Petroleum Exploration Licence 238 Gas Utilisation Project

New South Wales Major Projects Application

Preliminary Assessment Report

9 February 2007

EasternStar GAS

GASTAR

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1 Executive Summary

This Preliminary Assessment Report is submitted by Eastern Star Gas Limited on behalf of the Gunnedah Gas Joint Venture ("GGJV"), which comprises Eastern Star Gas 65% and Gastar Exploration 35%. It provides information in support of the application for a gas gathering system, flow line and power station expansion project to be granted Major Project status pursuant to *State Environmental Planning Policy (Major Projects) 2005* and Part 3A of the *Environmental Planning and Assessment Act 1979*.

The GGJV has completed stage one of a three stage program for the development of coal seam gas resources located within Petroleum Exploration Licence 238 ('PEL 238'), near Narrabri, NSW. Stage one involved total expenditure of approximately $39 million on a systematic evaluation of PEL 238's CSG resource, testing of various well completion techniques and subsequent gas production testing. On the basis of the stage one activity, the estimated gas-in-place within PEL 238 and the gas resource of PEL 238 have been independently certified at 17,000 PJ and 8,300 PJ, respectively.

Stage two of the development program, which includes the first coal seam gas pilot production project located at Bibblewindi, is now well advanced with expenditure exceeding $26 million. The Stage two activities builds upon the wealth of previous coal seam gas exploration activity and has been specifically formulated to demonstrate the commerciality of producing CSG from PEL 238 and to establish a base of marketable gas reserves.

As a complement to the Stage two activities, the GGJV proposes to undertake a major project that will avoid wasteful and environmentally undesirable venting or flaring of pilot production gas. The major project involves gathering and delivery of production test gas to the Wilga Park Power Station (WPPS) which will, in turn, be expanded from 11 MW to 40 MW nominal capacity. The budgeted cost for expansion of the power station and installation of gas gathering and flow line facilities to deliver gas to the Power Station exceeds $46 million.

The GGJV has commenced long-lead time activities that must be completed in order that the gas flow line can be constructed by mid-2007. The application of the Major Projects SEPP and its assessment under Part 3A will facilitate inter-agency consultation and will contribute to the GGJV's gas utilisation initiative being implemented in a timely manner.

