



2008 PEL238 Corehole Program A

Yallambee-1, Turrawan-3, Blue Hills-1C & Dewhurst-12C

Review of Environmental Factors

PEL 238, Gunnedah Basin

New South Wales

March 2008

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Location of lands referred to by REF

The proposed activities will occur in freehold lands surrounding the Narrabri Township (**Figure 2**).
Narrabri, Baan Baa and Edgeroi 1:50 000 Topographic map sheets

Declaration

Eastern Star Gas Ltd declares the information contained within this document an accurate representation of the existing operational environment and the extent of impacts likely to occur as a result of the proposed activity. With the assistance of Government agencies and external contractors, Eastern Star has endeavoured to characterise the environment within which the project is located and, where possible, mitigate any potential environmental impacts and ongoing operational risks.

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1 EXECUTIVE SUMMARY

The objectives of the 2008 PEL238 Corehole Program A are to extend the knowledge base on the coal development and Coal Seam Gas (CSG) prospectivity in the Late Permian Back Jack and Maules Creek formations and to continue the exploration development activities across PEL238. This proposed exploration program compliments the current production development activities occurring in PAL2.

The four coreholes discussed in this document have been designated the following names; Yallabee-1*, Turrawan-1, Blue Hills-1 and Dewhurst-12 and each occurs in private freehold land in the Narrabri Region. The total area of land impacted by this activity will approximate 1.00 ha based upon a pad size of 50 m x 50 m. The proposed activity will not create impacts on local land use practices nor landforms; the drilling of a corehole is temporary and once completed the well will be plugged and abandoned with the land being rehabilitated in full.

Consultation with the NPWS AHIMS database indicates that the proposed locations do not present any risk to known sites of aboriginal heritage significance.

Consultation with the NPWS threatened species registers indicates that the proposed locations will not impact on any known populations of rare or threatened species of native flora or fauna. Site selection has been based, in part, on the minimisation of vegetation modification to furthermore mitigate any residual risk of impact on such species.

It is the aim of the core hole program to achieve the projects main objectives whilst maintaining high standards of operational control including strict adherence to our environmental responsibilities under the various state legislative and regulatory instruments. The provision of this document fulfills the company's responsibility under Part 5, Section 111 of the *Environmental Planning and Assessment Act 1979* in which the determining authority (NSW Department of Primary Industries – Mineral Resources) is required to consider the likely and actual environmental impacts of the activity. The information contained within this document is an accurate characterisation of the operational environment within which the activity is to be conducted. It is the opinion of Eastern Star that the impacts created by the proposed activity when considered alongside the mitigation strategies in place will create no long term effect on the localised and regional environment.

* *Yallabee-1 has DPI (Mineral Resources) drilling approval; please see section 2.1.4 for further discussion*

2 INTRODUCTION

This Review of Environmental Factors (REF) has been prepared by Eastern Star Gas Ltd (ESG) for the continuing conventional and coal seam gas exploration program in Petroleum Exploration Licence (PEL) 238 (Figure 1).

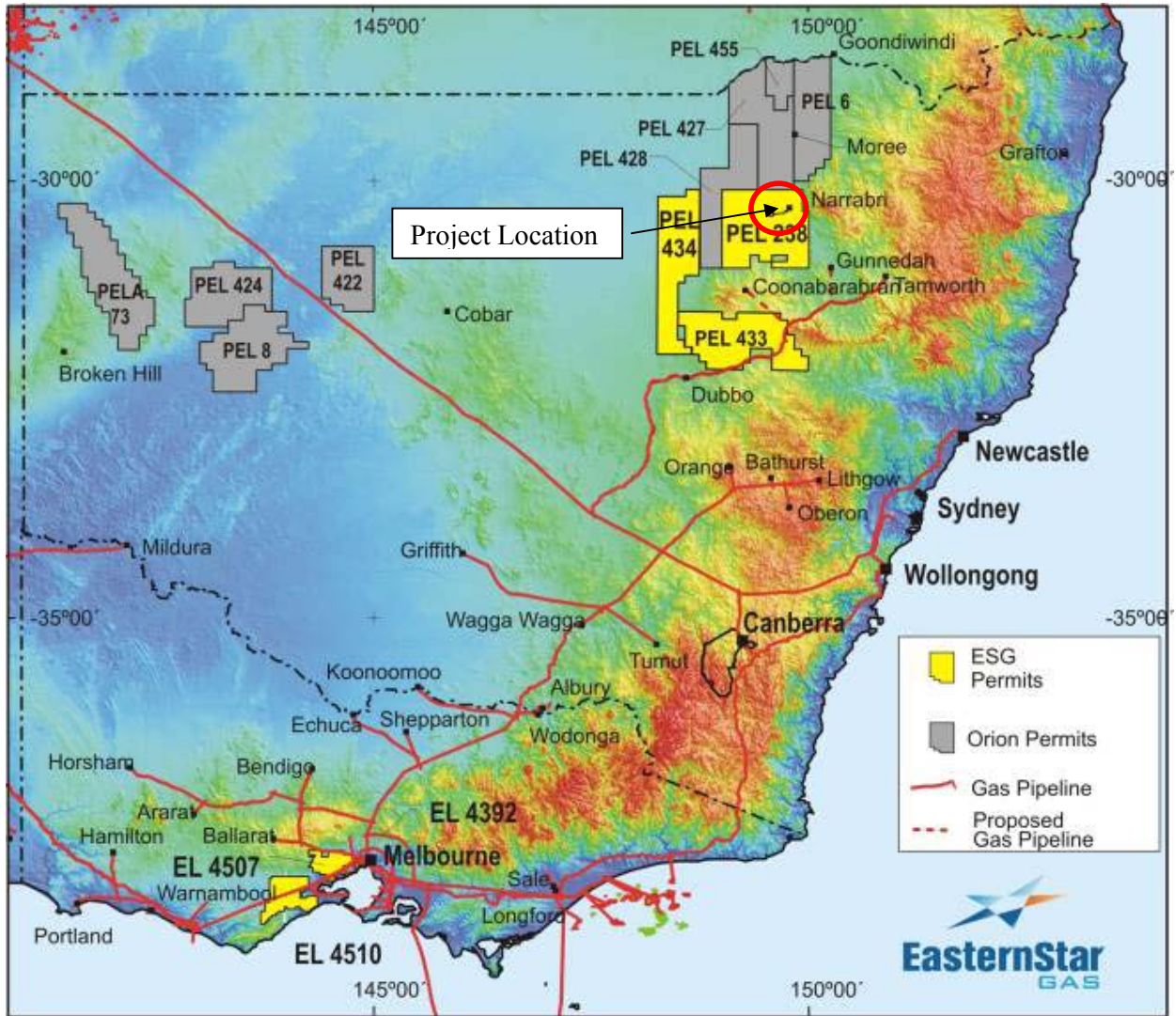


Figure 1 Eastern Star Gas Exploration Licences, NSW & Victoria

2.1 Location

The location of the proposed core holes is shown in **Figure 2** and discussed in the following sections. The four proposed coreholes are located upon freehold properties around the Narrabri Township in north western NSW. All coordinates are AGD 66 Zone 55.

