor route.

Step 3 – Aerial recognisance was utilised to identify the major constraints affecting the initial preferred pipeline corridor.

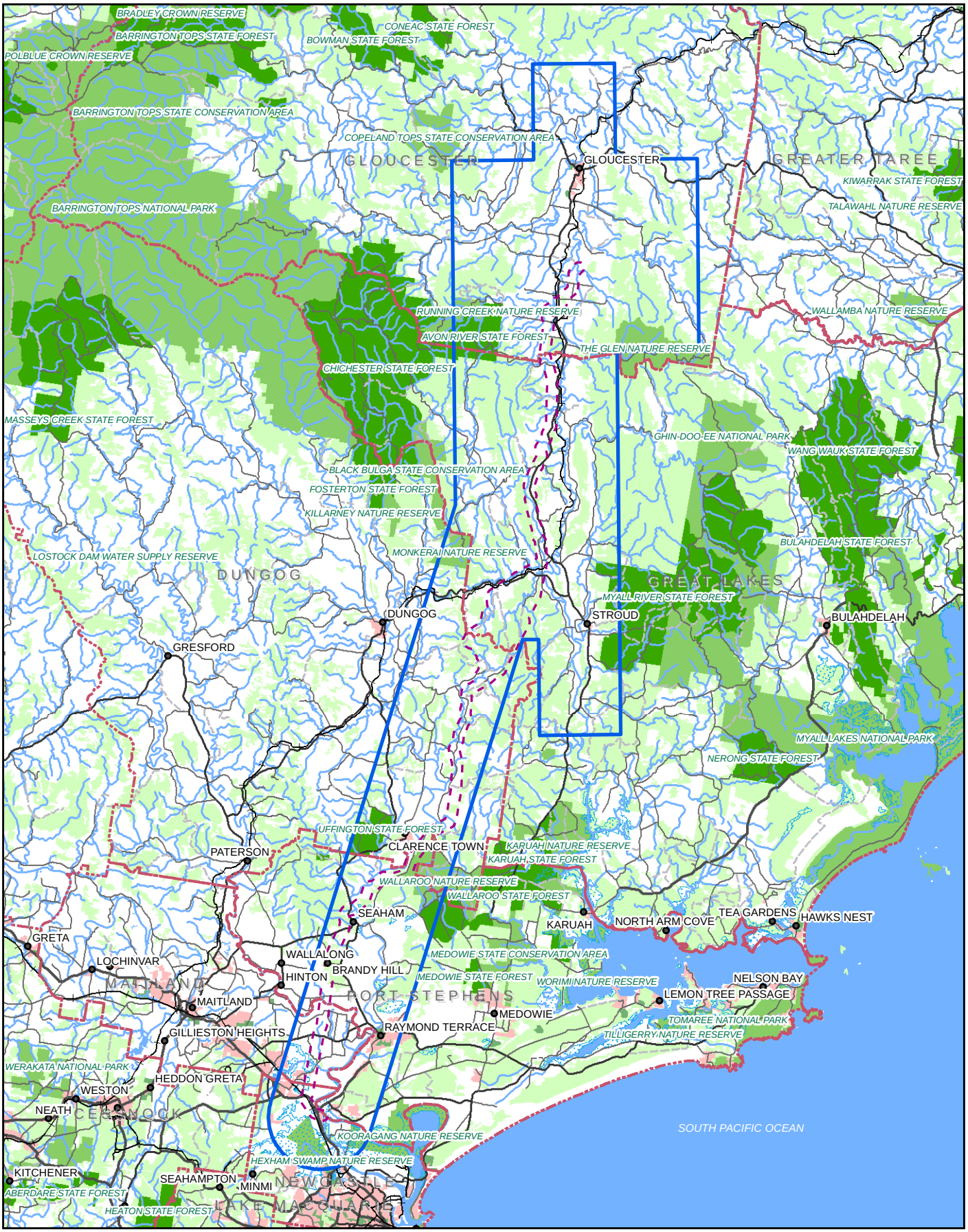
Step 4 – Provide a preferred pipeline corridor to facilitate further refinement of pipeline route and land access arrangements.

The Gas Pipeline Project is discussed below in relation to the pipeline corridor, design, construction and operation.

2.6.2 Pipeline Corridor Route

The Initial Study Area as shown in Figure 2-5 was initially chosen to commence the route selection process.

A number of route options were identified during the route selection process taking into account topographical features, land use, and environmental issues. The options were further verified by aerial survey and some ground truthing where possible.



N

LEGEND

- Study Area
- Principal Road
- Secondary Road
- Minor Road
- Track
- Rail
- Water Course
- Watercourse Areas
- Built Up Areas
- Recreation Areas
- Forest Or Shrub
- Nature Conservation Reserve
- State Forest
- LGA
- SEPP14
- Preferred Pipeline Corridor

1:500,000 for A4

0 2 4 8 12 16 Kilometers

Map Projection: Universal Transverse Mercator
Horizontal Datum: Geodetic Datum of Australia 1994
Grid: Map Grid of Australia, Zone 56

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Gloucester Coal Seam Gas Project
Initial Study Area

job no. 22-13715
rev no. E

Figure 2-5

23 July 2008

GIS Filename: G\22\13715\GIS\MAPS\Planning\2213715_FIG2_5_StudyArea_20080623_E.mxd

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The route selection criteria are outlined below in:

- Length of Pipeline - The shortest distance between the start and finish usually has the lowest cost;
- Utilisation of existing easements - Existing easements provide a corridor with pre-existing encumbrance to the land, minimising the impact to the land use and development potential;
- Safety Risk Assessment - Risk assessment determines the depth of burial, pipe wall thickness and other safety factors to be used in designing the pipeline;
- Environmental impacts - Impacts on the environment, including heritage issues determine the feasibility of the selected corridor;
- Social impacts - Public safety during construction, the impacts of noise, vibration to buildings and occupants, dust, traffic disruption and amenity issues during construction affect the feasibility of the proposed corridor;
- Constructability - The pipeline corridor must be selected so that conventional pipeline equipment can be used to construct the pipeline where possible. Special techniques can be used for short crossings such as bores and horizontal directional drilling (HDD) where conventional open-cut techniques cannot be used;
- Planning schemes - Existing planning schemes need to be referenced to determine the ongoing land use close to the pipeline as this affects the risk assessment referenced above;
- Geological features - Geological issues are reviewed for ground stability, ground water levels and other construction issues; and
- Buildings and infrastructure (existing and planned) - Pipeline corridors try to avoid existing and planned buildings and planned major infrastructure.

The Preferred Pipeline Corridor is shown in Figure 2-7. This corridor is shown as an area outlined by a dashed line based upon a 1 km buffer around the preferred pipeline route and includes four locations where there are alternative route options, i.e. 500m either side of the preferred pipeline route and options selected. The four alternative route segments along the route are required where more detailed investigation is necessary due to landowner and physical constraints for the construction of the pipeline.

Significant changes to the Preferred Pipeline Corridor are not anticipated, although the final alignment will be dependant upon ground truthing surveys taking into account landholder negotiations, constructability, environmental surveys and stakeholder considerations.

2.6.3 Key Principles for Pipeline Design

The design and construction of the Pipeline is to be in accordance with the current versions of AS2885 Part 1 Pipelines Gas and Liquid Petroleum. The design will be broken down into two main activities:

- Safety Management - including route selection, identify third party activities, future development, erosion, flooding and land movement; and
- Pipeline design - including steel and coating selection, valve spacing, depth of burial, corrosion protection, AC interference, remote monitoring, operations and maintenance.

The Pipeline will be a buried steel pipe with a maximum allowable operating pressure of between 10.2 and 15.3 MPa. The pipe diameter is yet to be confirmed and will be based on market demand. Above ground pipeline facilities include:

- Scraper stations at the inlet and delivery point (Hexham);
- Metering Station at the delivery point (Hexham);
- Marker posts – placed at bends and inter-visible locations at fence lines where possible to indicate the pipeline position; and
- Cathodic protection posts – depending on ground resistivity, these posts are typically spaced at 3 - 5 km spacings.

2.6.4 Pipeline Construction

Pipeline construction involves a sequence of production line activities. A similar production rate is targeted for each activity and it is anticipated for a project of this size to be approximately 1 km per day. The workforce anticipated to complete these activities is usually 100 personnel during the peak period. General skilled labour will be sourced locally, however some of the activities require specialist skills, and labour for these will be sourced from around Australia.

The sequence of activities to enable pipeline construction are listed below:

- **Clearing** – A Right of Way (ROW) will be cleared of any vegetation where required to enable construction activities;
- **Grading** – The ROW will be levelled to a suitable gradient using graders, excavators and bulldozers;
- **Trenching** – Either a specialist trencher or an excavator will be used to dig the trench in readiness for pipe-laying;
- **Pipe Stringing** – Pipe will be delivered to the ROW by trucks and will be unloaded and laid out adjacent to the trench;
- **Welding** – Each pipe length is welded together into continuous strings up to 1 km in length;
- **Radiography** – Each weld will be inspected using x-ray or ultrasonic equipment to check for the weld integrity;
- **Joint Coating** – The surface of the joint is cleaned by high pressure sand blasting or wire brushing and coated with a protective coating to inhibit corrosion;
- **Lowering-in and Backfill** – The pipe will be lowered directly into the trench and initially backfilled around the pipe with screened trench spoil (to remove any rocks). The remainder of the trench is backfilled with the remaining spoil ensuring the topsoil is not included;
- **Hydrostatic Testing** –The pipeline will be tested with water and pressurised above the maximum allowable operating pressure to ensure the integrity of the pipeline prior to commissioning;

- **Crossing** – Typical crossing methodologies for crossing major roads, railways, and rivers. include open trenching; boring or directional drilling.; and
- **Restoration** – Clean up and rehabilitation measures applied to the ROW and associated work areas are undertaken once all other work activities have been completed.

To enable pipeline construction, the following temporary work areas will be required along the pipeline route:

- **Access Tracks** – to gain access to the ROW from public roads; and
- **Temporary Work Areas** – during construction a number of temporary work areas will be required for the storage of pipe and facilities.