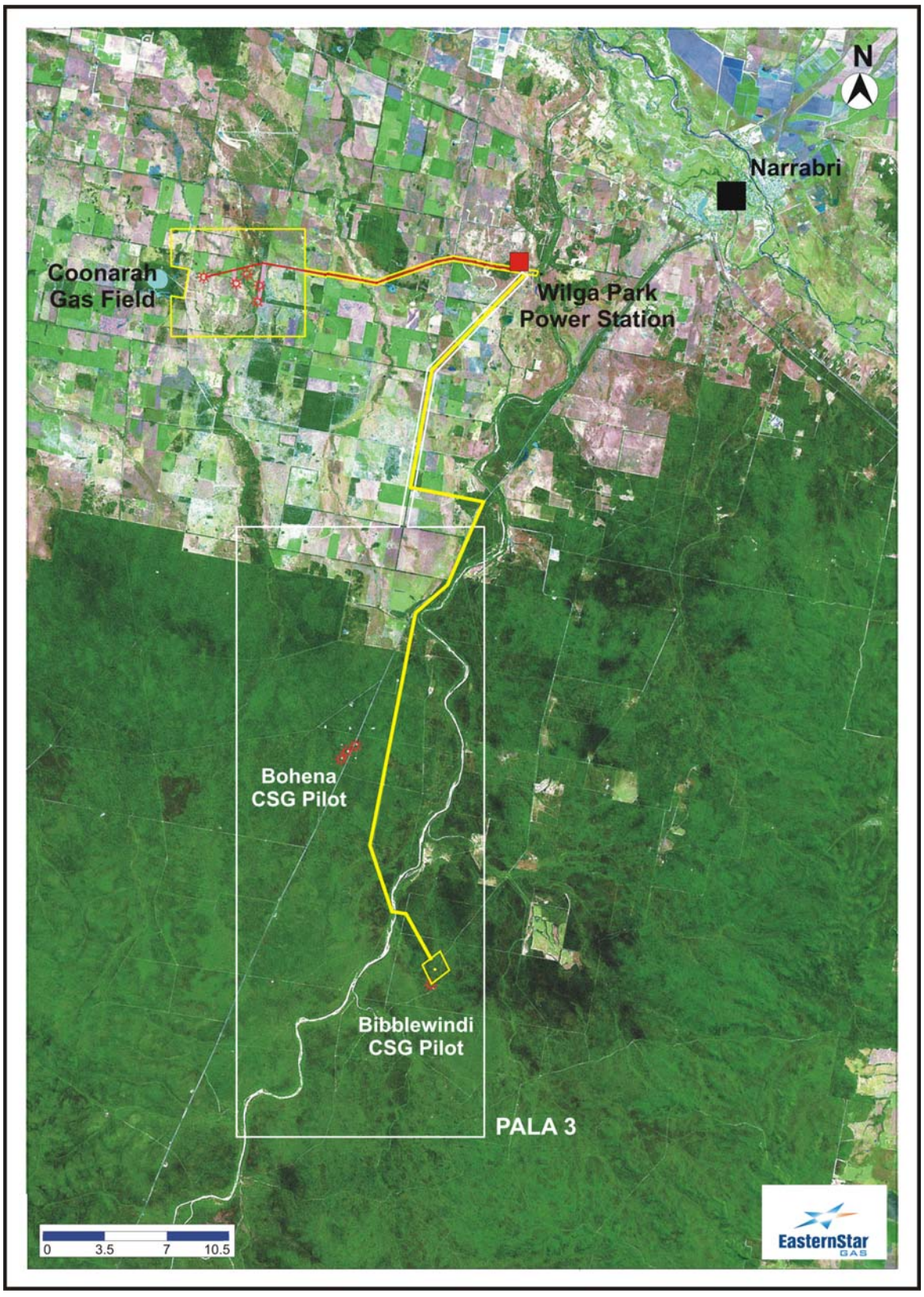

Figure 1. Project location and pipeline route in relation to Narrabri

Definitions

Bibblewindi CSG Pilot	Refers to the Gunnedah Gas Joint Venture's current operational focus, a nine-spot pilot production program being implemented in the south eastern corner of the Bohena CSG Project Area
Bohena CSG Project Area	The 265 square kilometre project area illustrated in Figure 1, which contains an estimated 3.7 Petajoules of gas "in place" and is subject to a Petroleum Assessment Lease Application lodged with the Department of Primary Industries (Mineral Resources Division)
Coal Seam Gas (CSG)	Refers to the gases that are adsorbed to the internal pore surfaces of suitable coals. The gas is adsorbed under the effect of hydrostatic pressure and can be released when water is pumped from the coal, thereby reducing the pressure within the coal. CSG differs from conventional natural gas in that the coal acts as both the gas source and the gas reservoir
Conventional natural gas	Natural gas that is trapped within, and may be recovered from, pore spaces within a reservoir rock to which it has migrated
Gunnedah Gas Joint Venture	A joint venture between Eastern Star Gas Limited (65%) and Gastar Exploration (35%) that was established to prove up and develop the CSG resource of PEL 238
Indigenous Gas Resources	Accumulations of natural gas (including coal seam gas) that are located inside the political boundary of New South Wales
Petajoule (PJ)	One Petajoule is 10^{15} Joules. One PJ is approximately equivalent to 1 billion standard cubic feet (BCF) of gas or 35,700 tonnes of coal
Major Project	Refers to the installation of gas gathering and pipeline facilities to deliver CSG from PEL 238 to the Wilga Park Power Station and expansion of the power station

2 Introduction

NSW is almost entirely dependent upon gas imported from the Gippsland Basin (Victoria) and the Cooper Basin (South Australia) for supply of its residential, commercial and industrial needs. The availability of gas from the Cooper Basin is in decline and security of gas supply is an emerging major issue for Government and industry. If indigenous supplies of gas are not developed, the importation of gas from Queensland or further afield is likely to become necessary.

The cost of gas that is imported into NSW from other states is high, owing to the unavoidable costs of transporting the gas over long distances, and is both a deterrent to the competitiveness and continued growth of NSW industry and a deterrent to expanded use of gas in environmentally friendly applications (for example, gas fired electricity generation).

In addition, the State of NSW derives no royalty revenue from imported gas. The State will benefit significantly if its indigenous gas resources are harnessed, creating new streams of royalty income that can be used for other development or public service needs.

2.1 PEL 238 Background

Since its formation, initially as a private company in 2000, the strategic focus of Eastern Star Gas has been to prove up reserves of natural gas for sale into eastern Australian markets. Both conventional and coal seam gas reserves have been targeted, predominantly within NSW and with a particular focus on the Gunnedah Basin.

