

ENVIRONMENTAL ASSESSMENT

**PROPOSED GAS PIPELINE
FROM PESTELLS LANE, MEROO MEADOW
TO
THE SHOALHAVEN STARCHES FACTORY SITE
BOLONG ROAD, BOMADERRY**

Prepared for

Shoalhaven Starches Pty Ltd

March 2012



Prepared by:

COWMAN STODDART PTY LTD

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FROM PESTELLS LANE, MEROO MEADOW
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Ref. 09/73

Town Planning, Agricultural & Environmental Consultants

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COWMAN STODDART PTY LTD

CERTIFICATION OF ENVIRONMENTAL ASSESSMENT
PREPARED PURSUANT TO PART 3A OF THE *ENVIRONMENTAL PLANNING*
AND ASSESSMENT ACT 1979

**ENVIRONMENTAL ASSESSMENT
PREPARED BY**

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NOWRA NSW 2541

in respect of

PROJECT TO WHICH PART 3A APPLIES

Proponent Name: Shoalhaven Starches Pty Ltd
Proponent Address:
Land to be developed: Address Road reserves extending from Pestells Lane to
Bolong Road as well as including Lot 2 DP 538289 and
Lot 16 DP 1121337
Lot No. DP/MPS, Vol/Fol etc. Various parcels
Proposed Development: Proposed Gas Pipeline

Environmental Assessment An Environmental Assessment is attached

Certification I certify that I have prepared this environmental
assessment and to the best of our knowledge

- It has been prepared in accordance with Section 75E of the *Environmental Planning and Assessment Act 1979*,
- The information contained in the environmental Assessment is neither false nor misleading.

Signature:



Name:

S. D. Richardson

Date:

2nd April 2012.....

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EXECUTIVE SUMMARY

Shoalhaven Starches engaged Cowman Stoddart Pty Ltd to prepare this Environmental Assessment (EA) in accordance with Part 3A of the Environmental Planning and Assessment Act (EP&A Act) 1979 for the installation of a 5.5 km gas pipeline connecting the Shoalhaven Starches factory site located at Bolong Road, Bomaderry directly to the Eastern Gas Pipeline (EGP) at Pestells Lane, Meroo Meadow. The pipeline would tie directly to into the EGP and provide gas directly to the Shoalhaven Starches factory.

The project includes a metering facility to be installed at the tie-in location at Meroo Meadow. A pressure reduction facility would also need to be installed at the Shoalhaven Starches factory site end of the pipeline to ensure a continuous pressure is maintained to service both the factory as well as the proposed Gas Co-generation Plant that has been approved for the factory site by the Minister for Planning.

Following the 2009 approval by the Minister for Planning of the Shoalhaven Starches Expansion Project, production of ethanol at the Shoalhaven Starches factory will increase in a staged manner from the current approved level of 126 ML per year to 300 ML per year. The energy requirements for the Shoalhaven Starches operations will increase substantially as a result of this approval.

At present the Shoalhaven Starches site is connected to the EGP by a private lateral gas pipeline owned by ActewAGL. The private ownership of this lateral pipeline is inhibiting Shoalhaven Starches' ability to source competitively priced supplies of gas from companies other than ActewAGL. In effect ActewAGL have a monopoly on supply of gas to Shoalhaven Starches.

Shoalhaven Starches have been investigating ways in which they can reduce their energy costs including through improved competition within the gas supply market to accommodate their expansion plan.

To overcome the current monopolistic situation Shoalhaven Starches plan to construct their own pipeline to connect the factory site directly to the EGP. This project will enable Shoalhaven Starches to gain direct access to the EGP and the various gas retailers who transport gas along the EGP. Shoalhaven Starches will then be able to take advantage of competition between gas retailers and seek an improved cost of supply of gas for their operations.

This EA investigates the development issues within which the pipeline will be engineered, constructed and operated.

The proposed Shoalhaven Starches Gas Pipeline Project involves a concurrent Concept Plan (MP10_0144) and Project (MP10_0108) Application pursuant to Sections 75D and 75M of Part 3A of the EP&A Act.

The pipeline route was determined following a broad investigation of route options and was refined with regard for the environmental, social and technical constraints on pipeline construction and operation. Potential impacts were identified and the selected route avoids and mitigates adverse social and environmental impacts. The pipeline design will conform to established codes of practice, have capacity for the gas volume to be transported and provide for the physical conditions encountered along the route.

The pipeline will be buried for its length and will primarily follow existing cleared land and existing road reserves.

The proposed pipeline will be approximately 5.5 kilometres in length. Land use in the area consists of grazing; with urban areas largely avoided by the route.

Kevin Mills & Associates conducted an assessment of the biodiversity value of the proposed pipeline route. The proposed pipeline route is heavily disturbed and does not contain extensive areas of significant native vegetation or habitat. It is considered that with the implementation of the mitigation measures the Project is unlikely to have a long-term impact on threatened species and/or populations within the pipeline corridor area.

Kayandel Archaeological Services completed an assessment of the impact of the Project on cultural heritage in accordance with the draft *Guidelines for Aboriginal Cultural Heritage Assessment and Community Consultation*. This assessment concluded the Project would not have any adverse impacts on items of Aboriginal heritage.

A Preliminary Hazard Assessment conducted by URS Australia (**Annexure 14**) did not identify any major risks associated with the Project.

The pipeline route crosses several intermittent watercourses. The methods of construction are designed to avoid permanent modification of surface flows. The Project is not likely to introduce any specific long term impacts on the quality or quantity of water for downstream or groundwater users, or impact the structural integrity of the creek banks or have any indirect impacts on the ecological function of the water systems.

Stapleton Transportation & Planning have undertaken a Traffic Impact Statement for this project. The disruption to localised traffic flows along the pipeline corridor is expected to be short term and low. The system of existing roads would permit the safe flow of traffic (both light and heavy) into and out of the Project area without any need for alteration to their current condition. Boring below sealed bitumen roads will be used to minimise disruption to traffic

movements and prevent any reduction in road surface integrity. Suitable traffic control plan will be required in accordance with the RTA's requirements.

Dust will be created during the construction phase however dust will be adequately managed through mitigation measures proposed. Stephenson Environmental Management Australia have prepared an Air Quality Impact Assessment for the project.

In terms of noise the operation of the pipeline is unlikely to create significant levels of noise. Given the nature of the locality and surrounding land uses, construction noise is unlikely to create an adverse impact; however, noise emissions will be managed through mitigation measures outlined in the EA. This is addressed in detail by a Noise Assessment for the project carried out by Day Design.

Subject to adopting the mitigation measures there will not be any cumulative environmental impact as a result of the proposed pipeline Project. Where potential adverse impact has been identified appropriate mitigation measures will be put in place. The key environmental impacts can be managed through the mitigation measures and preparation of a Construction and Operations Environmental Management Plan.

1.0 INTRODUCTION

1.1 BACKGROUND

This Environmental Assessment (EA) has been prepared to address the key environmental issues associated with a proposal by Shoalhaven Starches Pty Ltd to install a 5.5 km gas pipeline connecting the Shoalhaven Starches factory site located at Bolong Road, Bomaderry directly to the Eastern Gas Pipeline (EGP) at Pestells Lane, Meroo Meadow. The pipeline would tie directly into the EGP and provide gas directly to the Shoalhaven Starches factory.

As part of the project, a metering facility would be installed at the tie-in location at Meroo Meadow. In addition a pressure reduction facility would be installed at the end of the pipeline to ensure a continuous pressure of 3,500 kPa is maintained to service both the factory as well as the proposed Gas Co-generation Plant that has been approved for the Shoalhaven Starches factory site as part of the Minister's approval for the Shoalhaven Starches Expansion Project (MP06_0228).

Cowman Stoddart Pty Ltd has been engaged by Shoalhaven Starches Pty Ltd to assist in the preparation of this EA which provides an assessment of the key environmental issues pertaining to the proposal.

The Department of Planning (DoP) has been consulted with respect to the proposal. The Director-General of the Department of Planning has issued requirements for the preparation of this EA (DGRs) and which are included as **Annexure 1** to this EA.

The Roads and Traffic Authority, State Rail, Office of Heritage and Environment (previously DECCW) as well as Shoalhaven City Council have also been consulted with respect to the proposal (refer **Annexure 2**).

1.2 OVERVIEW OF PROPOSAL

The Shoalhaven Starches factory located on Bolong Road, Bomaderry produces a range of products for the food, beverage, confectionary, paper and motor transport industries including; starch, gluten, glucose and ethanol. During these processes treated waste water is produced and spray irrigated onto pasture of the Company's Environmental Farm, which comprises over 1000 hectares of land situated to the north of the factory site.

At present energy used at the Shoalhaven Starches operations is outlined in **Table 1** below and can be summarised as follows:

- Coal – 2,943,000 Gigajoules per annum (GJ/a)
- Natural Gas – 1,158,000 GJ/a
- Diesel on site – 25,476 GJ/a
- Electricity – 589,406 GJ/a

Table 1
Existing Energy Balance

<i>Data</i>	<i>Value (Q)</i>	<i>Units</i>
Manufacture at Bomaderry		
Electricity (plant & farm)	589,406	GJ/a
Natural Gas	1,158,000	GJ/a
Coal	2,943,000	GJ/a
Diesel on site	25, 476	GJ/a
Diesel (transportation)	660	kL/a

Following the 2009 approval by the Minister for Planning of Shoalhaven Starches Expansion Project (MP06_0228), it is anticipated that production of ethanol at the plant will increase in a staged manner subject to certain conditions, from the current approved 126 million litres per year to 300 million litres per year. Apart from the general increase in energy requirements associated with an increase in plant on the site required by such an expansion; the expansion approval includes the development of a gas fired co-generation plant which would supply electricity and steam to the factory. Electric power would be generated using natural gas turbine generator(s) to deliver a net power output of 40 MW.

Following the approved expansion in production at Shoalhaven Starches, the increased energy requirements are detailed in **Table 2** and are summarised as follows:

- Coal – 2,943,000 GJ/a
- Natural gas – 6,800,000 GJ/a
- Diesel on site – 25,476 GJ/a
- Electricity – 50,400 GJ/a

(Taken from Section 5.10 Environmental Assessment for the Shoalhaven Starches Expansion Project)

Table 2
Proposed Energy Balance
(Shoalhaven Starches Expansion Project MP06-0228)

<i>Data</i>	<i>Value (Q)</i>	<i>Units</i>
Manufacture at Bomaderry		
Electricity (plant & farm)	50, 400	GJ/a
Natural Gas	6,800,000	GJ/a
Coal	2,943,000	GJ/a
Diesel on site	25, 476	GJ/a
Diesel (transportation)	660	kL/a

*Information extracted from "Greenhouse Gas Assessment – Ethanol Plant Upgrade",
GHD dated August 2008.*

As indicated above, Shoalhaven Starches operations will experience a significant increase in consumption of natural gas as a result of the approved Expansion Project.

At present the Shoalhaven Starches factory site is connected to the EGP by a private lateral gas pipeline owned and operated by ActewAGL. The private ownership of the lateral pipeline is inhibiting Shoalhaven Starches' ability to source competitively priced supplies of gas from companies other than ActewAGL. ActewAGL in effect have a monopoly on the supply of gas to Shoalhaven Starches.

Given the significant increase in demand on gas as a result of the expansion project, Shoalhaven Starches have been investigating ways in which they can reduce their energy costs including through improved competition within the gas supply market to accommodate the Company's expansion project.

To overcome the current monopolistic situation with respect to gas supply to the site, Shoalhaven Starches propose to construct a 5.5 km pipeline to connect the Shoalhaven Starches factory directly into the Eastern Gas Pipeline (EGP) at a point at Meroo Meadow to the north east of the factory site. By undertaking this project Shoalhaven Starches will be able to gain direct access to the EGP, and the various gas retailers who are able to transport gas along this pipeline. As a result Shoalhaven Starches will be able to take advantage of the competition between gas retailers and seek an improved cost of supply of gas for their operations.

The proposed pipeline will be approximately 5.5 kilometres in length and travel north / north east between the Shoalhaven Starches factory site to connect with the EGP at a point in Pestells Lane at Meroo Meadow. The entire length of the pipeline will be situated within the local government area of Shoalhaven City.

The proposed pipeline route has been designed to minimise impact on the broader community with the route selected located largely away from residential areas. In addition the design route minimises environmental impacts. The route selected passes mainly along existing cleared road reserves. The route will also not adversely impact areas of either indigenous or non-indigenous cultural heritage. The design, construction and operation of the pipeline will be undertaken in accordance with *AS 2885 Pipeline – Gas and Liquid Petroleum*.

The objective of the pipeline is to essentially provide Shoalhaven Starches with greater access to a competitive gas supply market.

The Meroo Meadow to Shoalhaven Starches lateral gas pipeline proposal will:

- provide a pipeline route which minimises environmental, social and economic impacts on the broader locality;
- be designed and constructed in accordance with the requirements of Australia Standards and all applicable legislation and policies relevant to this form of development; and
- be constructed and operated in a safe, efficient and sustainable manner;
- provide an opportunity to provide greater competition in the gas supply market which can only improve the economics and efficiency of energy supply within the broader Shoalhaven.

Following commissioning of the proposed new gas pipeline, the existing ActewAGL pipeline will remain in place to continue to serve domestic requirements for the area north of the Shoalhaven River as well as the Shoalhaven Paper Mill.

1.3 THE PROPONENT

The proponent for this project is Shoalhaven Starches Pty Ltd.

Shoalhaven Starches is a member of the Manildra Group of Companies. The Manildra Group is a wholly Australian owned business and the largest processor of wheat in Australia. It manufactures a wide range of wheat based products for food and industrial markets both locally and internationally.

The Shoalhaven Starches factory produces a range of products for the food, beverage, confectionary, paper and motor transport industries including; starch, gluten, glucose and ethanol.

1.4 PURPOSE AND CONTENT OF THE REPORT

This report provides an assessment of the key environmental issues associated with the proposal to construct a lateral natural gas pipeline that connects the Shoalhaven Starches factory at Bomaderry directly to the EGP.