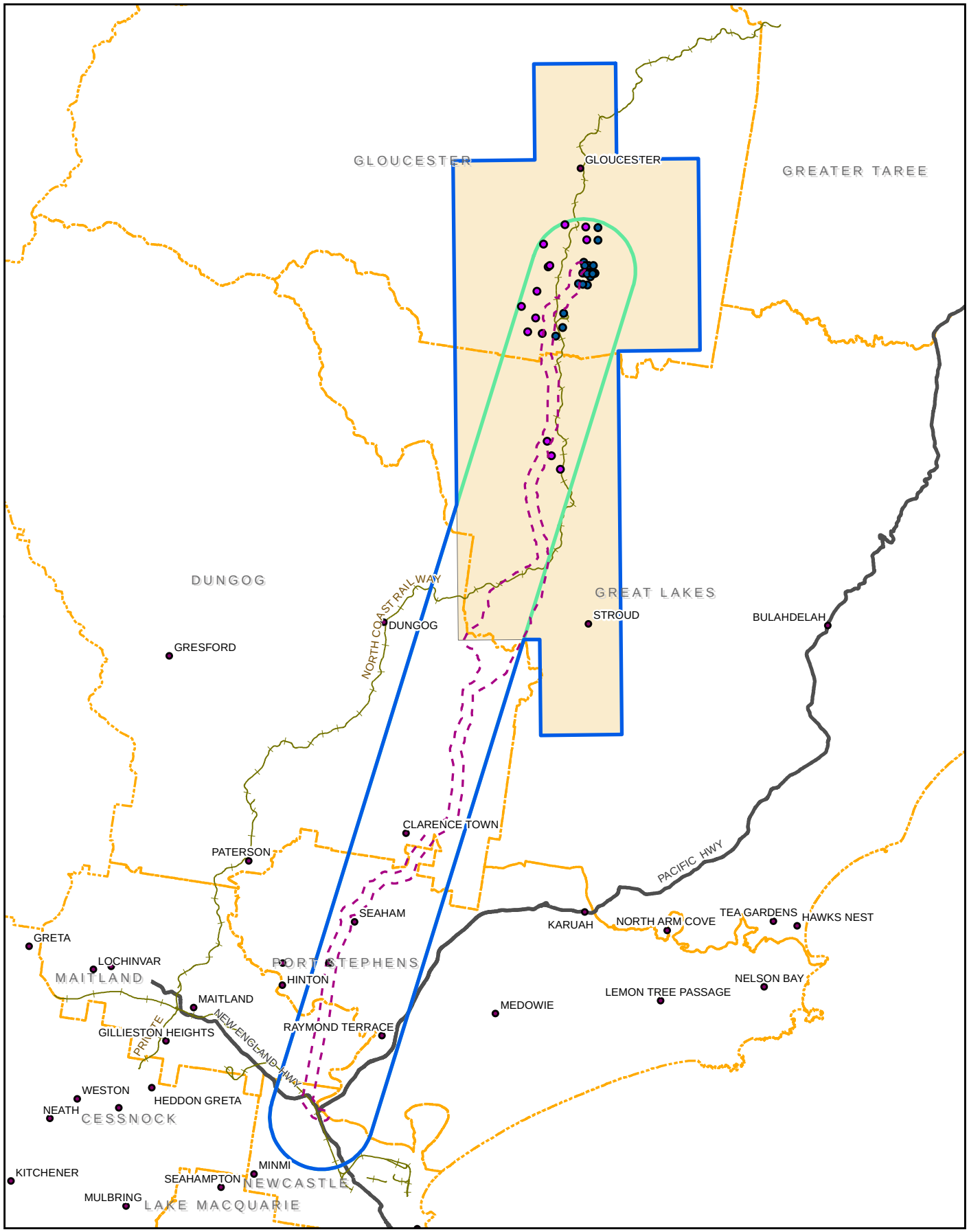
2.6.5 Operational Practices

As it is a buried pipeline, most previous land use activities can resume over the pipe with the exception of excavation and planting of deep-rooted vegetation. Permissible activities will include shallow rooted cropping and pasture re-establishment. Land use activities will be incorporated into the pipeline design to ensure pipeline integrity is maintained.

To ensure the pipeline integrity is maintained, the following protection measures are incorporated:

- Monitoring of any third party activities on or close to the easement;
- Erosion detection;
- Monitoring of revegetation;
- Monitoring of weed control;
- Connection of a Cathodic Protection system;
- Installation of a Supervisory Control and Data Acquisition System (SCADA) to allow remote operation of the system;
- Pipeline protection measures from third party interference, including;
  - Adequate depth of cover;
  - Marker posts are installed;
  - Registered with Dial Before You Dig;
  - Pipeline patrols of the easement for construction and earthmoving activities; and
  - Education programs to local contractors and utility service providers informing them about the dangers of working near gas pipelines.

A Safety Management Study will be completed as part of the pipeline design, which aims to identify all potential threats along the pipeline corridor. This will also assist in ensuring the pipeline is adequately protected as part of the pipeline design to minimise the threats.



1:500,000 for A4

0 2 4 8 12 16
Kilometers

Map Projection: Universal Transverse Mercator
Horizontal Datum: Geodetic Datum of Australia 1994
Grid: Map Grid of Australia, Zone 56

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Gloucsester Coal Seam Gas Project
Preliminary Corridor Selection