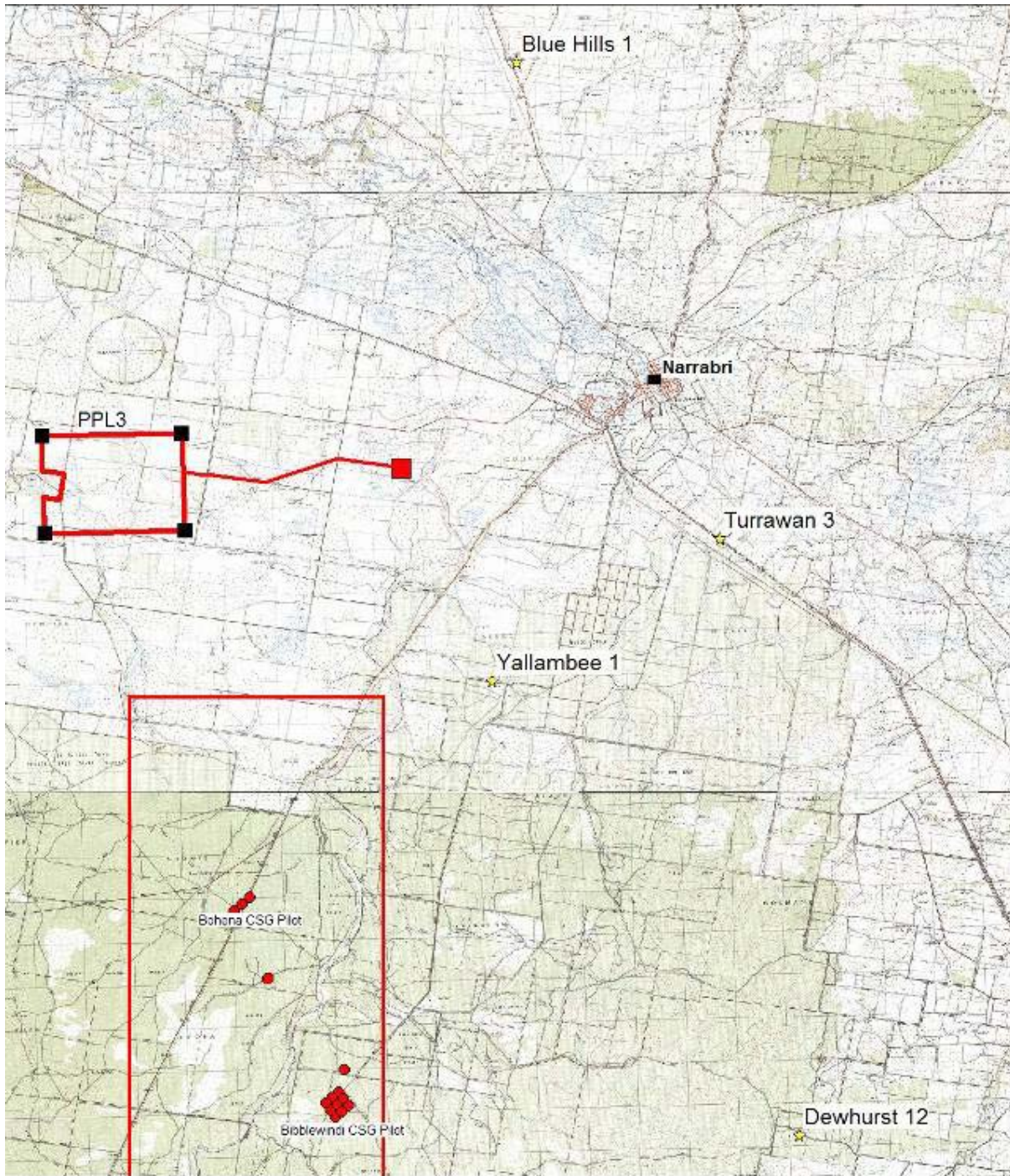


Figure 2 Location of core holes within the Narrabri Region

2.1.1 Blue Hills-1C

Located approximately 15km north/northwest of the Narrabri Township, Blue Hills-2C site is located upon open grazing pastures within private freehold lands. Access to site will be provided directly from the sealed roadway via a purpose built access track.

Map Coordinates: 762301mE/6656371mN, Edgeroi 1:50K Topographic Map

2.1.2 Dewhurst-12C

Located on the eastern extremity of the Pilliga East State Forest, the Dewhurst-12C site is located on an extension of Monument Rd that runs through a private freehold block. Access to site will be via access track leading off Monument Rd.

Map Co-ordinates: 772402mE/6606431mN Baan Baa 1:50K Topographic Map

2.1.3 Turrawan-3C

Located approximately 8km southeast of the Narrabri Township along the Kamilaroi Highway, the proposed Turrawan-3C site is located on a cleared grazing paddock adjacent to the northwestern branch railway line. Access will be via private track off Jacks Creek Rd.

Map Coordinates: 769890mE/6634147mN Narrabri 1:50K Topographic Map

2.1.4 Yallabee-1C

Located approximately 16km south of the Narrabri Township, the proposed Yallabee-1C site is located on cleared freehold grazing land just off Danger Lane. Access will be provided directly from Danger Lane via a purpose built access track.

Yallabee-1 has previously been approved by DPI (Mineral Resources) as Jacks Creek-2C and was subsequently amended to Yallabee-1C. The resubmission of the application for this corehole is in response to a significant change in both location and land use (from forestry lands to private, freehold).