The report is structured as follows:

1. a history of Shoalhaven Starches (Section 2.0);
2. the need and justification for the proposal (Section 3.1);
3. a description of the proposal (Section 3.2);
4. the planning and legislative assessment framework (Section 5.0);
5. a description of the existing environment along the pipeline route (Section 6.0);
6. an assessment of the key environmental issues (Section 7.0) that arise with a proposal of this nature;
7. an environmental risk analysis (Section 8.0) that summarises the potential environmental impacts associated with the proposal and proposed mitigation measures;
8. Section 9.0 includes a draft Statement of Commitments made by Shoalhaven Starches to mitigate the effects of the proposed pipeline Project.

The EA has been prepared to support a Project Application made by Shoalhaven Starches seeking the consent of the NSW Minister for Planning & Infrastructure pursuant to Part 3A of the Environmental Planning & Assessment Act.

2.0 HISTORY OF SHOALHAVEN STARCHES

Shoalhaven Starches Pty Ltd is a member of the Manildra Group of Companies, a wholly Australian owned business and the largest processor of wheat in Australia. The Manildra Group originated from the NSW country town of Manildra where a single flour mill was purchased in 1952.

The Shoalhaven Starches wheat starch and gluten plant at Bomaderry was originally constructed in 1970. The Manildra flour mills, at Manildra, Narrandera and Gunnedah, supply the Shoalhaven Starches factory, which currently produces wheat starch, gluten, syrups and ethanol (industrial and fuel grades). The Shoalhaven Starches operation provides direct on-site employment for 280 employees. Through the use of contractors it also indirectly creates employment for many more people in the local and regional economies.

In order to address the issue of waste water disposal, in 1984 Shoalhaven Starches installed a spray irrigation system, using farmland it owned on the northern side of Bolong Road at Bomaderry.

In June 1991, two storage ponds were built (Ponds No. 1 and 2) resulting in the cessation of waste water discharge to the Shoalhaven River.

To further reduce product wastage, Shoalhaven Starches sought to use excess starch for the production of ethanol. Ethanol production began at the Shoalhaven site in June 1992.

In 1994, the NSW Government approved the installation of a larger ethanol distillery within the existing site. The new distillery and its associated facilities enabled production of ethanol to increase from 20 million litres per annum to a production capacity of 100 million litres per year.

Subsequent to this approval Shoalhaven City Council issued development consent for:

- a protein isolate plant and DDGS Dryer; and
- a sorghum grinding plant.

Shoalhaven City Council issued development approval for the construction of a wet weather storage pond (Pond No. 6) on the 27th April 2001. At present, Shoalhaven Starches has a combined waste water storage capacity within the existing ponds of 925 ML. A further wet weather storage pond (Pond No. 7) was approved by the Minister for Planning on the 23 December 2002. (Pond 7 was subsequently modified to become the biological treatment section of the Wastewater Treatment Plant under MP06_0228.)

On the 1st June, 2001 the then Minister for Urban Affairs & Planning, Dr Andrew Refshauge MP, declared both the Shoalhaven Starches factory and Environmental Farm as being State

Significant Development for the purposes of the then Section 76A(7) of the Environmental Planning & Assessment Act.

In 2003 the Minister for Planning issued development consent (D223) for Shoalhaven Starches Pollution Reduction Program (PRP) No. 7. This approval enabled the implementation of the Company's Waste Water Management Strategy, and essentially sought to remove solids (suspended and soluble) from the Company's waste water, prior to its irrigation on the Environmental Farm.

This process, known as Stillage Recovery, essentially involved the introduction of additional decanters, the installation of an evaporation plant and additional dryers, to remove solids from the waste water. It is the remaining solids in the waste water that when sprayed onto the Environmental Farm, or stored in the wet weather storage ponds, which have the potential to result in the generation of odours.

The recovery of the suspended and soluble solids from the waste water could not be undertaken by the dryers in this process, without firstly providing additional coarse solids. Additional coarse solids (grain) were required to be imported to the site.

As a consequence of the additional grain, the starch contained in the grain resulted in a need to increase ethanol production to 126 million litres per year. This increase in ethanol production required the installation of additional fermenters, associated cooling towers and molecular sieves.

The increase in ethanol production also resulted in an increase in waste water, which was required to be disposed on the environmental farm. In this regard this previous proposal also included an increase in waste water disposal area on the Environmental Farm.

The plant associated with this previous approval has now been substantially installed and commissioned.

Shoalhaven Starches have subsequently received the following development approvals:

- The establishment of a flour mill on the factory site. This proposal provides for the transportation of wheat directly to the site by train for processing into industrial grade flour for the use in the production of starch and gluten at the factory site.
- An approval pursuant to Section 96 of the Environmental Planning & Assessment Act seeking to modify the development approval for the PRP No. 7 project to enable a DDGS Dryer to be installed in a slightly different location in the same building as previously approved; and the installation of an additional evaporator (a redundant piece of equipment

located at the Company's Altona Plant in Victoria) to provide standby capacity for the existing evaporator plant when sections of the existing plant are out of service or cleaning.

- A Section 96 modification application for a standby fermenter tank to be installed on the site, to enable the existing fermenter tanks to be taken out of service for maintenance one at a time.

A full list of all approvals that apply to the Shoalhaven Starches site are detailed within Section 2.4 of the EA prepared by our firm, in relation to the Shoalhaven Starches Expansion Project (MP 06_0228).

On the 28th January 2009 the Minister for Planning issued Project Approval (MP 06_0228) for a major expansion of the Bomaderry plant (the Shoalhaven Starches Expansion Project (SSEP)). It is anticipated that production of ethanol at the plant will increase in a staged manner from the current approved 126 million litres per year to 300 million litres per year.

This increase in production seeks to meet the expected increase in demand for ethanol arising from initiatives of the NSW Government which has mandated the blending of 6% ethanol into the total volume of petrol sold within NSW from the 1st October 2011.

Apart from the general increase in energy requirements associated with an increase in plant on the site required by such an expansion; the expansion approval includes the development of a gas fired co-generation plant which would supply electricity and steam to the factory. Electric power would be generated using natural gas turbine generator(s) to deliver a net power output of 40 MW.

3.0 THE PROPOSED PIPELINE PROJECT

3.1 NEED AND JUSTIFICATION FOR THE PROPOSAL

3.1.1 Need for Proposal

As detailed in Section 1.0 above, Shoalhaven Starches will experience a significant increase in demand for natural gas following the implementation of their recently approved expansion project. Apart from the general increase in energy requirements associated with the increase in production as a result of expansion; the expansion project includes the development of a co-generation plant which would supply electricity and steam to the factory. Electric power would be generated using natural gas fired turbine generator(s) to deliver a power output of 40 MW.

3.1.2 Justification

At present the Shoalhaven Starches factory site is connected to the EGP by a private lateral gas pipeline owned and operated by ActewAGL. ActewAGL in effect have a monopoly on the supply of gas to Shoalhaven Starches.

In order to overcome the current monopolistic situation Shoalhaven Starches propose to construct a 5.5 pipeline to connect the Shoalhaven Starches factory directly into the EGP at a point at Meroo Meadow to the north east. By undertaking this project Shoalhaven Starches will be able to gain direct access to the EGP, and the various gas suppliers who are able to transport gas along this pipeline. As a result Shoalhaven Starches will be able to take advantage of the competition between a range of gas suppliers and thereby seek an improved cost of supply of gas to their operations.

The objective of the pipeline is essentially to provide Shoalhaven Starches with greater access to a more competitive gas supply market and to reduce the delivered cost per year.

At present Shoalhaven Starches are charged an average rate of \$7.40 per GJ. Shoalhaven Starches envisage that once the expansion project is implemented that natural gas will cost the Company \$50.32 million per annum (based upon previously approved co-generation).

Shoalhaven Starches estimate that the proposed gas pipeline will cost approximate \$6 million to construct. Once the pipeline connects Shoalhaven Starches factory directly to the EGP, the Company will be able to competitively source gas supply from a variety of suppliers/retailers including Mobil Exxon, Santos, Origin and Anzon.

Shoalhaven Starches envisage that the competition created by access to these various gas retailers will reduce the cost of gas to the site to an average of \$6.00 per GJ resulting in significant cost savings of \$9.5 million per annum to the Company.

The Company envisages that it would take approximately 1 year of operation with its own lateral gas pipeline to recover the capital cost of the pipeline works.

The installation of this alternative gas pipeline will also provide broader benefits:

- The development of an additional gas supply infrastructure has the potential to free up capacity within the exiting ActewAGL pipeline to service increased population within the Nowra Bomaderry area as well as increase in demands from other development projects.
- Energy, including natural gas, is a major cost of operation at Shoalhaven Starches representing around 25% of the total operating costs at the plant. Competitively sourced supplies of energy, including natural gas to the plant, can therefore significantly improve the international competitiveness of the operations at Shoalhaven Starches. This is essential for the long term viability of the plant and hence helping to secure existing jobs on the site. Achieving and maintaining the international competitiveness at Shoalhaven Starches is also a prerequisite for justification for any further capital investment and associated increase in employment on the site in future.
- Improved local gas supply competition has the potential to reduce energy costs for the broader local business community. The new gas pipeline has the potential to supply other industrial consumers via infrastructure owners operated either by ActewAGL or Shoalhaven Starches.
- Improved regional gas supply competition and potential reduced costs for industry associated with a duopoly of regional gas supplier options. The new gas pipeline will enable supply to local industry from either the Australian Energy Market Operator (AEMO) infrastructure, designated as an uncontrolled asset owned by Jemena, via gas reserves owned and supplied independently by either Mobil Exxon, Santos or Origin Energy.
- Increased security of energy (gas) supply. The new lateral gas pipeline will enable supply either by ActewAGL or Shoalhaven Starches systems. This will reduce loss of supply associated with maintenance or unplanned outages.

- The increased availability of natural gas, an energy source with approximately two-thirds of the greenhouse gas emissions of coal (on an energy equivalent basis) will allow management of greenhouse gas mitigation and associated cost savings over time.

3.1.3 Alternatives Considered

3.1.3.1 Do Nothing Option

The “do nothing” option will result in Shoalhaven Starches being confined to access their gas supply from the existing ActewAGL pipeline. Due to the higher costs associated with obtaining gas through this supply Shoalhaven Starches are of the view that such an option would render its overall operations including proposed co-generation plant unviable.

Were the proposed gas pipeline not to proceed Shoalhaven Starches would need to investigate alternate energy supplies to accommodate the proposed increase in production at the plant envisaged by the Minister’s recent Project Approval for the Expansion Project. This is discussed further in Section 3.1.3.2.

3.1.3.2 Other Alternatives

Alternative Energy Supply

GHD undertook an energy and greenhouse analysis for the Shoalhaven Starches Expansion Project and identified that total energy use at the Shoalhaven Starches site will increase by 2.7 times current levels as a result of this approved expansion project. The analysis undertaken by GHD shows that the primary energy source is the combustion of natural gas (responsible for 94% of net energy use). The proposed ethanol plant upgrade will include a cogeneration facility that will be powered by natural gas and biogas captured from wastewater treatment to produce electricity. The large increase in natural gas consumption will be offset to some extent by a reduction in purchased electricity from the grid. Following the upgrade, purchased electricity consumption will be cut to 11% of baseline usage.

Transport energy use for raw materials and products account for 6% and 4% net energy use respectively. The small increase in coal use for the proposed plant only accounts for 2% of net energy use.

Shoalhaven Starches have considered the implications for relying upon alternative energy supplies including:

- Coal – Shoalhaven Starches are concerned that coal is subject to limited security and competition from international demand. In addition coal raises issues in terms of environmental impacts through higher greenhouse gas emissions when compared to natural gas. Natural gas produces much lower greenhouse gas emissions than the amount of coal of equivalent energy. GHD in their Greenhouse Gas Assessment (dated August 2008) undertaken as part of the Shoalhaven Starches Expansion Project identified using natural gas in the proposed plant instead of coal saves approximately 187,680 + CO₂-ea/a.
- Biogas – This energy supply is limited in terms of on-site production from the anaerobic digestion of waste organics. This supply will not be able to meet the Companies overall energy supply requirements.
- Electricity – The additional electricity requirement would largely be sourced from coal fired generation with potential adverse environmental impacts (as outlined above for coal).

Alternative Pipeline Route Options

Shoalhaven Starches, and through their consultants URS Australia have initially investigated two alternative pipeline route options. These are detailed in **Figure 1**.

As is evident **Figure 1** shows one route following the EGP; while the second commences at Pestells Lane and follows a route almost identical to what would become the preferred route.

Shoalhaven Starches do not favour following the EGP route. As is evident from **Figure 1** this route along Meroo Road is located through the urban area of Bomaderry and contains residential and industrial land uses. To construct and lay a further pipeline along this route would result in disruption to landholders within this urban area.

The other option shown in **Figure 1** follows an almost identical route to that which would become the preferred route – except for the final southern section of the route as it crosses Shoalhaven Starches' land. At this point the route passed along the edge of Abernethys Creek. As shown in **Figure 10** this area is identified as a sensitive coastal location under State Environmental Planning Policy No. 71 – Coastal Protection.

As discussed in Section 5.2.1 the construction of the proposed pipeline would be prohibited development and it would not be open to the Minister to approve this segment of the proposed pipeline. Clearly this option is not permissible development and no further consideration can be given to this option.