job no. 22-13715
rev no. F

Figure 2-6

23 July 2008

GIS Filename: 22\13715\GIS\Maps\Planning\2213715_FIG2-2_Options_20080623_F.mxd

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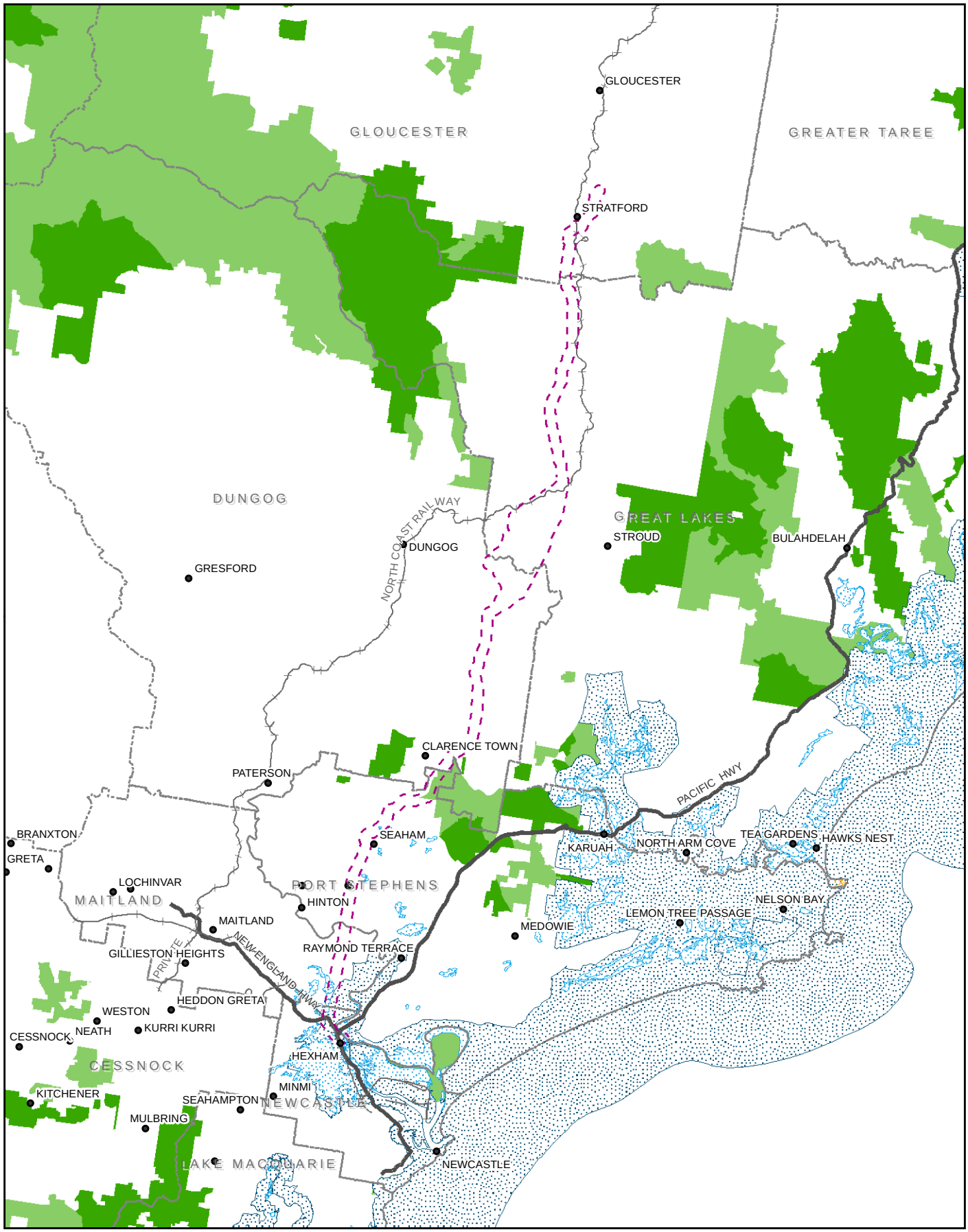

N

LEGEND

- Highway
- Railway
- LGA
- Preferred Pipeline Corridor
- Nature Conservation Reserve
- State Forest
- SEPP14
- SEPP71
- SEPP26

1:500,000 for A4

0 2 4 8 12 16
Kilometers

Map Projection: Universal Transverse Mercator
Horizontal Datum: Geodetic Datum of Australia 1994
Grid: Map Grid of Australia, Zone 56

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Lucas Energy Pty Ltd
Gloucester Coal Seam Gas Project
Concept Plan - Pipeline Project

job no. 22-13715
rev no. D

Figure 2.7

23 July 2008

GIS Filename: C:\Temp\2213715_FIG2-7_Pipeline_20080623_D.mxd

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3. Legislative Regime

This Section addresses the Commonwealth and NSW State Legislation relevant to the proposed development. The Proponent believes that it is most efficient for the development to conduct all approvals processes concurrently where possible.

3.1 *Environment Protection and Biodiversity Conservation Act* 1999 (EPBC Act)

The *EPBC Act* is Commonwealth Government legislation that applies when there is a significant impact (controlled action) on matters of National Environmental Significance (NES) or to Commonwealth lands. This requires formal approval from the Commonwealth Department of Environment, Water, Heritage and the Arts (DEWHA) under the *EPBC Act*.

A Protected Matters search under the *EPBC Act* on 6 February 2008 and 17 March 2008 for the Initial Study Area (see Figure 2-5) returned no records of World Heritage Properties, National Heritage Places or Commonwealth Marine Area or Nuclear Actions. The following NES matters were identified:

- One threatened ecological community was identified within the Initial Study Area;
- 19 threatened species have previously been recorded within PEL 285 and 25 threatened species previously been recorded within the Preferred Pipeline Corridor; and
- 15 migratory species previously been recorded within PEL285 and 27 migratory species previously been recorded within the Preferred Pipeline Corridor.

The Hunter Estuary Wetland has international significance and is found within the broad Initial Study Area. However, the Preferred Pipeline Corridor does not traverse this Wetland. Specialist studies as part of the EA will determine the significance of the impact of the proposal in relation to this wetland and the points raised above.

The Commonwealth and NSW Government's Bilateral Agreement of January 2007 will allow the assessment regimes under the *EP&A Act* to be automatically accredited under the *EPBC Act*. This will negate the requirement for parallel Commonwealth and NSW State assessments for controlled actions.