Map Coordinates: 760615mE/6627741mN Narrabri 1:50K Topographic Map

2.2 Primary Objectives

The primary objective of this corehole program is to provide further data on the quality of the Late Permian Black Jack and Early Permian Maules Creek Formations as CSG reservoirs. The data to be collected includes baseline parameters on

- Coal thickness, quality, composition, thermal maturity, permeability and adsorption capacity (gas holding capacity); and
- Gas content, quality and composition

The data collected for each of these core holes will be incorporated into the existing Narrabri CSG Project to provide a technical basis for the extension the current exploration and production development program.

2.3 Description of the Activity

The activities for which this REF refers to include:

- The preparation of well pad 50m x 50m (0.25ha) at the four (4) specified locations;
- The placement of a drilling rig and ancillary equipment;
- The drilling of the corehole as per the drilling proposal submitted to DPI (Mineral Resources);
- The collection and analysis of drill cores; and
- The plugging and abandonment of the well and site rehabilitation.

2.4 Project Duration

The duration of the core drilling activity is expected to take approximately 21 days per corehole from spud to plug & abandonment. At the completion of the drilling activity and after the departure of the rig, rehabilitation activities will commence as per section 4.3.3.

2.5 Evaluation of Alternatives

The only method of understanding an areas stratigraphy and for the testing of subsurface petroleum reservoirs is to drill exploration petroleum wells. Surface mapping, gravity, magnetics, seismic reflection and other forms of geophysical exploration are only able to provide an interpretative view of geological parameters and the discovery of petroleum relies on drilling. The use of a core bit allows for the preservation and collection of the rock core for analysis by petroleum geologists.

As a means to achieve the objectives stated in section 2.2, there are no viable alternatives to the drilling of stratigraphic core holes.

2.6 The Planning Context

2.6.1 Licences and Approvals

There are no licenses required to conduct the activity as proposed; the application and approvals process is administered by the NSW DPI (Mineral Resources) under the *Petroleum (Onshore) Act 1992* and the terms and conditions of the exploration licence.

The environmental review for the proposed activity occurs under Part 5, Section 111 of the *Environmental Planning and Assessment Act 1979* and results in the approval for the conduct of the activity in the specific locations within PEL238.

Landholder approval for the conduct of the proposed activities and the terms of ESG's access to private lands will be negotiated prior to commencement. The finalised access agreement will include the specific conditions of entry and compensation.

2.6.2 Land Zoning

The proposed activity will wholly occur within lands zoned 1(b) Rural General under the *Narrabri Local Environment Plan 1992*.

The proposed activity is not prohibited under any current environmental planning instrument.

3 THE EXISTING ENVIRONMENT

The project sites are located on freehold farmlands in the Narrabri district, on the NSW north western slopes and plains.

3.1 Topography

The project site lies within the western end of the Namoi River Basin where the regional topography is characterised by generally flat terrain with higher country approximately 45km to the north east in the Mount Kaputar National Park (MKNP) and approximately 20km to the south in the Pilliga East State Forest. (R.W. Corkery, 2002).

Natural Slopes within the region range from less than 1° on the flat terrain and flood plains of the Namoi River to in excess of 30° within the MKNP (R.W. Corkery, 2002).

Elevations in the region range from 1 510m at Mount Kaputar and approximately 220m within the flat, open terrain between the forest edge and the Namoi River flood plains.

3.2 Land Use

The land in the general area of the project sites is dominated by seasonal crop rotation and grazing activities under private freehold title. Native vegetation including remnants of varying quality is sparse to moderately common except where the freehold lands adjoin existing Crown Lands State Forest.

A key feature of private landholder negotiations has been the focus on implementing the proposal with minimal disruption to present land uses, impacts on existing farming infrastructure and integrating with seasonal agricultural production planning. Contained within each landholder easement agreement are stated conditions of entry, operation and compensation as defined by each individual title holder/s and each generally reflects the focus on impact minimisation.

3.3 Flora

The environment surrounding the proposed corehole locations is dominated by agricultural production and large open grazing paddocks devoid of significant native vegetation remnants. Previous clearing practices have impacted heavily on the quality and diversity of native vegetation in this region including the vegetation retained in shelter belts and riparian zones which have been impacted by frequent stock grazing.

Consultation with the NPWS threatened species register indicates 42 records of 7 species of threatened flora located within the region surrounding the corehole locations. **Figure 3** illustrates the location of the flora records in relation to the proposed core holes. Data for the Edgeroi mapsheet was unavailable at the time of mapping, however due to the land use type at this proposed Blue Hill-1 location; this is unlikely to present issues in terms of the potential impacts on native flora.

The threatened species records are generally concentrated in protected native vegetation remnants including the Brigalow Park Nature Reserve southwest of Narrabri and the Mount Kaputar National Park to the east. Previously uncleared or modified roadside verges and road easements offer the only real potential for locating further individuals or assemblages outside of these protected areas as shown by numerous records of *Lepidium aschersonii* in the freehold agricultural areas just south of PPL3.