Eastern Star Gas Limited ("Eastern Star") was floated in February 2001 and, shortly after listing on the Australian Stock Exchange, acquired 100% ownership of Petroleum Exploration Licence 238 ("PEL 238"). PEL 238 is a 9,100 square kilometre licence area within which the highly prospective, coal bearing Bohena Trough area of the Permo-Triassic Gunnedah Basin is located. Encouraging gas flows had been encountered during earlier exploration activity (i.e., prior to the float of Eastern Star) on the Coonarah structure, a conventional natural gas resource located approximately 25 km west of Narrabri.

After acquiring PEL 238, Eastern Star sought to explore for and develop conventional natural gas within the permit area. In view of Eastern Star's early focus on conventional gas, the

rights to coal seam gas within PEL 238 were assigned under a strata title arrangement to First Source Energy Group ("FSG"). FSG and its NYMEX listed joint venture partner, Forcenergy, invested in excess of $39 million on CSG exploration and development activities that:

- Confirmed the presence of very large resources of coal seam gas in two distinct and widespread coal measures; and
- Indicated, on the basis of an independent reserve assessment there could be in excess of 17 TCF of gas in place within PEL 238.

In 2004, Eastern Star together with Hillgrove Resources Limited acquired an interest in the CSG resources of PEL 238 and funded a further phase of CSG development activity including a fully cored hole at Bohena South, a horizontal well at Bohena 4-L, vertical wells at Bohena South and Bohena-9 and fracture stimulation of the Bohena South-1, Bohena- 9 and Bibblewindi-1 wells.

2.2 CSG Project Structure

Coincident with the acquisition of the abovementioned interest in PEL 238, the Gunnedah Gas Joint Venture ("GGJV") was established as the vehicle for funding and pursuit of coal seam gas opportunities within the permit area. The Joint Venture presently comprises Eastern Star (65%) and Gastar Exploration Ltd (35%) and is operated by Eastern Star. Eastern Star still retains 100% ownership of conventional natural gas rights within PEL 238.

The sole focus of the GGJV is commercialisation and development of the massive indigenous gas resources that are known to lie within the area of PEL 238.

2.3 Existing Activities Within PEL 238

2.3.1 Coonarah Gas Field and Wilga Park Power Station

Eastern Star commenced production of conventional natural gas from an Early Permian sandstone reservoir in the Coonarah Gas Field in July 2004. Gas is produced by means of five wells and is delivered through a gas gathering system and flow line to the purpose built Wilga Park Power Station. Electricity generated at Wilga Park is sold to Country Energy

under a 10 year Power Purchase Agreement.

The construction of the Coonarah gas gathering system and flow line was progressed:

- Under Part 4 of the Environmental Planning and Assessment Act 1979, with the consent of the Narrabri Shire Council; and
- Pursuant to the terms of Petroleum Production Lease No. 3.

The Wilga Park Power Station incorporates eleven, one Megawatt Jenbacher gas reciprocating engine driven generators, plus relevant transformer and switchyard facilities, and is designed for continuous 24 hour operation. The total project cost approximated $16 million and was commissioned in July 2004 with deliveries of electricity into Country Energy's grid commencing on 11 July 2004. The electricity generated at the Wilga Park Power Station is supplied into Country Energy's 66 kV distribution systems and is notionally delivered to Walgett, some 190km west of Narrabri.

Following 12 months of sustained gas production from the Coonarah Gas Field, during which there was a noticeable decline in gas deliverability, a multifaceted review of the Coonarah reserves status was carried out. Unfortunately, the review led to a significant downgrade of the proven gas reserves of the Coonarah field, from 11 Petajoules originally estimated to 5.8 Petajoules. As a result of the reserves downgrade, and in the absence of new sources of gas supply, the operating lifespan of the Wilga Park Power Station is likely to be the equivalent of only 4 to 5 years, or less. The power station is now being operated intermittently and at part load.

2.3.2 Coal Seam Gas Exploration

Following the wealth of historic CSG focused exploration and appraisal activity conducted during Stage one, which confirmed the existence of significant quantities of CSG and identified appropriate well completion techniques, the GGJV implemented a nine-spot pilot production program ('Stage 2'). The pilot production program has been specifically designed to fast-track commercialisation of CSG production from PEL 238 and to establish an initial base of gas reserves upon which gas sales activities may be founded.