3.2 *Environmental Planning and Assessment Act* 1979 *(EP&A Act)*

The Project is subject to Part 3A of the *EP&A Act* and is thus subject to determination by the Minister for Planning. The following approvals will be sought:

Project Component	Concept Approval	Project Approval
Field Area – PEL 285	√	√ Sub-area between Gloucester and Craven for 60-90 wells plus a location buffer or 'envelope'
Central Processing Facility (CPF)	√	√
Pipeline	√ (1km wide corridor)	√ 100m easement defined within the corridor

3.2.1 State Environmental Planning Policies

Under Part 3A of the *EP&A Act*, State Environmental Planning Polices apply to approved projects. However, during the assessment phase the consideration of State Environmental Planning Policies (like other environmental planning instruments) must be considered in the context of the Director-General's requirements and whether those requirements provide for an environmental assessment to be carried out against any of those instruments. Further, the Director-General's report under section 75I of the *EP&A Act* only requires a reference to State Environmental Planning Policies in that report in circumstances where those Policies substantially govern the carrying out of the project. It is not considered that there are any State Environmental Planning Policies, which substantially govern the carrying out of this Project.

However, the following State Environmental Planning Policies may be of some relevance through the environmental assessment phase:

(a) *State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries)* 2007 (this policy is only relevant to the extent that clause 7 of the Policy renders petroleum production permissible with development consent in certain zones);

(b) *State Environmental Planning Policy No. 14 – Coastal Wetlands*;

(c) *State Environmental Planning Policy No. 26 – Littoral Rainforest*;

(d) *State Environmental Planning Policy No. 33 – Hazardous and Offensive Industries*;

(e) *State Environmental Planning Policy No. 44 – Koala Habitat Protection*;

(f) *State Environmental Planning Policy No. 55 – Remediation of Land*; and

(g) *State Environmental Planning Policy No. 71 – Coastal Protection*.

3.2.2 Regional Environmental Plans

There are not considered to be any Regional Environmental Plans that are applicable for assessment purposes under Part 3A of the *EP&A Act* for this Project.

3.2.3 Local Environmental Plans

The Field Development Project and associated Central Processing Facility Project (CPF) are characterised as petroleum production facilities. The Pipeline Project is defined as a utility undertaking or utility installation. The Project is located with six local government areas (LGAs). These are:

- Gloucester Shire Council;
- Great Lakes Shire Council;
- Dungog Shire Council;
- Port Stephens Council;
- Maitland City Council; and
- Newcastle City Council.

In accordance with the provisions of:

- State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007;
- State Environmental Planning Policy (Infrastructure) 2007;
- Petroleum (Onshore) Act 1991; and
- Environmental Planning and Assessment Model Provisions 1980.

each of the project components are permissible with consent.

3.3 Pipelines Act 1967 (Pipelines Act)

A petroleum pipeline is defined in the *Pipelines Act* as one that conveys naturally occurring hydrocarbons and generally relates to high-pressure trunk lines. It is understood that pipelines include storage tanks and ancillary works but that field gathering lines are not usually licensed as a petroleum pipeline. These gathering lines would be included as part of the Production Licence facilities (DPI website 2008).

A Pipeline Licence granted under section 14 of the *Pipelines Act* is required for the Pipeline Project. If approval is granted under Part 3A of the *EP&A Act*, the Pipeline Licence cannot be refused and must be substantially consistent with the Part 3A approval.

3.4 Petroleum (Onshore) Act 1991

The existing PEL 285 applies to the whole of the Field Area shown in Figure 2-1. A Production Lease granted under section 42 of the *Petroleum (Onshore) Act 1991* will be required over the field development project area. This Production Lease will allow for the drilling of the wells, gas and water gathering activities and will be refined in consultation with the DPI.

The Production Lease will be sought during the approvals process as a consequence of the Project application to be made for Stage One of the field development across the Field Area. If approval is granted under Part 3A of the *EP&A Act*, the production lease cannot be refused and must be substantially consistent with the Part 3A approval.

3.5 Other State Legislation

There are other legislative requirements to be considered in relation to the further approvals and licences for the development and operation of the proposed Project. These are outlined below. Due to the operation of section 75U of the *EP&A Act* many approvals previously required under State Legislation are no longer required but assessment of the relevant impacts will be required through the Director-General's requirements.

3.5.1 Water Act 1912 (The Water Act)

Of the three main components of the Project: the drilling of methane gas wells, the compression facility and the high pressure pipeline, the component likely to be affected by *The Water Act* will be the gas wells. In particular Part 5 of the *Water Act 1912* requires a licence for bore holes. Preliminary advice from the Department of Water and Energy was that Part 5 of the *Water Act 1912* is likely to require a licence.

3.5.2 Protection of the Environment Operations Act 1997 (POEO Act)

An Environment Protection Licence (EPL) is required for the production of methane gas as this is a scheduled activity under clause 31 of Schedule 1 of the *POEO Act*. If approval is granted under Part 3A of the EP&A Act, the EPL cannot be refused and must be substantially consistent with the Part 3A approval.

3.5.3 Roads Act 1993

The carrying out of the Project may require works to be done in, on, under or over public roads. Where required, consents will need to be obtained under section 138 of the *Roads Act 1993*. If approval is granted under Part 3A of the *EP&A Act*, the *Roads Act* consents cannot be refused and must be substantially consistent with the Part 3A approval.

4. Preliminary Assessment

Preliminary environmental investigations were undertaken in respect of the Initial Study Area, which comprised the whole of PEL 285 and a 10km pipeline corridor based upon the straight line from Stratford to Hexham as shown in Figure 2-5. Investigations included desktop environmental assessments, identification of environmental constraints and opportunities, identifying sensitive environmental and cultural areas and determining the required level of field investigations.