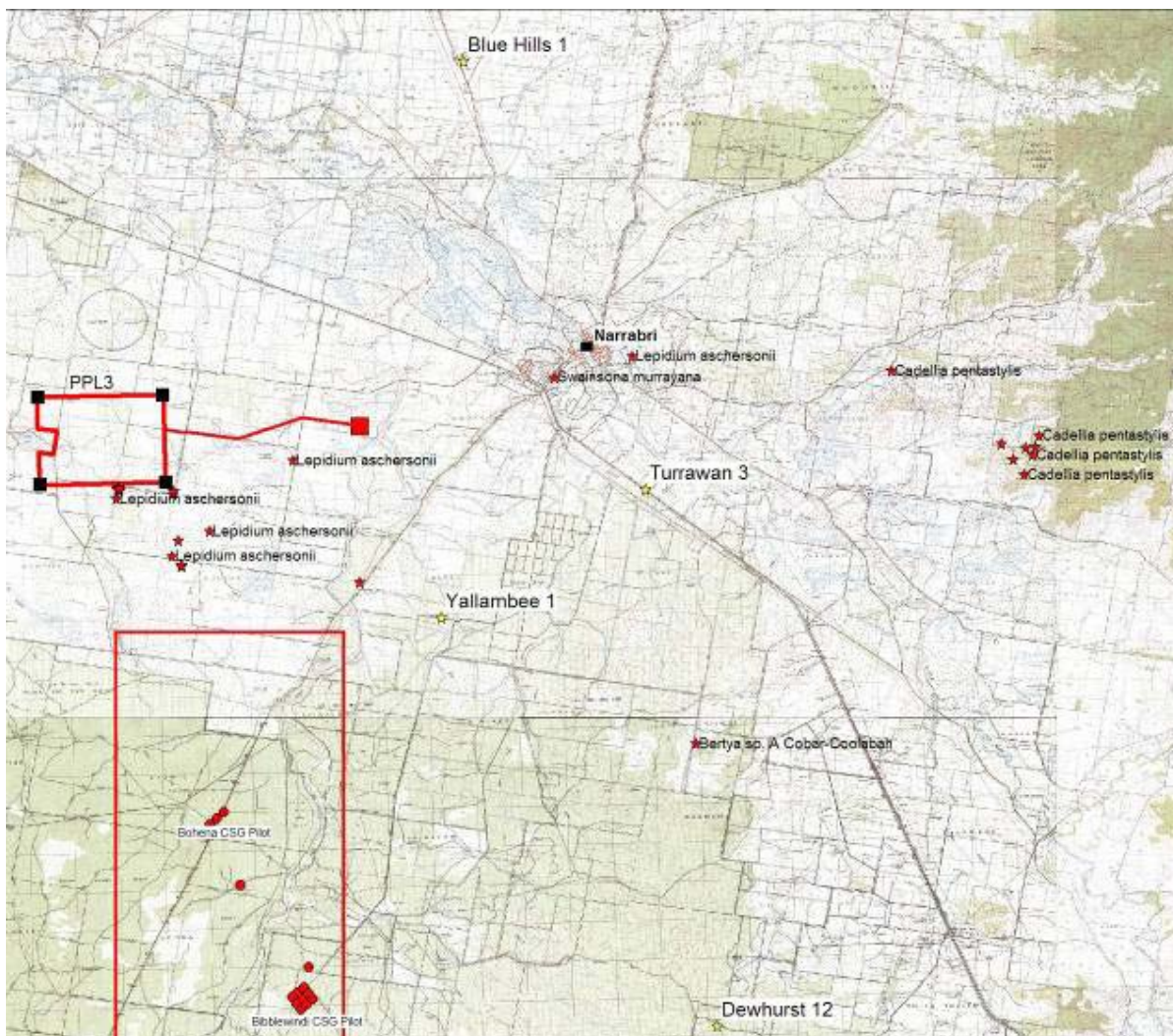


Figure 3 Threatened flora records within the area surrounding the proposed core holes

3.4 Fauna

The environment surrounding the proposed corehole locations is dominated by agricultural production and open grazing paddocks generally devoid of suitably sized native remnants capable of sustaining all but incidental faunal populations. Previous clearing practices and current grazing pressures have impacted heavily on the quality and diversity of native vegetation in this region including the vegetation retained in shelter belts and riparian zones that are common in the region.

Consultation with the NPWS threatened species register indicates 591 records of 53 species of threatened fauna occur in the region surrounding the corehole locations. **Figure 4** shows the location of the records in relation to the proposed sites. Data for the Edgeroi mapsheet was unavailable at the time of mapping, however due to the land use type at this proposed Blue Hill-1 location; this is unlikely to present issues in terms of the potential impacts on native fauna species.

In similar circumstances to the distribution of flora records, fauna observations are highly concentrated within the boundary of the Brigalow Park Nature Reserve, Mount Kaputar National Park and along various permanent and semi-permanent water sources. Other incidental sightings have been located amongst remnant vegetation found along roadsides and unformed road easements which are common in this area.

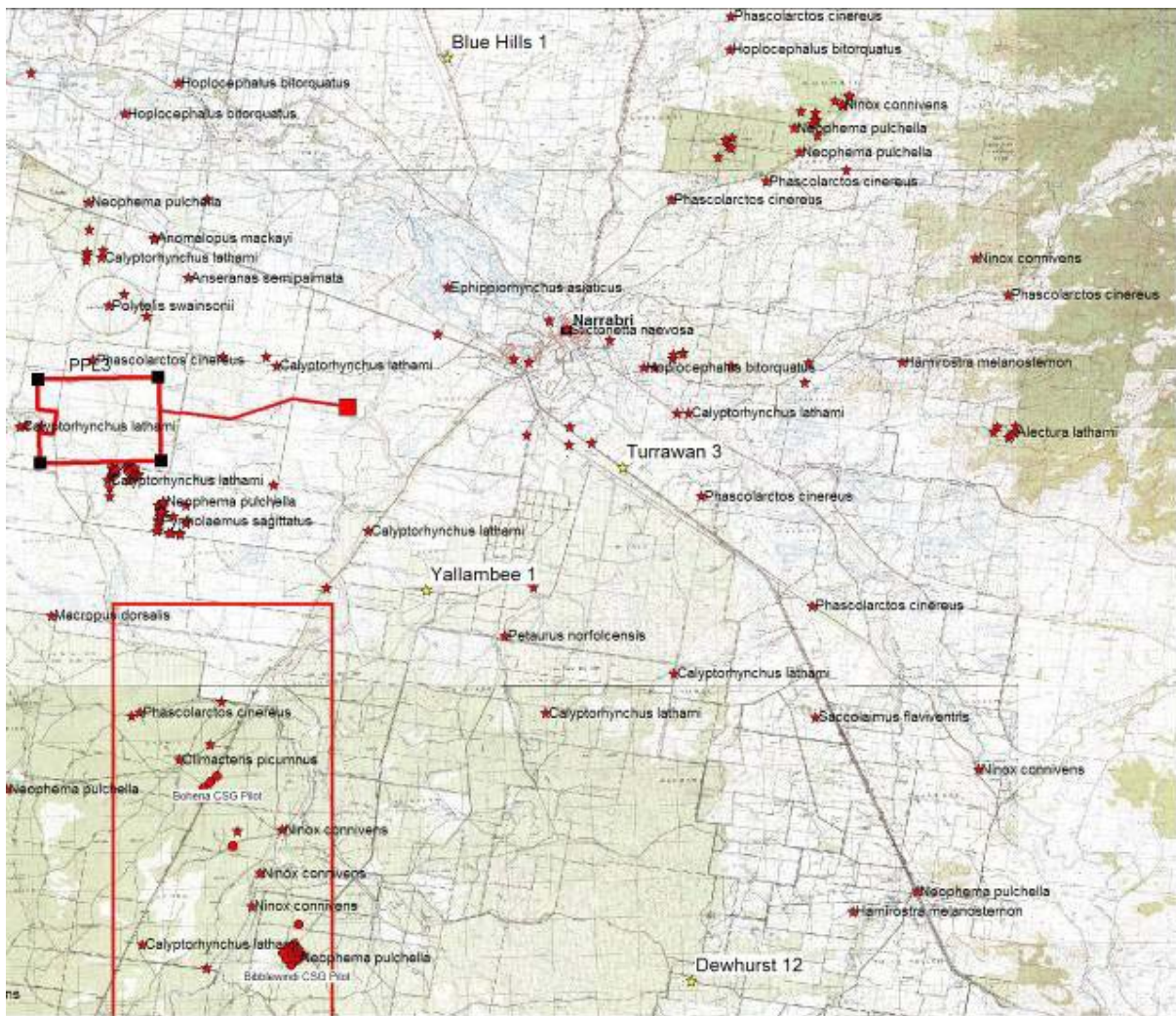


Figure 4 Threatened fauna records within the area surrounding the proposed core holes