The pilot production program is located at Bibblewindi, to the southeast of Bohena (where the majority of previous CSG exploration activity was carried out). The Bibblewindi pilot production program involves the drilling, completion and production testing of nine wells designed to facilitate dewatering and initiate gas production at commercial rates. Bibblewindi was selected as the site for the present program since, among other things, target coal seams in the Bibblewindi location are thinner than is typical for the Bohena area which, given the high permeability of the target coal seams, should enable dewatering and gas production activities to be accelerated.

The Bibblewindi pilot production program is well advanced; during 2006 the nine new wells were drilled and successfully fracture stimulated (or 'fracced'). The frac program completed at Bibblewindi is, in terms of sand emplaced, one of the largest undertaken in the Australian CSG industry. The installation of wellhead facilities, pumps and ancillary surface equipment has now been completed and the wells sequentially brought on line. At the time of this submission, the Bibblewindi pilot is fully operational and the dewatering program underway.

Water and gas production data gained during this stage, which will continue until at least the end of 2007, is a key input for estimation of the gas reserves over a defined area. Gas reserve determination will be independently undertaken and certified by Netherland, Sewell and Associates.

Water pumped from the target coal seam to initiate gas desorption will be transported through polyethylene pipelines for storage and evaporation in centrally located impoundments. Gas that is produced during the reserves assessment process must, unless a feasible alternative can be found, be flared or otherwise disposed of until such time as the commercial viability of CSG production from Bibblewindi has been demonstrated and gas reserves established to allow long-term sales commitments and to underwrite large-scale infrastructure development.

To avoid wasteful (and potentially environmentally undesirable) flaring of gas, Eastern Star proposes to implement a major project that will allow the gas to be used for electricity generation.

3 Proposed Gas Utilisation Project

3.1 Project Outline and Cost

Based upon reservoir modeling and predictions of well performance, it is anticipated that by mid-2007 CSG will be available from the Bibblewindi pilot production program at an aggregate rate approaching 7 to 10 TJ/d. An additional 0.1 to 0.5 TJ/d of gas is also available from Bohena exploration wells that are undergoing long-term production testing. Eastern Star intends to utilise the gas (that would otherwise be flared) to allow expansion and reversion to 24 hour operation of the Wilga Park Power Station.

Works to be carried out (the "Major Project") to allow utilisation of gas and expansion of the Wilga Park Power Station are detailed in Table 1. Expenditure already incurred on Stage two activities (including drilling, fraccing and well completion), which exceeds $12 million, is not considered part of the Major Project and has not been included in Table 1.

Item	Value
Gas gathering system	$520,000
Nodal Compression	$6,000,000
Flow line	$5,750,000
Power Station Expansion (30 MW)	$33,000,000
Substation Upgrade	$960,000
Total	**$46,230,000**

Table 1. Major Project Works

The total capital cost of the Major Project which, when completed will allow utilisation of CSG pilot production gas in the Wilga Park Power Station is $46.23 million. This satisfies the appropriate clauses of the major projects SEPP for determination by the Minister for Planning under Part 3A of the *Environmental Planning and Assessment Act 1979*.

3.2 Components of the Major Project

3.2.1 Gas Gathering System

A network of small diameter, polyethylene pipelines is required to transport production test gas from individual wells to the inlet location of the flow line to the Wilga Park Power Station. It is estimated that tie in of the wells to a central location will require the installation of 3.5 km of buried pipeline together with valving and associated equipment necessary for interconnection to nodal compression facilities. The estimated cost of the gas gathering system is $520,000 based upon:

- An installed cost for polyethylene pipeline of $90 per meter; and
- Provision of $205,000 for manifolds and valves.

3.2.2 Nodal Compression

Since the pressure at which gas is produced from coal seam gas wells is too low to allow the gas to be delivered to and used in the Wilga Park Power Station, gas compression facilities must be installed. Estimates suggest that 1,200 kW of compression power will be required.

Based upon indicative prices for supply of gas engine driven compression equipment, the installed cost of the compression facility will exceed $6m and includes inlet gas filtration, control systems and installation.

3.2.3 Flow Line (Bibblewindi to Wilga Park)

To deliver gas from the Bibblewindi pilot production site to the Wilga Park Power station will require installation of a 36 km long flow line nominally 250 mm in diameter. The route of the proposed flow line is shown in Figure 1. Subject to final bid prices, it is proposed the flow line will be constructed using fiberglass reinforced epoxy (“GRE”) pipe. Indicative pricing for

supply and installation of a GRE flow line has been sourced. The independently estimated cost of the flow line is $5.75m, not including provision for inlet or outlet facilities or connections.