The findings of these preliminary investigations have been incorporated in the development of the Concept Plan and the identification of the Preferred Pipeline Corridor. The preliminary assessments of environmental impacts in the Concept Plan Area are set out below for the purpose of informing the Director-General's requirements for the Project.

4.1 Soils and Geology

4.1.1 Pipeline

The Preferred Pipeline Corridor traverses through a number of different soil types.

Soils in the north of the Preferred Pipeline Corridor overlay conglomerate, sandstone, mudstone, arkose, carbonaceous shale and coal.

The area to the south of the Concept plan Area is comprised of typically erodable and colluvial soil types with alluvial plains (Floodplains / Terraces and Coastal Alluvial Plains), with swamps and waterlogged areas occurring within the Port Stephens, Maitland, and Newcastle LGAs. These areas have been identified as 'high risk' areas for encountering Acid Sulphate Soils (ASS) and therefore this is an environmental issue to be particularly addressed in the Environmental Assessment (EA) to be conducted for the Pipeline component.

4.1.2 Soil Management and Erosion Control

Vegetation clearance can lead to dust and erosion issues. This is an issue relevant to the whole concept plan area, and will be addressed as part of the EA.

The presence of high risk ASS in the southern part of the Concept Plan Area are potentially an issue, particularly where the Preferred Pipeline Corridor passes through the Newcastle, Maitland and Port Stephens LGAs, where they may be disturbed by the construction of the Pipeline.

The excavation of ASS or dewatering during construction works could potentially cause acid leaching into the environment. Acidified water could be produced within excavations and stockpiled areas and leach into the soils, groundwater and surface water bodies. Acidified water could also be produced and leached into the environment by stormwater runoff over excavated areas. The problem is further exacerbated by the sensitive nature of the receiving environments.

If undisturbed, ASS is relatively harmless; the best environmental management strategy is to avoid disturbance.

The EA for the Pipeline component will assess this issue and in the event ASS must be disturbed, an ASS management strategy will be prepared and implemented.

4.2 Protected Areas and Watercourses

Field assessments will be required to assess the impact of the Concept Plan on the identified protected and sensitive areas. This issue is likely to be relevant to all project components.

4.2.1 Rivers, Creeks and Streams

The Preferred Pipeline Corridor crosses approximately one hundred and fifty small, unnamed creeks and twenty-seven larger water bodies including the Karuah, Williams, and Hunter Rivers. Construction methods for the crossing of water bodies will be determined based on the findings of the EA, engineering requirements and any conditions of approval.

The CPF does not impact on any rivers, creeks or streams but the development of wells and gathering lines within the Field Area may impact rivers, creeks and streams which will need to be assessed for impact and mitigation where appropriate.

4.2.2 Wetlands

There are no Ramsar Wetlands within the Concept Plan Area.

The Ramsar-listed Hunter Estuary Wetlands are internationally recognised and home to protected species. The Hunter Estuary Wetlands comprises Kooragang Nature Reserve and Wetlands Centre (Australia), previously known as the Shortland Wetlands. These two wetlands are 2.5 km apart and are connected by a wildlife corridor consisting of Ironbark Creek, the Hunter River, and Ash Island.

The Hunter Estuary Wetlands have a close proximity to part of the Preferred Pipeline Corridor in the south of the Concept Plan Area, located approximately 2.7 km downstream (on the Hunter River) but the Preferred Pipeline Corridor does not pass directly through the Wetlands. Therefore as part of the detailed ecological investigations for the Pipeline Project, consideration will be given to any potential indirect impacts to the Ramsar site and the species that the wetlands support.

The Pipeline component will require vegetation clearance through areas of flood prone land and areas in close proximity to SEPP 14 Wetlands. The EA will therefore need to address the associated environmental issues for flooding and SEPP 14 Wetlands.

4.2.3 Nature Reserves

Within the Initial Study Area six nature reserves and four State Forests were identified. These include Running Creek Nature Reserve and Avon River State Forest to the west and Glen Nature Reserve to the east. These areas are close to but not within Concept Plan Area.

As indicated in Figure 2-7, the Preferred Pipeline Corridor travels through the north-western edge of the Wallaroo Nature Reserve located in the Port Stephens LGA. At this point the Corridor is following an existing transmission line easement. In addition, Hexham Swamp and Seaham Swamp Nature Reserves are located within one kilometre of the Preferred Pipeline Corridor.

It is anticipated that the final Pipeline Corridor will be located away from these sensitive environments to minimise. This will be assessed using detailed field surveys during the EA.

4.3 Flora and Fauna

4.3.1 Vegetation Communities

The search of the Lower Hunter and Cental Coast Regional Environmental Management Strategy (LHCCREMS), covering the three southern LGA's (Port Stephens, Maitland, and Newcastle) of the Concept Plan Area, identified the major vegetation communities in the Lower Hunter Region. The northern three (3) LGAs in the Concept Plan Area are not covered by LHCCREMS and no corresponding database exists which can provide the information required.

Twenty (20) vegetation communities were found in Port Stephens, Maitland and Newcastle LGA's; 10 occurring along the Preferred Pipeline Corridor. These communities are likely to be impacted by the construction of the Pipeline. The extent of the impact will be assessed when details of the scope of the works and targeted field surveys are available.

One endangered ecological community (EEC), Lower Hunter Spotted Gum-Ironbark Forest has been identified and is expected to occur in all LGAs and directly along the Preferred Pipeline Corridor.