3.5 Cultural Heritage

A search of the NPWS Aboriginal Heritage Information System indicates that there are 77 recorded sites of Aboriginal heritage significance located within the Narrabri & Baan Baa 1:50 000 topographic map sheets (**Figure 5**) many of which are concentrated within the Yarrie Lake Recreation Reserve and within the CSIRO telescope facility. Data for the Edgeroi mapsheet was unavailable at the time of mapping, however due to the land use type at this proposed Blue Hill-1 location; this is unlikely to present issues in terms of the potential impacts on sites of Aboriginal heritage significance. There are no recorded sites within the immediate area surrounding the corehole locations.

Many of these sites were identified and recorded by Wee Waa and Narrabri Local Aboriginal Land Council representatives during the completion of the Brigalow Belt Bioregional Assessments which

focused closely on areas with access to water, shelter and other resources utilised by local indigenous tribes.

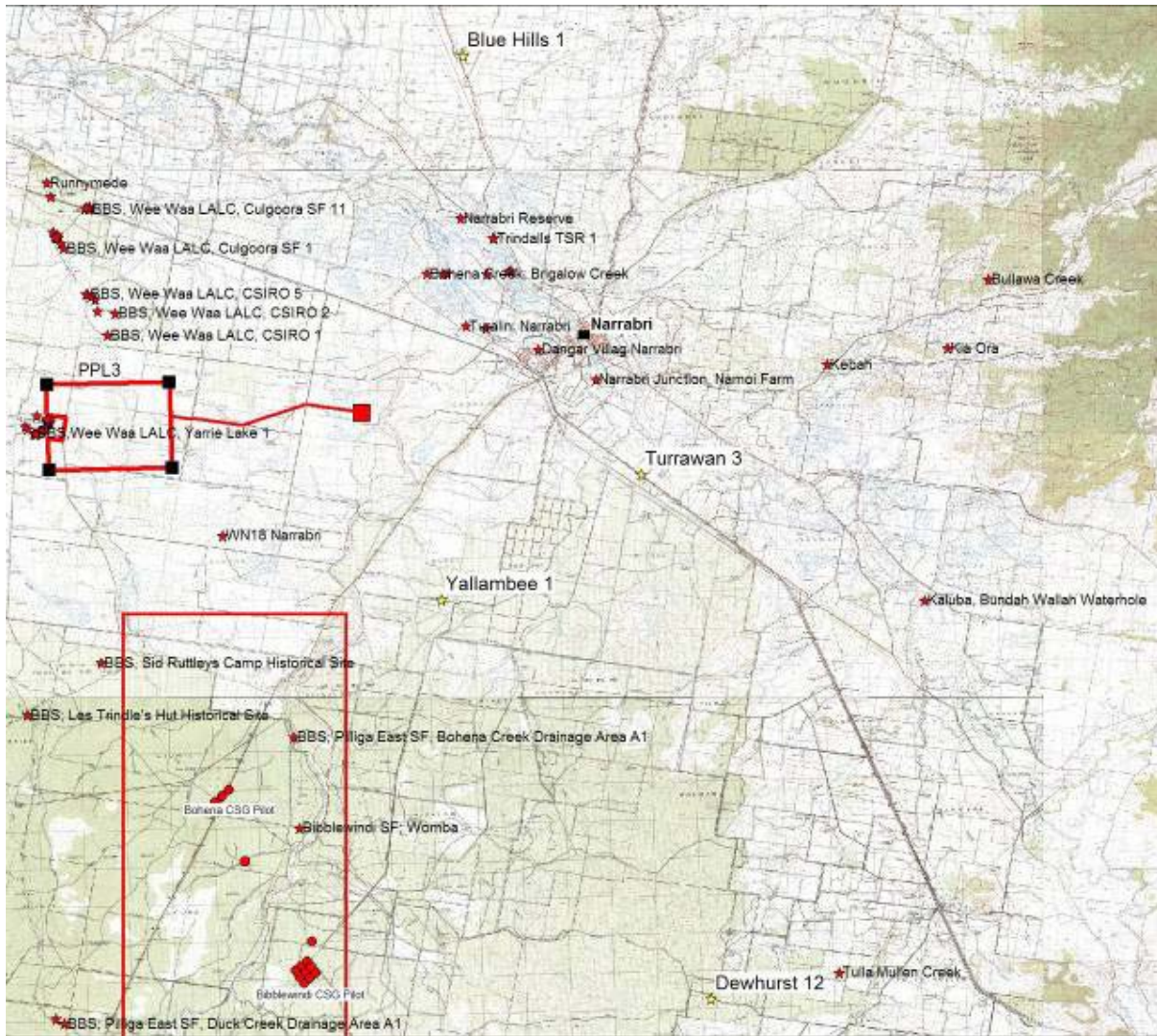


Figure 5 NPWS AHIMS records within the area surrounding the proposed core holes

4 ASSESSMENT AND MITIGATION OF ENVIRONMENTAL IMPACTS

4.1 Air

There are no identifiable risks that the proposed activity will create any measurable impacts on air quality, either localised or in the Narrabri region.

4.1.1 Noise Impacts

The ambient background noise in the vicinity of the project site is influenced by a range of activities consistent with the rural environment, mainly consisting of vehicular transport traffic and machinery based farming activities.

All equipment used for mobilisation and powering of drilling rigs are modern, well maintained and are fitted with noise attenuation apparatus as standard. Operating hours will be 7am to 6pm, 7 days per week for the short operating period.