3.2.4 Power Station Expansion

The Wilga Park Power station will be expanded to 40 MW by installation of additional reciprocating engine driven generators. The installed cost of generators in the 3 MW size range exceeds $1,100 per kW of capacity giving a total cost for the 30 MW expansion of $33m to $39m.

3.2.5 Substation Upgrade

The Wilga Park Power Station supplies electricity into Country Energy's 66 kV network through a substation adjacent to the power station. The substation will need to be upgraded to handle the output from the expanded power station. This will involve installation of a larger transformer and additional circuit breaker equipment. Based upon a budget price for the transformer upgrade plus provision for other additional equipment, the estimated cost of the substation upgrade is $960,000.

4 Facilitating Initiatives

4.1.1 Petroleum Assessment Lease

Eastern Star is awaiting determination on a Petroleum Assessment Lease Application ("PALA") submitted to the Department of Primary Industries (Mineral Resources Division) in 2005. The PALA covers the 265 square kilometre Bohena CSG Project Area (Figure 1) and, when granted, will facilitate ongoing resource assessment activities including use of CSG at the Wilga Park Power Station during the transition between the exploration and production phases of the Project.

The assessment lease is an interim step linking the exploration and production licences and grants a:

> "*retention of rights over an area in which a significant petroleum deposit has been identified, if mining the deposit is not commercially viable in the short term but there is a reasonable prospect that it will be in the longer term*."

The GGJV considers the granting of the PAL as an important step towards the creation of a larger, commercial development. An assessment lease also signifies the Government's approval in principle to production in the project area.

4.2 Long-lead Items

In order that the flow line can be installed and operational by mid 2007, work on a number of long-lead items has already been initiated. In particular, route selection and land-access activities (including discussions with Narrabri Shire Council and landholders) and environmental review activities have already commenced or are scheduled.

5 Legislative Considerations

5.1 Proposed Major Project - Why Part 3A?

Planning activities carried out to date indicate the proposed Major Project may be subject to assessment under a range of NSW legislation including (but not limited to):

- *Local Government Act 1993*
- *Crown Lands Act 1989*
- *Roads Act 1993*
- *Threatened Species Conservation Act 1995*
- *Forestry Act 1916*
- *Native Title Act 1994*
- *River and Foreshores Improvement Act 1948*
- *Native Vegetation Act 2003*
- *Heritage Act 1997*
- *Petroleum (Onshore) Act 1991*
- *Protection of the Environment Operations Act 1997*

Coordination of Government, Departmental, community and other public participation required to establish the framework of approvals necessary for implementation of the Major Project may therefore be a burdensome and time-consuming process. In the absence of any alternative this responsibility will lie with the Narrabri Shire Council as the consent authority.

For the proposed Major Project, application of Part 3A of the *Environmental Planning and Assessment Act 1979* offers an attractive alternative. The application of Part 3A will facilitate inter-agency consultation and approvals processes and will contribute to the GGJV's Major Project initiative being implemented in a timely manner.

5.2 Applicability of Part 3A to Proposed Major Project

As part of a recent reform of planning legislation the NSW Government implemented initiatives that are directed at providing "*a separate streamlined and integrated development assessment and approvals regime for major infrastructure and other projects of significance to the State…*" (Planning NSW Fact Sheet, August 2005)

Specifically, the NSW State Environmental Planning Policy (Major Projects) 2005 specifies classes of developments that exceed the minimum capital investment value and/or

employment qualifier and are therefore to be assessed under Part 3A of the Environmental Planning and Assessment Act 1979 and determined by the Minister for Planning. Clause 24, Schedule 1 of the State Environmental Planning Policy (Major Projects) 2005 provides that projects of the following nature are projects to which Part 3A will apply.

> ***Clause 24 "Development for the purpose of an electricity generation facility that:***
>
> > ***(a) has a capital investment value of more than $30 million for gas or coal-fired generation…"***

The proposed Major Project, incorporating the gas gathering system, flow line and electricity generation facilities will require estimated capital investment exceeding $46m, thereby exceeding the minimum capital investment value of $30 million as prescribed in the aforementioned Schedule 1 of the State Environmental Planning Policy (Major Projects) 2005 for electricity generation facilities.