INITIAL OPTIONS INVESTIGATED

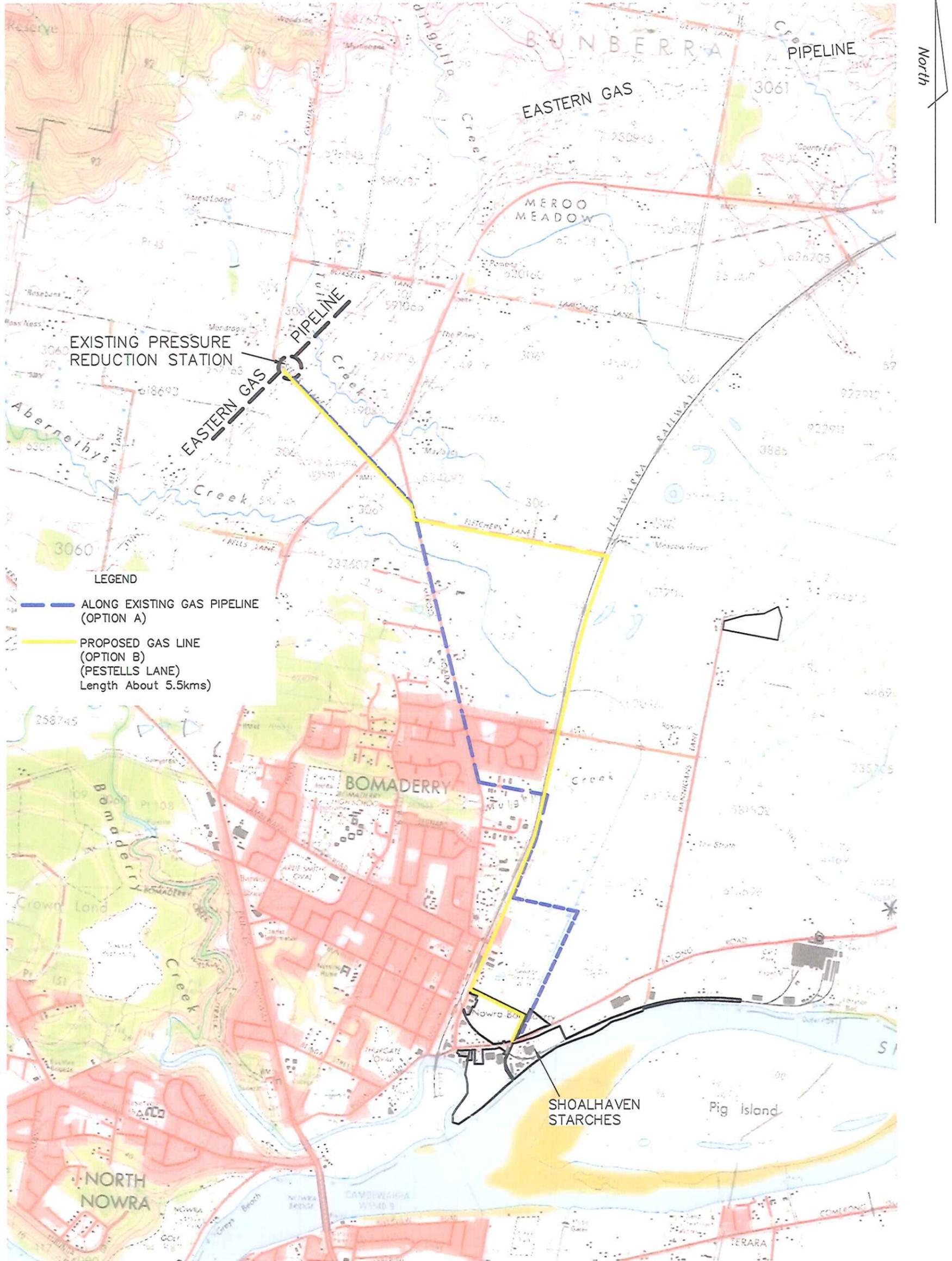


FIGURE 1

SKETCH PLAN SHOWING OPTIONS FOR A PROPOSED GAS LINE ROUTE FROM EXISTING GAS MAIN TO THE BOLONG ROAD FACTORY

CAD FILE: 24710-01K

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In addition a further alternative pipeline route has been suggested by Shoalhaven City Council. This further alternative route is shown in **Figure 2**.

Shoalhaven City Council has suggested this alternative route to avoid areas identified by Council's Nowra Bomaderry Structure Plan for future development and road upgrades. The alternative route suggested by Council would also relocate the route away from public road reserves and across land owned by Manildra.

Shoalhaven Starches have reviewed in detail this alternative route suggested by Council. With respect to this alternative route Shoalhaven Starches raised the following concerns:

- The alternative route is almost 1 kilometre longer than Shoalhaven Starches' preferred route.
- Under the Council option, a connection would need to be made at Devitts Lane. There is however no existing connection to the Eastern Gas Pipeline at Devitts Lane. There is an existing connection facility at Pestells Lane (the connecting point under the preferred route).
- In order to establish a connection into the Eastern Gas Pipeline at Devitts Lane would require a hot tap and a Custody Transfer Metering Station. The installation of the tie into the EGP is estimated to cost \$2,732,100.00.
- The estimated cost of the additional length of line associated with the Council option is \$500,000.00.
- There are nine (9) private land owners located along the Council option; while only one (1) private land holder along the preferred route. The Council option will therefore result in greater community impacts when compared to the preferred route option. In this regard it is noted that there are substantial residences and gardens located along the Council option.
- The route along Devitts Lane is also partly heavily timbered, and the laying of the pipeline along this route may require significantly more vegetation disturbance compared to the preferred route.
- Given the greater number of private properties likely to be affected by the Council option; this is likely to result in significantly greater delays and costs to implement the project.

SCC PROPOSED OPTION

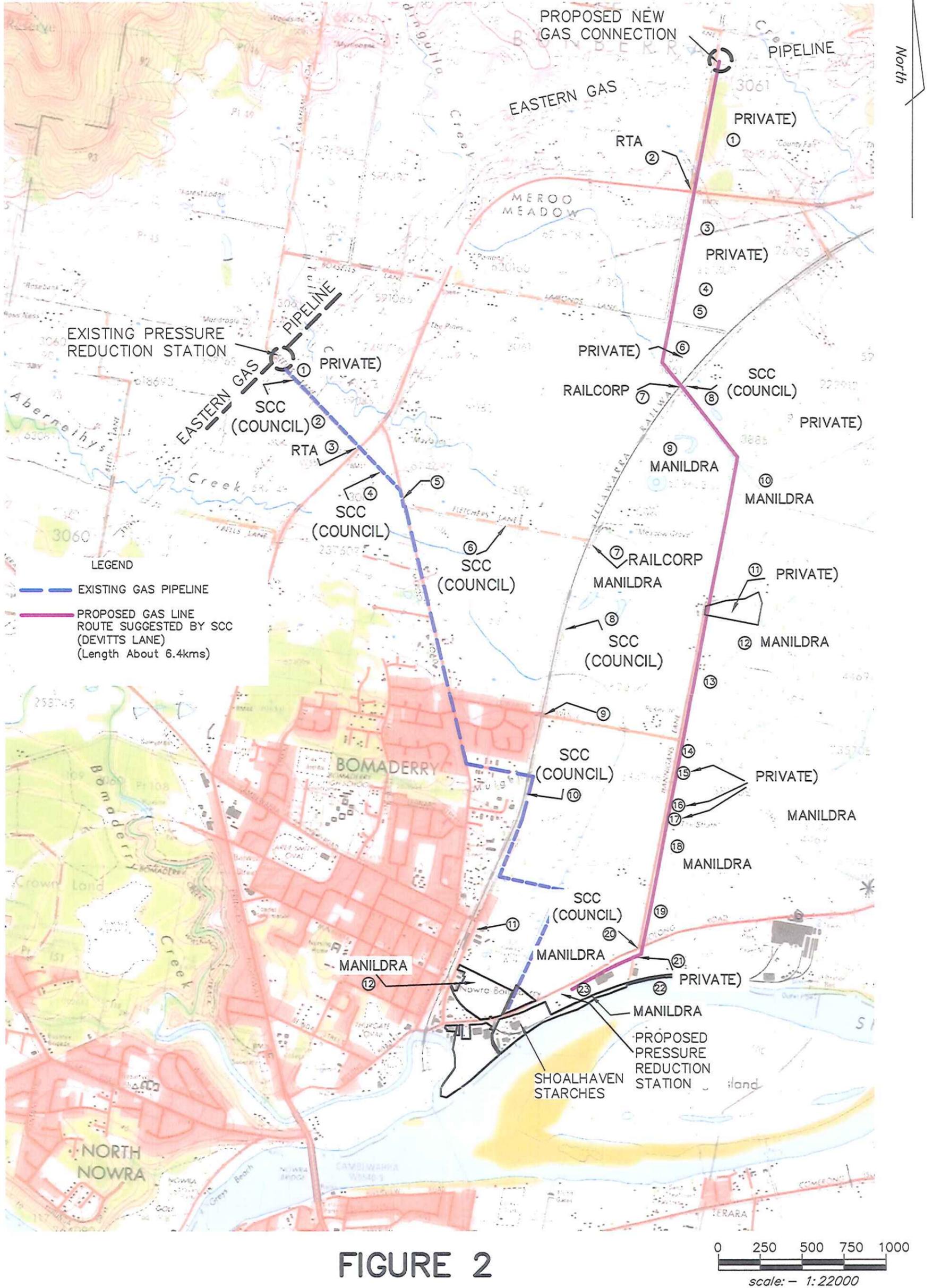


FIGURE 2

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SKETCH PLAN SHOWING EXISTING GAS LINE AND THE OPTION SUGGESTED BY SCC FOR A PROPOSED GAS LINE FROM THE GAS MAIN TO THE BOLONG ROAD FACTORY FOR THE MANILDRA GROUP

CAD FILE: 24710-01K

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Given the above it is estimated that the Council option would increase the capital cost of the project by 50% when compared to the preferred route.

The Council option would also involve greater complexity in terms of having to arrange easements (and associated costs) with a greater number of private land holders when compared to the preferred route.

Overall it is considered the Council option would involve greater adverse social and economic impacts when compared to the preferred route.

Following further consultation between Shoalhaven Starches and Council, Shoalhaven City Council (in a letter dated 19th April 2010) accept justification for the preferred route from Pestells Lane. A copy of this letter is included as **Annexure 4** to this EA.

An investigation has also been undertaken of extending the pipeline to the closest alternative tie-in to the EGP located at Yalwal Road at West Nowra. This location includes similar tie-in facilities as those located at Pestells Lane. For the purposes of this EA these options are referred to as the “South West Options”.

Two separate “South West Options” were examined and these are shown in **Figure 3**.

- The first south west option shown in **Figure 3** follows existing road reserves extending from this alternative tie-in location to the Shoalhaven Starches factory site (shown red in **Figure 3**).
- The second option shown in **Figure 3** follows a more direct line route extending from the alternative tie-in location to the Shoalhaven Starches factory site however where possible following existing electricity and other easements (shown blue in **Figure 3**).

These alternative route options raised several concerns:

- The “red” south west option comprises an overall length of approximately 8.9 kilometres.
- The “blue” south west comprises an overall length of approximately 9.6 kilometres.
- Both these options are considerably longer when compared to Shoalhaven Starches preferred route which comprises a length of only 5.5 kilometres. The increased length of these south west route options would involve an estimated additional construction cost of \$1.7 million and \$2.05 million (excluding costs associated with crossing the Shoalhaven River).
- The first of these two options would involve extending along road reserves through established urban areas. The construction of this alternative route option would

SOUTH WEST OPTIONS



FIGURE 3

SKETCH PLAN SHOWING TWO POSSIBLE OPTIONS FOR PROPOSED GAS LINE ROUTE FROM EXISTING GAS MAIN AT YALWAL ROAD TO THE BOLONG ROAD FACTORY FOR THE MANILDRA GROUP

CAD FILE: 24710-01K STH WEST OPTION

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result in greater community impacts when compared to the preferred route as the pipeline would need to be located along residential street frontages resulting in disturbance during construction to numerous driveways and the general residential amenity.

- The more blue, south west route option, whilst involving minimal impacts to established urban areas, traverses numerous privately owned rural properties.
- This alternative route option would also result in disturbance to both rural and native bushland areas and the associated adverse ecological impacts.
- This blue, south west route option would also need to negotiate the Regional Services Corridor which traverses this locality.
- Large tracks of land along the southern side of Shoalhaven River are zoned Environmental Protection 7(d1) Scenic Protection. From a review of the zoning provisions that apply to this zone the gas pipeline is likely to be prohibited development. Significant areas along this route option are also identified as identified as Sensitive Coastal Land under SEPP 71. The Minister would therefore not have the ability to consider this option given the terms of Clause 8N of the EP&A Regulations.
- Both options would necessitate crossing the Shoalhaven River either by the existing bridge crossing; or by underboring the existing river. Such will involve considerable approval, environmental and additional cost implications.
- Given the greater number of private properties likely to be affected, significant delays and costs to implement these options would be encountered.

Preferred Option

The preferred pipeline route is shown in **Figure 4**. The preferred route has been refined following initial site visits, mapping, and consideration of social and environmental constraints associated with these other options. It is envisaged that this route will be further refined through further field work and consultation with relevant stakeholders. This route minimises social and environmental impacts. The route depicted in **Figure 4** is assessed as part of this EA.

Annexure 5 includes a detailed plan of the preferred pipeline route superimposed on an aerial photograph identifying the route and surrounding lands.

3.2 DESCRIPTION OF PROPOSAL

3.2.1 Pipeline Route

The preferred pipeline route extending a distance of 5.5 km has been identified and is shown in **Figure 4**.

The selection of the preferred route has been based upon an assessment of desktop studies, initial field work, detailed expert consultant assessment and consultation with relevant government agencies. The route has been devised to avoid environmentally sensitive and urban areas as well as satisfying construction and cost requirements.

The proposed Shoalhaven Starches Gas Pipeline Project involves a concurrent Concept Plan (MP10_0144) and Major Project (MP 10_0108) Application pursuant to Sections 75D and 75M of Part 3A of the EP&A Act.

It is proposed that the pipeline will tie-in to the EGP at the existing Bomaderry Meter Station and travel along the following general route as denoted in **Figure 4**.

- Follow Pestells Lane in a south-easterly direction (**Plate 1**);
- Cross Princes Highway and follow the transmission line easement to Meroo Road (**Plates 2, 3 and 4**);
- Cross Meroo Road and travel south to Fletchers Lane;
- Follow Fletchers Lane east to the railway tracks (**Plate 5**);
- Cross railway tracks and follow road easement adjacent to rail easement in a generally southerly direction to Edwards Avenue (**Plates 6 and 7**);
- Cross Edwards Avenue and continue in a southerly direction (**Plate 8**);
- Change of direction – head in a easterly direction (**Plate 9**); and
- Change of direction – head in a southerly direction until pressure reduction facility is reached.