Core Hole	Distance to Nearest Point Receptor
Blue Hills-1C	500m to the Blue Hills residence
Turrawan-3C	900m north of 'Mylands'
Yallabee-1C	1600m southwest of 'Lemnos'
Dewhurst-12C	2700m south of 'The Bulga'

Table 1 Distance to nearest point receptors for potential noise impacts

The extent of noise impacts at the closest point receptor are expected to be negligible given the existing ambient background noise levels and the degree of mitigation achievable at the point source (muffling of engine noise etc). With significant distances between the proposed location and the nearest residences, ESG considers the noise related impact of the proposed activity small in scale, localised and short in length.

4.1.2 Fugitive Dust Generation

Depending on road and weather conditions, the dust generated by the mobilisation of the drilling and ancillary equipment to and from a location is generally no greater than localised traffic movements. In the event that the roads are soft and mobilisation will generate excessive amounts of dust, a water truck will be deployed to water the roads before and during the move to location.

The mobilisation of rig equipment to and from the locations is not expected to have more impact than the normal road transport of equipment on sealed and unsealed roads within the district and is not believed to present any impacts requiring specific mitigative action.

4.2 Water

There are no identifiable impacts likely to be introduced onto localised creeks and water courses through the installation or short term operation of the corehole sites.

4.2.1 Source:

Water requirements for the corehole drilling program are estimated at between 30-50 kL and will be sourced from appropriate on farm bore or dam supplies at the discretion of the landholder. Storage in both mud pits and holding tanks supplied by the drilling contractor will provide water on an 'as needs' basis for the duration of the program.

4.3 Soils

4.3.1 Well Pad Construction

The construction of the well pad is designed to provide a stable, flat and level platform for the drilling rig, associated equipment and provide adequate access to the location. The core hole drilling rigs require significantly smaller drill pads than would otherwise be required for potential production wells.

The preparation required to provide a suitable drill pad at each site is relatively minor. Depending on the depth and stability of the subsoils, the preparation activity may be limited to the removal of topsoils, excavation of the flare pit and installation of the surface cellar and surface conductor pipe.

The importation of gravels for stability improvement is likely to some degree, however with modern drilling rigs possessing self levelling hydraulics this will be small quantities spread over very specific areas rather than full pad sheeting.

ESG considers the impacts as a result of this activity to be relatively small and short term; the well pads are only as large as required by safety parameters and the rehabilitation potential of the sites remains very high.

4.3.2 Drainage:

Well pad design and construction is designed to maintain a well drained area suitable for the safe operation of drilling machinery and ancillary equipment in all but the heaviest rainfall. Installation of drainage lines to prevent the retention of meteoric water on or around the site will be included in preliminary earthworks should a requirement be identified. Further consultation with landholders in this regard will characterise any site specific requirements for drainage improvements to be implemented.

4.3.3 Rehabilitation and Site Restoration:

At the completion of the drilling and core collection activities and the plug and abandonment procedures implemented as per the drilling proposal, rehabilitation activity can commence.

The process includes the removal of the surface cellar, surface conductor pipe, the removal of all imported gravel materials, the replacement of stockpiled topsoils and overall rehabilitation activity (grading, ploughing, seeding etc) as per the previous land use or landholders requirements. The methods, timing and overall objectives of the rehabilitation program are a specific part of the access and compensation agreements finalised with the individual landholders and will determine the rehabilitation schedule.

4.3.4 Subsurface Impacts:

Protection of the subsurface environment is an important consideration in the drilling of petroleum wells. The intersection of over/undercharged aquifers from surface to total depth presents various issues to the drilling of wells as does the intersection of gas bearing formations. In these terms, a number of important features of the drilling process provide physical protection to subsurface aquifers, surface equipment and personnel from the higher pressures experienced as the well deepens whilst also preventing the inflow of water into the well bore and the loss of drilling fluids into permeable formations.

The main functions of a drilling fluid are to cool and lubricate the drill bit, provide a mechanism to carry drill cuttings up and out of the well bore and 'balance' the hydraulic pressures exerted on the bore hole as vertical depth increases.

To maintain ideal conditions during the drilling of the wells, the mud program typically employed by ESG for the drilling of CSG wells in this area consists of:

- A high viscosity, mid weight mud for the surface to approximately 100m vertical depth (surface casing shoe) where water bearing formations are typically overcharged and will readily flow into the well bore; and
- A low to mid viscosity, minimum weight mud from the surface casing shoe to total depth where there is lower risk of intersecting gas bearing reservoirs or overcharged aquifers.

The mud system is bentonite based and readily forms an impermeable layer or ‘filter cake’ on the surface of the open hole which:

- Retards the inflow of water into the well bore from overcharged aquifers or formations; and
- Prevents the loss of drilling fluids into undercharged aquifers or porous formations.

Whilst some exchange of fluids is inevitable in the lead up to the formation of the filter cake or where the mud system is too low in weight (or ‘under balanced’), the gain or losses of fluids is readily controllable and is unlikely to be result in the loss/generation of any significant volumes of water or fluids.

Further, long term protection of the subsurface environment from petroleum well operations is afforded by the installation and cementing of steel casing into the open hole once the well has reached total depth. Casing is left in place over the entire depth of the well further limiting the likelihood of fluid exchange and aquifer contamination.

4.3.5 Plugging and Abandonment Procedures:

Prior to plugging and abandonment operations, a notification of the plan of abandonment will be provided to the DPI-Minerals for approval. A surface marker will be installed in the closest appropriate location so as not to interfere with the rehabilitation of the site and its return to previous use.

4.4 Waste Disposal

4.4.1 Drilling Fluid and Cuttings Disposal:

Aqueous drilling fluids generally comprise of water and various additives such as bentonite clays, barium sulphate (barites) and calcium carbonate to provide adequate viscosity and weight to material. Potassium chloride has been commonly employed by ESG to increase density in lightweight drilling fluids. Mixed onsite by the drilling contractor, the mud is stored in the purpose built containment pits, introduced into the well during drilling.

The term ‘drill cutting’ describes the material generated from the drilling activity once removed from the drilling fluids. Varying is size depending on the type of drill bit employed, the cuttings can range in size from coarse sand like material to >5mm in diameter. ESG exclusively uses PDC (polycrystalline diamond compact) bits that generate cuttings of a size similar to very coarse sand (<3mm) as shown in figure 10.