5.3 Petroleum Exploration Activities in NSW

The Minister for Mineral Resources ("Minister") and the NSW Department of Primary Industries, Mineral Resource Division ("Mineral Resources") are the consent authority for petroleum exploration, assessment and production in NSW under the *Petroleum (Onshore) Act 1991*. The partial or whole conversion of Petroleum Exploration Licence 238 into a Petroleum Assessment Lease or a Petroleum Production Lease requires the approval and consent of the Minister under this Act. The GGJV will, in consultation with the Minister for Mineral Resources, seek the appropriate conversion pathway that will facilitate the development of the CSG Project in consideration of the applicable Commonwealth, State and Local Government planning legislation and instruments.

5.4 Government Consultation

Development of the CSG project to date has occurred in close collaboration with a range of Local and State Government Agencies and Non Government Organisations including:

- Narrabri Shire Council
- NSW Department of Primary Industries - Mineral Resources;
- NSW Department of Primary Industries – Forestry NSW;

- NSW Department of Primary Industries – Agriculture
- NSW Department of Primary Industries – Fisheries NSW
- NSW Department of Natural Resources
- NSW Department of Environment and Conservation – Environment Protection
- NSW Department of Environment and Conservation – National Parks and Wildlife Service
- Pilliga Forest Aboriginal Management Committee
- Narrabri Local Aboriginal Land Council

5.5 Community Consultation

Development of the petroleum resource potential of PEL 238 has occurred with the significant support of local and regional communities.

In relation to the GGJV's Petroleum Assessment Lease Application and the proposed Major Project, direct community consultation occurred via a public meeting in preparation for the submission of PALA. Each landholder affected by the development of the Major Project has been contacted and given an opportunity to participate in the locating of flow line easements and to develop access and compensation agreements.

Eastern Star has been well supported in the local press since developing the Coonarah Gas Field, Pipeline and Wilga Park Power Station and in its role as operator of the CSG Project.

5.6 Commonwealth Legislation

Eastern Star Gas has (on behalf of the GGJV) commenced preliminary investigations that will characterise the applicability of the (Cwth) *Environmental Protection and Biodiversity Conservation Act 1999,* particularly Part 3 (S18.ss 2-6) which prohibits actions likely to result in significant impact on listed threatened species or endangered communities of national significance.

The completion of preliminary flora and fauna studies across the project area suggests that the proposed activity will not trigger an assessment under the EPBC Act. Additional field based surveying in preparation for the environmental assessment will adequately characterise the role of the EPBC Act in the minimisation of environmental impacts

associated with the project.

5.7 Regional Planning Instruments

The proposed Major Project is not subject to any specified Regional Environmental Plans for the Western Division in which the project site is located.

5.8 Local Planning Instruments

The proposed Major Project is wholly located within the Narrabri Local Government Area and is subject to the various provisions of Narrabri Local Environment Plan 1992 ("NLEP").

The southern portion of the proposed gas pipeline development is located entirely upon lands designated Crown Lands State Forests under the Forestry Act 1916.

The northern portion of the proposed gas pipeline development is located upon land designated by the NLEP as Zone 1(a) (General Rural). The proposed activity is permissible under the NLEP and will require the development consent of the Narrabri Shire Council. The original, 2003/04 development of the Wilga Park Power Station occurred upon lands designated by the NLEP as Zone 1(a) (General Rural) and under a Part 4 Development Consent subject of approval of the Narrabri Shire Council. The development application on this zoned site was additionally subject to (NLEP) Regulation 22 – Development of flood liable land and Schedule 5 (Clause 19) – Industries, other than rural industries in zone 1(a). Expansion of the Wilga Park Power Station may be subject to a modification of the Development Consent.

The submission and subsequent endorsement of an appropriate development application by the Narrabri Shire Council will sufficiently account for Section 75J subsection 3(b) of the *Environmental Planning and Assessment Act 1979* which stipulates the Minister cannot approve the carrying out of a project wholly prohibited under an environmental planning instrument.

6 Initial Environmental Assessment

The following subsections outline environmental issues that the GGJV anticipates will need to be addressed in the course of implementing the Major Project.

6.1 Land use Management

The Major Project spans a number of land use types and jurisdictions including (but not limited to) Crown Lands State Forest, freehold/leasehold farmland and, in regard to the crossing of Bohena Creek, Protected Lands as defined in the *River and Foreshores Improvement Act 1948*.

An important consideration during preliminary planning of the proposed gas gathering system and flow line has been minimisation of the impact of the development upon the land over which it passes e.g. the gas gathering and flow line infrastructure will be located on existing tracks, roads and/or fence lines where practicable. The flow line will also be buried with a minimum cover of 750mm which will generally mean pre-existing land-use activities can be continued after construction is completed. Furthermore, due compensation will be made to affected landholders pursuant to land access or easement agreements established with landholders.