PREFERRED OPTION

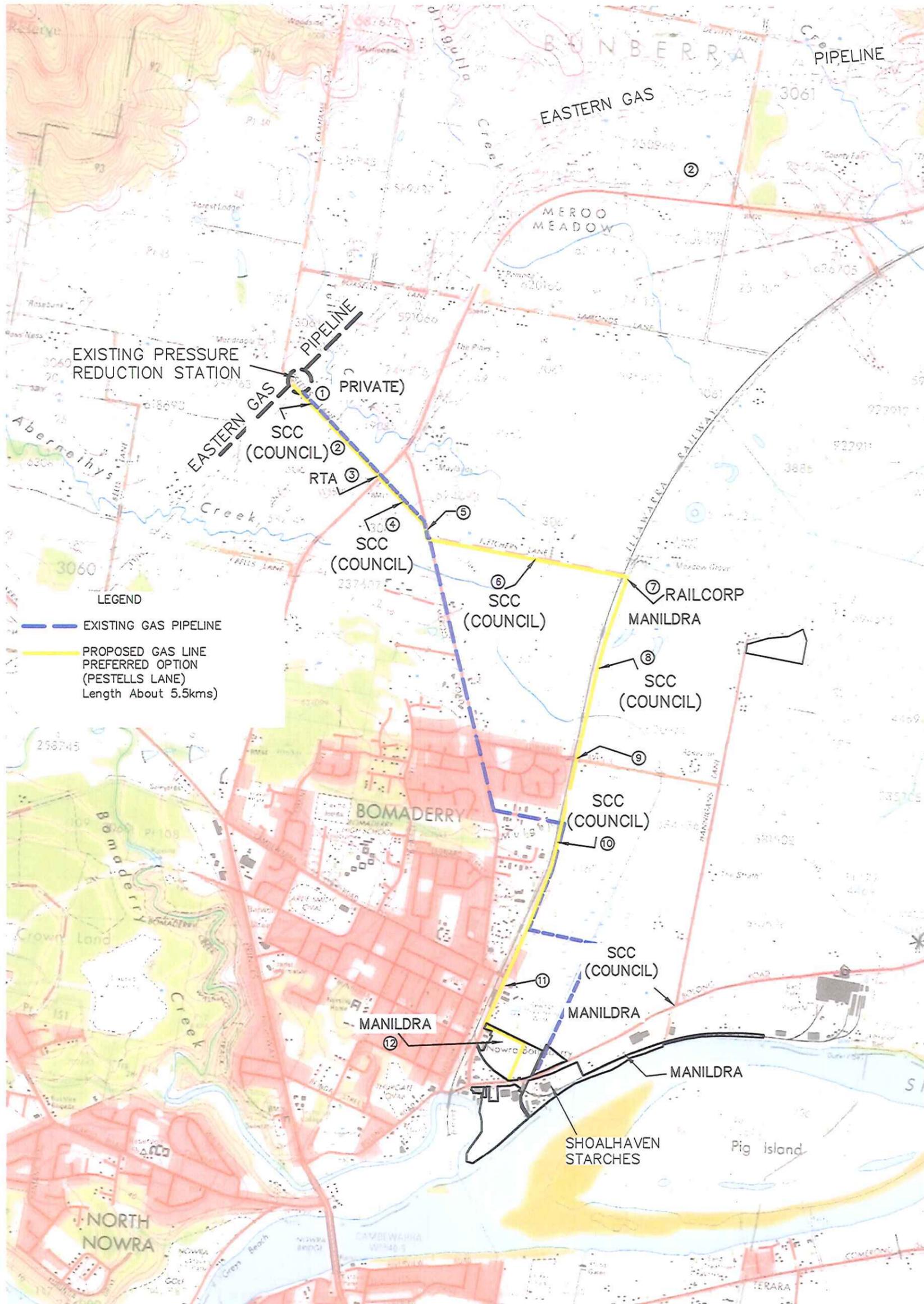


FIGURE 4

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SKETCH PLAN SHOWING EXISTING GAS LINE AND PREFERRED OPTION FOR PROPOSED GAS LINE ROUTE FROM EXISTING GAS MAIN TO THE BOLONG ROAD FACTORY FOR THE MANILDRA GROUP

CAD FILE: 24710-01K

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COVER OF EXCELLENCE



Plate 1: View along Pestells Lane



Plate 2: View of crossing point of Princes Highway at Pestells Lane intersection.



Plate 3: View along transmission line easement.



Plate 4: View south along Meroo Road.



Plate 5: View along Fletchers Lane.



Plate 6: View of rail crossing.



Plate 7: View along road reserve adjacent to rail line.



Plate 8: View south along Railway Street, Bomaderry.



Plate 9: View of location where pipeline leaves Railway Street and heads east.

3.2.2 Pipeline Design

Design Life

The pipeline will be designed for a minimum life of 30 years.

Pipeline Capacity

The pipeline will be designed for the following flows:

- Minimum flow: 10 TJ/day
- Maximum flow: 25 TJ/day

Design Pressures

The pipeline will be designed for the following pressures:

- Maximum pressure: 16,550 kPa
- Normal operating pressure: 8,800 – 14,000 kPa

Based on the above, the maximum allowable operating pressure (MAOP) of the pipeline will be 16,550 kPa to match that of the EGP.

Design Temperatures

Based on information gathered from operation of the EGP, the following design temperatures have been adopted:

- Buried piping: Min = 5°C, Max = 25°C
- Aboveground piping: Min = -10°C, Max = 60°C

Based on the above, pipe material strengths will not be de-rated due to temperature.

Pipeline Internal Diameter

The following conditions were assumed when evaluating the potential internal diameter for the pipeline:

- Minimum inlet pressure from EGP = 8,800 kPa
- Minimum allowable pressure at pressure reduction facility = 4,000 kPa
- Maximum flow = 25 TJ/day

Based on the above conditions, preliminary calculations prepared by URS Australia show that the pipeline internal diameter could be as small as 90mm. Thus, DN100 pipe could be considered assuming the maximum flow does not increase and the inlet pressure from the EGP does not decrease. In accordance with the original design, DN150 pipe has been considered for this EA.

Materials

Line Pipe

Line pipe will be manufactured to API 5L in addition to any further Manildra specifications. **Table 3** displays minimum pipe grades and wall thicknesses based on the associated design factors.

Table 3
Minimum Wall Thickness based on Design Factor

Outside Diameter	Design Factor	Grade	SMYS	Minimum Wall Thickness
168.3 mm (6.625")	0.72	Grade B	35,000 psi	7.41 mm
		API 5L X-42	42,000 psi	6.2 mm
	0.6	Grade B	35,000 psi	8.9 mm
		API 5L X-42	42,000 psi	7.41 mm

Corrosion Protection

Cathodic protection for the pipeline will be in accordance with AS2383.1-1998. Further investigation into the most appropriate type of corrosion protection will be performed during the detailed design process including impacts from rail and overhead power lines. Specific measures include the following:

Pipeline Coating

The primary form of corrosion prevention will be the pipeline’s external coating. Below ground pipe shall be externally coated with a fusion bonded epoxy (FBE) in accordance with AS3862-1991 or High Density Polyethylene (HDPE) [‘yellow jacket’] in accordance with other relevant specifications. The approximate minimum coating thickness will be 550 microns.

Sacrificial Anodes

As a potential secondary measure of corrosion protection, the pipeline shall have a sacrificial anode system located along the pipeline route. Locations and details of the systems will be developed during the detailed engineering phase, but it is anticipated that the sacrificial anode system will be installed at the meter station with at least two test stations installed along the 5.5 km length of the pipeline.

High Voltage Powerlines

Portions of the pipeline will be located parallel with high voltage powerlines (specifically between the Princes Highway and Meroo Road), which may induce AC into the pipeline.

This would produce a hazard to personnel and equipment. During detailed design, calculations will be carried out to determine the magnitude of the induced current as well as necessary mitigative earthing.

3.2.3 Pipeline Construction

General

Right-of-Way

An approximate five to seven metre wide temporary construction right-of-way will be needed to allow for transportation of construction equipment during installation of the pipeline. In addition, temporary workspace will be required near the right-of-way in major watercourse and road crossings, particularly the crossing of the Princes Highway.

Depth of Cover

The minimum depth of cover as set forth in AS 2885 is 750 mm from natural grade to the top of the pipe. The pipeline will be buried to a minimum depth of 1,200 mm in road and rail reserves as well as in ploughed agricultural areas. **Figure 5** provides a typical pipe cross section.

Trenching and Backfill

During construction, the width of the trench will roughly be 660 mm wide except at tie-in locations where the trench will need to be wider and sloped appropriately to allow welders to make the tie-ins.

Excavated Material Volumes

Table 4 presents estimated volumes of spoil to be excavated from the trench.

Table 4
Estimated Volume of Excavated Material

<i>Depth of Cover</i>	<i>Approx. Trench Dimensions</i>	<i>Approx. Volume of Soil Excavated</i>	<i>Approx. Volume of Spoil</i>
750 mm	660 mm (width) x 970 mm (depth)	0.64 cubic metres per linear metre	0.8 cubic metres per linear metre
1,200 mm	660 mm (width) x 1,420 mm (depth)	0.94 cubic metres per linear metre	1.2 cubic metres per linear metre

Note: Spoil volume assumes ordinary earth is excavated. Ordinary earth will expand to 1.25 times its undisturbed volume when excavated while sand will expand by 1.11 times its initial volume.

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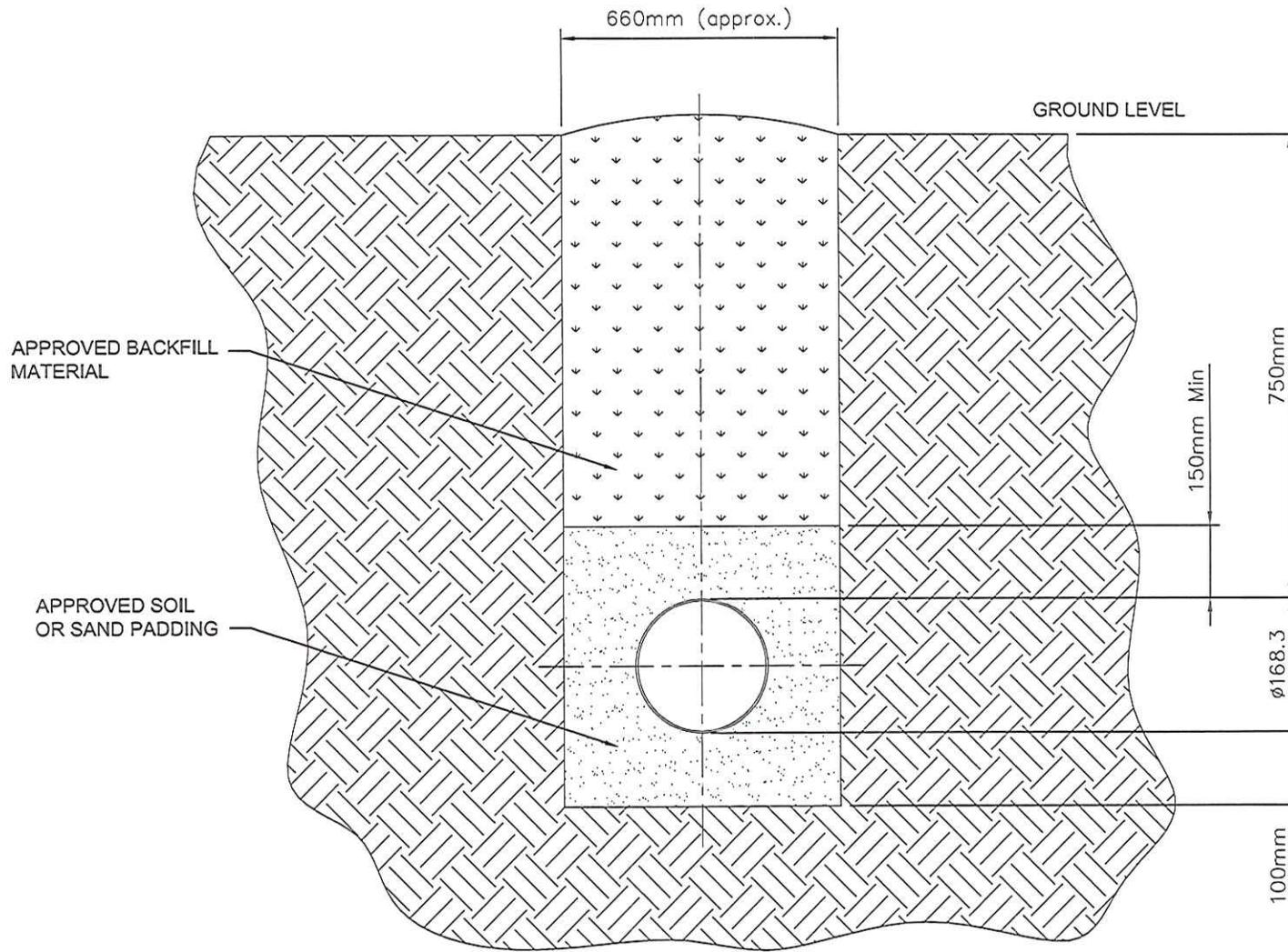


FIGURE 5

Rev	Date	By	App	Amendment Details
A	31.05.2009	B.E.	C.M.	PRELIMINARY FOR REVIEW

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Client
MANILDRA GROUP

Project
**GAS TRANSMISSION
BOMADERRY
TO MANILDRA STARCHES**

Drawing Title
**TYPICAL PIPE
CROSS SECTION**

Status
FOR REVIEW

Project No.
43167736

Drawing No.
005

Scale (A1)
NTS

Rev
A

Buoyancy

Depending on wall thickness, flotation of the pipeline may be an issue at watercourse crossings and within the floodplain. **Table 5** presents minimum specific gravity values in low-lying areas that will be encountered as part of this project.

Table 5
Recommended Minimum Specific Gravity Values

<i>Area</i>	<i>Specific Gravity</i>
Small streams	1.15
Wetlands and floodplains	1.20
Erodible streams, major rivers	1.25

Preliminary calculations indicate that for DN150 pipe, a minimum wall thickness of 6.7 mm is required to achieve a specific gravity of 1.2. However, this wall thickness accounts for uncoated steel. The actual required wall thickness may be smaller due to the external coating.