Figure 6 Drilling fluid and drill cuttings exiting the core hole (PEL433 Allambi-1C)

At the completion of the drilling program, excess water is removed from the mud pits to accelerate the drying process. The drill cuttings are not removed from the pits unless they are lined with HDPE. The pits are then backfilled and rehabilitation of the site is completed.

4.4.2 Putrescible Waste Disposal

There is little requirement for the onsite management of putrescible wastes from the drilling operations. The crew will be accommodated in hotels located at Narrabri and are expected to assist in the management of rubbish and waste each day.

A portable toilet will be located onsite and maintained by services from Narrabri. A rubbish cage will be located on the drilling site for the duration of the activity to manage any waste materials for later disposal at the Narrabri waste depot.

4.5 Flora

No specific flora surveying has been conducted in preparation for this corehole program as each of the five proposed sites have undergone previous improvement, vegetation modification and/or is currently utilised for stock grazing or cropping activity. There remains no requirement for the destruction or modification of any vegetation in accessing each site or during the conduct of the activity.

4.5.1 Assessment of Significant Effects

The assessment of significant effect on threatened species, populations or ecological communities or their habitats as per S5A (2) of the *Environmental Planning and Assessment Act 1979*, as applied to the 2008 PEL 238 Corehole Program A are such that:

- a) In the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction,**

The activity is to occur on open pasture and grazing paddocks with no requirement for the modification of any vegetation. The proposed activity is unlikely to have any adverse effect on the life cycle of any threatened species such that a viable local population is likely to be placed at risk of extinction.

- b) In the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction,**

A search of the NPWS Wildlife database for threatened flora species records no evidence of any endangered populations, communities or habitat. The proposed activity is unlikely to have adverse effect on the life cycle of any endangered population such that a viable local population of the species is likely to be placed at risk of extinction.

- c) In the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:**

(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or

(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.

As no evidence of any endangered ecological community or critically endangered ecological community has been identified, the proposed activity is not likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction; or is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.

d) In relation to the habitat of a threatened species, population or ecological community:

(i) the extent to which habitat is likely to be removed or modified as a result of the action proposed, and

(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and

(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality.

The proposed activity does not require any modification or removal of vegetation across the four (4) individual sites and as such:

i) no habitat of a threatened species, population or ecological community is likely to be removed or modified as a result of the proposed activity;

ii) there is no identifiable risk of any habitat becoming fragmented or isolated from other areas such as the relative isolation of each site from any other clearing activity; and

iii) No modification or removal of vegetation is planned and unlikely to be a factor to the long term survival of any species, population or ecological community in the project locality.

e) Whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly),

There is no evidence of any critical habitat being located in the project area. The proposed activity is unlikely to have any adverse effect on critical habitat, either directly or indirectly.

f) Whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan.

The action is not inconsistent with the objectives or actions of recovery and threat abatement plans.

g) Whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

The proposed activity does not constitute a key threatening process or is likely to result in the operation of, or increase the impacts of any key threatening process.

4.5.2 Weed Species

The risk of introduction of weeds and pests species to the site via the entry of vehicles and plant will be mitigated by the wash down of all vehicles, plant and ancillary equipment new to the region at the ESG yard prior to commencement of the program. This will entail the complete removal of soils and organic matter from all machinery, equipment and vehicles expected to enter the proposed well sites.

4.6 Fauna

No specific fauna surveying has been conducted in preparation for this corehole program as each of the five proposed sites have undergone previous improvement, vegetation modification and/or is currently utilised for stock grazing or cropping activity. There remains no requirement for the destruction or modification of any vegetation in accessing each site or during the conduct of the activity.

4.6.1 Assessment of Significant Effects

The assessment of significant effect on threatened species, populations or ecological communities or their habitats as per S5A (2) of the *Environmental Planning and Assessment Act 1979*, as applied to the 2008 PEL 238 Corehole Program A are such that:

a) In the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction,

The activity is to occur on open pasture and grazing paddocks with no requirement for the modification of any habitat. The proposed activity is unlikely to have any adverse effect on

the life cycle of any threatened species such that a viable local population is likely to be placed at risk of extinction.

- b) In the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction,**

The NPWS Wildlife database for threatened fauna species records no evidence of any threatened species, populations, communities or critical habitat. The proposed activity is unlikely to have adverse effect on the life cycle of any endangered population such that a viable local population of the species is likely to be placed at risk of extinction.

- c) In the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:**

- (i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or**
- (ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,**

As all endangered ecological communities are vegetation communities see section 4.5.1 (c) for consideration of this factor.

- d) In relation to the habitat of a threatened species, population or ecological community:**

- (i) the extent to which habitat is likely to be removed or modified as a result of the action proposed, and**
- (ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and**
- (iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality,**

The proposed activity does not require the modification or removal of any vegetation or potential/actual habitat; therefore:

- (i) no habitat of a threatened species, population or ecological community is likely to be removed or modified as a result of the proposed activity;**

- (ii) there is no identifiable risk of any habitat becoming fragmented or isolated from other areas such as the relative isolation of each site from any other clearing activity; and
- (iii) the proposed activity is unlikely to be of importance to the long term survival of any species, population or ecological community in the project locality.

e) Whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly), critical habitat as listed in the Register of critical habitat kept by the Director-General of DECC does not occur in the study area.

The proposed activity is unlikely to have any adverse effect on critical habitat, either directly or indirectly.

f) Whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,

The NPWS Wildlife database for threatened fauna species records no evidence of any threatened species, populations, communities or critical habitat in terms of the action being inconsistent with the objectives or actions of recovery and threat abatement plans.

g) Whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

With respect to fauna, the removal of vegetation would not be likely significantly impact on the habitat of TSC Act threatened fauna species known to occur within the Study Area or considered as possible occurrences within the Study Area.

4.7 Cultural Heritage

A search of the (NPWS) AHIMS database has shown that 76 Aboriginal heritage sites are recorded across the Narrabri, Baan Baa (northern portion) and Edgeroi (southern portion) map sheets, however none within close proximity to the proposed core hole locations.

The likelihood that the proposed activity will impact on sites or items of Aboriginal Heritage significance is low considering the previous and current land use practices carried out by the landholders on each site. The field inspections served to confirm the highly disturbed nature of the land in question and the ongoing utilisation of each for intensive agricultural activity that would furthermore reduce the likelihood that items or sites have remained undisturbed and potentially at risk from the preparation of the drill pads and the conduct of the drilling activity.