Environmental Assessment studies carried out for the proposed Major Project will contain a full review and evaluation of land use management issues. A management plan will be developed to address potential land-use impacts.

6.2 Flora

Prior to completion of the 2002 Pilliga East Seismic Survey, the flora composition of the Pilliga State Forest (including species types, quality and population, and faunal habitat) had received little attention by way of data collection. Since the 2002 survey the GGJV has conducted a further four botanical surveys over the area within which CSG related activities are presently focused. As a result, the floristic composition of the northern Pilliga is now well understood and likely and potential impacts of proposed developments can be confidently predicted.

Based upon survey work to date the following observations can be made:

- Endangered communities listed in the *NSW Threatened Species Conservation Act 1995* and *Environmental Protection and Biodiversity Conservation Act 1999* (Cwth) have not been detected in the area of CSG activities and are therefore unlikely to be of concern for the proposed Major Project; and
- Habitat requirements for five threatened flora species may be met in the study area, but as threatened flora species have not been previously recorded in the study area and have not been detected in the surveying, the possibility that they do occur there is considered to be low.

Further surveying of the gas gathering and flow line routes will be undertaken to evaluate the likelihood that construction or operation of the infrastructure will have an impact on any species or communities of significance. Relationships between the floristic composition and habitat quality for faunal species identified as inhabiting the project area will also be characterized as part of the further survey.

6.3 Fauna

Faunal species data for the Pilliga East State Forest was also scarce prior to completion of the 2002 Pilliga East Seismic Survey. Studies completed for the 2002 survey indicate that the Pilliga State Forest and Nature Reserve have national, state and regional conservation significance for the protection of biodiversity and threatened species. This significance is primarily due to the large size of the area (>500 000 ha), the high diversity of threatened species within the area and the high quality of habitat.

Four additional fauna surveys completed between 2002 and 2007 have demonstrated that:

- Twelve threatened fauna species have been recorded across the CSG project area, namely: Barking Owl; Hooded Robin; Speckled Warbler; Long-eared Bat; Brown Treecreeper; Glossy Black Cockatoo; Koala; Grey Crowed Babbler; Pilliga Mouse; Turquoise Parrot; Masked Owl; and Yellow-bellied Sheathtail Bat;
- A majority of the threatened species inhabiting the CSG project area are mobile (i.e.

avian or chiropteran species), occupy reasonably large home ranges and utilise the main vegetation communities as diurnal/nocturnal refugia; and

- Mitigative action can be implemented to reduce potential impacts on these species to an acceptable level.

In preparation for the Environmental Assessment, further surveying will be completed on the GGS and flow line route. Specific strategies for the mitigation of likely and potential impacts on species and communities of significance and actual habitat will be formulated.

6.4 Aboriginal Heritage

Information regarding Aboriginal inhabitation of the region comprises a number of site registers, previous Aboriginal heritage survey reports and the existing knowledge-base of local Aboriginal Land Councils and other management committees. All CSG related activities have been carried out with approval of the Narrabri Local Aboriginal Land Councils (NLALC) and, in the case of the Pilliga State Forests, endorsement of the Pilliga Forests Aboriginal Management Committee (PFAMC).

Cultural heritage assessment activities to be undertaken as part of the proposed Major Project will involve consultation with appropriate heritage registers and field surveying of access corridors and development sites. The planning, field surveying and documentation of the Aboriginal heritage assessment will be carried out in collaboration with the NLALC and PFAMC with the final location of the GGS and flow line infrastructure subject to the outcomes of the assessment.

6.5 European Heritage

Preliminary consultation with the NSW Heritage Register indicates there are no known heritage items within the CSG project area. Further surveying will occur as part of Environmental Assessment activities.

6.6 Water

The GGJV has approved strategies in place for treatment, storage and disposal of water that is produced as a result of its CSG exploration and development activities. These activities

and water management strategies are not impacted by the proposed Major Project.

Limited volumes of water will be required during the construction and operation of the proposed Major Project. The water will be sourced from existing DNR licensed water bores located at Bibblewindi or from licensed water supplies in the Narrabri Township. An estimate of the volumes required for the proposed Major Project will be prepared as part of Environmental Assessment work undertaken for the project, and likely impacts of its utilisation will be addressed.