Crossings

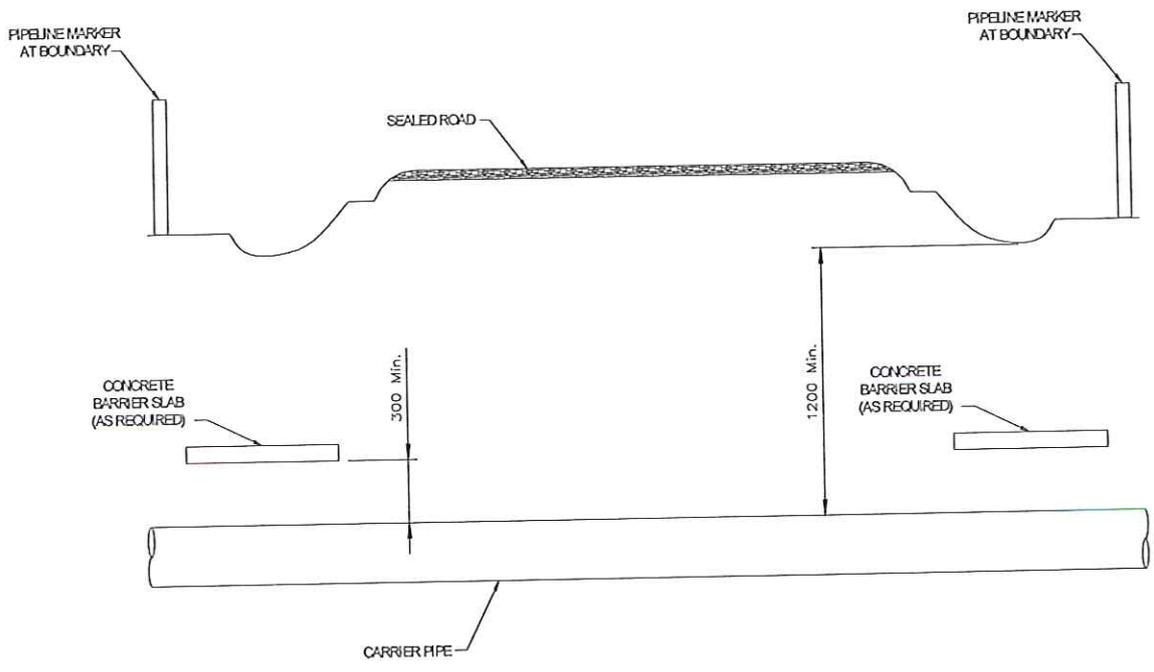
Road

Table 6 presents road crossings associated with the proposed pipeline route:

Table 6
Meroo Meadow –Shoalhaven Starches Pipeline - Road Crossings

<i>Approx. KP</i>	<i>Road</i>	<i>Probable Crossing Method</i>
0.7	Princes Highway	Horizontal Bore
1.0	Meroo Road	Horizontal Bore
3.6	Edwards Avenue	Horizontal Bore

As detailed in **Table 6** above, the three roads encountered are proposed to be crossed by the horizontal bore method. Works would include excavation of a bore pit on both sides of the crossing (workspace area of approximately 20 metres by 40 metres would be needed for the Princes Highway crossing), reaming of a hole underneath the road, pushing or pulling the pipeline through the hole, and tying in to pipeline sections. No disturbance to the road surface would occur and traffic would not be significantly impacted (potential for minor disturbances due to moving of heavy equipment into and out of the area). **Figure 6** details a typical road crossing.



Extract from "Front End Engineering Design" by URS May 2009

COWMAN STODDART PTY LTD

ABN 29 057 616 896

Town Planning, Agricultural and
Environmental Consultants

FIGURE 6
Typical Road Crossing

Scale NTS

Date: June 2010

Heavier wall pipe (0.6 design factor) will be used at road crossings and will extend through the width of the road easement. Where horizontal boring is used, an abrasion resistant coating such as Powercrete will be applied to the pipe in order to prevent coating damage during installation under the road.

Railway

The South Coast Railway will be crossed near the intersection of Fletchers Road. Although the horizontal bore method will likely be used, the design and installation method of the crossing will be agreed upon with the rail authority. If the railway is electrified, a casing will be installed around the carrier pipe to mitigate stray currents. In accordance with AS2885, the pipe will be buried to a minimum depth of 2,000 mm below the top of the rails and 1,200 mm below the drainage ditches. A protective concrete slab should also be installed no more than 300 mm above the pipe where it crosses the ditches. **Figure 7** details a typical railway crossing.

Watercourses

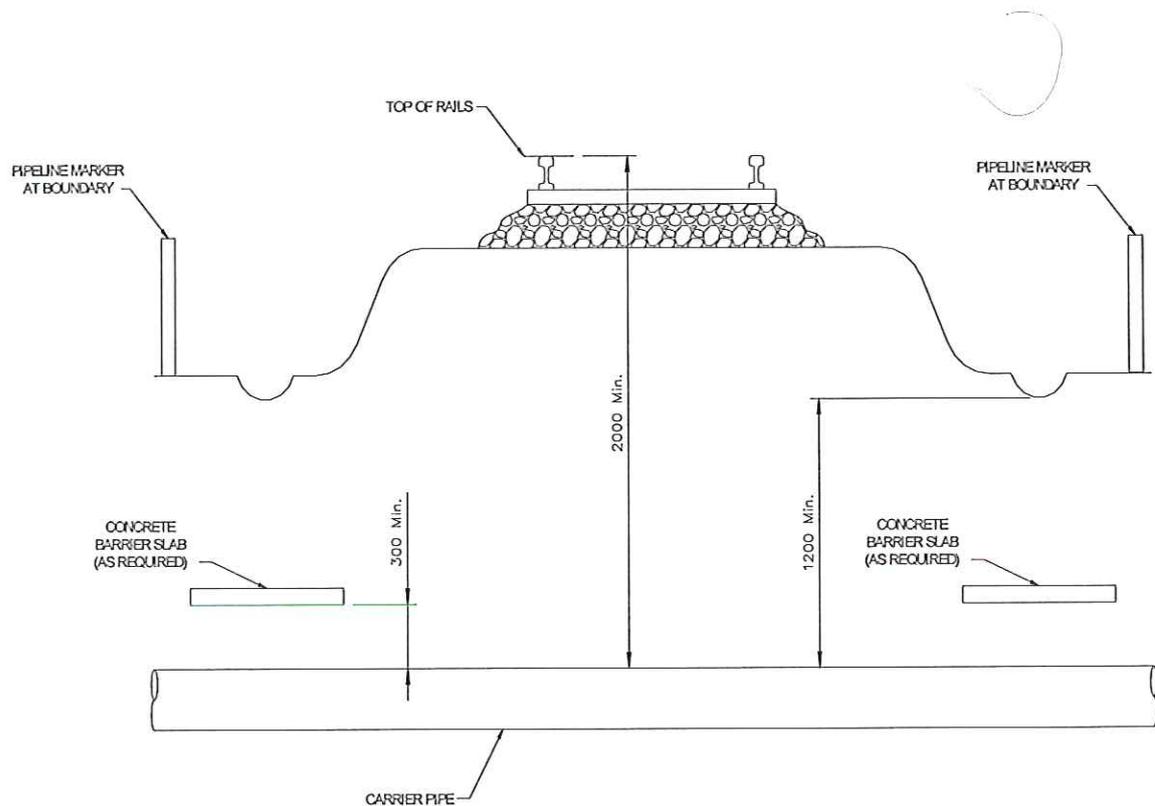
Whilst the proposed pipeline will not cross any major watercourses, it will cross intermittent streams/creeks. As outlined in Section 7.4.1 Shoalhaven Starches commit to horizontal underboring to cross all watercourses to minimise potential impacts to these watercourses and any associated infrastructure. The pipe will also be buried to a minimum depth of 2,000 mm below the creek bed.

Utilities

Dial Before You Dig has been contacted for planning purposes, and utilities that are likely to be crossed are presented in **Table 7**.

Table 7
Potential Utilities Crossed

<i>Company</i>	<i>Utility Crossed</i>	<i>Approx. Location</i>
Agility	100mm primary gas main	Fletchers Lane / Princes Hwy – could be crossed several times depending on final alignment
Alinta	18” gas main line	Bomaderry Meter Station
Integral Energy	Underground power cable	Various
Optus	Telephone cables	Various
Telstra	Telephone cables	Various



Extract from "Front End Engineering Design" by URS May 2009

COWMAN STODDART PTY LTD

ABN 29 057 616 896

Town Planning, Agricultural and
Environmental Consultants

FIGURE 7

Typical Railway Crossing

Scale NTS

Date: June 2010

3.2.4 Commissioning

Once the pipeline has been fully installed in the trench and backfilling is complete, the pipeline shall be hydrostatically tested. Upon completion of the hydrotest, it is proposed that the water be discharged into the nearby creek/watercourse. Measures should be taken to prevent this discharge causing soil erosion, sedimentation, and negative impacts to aquatic fauna.

The discharge flow rate should be controlled, and water quality should be monitored for pH, heavy metals, and total suspended solids to ensure the water meets the guidelines detailed within ANZECC 2000.

3.2.5 Project Timing

Table 8 presents a preliminary construction schedule based on discussions with construction contractors. The schedule does not account for significant weather delays and assumes geotechnical conditions of the land/soil are satisfactory for construction.

Table 8
Preliminary Construction Schedule

<i>Week Number</i>	<i>Description</i>
1-2	Mobilisation, safety inductions, third party line locates
3-7	Pipeline installation (stringing, excavating, welding, lowering in, tie-ins, backfill, hydrotest)
8-9	Right-of-way restoration, begin demobilisation
10	Demobilisation complete

3.2.6 Meter Station

Objective

A meter station is proposed to be installed at the current location of the Bomaderry lateral tie-in to the EGP, approximately 3 km north of Bomaderry. There will not be sufficient space for the meter skid inside the current fenced yard. A separate facility will need to be constructed adjacent to the existing meter station. Plan details of the meter station are included as **Annexure 6**.

Tie-In to Eastern Gas Pipeline

A tie-in to the EGP currently exists at the Bomaderry Meter Station (refer **Plate 10**). An aboveground tee and blind flange are located just downstream of the DN100 isolation valve that leads to the meter skid. The intent would be to remove the existing blind flange, install an actuated ball valve and then tie the meter skid in at this location.



Plate 10: View of location of existing tie-in to EGP (Pestells Lane)

Design Capacity

The meter station will be designed to handle the following flow rates and pressures:

- Minimum Flow: 10 TJ/day
- Maximum Flow: 25 TJ/day
- Inlet Pressure Range: 8,800 kPa – 14,985 kPa (Current MAOP of EGP)

Carbon steel piping and fittings within the meter facility will include Class 1500 flanges (with the exception of the Coriolis meter), which are suitable up to 20,685 kPa. The Coriolis meter will contain stainless steel flanges, and Class 900 stainless steel flanges are only rated to 12,410 kPa. Thus, Class 1200 flanges will be required on the Coriolis meter.

Gas Filter

A gas filter will be installed on the upstream side of the meter run. A bypass will be installed around the filter to ensure that the meter may still operate during maintenance work on the filter.

A pressure safety valve (PSV) will be located at the filter to protect against over pressure resulting from thermal expansion in the vessel as well as clogging of the filter elements. The PSV will be set at 14,985 kPa to match the current MAOP of the pipeline.

Flow Meter

The gas flow will be monitored by one meter run located downstream of the gas filter near the tie-in to the EGP. The meter run will consist of a DN80 Coriolis Flow Meter with a bypass around the meter. The bypass will typically be closed and only used when the meter is out of service but gas flow to the client facility must be maintained.

Power and Communications

Mains power is available at the Bomaderry Meter Station and 240VAC and 24VDC supplies will be utilised. A separate tariff metering box from the power authority will be installed to deliver 240VAC 50Hz single phase supply.

A Bristol RTU will be installed as part of the meter skid package. This will include 24VDC supply provided from a battery charger and batteries capable of operating the communications equipment for at least 48 hours after mains power failure. SCADA alarms will be activated should mains power be lost.

ESD (Emergency Shutdown) and Isolation

An actuated ball valve capable of isolating the meter station and pipeline from the EGP shall be installed at the inlet of the facility. The valve shall be double block and bleed design and may be closed either remotely or locally within the fenced yard (by means of and ESD button). In the event of ESD activation, the valve will lock in the closed position and will require manual intervention to be opened.

The valve actuator will have a local/remote selector switch so that the operator may operate the valve whilst on site.

Skid Size

The meter skid will occupy an area of approximately 3 metres by 10 metres. Further investigation should be completed, but it is likely that the new skid will need to be installed in an area outside the current fenced in facility at the EGP tie-in.

3.2.7 Pressure Reduction Facility

Objective

A pressure reduction facility will be located at the end of the 5.5 km pipeline lateral, opposite the Shoalhaven Starches factory on Bolong Road. The purpose of the facility is

to reduce the gas pressure from roughly 10,000 kPa to 3,500 kPa as required by Shoalhaven Starches. Plan details of the pressure reduction facility are included in **Annexure 7**.

Design Capacity

Similar to the meter station, the pressure reduction facility will be designed to accommodate the following flow rates and pressures:

- Minimum Flow: 10 TJ/day
- Maximum Flow: 25 TJ/day
- Inlet Pressure Range: 8,800 kPa – 14,985 kPa (MAOP of Eastern Gas Pipeline)
- Required Outlet Pressure (to client): 3,500 kPa

Gas Heater

As a result of the large pressure cut, a significant drop in gas temperature will occur. Thus, a gas heater will be utilised to prevent liquids from forming in the gas stream. The heater will be of water bath type and will be installed upstream of the pressure reduction skid. A temperature transmitter will be installed downstream of the pressure reduction skid and will relay temperature data to control the output of the heater.

Pressure Reduction

The pressure of the gas flow to Shoalhaven Starches will be controlled by pressure control valves (PCV). The pressure reduction skid will consist of dual runs, both capable of handling the pressure reduction requirements and maximum flow. Each run will consist of an active PCV and a monitoring PCV as well as a slam shut over pressure protection valve.