The EEC, White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland, was listed under the EPBC Matters of National Environmental Significance as having the potential to occur in the area. Its absence or presence will be determined by the targeted field surveys. Consequently, the EA will need to address the major vegetation communities affected by the construction and operation of the Project.

4.3.2 Habitat

Clearing of vegetation during the construction of each component of the Project has the potential to disturb fauna and their habitat. Habitat for threatened species is of particular concern.

Further assessments will identify key fauna species and the likelihood of their presence, ecology and habitat requirements in order to develop a management strategy.

4.3.3 Koala Habitat

Koala habitat is protected under *SEPP 44 - Koala Habitat Protection*. The majority of the records for the presence of Koalas were for the Port Stephens LGA, where the Port Stephens Council Comprehensive Koala Plan of Management is applicable. The presence of koalas in Port Stephens is concentrated on the eastern side of the Hunter River.

The Concept Plan Area does not cross through this area; therefore the construction of the Pipeline within the Preferred Pipeline Corridor through the Port Stephens LGA is not expected to have a significant impact on Koala Habitat.

4.3.4 Threatened Species

Eighty-four (84) threatened flora and fauna species were identified by BioNet, DECC NSW Atlas, and *EPBC* Protected Matters searches within the initial study area. The threatened species include: 50 birds (4 endangered; 8 migratory terrestrial; 16 migratory wetland; 3 migratory marine); 5 frogs (3 endangered); 15 mammals (2 endangered); 1 reptile; and 13 plants (3 endangered).

Threatened fauna species were recorded in all six (6) LGAs, with the highest concentration in the Port Stephens LGA. Threatened flora records are distributed sporadically in five (5) of the LGAs, and Maitland LGA contains no threatened flora records.

Threatened species are of most concern in the Port Stephens LGA, which is the part of the Concept Plan Area comprised solely of the Preferred Pipeline Corridor.

There were sixteen fauna species previously recorded along the Preferred Pipeline Corridor. No threatened flora species records have been found directly along the Preferred Pipeline Corridor.

Field investigations will be required for assessments and detailed Ecological surveys are proposed for the EA.

4.3.5 Vegetation Clearing

A key environmental issue will be the effect of vegetation clearance. This will be an issue to be addressed in the EA.

Further assessments will identify key vegetation communities (including the EECs), their condition and abundance. Mitigation measures will be proposed, including rehabilitation of the effected vegetation after construction.

4.4 Air and Noise

4.4.1 Air

A desktop assessment for air quality (including potential impacts of 'flaring') will be undertaken to identify all the potential impacts and recommended mitigation measures for the EA.

Construction

The Concept Plan is not expected to have a significant impact on air quality, however the construction stage of each of the project components has the greatest potential for air impacts. Air quality issues will include emissions from machinery and vehicles associated with construction activities and transport of goods and equipment, and dust generation from vehicular movement over exposed soils. These impacts will be short-term and localised.

Operation

During operation of the pipeline, maintenance will be required every 6-12 months, which is not expected to create any significant air quality issues. The operation of the compressor facility and wells will not be expected to produce any on-going air quality impacts.

4.4.2 Noise

Noise impacts will be imposed during construction. A desktop assessment for noise will be undertaken to identify all the potential impacts and recommended mitigation measures for each Project component.

Construction

Noise issues will be associated with construction phase activities and the transportation of goods and equipment. Earthworks machinery and construction vehicles will be the main contributors to noise for the Pipeline component.

Operation

Ongoing noise issues are primarily relevant for the CPF component.

During operation of the Pipeline, maintenance will be required every 6 - 12 months, which is not expected to create any significant noise issues.

The operation of the production wells as part of the Field Development is not expected to produce significant noise impacts.

4.5 Water

The Field Development involves drilling the gas production wells and the primary effect on water is the extraction of water as a by-product of the drilling production process. This water is proposed to be captured separately for treatment and disposal via the interconnected gathering system. In addition, de-watering of the extracted gas will also take place at the CPF, the water produced as a by-product in process is less significant, though important to the process.

The disposal and treatment of water obtained from the wells will be determined at the detailed design stage. This will depend on the quality of that water. Possible disposal will be either into holding dams and/or used for irrigation purposes. The treatment and disposal methodology will be formulated in accordance with DECC licensing requirements and industry regulations, and will examine sustainable practices to minimise environmental impacts. These measures are detailed in the EA for the CPF component

The Pipeline will cross numerous waterways. The method for crossing the waterways will be determined at the preferred route refinement and detailed design stages. The Pipeline component will consider the potential impacts on waterways as a result of the likely methods to be employed for Pipeline crossings. Environmental management measures will be developed at the preferred route refinement and detailed design stage, and will be detailed in the EA.

4.6 Heritage

4.6.1 Aboriginal Heritage

The study area crosses five local Aboriginal land council areas.

The Concept Plan may impact two types of identified Aboriginal Heritage items: the Bora/Ceremonial, and open campfire. A field investigation will be required for the EA for each project component, together with consultation with representatives from the relevant Local Aboriginal Land Councils (LALC).

4.6.2 Non-Indigenous Heritage

Reviews of non-indigenous heritage databases indicate that the proposed pipeline route has the potential to impact listed properties in Seaham and Hexham. The proposed pipeline route may also affect properties in Tarro, Duckenfield, Clarence Town and Beresfield. A field investigation will provide an indication of the extent of the impacts on these heritage properties. This will be carried out in the EA.

The construction and operation of both the compressor facility and the well sites is not anticipated to affect any items of non-Indigenous heritage.

4.7 Social and Land Use

Potential social impacts from the Project will include alterations to property access, the short-term severance of communities during the construction phase, increased or altered traffic movements and reduced amenity. These issues will primarily be associated with the construction phase of the Proposal.