6.6.1 Regional and Localised Drainage Systems

The proposed Major Project is located within the western portion of the Namoi River Basin, where the regional topography is characterised by generally flat terrain and flood plains of less that 1° slope. The northern edge of the catchment is defined by Mount Kaputar and the Nandewar Ranges.

The project site drainage is dominated by floodplains associated with three ephemeral tributaries of the Namoi River. The Bohena Creek is the dominant drainage line running from south to north through the entire project area and is a well defined, low sinuosity sand channel capable of accepting significant volumes of surface runoff during periods of high surface flow. Located within cleared farmland to the north of the CSG project area are the poorly defined creek channels of Bundock and Mollee Creeks.

As part of Environmental Assessment activities, the GGJV will consider the relationship of the proposed Major Project with the topographic character of the project site including the likely and potential impacts on local and regional drainage features.

6.6.2 Creek Crossings

The flow line from Bibblewindi to the Wilga Park Power Station will cross one ephemeral creek adjacent to the Bibblewindi CSG pilot production project. The creek crossing will be carried out using trench and fill techniques at a location selected to avoid impact upon water lands. The potential for short-term biophysical impacts during construction of the flow line will be addressed during Environmental Assessment work and management plans formulated.

6.7 Soils

The likely impacts of the proposed Major Project on local soil resources do not differ from those identified during planning for CSG exploration activities within PEL 238. Experience gained during the conduct of baseline surveys for the Coonarah Gas Field Statement of Environmental Effects and the related Coonarah Gas Project Petroleum Production Environmental Operations Plan (both of which relate to Petroleum Production Lease No.3) will contribute to successful mitigation on soil resource impacts.

Field investigations and geotechnical assessments will be carried out as part of Environmental Assessment work for the proposed Major Project. These assessments will complement the existing knowledge base on soils management and will allow formulation of safeguards and techniques for management of soil erosion and control of sediments both during and after project construction.

6.8 Air Quality

The production of CSG and its use as a fuel for electricity generation is a desirable alternative to coal fired power generation, the latter option leading to higher levels of CO_2 and particulate emission. Reductions in greenhouse gas production leading to the creation of NSW Greenhouse Gas Abatement Certificates are a positive benefit of natural gas fueled electricity generation.

Although expansion of the Wilga Park Power Station will lead to increased exhaust gas emissions, the GGJV does not expect development or operation of the proposed Major Project to pose any measurable threat to the quality of air in the localised or surrounding environments. Nonetheless, potential point and diffuse sources of air pollution and their impact upon air quality will be assessed as part of Environmental Assessment activities carried out for the proposed Major Project. In particular, empirical data on emissions of CO, CO_2 and NO_X will be analysed and strategies identified to mitigate potential, if any, for a decline in air quality in the vicinity of the power station.

6.9 Noise

Impact assessment studies completed prior to development of the Wilga Park Power Station in 2002 demonstrated that noise impacts from operation of the existing facility were likely to remain in compliance with EPA industrial noise policies. The GGJV does not expect operation of the expanded Wilga Park Power Station to result in measurable noise impacts in the localised or surrounding environment however, the potential for increased noise impacts on the environment and rural properties surrounding the power station site will however be addressed as part of Environmental Assessment work carried out for the proposed Major Project.

Noise arising during construction of the proposed Major Project will also be specifically addressed during Environmental Assessment activities and appropriate management plan formulated.

6.10 Visual Amenity

The installation of the gas gathering system and gas flow line will not result in any specified or long term decline in visual amenity, including through the Pilliga State Forests system.

The Wilga Park Power Station does not present any adverse visual impacts since there is a considerable vegetative buffer around the power station and the surrounding topography is flat. The extent if any to which expansion of the power station may have an impact on visual amenity will be re-evaluated during the completion of the Environmental Assessment.

6.11 Hazard

Environmental risk assessments will be undertaken to identify residual risks arising from production, transportation and use of CSG for power generation and that cannot be accounted for through existing management planning, training and reporting procedures. It is proposed that a suitable environmental risk assessment will be undertaken as part of Environmental Assessment activities including screening for State Environmental Planning Policy 33 (Hazardous and Offensive Development).

6.12 Traffic and Transport Management

During the construction phase of the proposed Major Project it is likely that short term increases in localised vehicular traffic may occur. Aside from the statutory transport and permitting requirements related to the transportation of over-sized loads, Environmental Assessment activities will incorporate an evaluation of the localised traffic increases and will outline a traffic management plan to mitigate potential impacts on the community and other road users.