The PCVs will be designed to handle a maximum flow of 25 TJ/day and shall reduce the pressure from approximately 10,000 kPa to 3,500 kPa.

Over Pressure Protection

Protection will be supplied to ensure the pressure downstream of the pressure reduction skid does not exceed 3,500 kPa. This will be accomplished by the following methods:

1. Slam shut valves will be installed upstream of each PCV run. Pressure transmitters downstream of each meter run will relay pressure data to the facility's control panel, which in turn will activate the slam shut valves if high pressure is detected.

2. Both regulating runs will consist of an active regulator as well as a monitoring regulator.
3. A pressure relief valve will be installed downstream of the PCV runs to relieve any excess pressure build-up due to leakage through the slam shuts, thermal expansion, or gas turbine trip at the customer facility.

Skid Size and Process Schematic

The pressure reduction skid, excluding the water bath heater, will occupy an area of approximately 3 metres by 9 metres and will be elevated roughly two metres off of the ground.

3.2.8 The Existing ActewAGL Pipeline

Following the commissioning of the proposed Shoalhaven Starches gas pipeline, the existing ActewAGL pipeline that serves the site will remain in place. This pipeline will continue to service the domestic gas requirements for the urban area north of the Shoalhaven River as well as the requirements for the Shoalhaven Paper Mill.

4.0 CONSULTATION

4.1 INTRODUCTION

The stakeholder consultation adopted through the Environmental Assessment process sought to provide a structured, transparent and open communication with key stakeholders including the local community. It enabled the dissemination of information about the project; and provided an opportunity for concerns raised by government agencies and the local community to be identified early and addressed in the EA process.

4.2 PRELIMINARY ENVIRONMENTAL ASSESSMENT

A Preliminary Environmental Assessment was prepared for this proposal and was referred to the Department of Planning & Infrastructure as part of the process for formulating the Director-General's requirements (DGRs) for this project. The Department forwarded the document to relevant government agencies including the Office of the Environment & Heritage, Roads and Traffic Authority and Shoalhaven City Council seeking these agencies' requirements for the preparation of the EA. These agency requirements formed the basis for the subsequent DGRs issued by the Department.

4.3 GOVERNMENT AGENCY CONSULTATION

Relevant government agencies consulted during the EA process included:

- Department of Planning & Infrastructure (DPI);
- Office of Environment and Heritage (OEH);
- Roads and Traffic Authority;
- Office of Water
- Department of Industry & Investment
- Railcorp
- Shoalhaven City Council.

Consultation was undertaken with government agencies listed above during the preparation of this EA and associated technical reports. This included face to face meetings, telephone discussions, and written correspondence to ensure the EA and its associated technical papers addressed the requirements of the various government agencies.

Annexure 1 to the EA includes a table that outlines the Director-General's Requirements (DGRs) for the preparation of this EA and details where each of the requirements has been addressed in this EA. This annexure also includes a copy of the formal DGRs.

Annexure 2 to the EA includes a table outlining the requirements of the above Government agencies consulted and details where these requirements have been addressed in the EA. This annexure also includes copies of submissions received from these government agencies.

4.4 COMMUNITY CONSULTATION

As part of Shoalhaven Starches Application for a Pipeline Licence, advertisements were placed in major statewide newspapers, the Sydney Morning Herald and the Daily Telegraph on the 18th and 20th March 2010 respectively, detailing the proposed pipeline route options. No formal written submissions were made following the placement of these notices. One telephone enquiry was received. This telephone enquiry raised concerns with respect to impacts associated with the route option initially suggested by Shoalhaven City Council. The enquiry raised concerns shared by Shoalhaven Starches to this alternative route option. This route, following consultation and agreement with Shoalhaven City Council has not been pursued as detailed in Section 3.1.3 of this EA.

4.5 ABORIGINAL STAKEHOLDER CONSULTATION

Consultation was carried out in accordance with DECC *National Parks & Wildlife Act 1974 - Part 6 Approvals - Interim Consultation Requirements for Applicants* guidelines as part of the Aboriginal Heritage Assessment carried out by Kayandel Archaeological Services (**Annexure 9**). This report included consultation with the Nowra Local Aboriginal Land Council, Jerrinja Consultants and the Yuin traditional owners.

4.6 ENVIRONMENTAL ASSESSMENT ADEQUACY REVIEW

The Department of Planning & Infrastructure, in consultation with relevant government agencies reviewed earlier versions of this EA document. The Department have requested that the EA be revised to address issues arising from these reviews of the original EA document.

Annexure 3 to the EA includes tables that outline the issues raised by the Department of Planning & Infrastructure, as well as the other relevant government agencies and how these issues have been addressed in this revised EA. This annexure also includes copies of the submissions from the Department and the other government agencies.

5.0 STATUTORY APPROVAL CONTEXT

5.1 COMMONWEALTH LEGISLATION

5.1.1 Environment Protection & Biodiversity Conservation Act

The Commonwealth *Environmental Protection and Biodiversity Conservation Act 1999* specifies that approval is required from the Commonwealth Minister for the Environment for actions that have, will have or are likely to have a significant impact on a matter of “*national environmental significance*”, including:

- (i) declared World Heritage Areas;
- (ii) declared RAMSAR wetlands;
- (iii) listed threatened species and ecological communities;
- (iv) listed migratory species;
- (v) nuclear actions; and
- (vi) the environment of Commonwealth marine areas.

Actions on or outside Commonwealth land that have, will have or are likely to have a significant impact on the environment on or outside Commonwealth land must also be referred to the Commonwealth Minister for assessment and approval.

The Department of Environment and Heritage (2005) has published guidelines to assist in determining whether an action will have or is likely to have a significant impact on a matter of national environmental significance and, hence, whether a referral should be submitted to the Department for a decision by the Minister on whether assessment and approval is required under the EPBC Act.

A Flora and Fauna Assessment prepared by Kevin Mills & Associates (KMA) supports this EA (**Annexure 8**). This report concludes that the proposed pipeline will not have a significant impact on native flora and fauna.

Issues pertaining to the ecological impacts associated with this proposal are addressed in Section 7.6 of this EA.

5.1.2 Commonwealth Aboriginal Heritage Legislation

The *Aboriginal and Torres Strait Islander Heritage Protection Act, 1984*, provides for the protection of areas and objects which are of significance to Aboriginal people in accordance with Aboriginal tradition. The Act allows Aboriginals to apply to the Minister to seek protection for significant Aboriginal areas and objects. The Minister has broad

powers to make such a declaration should the Minister be satisfied that the area or object is a significant Aboriginal area or object and is under immediate threat of injury or desecration.

Under the Act, 'Aboriginal tradition' means:

'the body of traditions, observances, customs and beliefs of Aboriginals generally or of a particular community or group of Aboriginals, and includes such traditions, observances, customs or beliefs relating to particular persons, areas, objects or relationships' (Section 3).

A 'significant Aboriginal area' refers to:

An area of land or water in Australia being of 'particular significance to Aboriginals in accordance with Aboriginal tradition' (Section 3).

A 'significant Aboriginal object' refers to:

An object (including Aboriginal remains) of 'particular significance to Aboriginals in accordance with Aboriginal traditions' (Section 3).

For the purposes of the Act, an area or object is considered to be injured or desecrated if:

- a) *in the case of an area, it is used or treated in a manner inconsistent with Aboriginal tradition; or the use or significance of the area in accordance with Aboriginal tradition is adversely affected by reason of anything done in or near the area; or passage through or over, or entry upon the area by any person occurs in a manner inconsistent with Aboriginal tradition; and*
- b) *in the case of an object, it is used or treated in a manner inconsistent with Aboriginal tradition (Section 3).*

This EA is supported by an Aboriginal Heritage Assessment prepared by Kayandel Archaeology Services (**Annexure 9**). This assessment identifies that the lands affected by the project does not contain any heritage items registered for indigenous values under the *Aboriginal and Torres Strait Islander Heritage Protection Act 1984*, *Environmental Protection and Biodiversity Conservation Act 1999* or the *Australian Heritage Council Act 2003*.

5.2 STATE LEGISLATION

5.2.1 Environmental Planning and Assessment (EP&A) Act 1979

Objects of the EP&A Act

Section 5 of the Act outlines the objects of the Act as follows:

5 Objects

The objects of this Act are:

- (a) *to encourage:*

- (i) the proper management, development and conservation of natural and artificial resources, including agricultural land, natural areas, forests, minerals, water, cities, towns and villages for the purpose of promoting the social and economic welfare of the community and a better environment,*
- (ii) the promotion and co-ordination of the orderly and economic use and development of land,*
- (iii) the protection, provision and co-ordination of communication and utility services,*
- (iv) the provision of land for public purposes,*
- (v) the provision and co-ordination of community services and facilities, and*
- (vi) the protection of the environment, including the protection and conservation of native animals and plants, including threatened species, populations and ecological communities, and their habitats, and*
- (vii) ecologically sustainable development, and*
- (viii) the provision and maintenance of affordable housing, and*
- (b) to promote the sharing of the responsibility for environmental planning between the different levels of government in the State, and*
- (c) to provide increased opportunity for public involvement and participation in environmental planning and assessment.*

Comments

The proposal is consistent with the above objects as:

- It will provide greater competition in the gas supply market which will improve the economics and efficiency of energy supply to Shoalhaven Starches, and the broader Shoalhaven.
- It will provide a route which minimises environmental and social impacts within the broader locality.
- It will be constructed and operated in a safe, efficient and sustainable manner.
- It has been designed in accordance with relevant Australian Standards and applicable legislation and policies relevant to projects of this nature.

State Significant Development - Part 3A and the Repeal of Part 3A Environmental Planning & Assessment Act

The proposal involves a concurrent Concept Plan (MP10_0144) and Project Application (MP10_0108) made pursuant to Part 3A of the Environmental Planning & Assessment Act.

The introduction of Part 3A to the Environmental Planning & Assessment Act 1979, and the introduction of *State Environmental Planning Policy (Major Development)* in 2005, brought about a change in the regime concerning the assessment of state significant development. Part 3A initially targeted the streamlining of the assessment of projects deemed to be of state significance, including critical infrastructure projects.

Following the recent 2011 election, the newly elected Coalition Government have instigated measures seeking to implement change to the planning, environmental legislative and policy regime applicable to projects previously subject to Part 3A.

According to Planning Circular PS 11-014 issued by the Department of Planning & Infrastructure and dated 13th May 2011 no new applications for any of the development that remains identified as Part 3A in the Major Development SEPP will be accepted and assessed during this interim period.

Projects currently awaiting declaration will not be declared. Generally, applications for the assessment of these projects will be able to be lodged once the new legislation has commenced, provided the category of development is one to which the new system of state significant development applies.

The NSW Parliament has passed the *Environmental Planning & Assessment (Part 3A Repeal) Act* (the "Part 3A Repeal Act") to repeal Part 3A of the *Environmental Planning and Assessment Act 1979* (the EP&A Act). The Part 3A Repeal Act creates an alternative assessment system which allows the NSW Government to assess and determine projects which are of State significance.

The Part 3A Repeal Act establishes two separate assessment frameworks for either State Significant Infrastructure (SSI) or State Significant Development (SSD). Projects that fall under these two categories will be assessed by the Department of Planning and Infrastructure (the 'Department').

To this end, the Act largely returns to the situation before Part 3A where two separate assessment pathways were in place for projects to be assessed by the State, namely:

- Linear public infrastructure projects such as railways, water supply systems, pipelines and transmission lines, or other development by a State agency which has a significant environmental effect; and
- Significant development types which require consent such as mines, chemical and manufacturing plants, warehousing and distribution facilities, hospitals and associated ancillary development.

The Act also introduces a number of changes to the operation and make-up of the Planning Assessment Commission (PAC) and Joint Regional Planning Panels (Regional Panels), seeking to provide additional transparency and greater local government input.

Supporting Regulations and a new State Environmental Planning Policy (SEPP) associated with the Part 3A Repeal Act have been introduced and come into effect from the 1st October 2011. These supporting provisions provide additional detail with respect to the classes and thresholds for development to be considered as State Significant.

This new SEPP is called *State Environmental Planning Policy (State and Regional Development) 2011* and is known as the “State and Regional Development SEPP”. This new SEPP approximately halves the number of proposals dealt with by the State when compared with the former Part 3A system.

The *Environmental Planning and Assessment Regulation 2000* (EP&A Regulation) has also be amended to update a number of procedural and administrative arrangements.

This is an interim assessment system which will be reviewed as part of the proposed overall review of the NSW planning system that the new NSW Government has also instigated.

For the purpose of the *Environmental Planning & Assessment (Repeal of Part 3A) Act* (the ‘*Repeal of Part 3A Act*’), the proposed Gas Pipeline Project however is termed a *Transitional Part 3A Project* under the Repeal Part 3A legislation.

These circumstances are clarified in Planning Circular PS 11-021 issued by the Department of Planning & Infrastructure on the 30th September 2011. This Circular confirms that Part 3A continues to apply to certain projects subject to transitional provisions identified in Schedule 6A of the Act.

Schedule 6A of the *Repeal of Part 3A Act* makes provisions for such projects. Essentially a *Transitional Part 3A Project* includes:

- (a) *an approved project (whether approved before or after the repeal of Part 3A),*
- (b) *a project for which environmental assessment requirements were notified or adopted before the repeal of Part 3A,*
- (c) *a project that is the subject of a Part 3A project application and that the regulations declare to be a transitional Part 3A project.*

As the DGRs for this project were issued on the 8th November 2010 (**Annexure 1**) this project is considered a *Transitional 3A Project* for the purposes of this legislation.