ESG is confident that this proposal carries no potential for direct impacts on the cultural heritage values of the project area. However, in the small likelihood that the activity locates a potential site or item of significance, it is proposed that all activities are ceased until such time as a qualified archaeologist or local aboriginal land council representative is able to assess further the significance of the find and suggest suitable mitigative action.

4.8 Land or Water Contamination

The proposed activity carried out as proposed does not pose any measurable risk of land or water contamination. The containment of the drilling mud's within purpose built pits limits any scope for the loss of materials into the localised environment, soils or near surface groundwater.

4.9 Visual Impacts

The proposed activity will not introduce any significant, long term visual impacts on the localised area; the drilling activity is short in duration and full rehabilitation of the drill sites is possible immediately following the demobilisation of the drill rig.

5 EVALUATION OF CUMULATIVE ENVIRONMENTAL IMPACTS

The assessment of the proposed activity and the characterisation of the cumulative impacts occur in response to S228 of the *Environmental Planning and Assessment Regulation 2000* which suggests the factors that must be taken into account concerning the impact of an activity.

S228 (2) (o) specifies

“that any cumulative environmental effects arising from the implementation of the proposal with other existing and likely future activities must be identified as part of the assessment process.”

A summary of the likely impacts associated with the planned activity include:

- The preparation of four (4) 50m x 50m core hole well pads at the stated locations;
- The drilling and core collection from the four (4) core holes; and
- The plugging, abandonment and rehabilitation of the four (4) core wells and drill sites.

The biophysical receptors that are likely to or have the potential to be impacted upon include biodiversity (flora & fauna).

The socioeconomic receptors likely to have the potential to be impacted upon include the local economy and cultural heritage.

5.1 Cumulative Biophysical Impacts

The cumulative impacts on the biodiversity of the area are considered insignificant. The preparation of the four core hole pads each 50m x 50m (cumulative total 1.00 ha) is considered a minor impact overall considering the absence of vegetation or habitat at each site.

No threatened species of flora have been identified in the immediate area surrounding the three proposed corehole locations. The direct impact of the activity on threatened species of fauna is considered negligible with no habitat in close proximity to the proposed locations. There is no requirement for the modification or removal of vegetation in the preparation of the well pads and hence no measurable impact on any faunal species.

The impact of soil resources is able to be accurately quantified and for the most part mitigated. The conservation of topsoil stocks is designed to minimise the time taken and maximise the effectiveness of the rehabilitation program.

The scale of fugitive particulate material generation and their impacts on the surrounding environment is generally thought to be negligible. Adequate mitigative measures are available during the construction phase to limit the generation of dust in the localised area and where the activity creates greater than normal levels of traffic on the unsealed access tracks inbound and outbound from the sites

5.2 Cumulative Socioeconomic Impacts

The scope for cumulative impacts on items or sites of cultural heritage significance remain absent from the proposed activity.

The direct impacts on the owners of the land parcels where the coreholes have been proposed are key concern to ESG. The operation of the Narrabri CSG Project in the Narrabri region and the perception of the company in the local community is an important consideration that remains at the forefront of company policy. Where possible, the locations have been selected to minimise the cumulative impacts (noise, dusts and incidental nuisance) to the greatest extent. The terms of ESG's access to the land and the specific items of compensation are agreed to and listed in the access agreement finalised with the landholder prior to any activity occurring. Where greater than acceptable nuisance is likely to occur, special consideration to mitigate any such impacts is considered a means to foster good faith with the landholders and local community.

Positive cumulative benefits for the local business community are an expected result of the proposed activity with the planning and construction phases utilising a range of local professional service providers. The value of the project to the local economy would be expected to exceed \$100 000, with all earthworks, site preparation and rehabilitation activity completed with the assistance of landholders and local contractors.

6 PROJECT JUSTIFICATION

Eastern Star Gas Limited is exploring for new sources of energy located within NSW that will clearly enjoy a significant advantage in developing new domestic and industrial gas markets, as well as penetrating existing markets.

New conventional and coal seam gas discoveries in regional NSW will have a significant positive impact by providing a local energy source that will attract new industry and economic development and also replace existing more expensive options. The development of gas resources in the region will not only provide new employment opportunities but also inject money into a range of local businesses and service providers. It will also provide the community with an opportunity to diversify from and complement its agricultural base. In addition to attracting new businesses and the creation of new local job opportunities, additional revenue will be spent in the business community and will lead to an improvement of local infrastructure and a more diverse economic base for people living in the region.

Populations and businesses based in regional NSW are generally declining with a movement to the major cities. The development of this project within the Narrabri area will have a significant impact on the region by providing a cheap, clean energy source that will attract new business and employment whilst the development of new and upgraded infrastructure is generally a component of gas field development. The local community will also benefit economically with the gas field operations directly purchasing services and equipment from local suppliers and businesses and the general knowledge that for every dollar invested in developing a property or installing facilities to deliver gas to market, the local economy benefits by approximately seven fold.

The planning process behind the operational phases within this unique environment include a significant range of desktop study and field-based surveying to both characterise the environment and to evaluate the actual and potential impacts of the activity. The Company has introduced further risk assessment studies into the impact assessment process to ensure that all facets of the activity are adequately characterised and the risks attenuated where possible.

7 CONCLUSIONS

Eastern Star remain confident that the proposed core hole drilling activity at the specified locations in the Narrabri region will not create any long term, detrimental environmental impacts likely to alter the operational environment or the surrounding region.

The proposed activity will not result in any impacts on the biophysical environment including flora, terrestrial fauna or sites of Aboriginal heritage significance.

No ongoing land use or locally/regionally significant infrastructure such as roads will be impacted by the activity.

A sufficient buffer zone (distance and physical barriers) exist between the drilling locations and the nearest inhabitation.

The bulk of the activity will occur over a short (less than 3 weeks per site) time frame limiting any further impacts associated with noise, visual and other impacts in this regard.

Sufficient mitigative action will be taken to limit any incidental nuisance caused by the proposed activity on landholders and surrounding residents.

The information contained within this document is an accurate representation of the existing operational environment and the extent of impacts likely to occur as a result of the proposed development. It is the opinion of Eastern Star that the impacts created by the proposed activity when considered alongside the mitigation strategies in place will create no long term effect on the localised and regional environment.

8 REFERENCES

Corkery, R.W & Company (2002). Statement of Environmental Effects – Coonarah Natural Gas Gathering System and Associated Electricity Generating Facility, R.W Corkery & Company Pty Ltd, Orange, NSW