Longer-term visual effects and noise impacts will be primarily associated with the CPF and the gas production wells. The operation of the Pipeline is not anticipated to have significant negative social impacts in the long term.

There are significant broader social benefits for NSW in terms of regional access to alternative energy supplies.

4.8 Visual

The Compressor Facility site and the Gas Well sites will generally represent the greatest potential for visual impacts to be created.

The Compressor Facility will represent a building that is largely incongruous with the surrounding land uses. However, through the adoption of mitigation measures such as landscaping and sensitive colouring, the visual impact of the Compressor Facility will be largely mitigated.

Once operational, the gas production wells as part of the Field Development will represent a change in appearance to surrounding landuses and will impose visual impacts. Landscaping and other mitigation measures will be developed to limit the scale of the impacts.

Visual impacts associated with the Pipeline are minimal.

4.9 Hazards and Risks

A Hazard and Risk analysis will be undertaken for all three project components. The EA for each project component will detail the methodology, results and recommendations from this analysis.

4.10 Bushfire

The Initial Study Area includes areas that are likely to be bushfire prone land. A Bushfire Constraints Assessment will be carried out. It will provide an analysis of the possible bushfire constraints as part of the EA process, having regard for Planning for Bushfire Protection 2006 (Rural Fire Service, 2006). This will be outlined in the EA and included in the project specific hazard and risk study.

4.11 Other Environmental Issues

4.11.1 Traffic and Transport

The Project is not expected to have a significant impact on traffic movements and transport. The construction stage of the Project has the greatest potential for the generation of additional traffic movements such as construction machinery and vehicles.

An assessment of the impact of traffic activity during the construction stage will be undertaken.

4.11.2 Energy and Greenhouse

Energy consumption and greenhouse gas generation are not considered key issues for the construction phase.

However, a key component to the Project will be the operational performance and downstream benefits the Project will bring to the State of NSW in terms of providing an energy source that is an alternative to the burning of fossil fuels, and one that will represent a reduction in the production of greenhouse gases.

An assessment of the Project's use of energy during construction and operation, the production of energy sources and an assessment of greenhouse has emissions and savings from the Project will be undertaken.

4.11.3 Ecologically Sustainable Development

Ecologically Sustainable Development (ESD) is defined as development that "*meets the needs of the present without compromising the ability of future generations to meet their own needs*" (Brundtland Report, 1987).

Should the Director General require, the Environmental Assessment will address the principles of ESD including any specialist studies that may be necessary for this process. The four ESD principles are:

- The Precautionary Principle;
- Inter-Generational Equity;
- Conservation of Biological Diversity and Ecological Integrity; and
- Improved Valuation and Pricing of Environmental Resources.

In summary, the EA for each Project will give due consideration to the principles of ESD through implementation of the following:

- Compliance with the NSW EA process which includes consultation with the community and government and statutory authorities to ensure issues are addressed as required;
- Development and implementation of "best practice" environmental management measures to minimise the environmental impact of the Project; and
- A balance of environmental impacts against engineering and economic considerations in acknowledgment of environmental sensitivities and principles of sustainability.

5. Consultation

Given the major nature and significance of this Project to the region it is considered that clear and effective consultation is required at the earliest possible time in the process and this process has begun in relation to relevant State Agencies.

5.1 Consultation with Relevant Agencies

Consultation with the relevant agencies is considered an important part of the assessment process. This proceeded with the initial request to the Department of Planning (the Department) for a Planning Focus Meeting (PFM).

The Department invited the relevant agencies to the PFM. This enabled the agencies to be able to provide preliminary advice to assist in the formulating of the Director-General's requirements for the Project.

Consultation will also be necessary during the preparation of the EA. Depending on the issues that arise during the assessment process, consultation with other authorities may also be required.

5.2 Community Consultation to Date

During the compilation of this Report, the Proponent commenced broad consultation with landowners, some government agencies and the broader community in relation to the Project requirements. The consultation undertaken to date is summarised below.

5.2.1 Field Development

Due to the gas exploration program currently being undertaken within PEL285, consultation with landowners, a number of local community/interests groups and the Gloucester Council have been in progress over the past 12 months with the profile increased in the past few months.

The intention has been to raise awareness to the community of the Project requirements and keep the community informed of Project updates. Quarterly newsletters are issued to landowners as part of the current exploration program.

The intention is to work with landowners and the broader community to ensure their concerns are addressed and managed where possible.

5.2.2 Pipeline

The Preferred Pipeline Corridor between Stratford to Hexham impacts approximately 250 parcels of land, which involves approximately 140 landowners. Initial consultation has commenced with a majority of these landowners with each landowner being provided with an introductory letter and a Project information brochure. The consultation to date has been well received with only a small minority of landowners providing negative feedback.

Initial consultation has also commenced with a number of political bodies and local community groups in relation to the Pipeline component. Again, the consultation was an introductory briefing aimed at increasing Project awareness and to try and address any significant issues prior to lodging the Concept Plan application. These stakeholders included:

- Federal Member for Paterson – Hon. Bob Baldwin;
- State Member for Upper Hunter – Hon. George Souris;
- Great Lakes Council;
- Dungog Shire Council;
- Gloucester Shire Council;
- Maitland Council;
- Port Stephens Council;
- Newcastle City Council;
- Gloucester Project Group;
- Gloucester Environment Group;
- Probus Group;
- TransGrid;
- Rail Authority;
- Hunter Water Corporation;
- Energy Australia; and
- Country Energy.

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