In this regard *environmental assessment requirements* are defined for the purposes of Schedule 6A as meaning:

Environmental assessment requirements means:

- (a) *environmental assessment requirements for approval to carry out a project notified to the proponent of the project under Part 3A, or*
- (b) *environmental assessment requirements accepted by the Director-General as environmental assessment requirements for approval to carry out a project under clause 8J of the Environmental Planning and Assessment Regulation 2000, but does not include draft environmental assessment requirements for the purposes of the approval of a concept plan.*

Clause 3 of Schedule 6A provides for the continuation of Part 3A and Transitional Part 3A projects. Essentially it states that Part 3A continues to apply to and in respect of transitional Part 3A projects. Clause 3 reads:

3 Continuation of Part 3A – transitional Part 3A projects

- (1) *Part 3A continues to apply to and in respect of a transitional Part 3A project.*
- (2) *For that purpose:*
 - (a) *any State environmental planning policy or other instrument made under Part 3A, as in force on the repeal of that Part and as amended after that repeal, continues to apply to and in respect of a transitional Part 3A project, and*
 - (b) *declarations, orders, directions, determinations or other decisions with respect to a transitional Part 3A project continue to have effect and may continue to be made under Part 3A (including for the purpose of the application or continued application of Part 4 or 5 or other provisions of this Act in relation to the project).*
- (3) *The regulations may modify provisions of Part 3A (and the instruments or decisions referred to in subclause (2)) as they apply to a transitional Part 3A project.*

- (4) *The declaration of development as a project under Part 3A (or as a critical infrastructure project) is revoked if the development is not, or ceases to be, a transitional Part 3A project.*
- (5) *A transitional Part 3A project is not State significant development or State significant infrastructure.*
- (6) *This clause is subject to the other provisions of this Schedule.*

Given these circumstances Part 3A will continue to apply for the proposed Pipeline Project.

As outlined above, the environmental assessment requirements do not include those requirements for a “*concept plan*”. As outlined, this proposal includes an application for a Project as well as a Concept Plan. Clause 8 of Schedule 6A details the provisions for the continuing operation of Part 3A Concept Plan provisions for non-Part 3A transitional projects (*ie.* concept plan application). Clause 8 of Schedule 6A reads:

8 Continuing operation of Part 3A concept plan provisions for non-Part 3A transitional projects

- (1) *This clause applies to development:*
 - (a) *that was a project the subject of a Part 3A project application before the repeal of Part 3A (but not an approved project), and*
 - (b) *that is not a transitional Part 3A project to which Part 3A continues to apply, and*
 - (c) *that is not State significant infrastructure for which a concept plan has been approved under Part 3A.*

This clause applies even if the declaration of the development as a project to which Part 3A applies has been revoked.

- (2) *If the Director-General had, before the repeal of Part 3A, notified the proponent of environmental assessment requirements for an application for approval of a concept plan for development to which this clause applies, Part 3A continues to apply for the purposes only of the determination of the application (including for the purposes of the modification of any concept plan that is approved by the determination).*
- (3) *The regulations may modify provisions of Part 3A as they continue to apply for those purposes.*
- (4) *The following provisions apply to development to which this clause applies that is covered by a concept plan that is approved under Part 3A (whether before or after the repeal of Part 3A):*

- (a) *the development is take to be development that may be carried out with development consent under Part 4 (despite anything to the contrary in an environmental planning instrument),*
- (b) *any development standard that is within the terms of the approval of the concept plan has effect,*
- (c) *a consent authority must not grant consent under Part 4 for the development unless it is satisfied that the development is generally consistent with the terms of the approval of the concept plan,*
- (d) *a consent authority may grant consent under Part 4 for the development without complying with any requirement under any environmental planning instrument relating to a master plan.*
- (e) *the provisions of any environmental planning instrument or any developmental control plan do not have effect to the extent to which they are inconsistent with the terms of the approval of the concept plan,*
- (f) *an order or direction under section 75P(2) has no effect to the extent to which it is inconsistent with the terms of the approval of the concept plan.*

Having regard to Clause 8(2) above, as the Director-General has, before the repeal of Part 3A, issued environmental assessment requirements for the concept plan for this project, Part 3A will continue to apply for the purposes of the determination of this Concept Plan application component of the project.

Under these circumstances, and as confirmed in Circular PS 11-021, Part 3A continues to apply to:

- Approved projects, whether they were approved before or after 1st October 2011.
- Additionally, Part 3A continues to apply to most undetermined project and concept plan applications where the DGRs were issued before 1st October 2011 and a current major project declaration remains in force. These undetermined applications continue to be assessed and determined under Part 3A, as in force immediately before its repeal.

State Environmental Planning Policy (Major Projects) continues to support Part 3A to the Act. Schedules 1 and 2 of this SEPP outline those developments that are essentially subject to the provisions of Part 3A of the Act.

Section 75B of the EPA Act identifies those projects to which Part 3A applies:

75B(1) General

This Part applies to the carrying out of development that is declared under this section to be a project to which this Part applies:

- (a) *by a State Environmental Planning Policy ...*

Clause 6 of State Environmental Planning Policy (SEPP) (Major Projects) 2005 identifies those projects that Part 3A of the EP&A Act apply to and states:

6 Identification of Part 3A projects

- (1) *Development that, in the opinion of the Minister, is development of a kind:*

- (a) *that is described in Schedule 1 or 2, or*

Schedule 1 of the SEPP (Major Project) identifies those categories of development to which Part 3A of the EP&A Act apply and which includes 26A Pipelines which reads:

26A Pipelines

Development for the purposes of a pipeline in respect of which:

- (a) *a licence is required under the Pipelines Act 1967, or*
(b) *an application for a licence is made under that Act on or after the commencement of this clause, or*
(c) *a licence was granted under that Act before the commencement of this clause.*

Note. *The Pipelines Act 1967 enables a person to apply for and be granted a licence under that Act although a licence is not required by the Act for the pipeline concerned. Also, see Part 3 of Schedule 1 to the Pipelines Act 1967, which affects the operation of the Environmental Planning and Assessment Act 1979 with respect to pipelines.*

The proposed pipeline project is required to obtain a licence under the Pipelines Act 1967 and an application has been made under the Pipelines Act to the then Department of Industry and Investment. The gas pipeline project therefore meets the above criteria.

The Minister has declared the Shoalhaven Starches gas pipeline project a Major Project. The Director-General of Planning & Infrastructure has also issued requirements for the preparation of the EA (**Annexure 1**). The EA has been prepared in accordance with these requirements.

Relevant legislation and other approvals

Approvals under eight Acts listed under Section 75U Clause 1 of the EP&A Act are not required for developments identified as Major Projects. These Acts include:

- a) *the concurrence under Part 3 of the Coastal Protection Act 1979 of the Minister administering that Part of the Act,*
- (b) *a permit under section 201, 205 or 219 of the Fisheries Management Act 1994,*
- (c) *an approval under Part 4, or an excavation permit under section 139, of the Heritage Act 1977,*
- (d) *a permit under section 87 or a consent under section 90 of the National Parks and Wildlife Act 1974,*
- (e) *an authorisation referred to in section 12 of the Native Vegetation Act 2003 (or under any Act to be repealed by that Act) to clear native vegetation,*
- (f) *a permit under Part 3A of the Rivers and Foreshores Improvement Act 1948,*
- (g) *a bush fire safety authority under section 100B of the Rural Fires Act 1997,*
- (h) *a water use approval under section 89, a water management work approval under section 90 or an activity approval under section 91 of the Water Management Act 2000.*

Threatened Species Conservation Act and Part 3A Projects

The New South Wales *Environmental Planning and Assessment Act 1979*, as amended by the *Threatened Species Conservation Act 1995* and *Threatened Species Conservation Amendment Act 2002*, requires that various factors be taken into account in deciding whether a proposed action, development or activity is likely to have a significant effect on threatened species, populations or communities, or their habitats and, hence, whether the preparation of a Species Impact Statement (SIS) is warranted. The TSC Amendment Act also specifies that any assessment guidelines issued by the Minister for the Environment be taken into account when making an assessment of significance.

Guidelines that identify matters relevant to the assessment of potential impact on threatened species, populations or ecological communities of proposed development under Part 3A of the *Environmental Planning and Assessment Act 1979* (NSW) have been prepared by the OEI and the Department of Primary Industries (DEC July 2005).

The *Guidelines for Threatened Species Assessment* identifies the following objectives in regard to conserving threatened species, etc.:

- “1. *Maintain or improve biodiversity values (i.e. there is no net impact on threatened species or native vegetation).*
2. *Conserve biological diversity and promote ecologically sustainable development.*

3. *Protect areas of high conservation value (including areas of critical habitat).*
4. *Prevent the extinction of threatened species.*
5. *Protect the long-term viability of local populations of a species, population or ecological community.*
6. *Protect aspects of the environment that are matters of national environmental significance.”*

Note that matters of national environmental significance (NES) are those matters listed under the *Environment Protection & Biodiversity Conservation Act 1999* (Commonwealth); these matters are not listed under state legislation, although there is considerable overlap in the species and communities that are listed.

The *Guidelines* outline a broad five-step process for assessing impacts on threatened species. Note that ‘threatened species’ refers here to species, populations and communities listed as threatened under the *Threatened Species Conservation Act 1995* (NSW) or the *Fisheries Management Act 1994* (NSW).

Kevin Mills & Associates (KMA) have undertaken an ecological assessment of the pipeline route (**Annexure 8**). As this project is being assessed under Part 3A of the EP&A Act, the assessment by KMA follows the *Guidelines* where relevant.

Step 1 – Preliminary Assessment

“The main purpose of a preliminary assessment is to determine the likelihood of the study area and subject site supporting threatened species”.
(*Guidelines*, page 2)

As noted in the *Guidelines*, this step is primarily a ‘desktop’ study, using existing information, literature and data bases to identify relevant threatened species. The *Guidelines* state that the following matters should be included in the preliminary assessment:

- *a description of the location and nature of the proposed development;*
- *a description of dominant vegetation types;*
- *a description of habitat features;*
- *a list of threatened species that are known or likely to occur within the study area;*
- *an assessment of which of the threatened species that are known or likely to occur are likely to be directly or indirectly affected by the proposal provides a list of factors for consideration in identifying adverse impacts. This list is not necessarily exhaustive and is not development-specific.*

Step 2 – Field Survey and Assessment

As noted in the *Guidelines*:

“the required intensity and extent of survey will vary greatly depending upon the species likely to be present, size of the development area, the level of biological and habitat diversity on the site, and the type and complexity of vegetation on the site.” (Guidelines, page 3)

The *Guidelines* point out the need *“to ensure that a reliable assessment of the presence or absence of threatened species can be made”*. It is also noted that consideration needs to be given to the relevance of climatic or seasonal conditions for the target species.

Where relevant, the survey methods set out in the document titled *Threatened Species Survey & Assessment: Guidelines for Developments and Activities* (DECC 2004) should be followed. As noted above, the level of the survey will very much depend upon site conditions.

The outcome of Step 2 should be that adequate field surveys are undertaken for all target species identified in Step 1 such that confident statements can be made regarding the potential for the presence of the species on the subject site. In some instances, the precautionary principle should be adopted and the presence of a species assumed for the purposes of impact assessment.

Step 3 – Evaluation of Impact

This step involved identifying the potential magnitude and extent of impact, if any, the development will have on each of the target species.

The *Guidelines* suggest that:

“impacts will be more significant if:

- *areas of high conservation value are affected;*
- *individual animals and/or plants and/or subpopulations that are likely to be affected by the proposal play an important role in maintaining the long-term viability of the species, population or ecological community;*
- *habitat features that are likely to be affected by the proposal play an important role in maintaining the long-term viability of the species, population or ecological community;*
- *the duration of impacts are long-term;*
- *the impacts are permanent and irreversible.” (Guidelines, page 4)*

Step 4 – Avoid, mitigate and then offset

Where there is a potential to impact on threatened species, this should be addressed through, firstly, avoiding the impact; this may mean making some changes to the proposed development. If avoidance is not possible, then some form of mitigation may be required. Finally, if neither avoidance nor mitigation are possible, then some form of offset or compensation will be required. This could entail the rehabilitation of similar habitat nearby.

Step 5 – Key thresholds

The *Guidelines* state that:

“the development application needs to contain a justification of the preferred options based on:

- *whether or not the proposal, including actions to avoid or mitigate impacts or compensate to prevent unavoidable impacts will maintain or improve biodiversity values.*
- *whether or not the proposal is likely to reduce the long-term viability of a local population of the species, population or ecological community.*
- *whether or not the proposal is likely to accelerate the extinction of the species, population or ecological community or place it at risk of extinction.*
- *Whether or not the proposal will adversely affect critical habitat.”*
(*Guidelines*, page 4)

Appendix 3 to the *Guidelines* contains more detail for identifying potential impacts on threatened species.

The assessment process under the *TSC Act 1995* commonly known as the ‘seven part test’ is not used for Part 3A matters. The matters to be considered in the assessment of a Part 3A development are determined by the Minister for Planning for each development (ie. the Director-General’s Requirements).

A Flora and Fauna Assessment prepared by Kevin Mills & Associates (KMA) supports this EA (**Annexure 8**). This Flora and Fauna Assessment has been prepared in accordance with the above requirements. This assessment concludes that the proposed pipeline will not have a significant impact upon native flora and fauna. The assessment states:

“The proposed natural gas pipeline from Meroo Meadow to the Shoalhaven Starches Factor in Bolong Road, Bomaderry will not have a significant impact upon native flora and fauna. There are no areas of high biodiversity value on the route or immediately adjacent to the route. The proposal is not likely to have an adverse impact on species, populations and ecological

communities listed under the New South Wales Threatened Species Conservation 1995; no threatened species, populations or ecological communities are known or likely to occur on the pipeline route. Nor was any regionally significant vegetation, habitat or species located along the route of the pipeline.”

Issues pertaining to the ecological impacts associated with this proposal are addressed in Section 7.6 of this EA.

5.2.2 Protection of the Environment Operations Act

The existing Shoalhaven Starches factory operation has an Environmental Protection Licence (EPL) under the Protection of the Environment Operations Act 1997 (POEO Act) (EPL No. 883). The licence imposes requirements in terms of:

- discharges to air, water and land;
- irrigation controls;
- management of irrigation;
- maintenance of irrigation reticulation;
- odour control.

Schedule 1 of the POEO legislation does not require pipelines to be licensed.

5.2.3 Water Management Act 2000

The *Water Management Act 2000 (WMA)* brought into effect in February 2008 the provision for controlled activities for certain types of developments and activities carried out in or near a river, lake or estuary. The purpose of *WMA 2000* is to provide sustainable, integrated and comprehensive management of NSW State waters and a guide for water management activities (DNR, 2008).

The NSW Office of Water (OOW) administers the *WMA 2000* and has developed guidelines to assist applicants considering carrying out a controlled activity on waterfront land. The guidelines provide information on the design and construction of controlled activities and other mechanisms for the protection of waterfront land, including:

- in-stream works;
- laying pipes and cables in watercourses;
- outlet structures;
- riparian corridors;
- Vegetation Management Plans;
- watercourse crossings.

Given the provisions of Section 75U of the EP&A Act (as outlined in Section 5.2.1 of this EA) as the proposal constitutes a Major Project the need to obtain a controlled activity approval pursuant to Section 91 of this Act is not required.

5.2.4 Native Vegetation Act 2003

The objectives of the Native Vegetation Conservation Act essentially relate to the conservation and management of native vegetation. The definition of “native vegetation” under the Act is quite broad, it includes; trees, understorey plants, groundcovers and plants occurring in a wetland. Under the provisions of Section 12 of the Act, the clearing of native vegetation (except under certain exemption and exclusion circumstances) requires to obtain an approval under this legislation from the relevant Catchment Management Authority.

Pursuant to Section 5 of this Act certain land is excluded from the provisions of this legislation including land within a zone designated “residential” (but not “rural-residential”), “village”, “township”, “industrial” or “business” under an environmental planning instrument.

Furthermore pursuant to Section 75U(e) of the EP&A Act, an approval under Section 12 of this Act is not required to be obtained for a project affected by Part 3A of the EP&A Act.

Under these circumstances this legislation does not apply to this proposal.

5.2.5 The Roads Act 1993

Section 138 of the Roads Act deals with works and structures within road reserves and states:

138 Works and structures

(1) *A person must not:*

- (a) *erect a structure or carry out a work in, on or over a public road, or*
 - (b) *dig up or disturb the surface of a public road, or*
 - (c) *remove or interfere with a structure, work or tree on a public road, or*
 - (d) *pump water into a public road from any land adjoining the road, or*
 - (e) *connect a road (whether public or private) to a classified road,*
- otherwise than with the consent of the appropriate roads authority.*

Maximum penalty: 10 penalty units.

- (2) *A consent may not be given with respect to a classified road except with the concurrence of the RTA.*
- (3) *If the applicant is a public authority, the roads authority and, in the case of a classified road, the RTA must consult with the applicant before deciding whether or not to grant consent or concurrence.*
- (4) *This section applies to a roads authority and to any employee of a roads authority in the same way as it applies to any other person.*
- (5) *This section applies despite the provisions of any other Act or law to the contrary, but does not apply to anything done under the provisions of the Pipelines Act 1967 or under any other provision of an Act that expressly excludes the operation of this section.*

The proposal involves the excavation of trenches along; and underboring below; public roads as well as the Princes Highway. As the works will be undertaken pursuant to the Pipelines Act 1967, the provisions of Section 138 will not apply to this proposal pursuant to S.138(5) outlined above.

5.2.6 National Parks and Wildlife Act 1975

The *National Parks and Wildlife Act 1974* (as amended) provides the primary basis for the legal protection and management of Aboriginal heritage sites within NSW. Implementation of the Aboriginal heritage provisions of this Act is the responsibility of the OEH. The rationale behind the Act is to prevent unnecessary or unwarranted destruction of Aboriginal objects and to protect and conserve objects where such action is considered warranted.

With the exception of some artefacts in collections, the Act generally defines all Aboriginal objects to be the property of the Crown. The Act then provides various controls for the protection, management and destruction of these objects. An 'Aboriginal object' is defined as

'any deposit, object or material evidence (not being a handicraft made for sale) relating to the Aboriginal habitation of the area that comprises New South Wales, being habitation before or concurrent with (or both) the occupation of that area by persons of non-Aboriginal extraction, and includes Aboriginal remains' [Section 5(1)].'

Under the terms of the *National Parks and Wildlife Act 1974*, it is an offence for a person to:

- Knowingly destroy, damage or deface an Aboriginal object or place, or knowingly cause or permit the destruction, defacement or damage to an Aboriginal object or place, without first obtaining the consent of the OEH;

- Disturb or excavate any land, or cause any land to be disturbed or excavated, for the purpose of discovering an object, without first obtaining the consent of the OEH; and
- Collect on any land an object that is the property of the Crown, other than an object under the control of the Australian Museum, without obtaining appropriate authorisation from the Director-General of DECC.

Under the *National Parks and Wildlife Act 1974*, 'Aboriginal areas' may also be declared over private land, where Aboriginal objects or places are located, with the consent of the owner or occupier. The purpose of reserving land as an 'Aboriginal area' is to identify, protect and conserve areas associated with a person, event or historical theme, or containing a building, place, object, feature or landscape of natural or cultural significance to Aboriginal people, or of importance in improving public understanding of Aboriginal culture and its development and transitions (Section 30K).

Under Section 91AA of the Act, if the Director-General is of the opinion that any action is being, or is about to be carried out that is likely to significantly affect an Aboriginal object or Aboriginal place or any other item of cultural heritage situated on land reserved under the Act, the Director-General may make a stop-work order for a period of 40 days.

Under amendments to the *Environmental Planning and Assessment Act 1979* (EP&A Act) as part of the introduction of Part 3A, subsequent to approval being granted, Section 90 Consent to impact Aboriginal objects or a Section 87 Permit under the *National Parks and Wildlife Act 1974* may not be required. *In lieu* however, a Part 3A application involving a Statement of Commitments outlining proposed heritage management and mitigation measures must be approved. Also, under more recent Part 3A Major Project amendments (Section 75U(4)), a Section 87 Permit may not be required for investigation of artefact deposits where the investigation is being undertaken for the purpose of complying with an environmental assessment requirements issued in connection with an application for approval to carry out a project or for a concept plan for a project.

This EA is supported by an Aboriginal heritage archaeological assessment carried out by Kayandel Archaeological Services (**Annexure 9**). Aboriginal heritage is addressed further in Section 7.7 of this EA.

5.2.7 Rural Fires Act

Under the provisions of section 100b of the rural fires act, 1997, authorisation is required with respect of the bushfire safety of subdivision of land that could lawfully be used for residential or rural residential purposes or development of land for special fire protection

purposes that are to be situated on bushfire prone land. The proposed pipeline route follows farmland and is not mapped as bushfire prone by mapping prepared by Shoalhaven City Council (refer **Figure 15**).

5.2.8 Contaminated Land Management Act 1997

This legislation relates to the investigation and remediation of contaminated land. It sets out the powers of the new Office of Environment and Heritage, and provisions relating to the investigation and remediation of contaminated land. This issue will be dealt with in Section 7.10 of this EA.

5.2.9 Fisheries Management Act 1994

Under the provisions of Section 200 of this Act:

“200(1) a local government authority must not carry out dredging or reclamation work in any waters except under the authority of a permit issued by the Minister.

Maximum penalty: 500 penalty points

(2) This section does not apply to:

(a) work authorised under the Crown Lands Act, 1989; or

(b) a work authorised by a relevant public authority (other than a local government authority).

(3) This section has effect irrespective of any other Act to the contrary.”

For the purposes of this legislation dredging means (Section 198A):

“(a) any work that involves excavation within water, land, or

(b) any work that involves the removal of material from water or land that is prescribed by the regulations as being dredging work to which this Division applies.”

Clearly if the project is authorised under the Crown Lands Act; and or is subject to authorisation from a public authority; an authority under this legislation is not required.

Section 205 of the FM Act requires that:

“A person must not harm any such marine vegetation in a protected area, except under the authority of a permit issued by the Minister under this Part”.

Section 4 of the FM Act contains the definitions and includes a definition of marine vegetation as

“any species of plant that at any time in its life must inhabit water (other than fresh water)”.

If the proposal involves disturbance or “harm” to marine vegetation, and authority would be required under this legislation.

Pursuant to the provisions of Section 75U of the Environmental Planning & Assessment Act the provisions of Section 200 and 205 of this legislation will not apply to this Major Project.

5.2.10 Pipelines Act 1967

Pursuant to Section 11 of the Pipelines Act a person shall not without a licence under this legislation:

- Commence, or continue, the construction of a pipeline, or
- Alter or reconstruct a pipeline,
- Operate a pipeline.

The construction of the proposed gas pipeline will therefore require to obtain a licence under this legislation.

A licence application has been submitted to the then Department of Industry & Investment by Shoalhaven Starches for the proposed gas pipeline.

5.2.11 Other NSW Legislation

A range of other legislation, both State and Commonwealth, may apply to the pipeline route. Comments on relevance of each Act are also included.

<i>Legislation</i>	<i>Application</i>	<i>Relevance to Project</i>
NSW		
Environmentally Hazardous Chemicals Act 1985	Licences use or disposal of environmentally hazardous chemicals or declared chemical waste.	License if required will be sought prior to construction.
Heritage Act 1977	Protects non-indigenous heritage of state significance.	The route avoids known items of significant cultural heritage.
Noxious Weeds Act	Minimise risk of spread and control of noxious weeds.	Weed control measures will be required to be put in place during construction.
Occupational Health & Safety Act 2000	Promotes and regulates the health, safety and welfare of workers.	OH&S will be incorporated into project planning and the construction phase.
Pesticides Act 1999	Controls and regulates pesticides.	Pesticide use, if required, will be required to be carried out in accordance with relevant regulations during construction and operations.

Legislation	Application	Relevance to Project
Soil Conservation Act 1938	Provides for the conservation of soil resources and farm water resources and for the mitigation of erosion.	Erosion and sedimentation control will be incorporated into construction works.
Waste Avoidance and Resource Recovery Act 2001	Promotes waste avoidance and recovery	Waste will be managed in accordance with NSW Waste Avoidance and Resource Recovery Strategy 2007.
Water Act 1912	License and permits use of water. Regulates water pollution.	Water supply requirements for the proposed pipeline will involve: <ul style="list-style-type: none"> • Hydrotesting pipeline following construction (120 kL). • Potential dust suppression and miscellaneous construction use (800 kL – dependent upon weather conditions during construction (20 kL road tanker)). It is envisaged that the treated water from the existing factory operations will be used for the above purposes. There will be no requirement to extract water or groundwater along the pipeline route for these purposes. Under these circumstances a licence under this legislation will not be required.
Wilderness Act 1987	Protection and management of nominated wilderness areas.	No declared wilderness areas will be affected by this pipeline route.

5.3 STATE POLICIES

5.3.1 State Environmental Planning Policies (SEPPs)

The following SEPPs are likely to be relevant to this project:

SEPP 14 – Coastal Wetlands

The aim of SEPP 14 is to ensure that the coastal wetlands are preserved and protected in the environmental and economic interests of the State.

The aim of this policy is to “*ensure that coastal wetlands are preserved and protected in the environmental and economic interest of the state*”.

In respect of land to which this policy applies, development consent is required to:

- (a) *clear that land;*
- (b) *construct a levee on that land;*
- (c) *drain that land; or*
- (d) *fill that land.*

No SEPP 14 wetlands are located within the vicinity of the proposed pipeline route following a review of mapping that supports the SEPP. The closest SEPP 14 wetlands to the pipeline route are shown in **Figure 13**.

SEPP 44 – Koala Habitat Protection

SEPP 44 encourages the conservation and management of natural vegetation that provides habitat for koalas to ensure permanent free living populations will be maintained over their present range. The policy applies to the local government area of the Shoalhaven.

A consent authority is required to determine whether an area affected by a proposed development is a core koala habitat.

The Flora and Fauna Assessment prepared by KMA (**Annexure 8**) has not identified any ecological constraints to the proposed pipeline.

SEPP 55 – Remediation of Land

SEPP 55 introduces state-wide planning controls for the remediation of contamination land. The policy states that land must not be developed if it is unsuitable for a proposed use due to it being contaminated. If land is found to be unsuitable, remediation must occur before the land is developed.

The presence (or otherwise) of contamination has been investigated in the EA by Coffey Environments (**Annexure 10a**). This is further addressed in Section 7.10 of this EA.

SEPP 71 – Coastal Protection

On the 1st November 2002 the State Government gazetted SEPP No. 71. This policy

- *“identifies State significant development in the coastal zone, and*
- *requires development applications to carry out development in sensitive coastal locations to be referred to the Director-General for comment, and*
- *identifies master plan requirements for certain development in the coastal zone.”*

The coastal zone has the same meaning as in the Coastal Protection Act 1979. This Act essentially maps the area of land and waters that lie to the west of coastal waters. From

a perusal of this mapping it is evident that the coastal zone covers a portion of the southern area affected by the pipeline route.

Under these circumstances, sections of the proposed gas pipeline project would be situated within the coastal zone.

The proposal is consistent with the objectives of the Policy and the matters for consideration, as detailed in clause 8 of the Policy for the following reasons:

- The proposal does not affect or impinge on public access to or along the coastal foreshore.
- The proposed works are situated within urban and rural areas and generally follow road reserves within which infrastructure already exists. It is therefore considered to be suitable development given its type, location and design.
- The development will not result in any additional overshadowing of foreshore areas compared to that which currently occurs. The proposed works will be largely situated below ground level.
- The scenic qualities of the area will not diminish.
- The proposal will not lead to adverse impacts on threatened fauna and flora (refer Section 7.6 of this EA).
- The proposal does not propose any structures that are likely to impact on fish, marine vegetation or their habitats.
- The site is not identified as a wildlife corridor.
- It is considered that the proposal will not lead to conflict between land based and water based coastal activities.
- It is not anticipated that the proposal will impact on Aboriginal heritage (refer Section 7.7 of this EA).

In terms of the provisions of Part 4 of the SEPP (clauses 13 – 16) the following comments are made:

- The proposed development will not impede or diminish public access to coastal foreshore areas.
- The proposal includes a comprehensive Erosion and Sediment Control Plan.
- The development will not impact upon local stormwater quality (refer Section 7.4.1 of this EA).

The development is also not subject to the provisions of Part 5 (Master Plans) of the SEPP as the proposal does not seek to subdivide land.

SEPP (State and Regional Development) 2011

As outlined in Section 5.2.1 above the NSW Government has introduced from the 1st October 2011 a new regime for assessing and determining state significant development. Included within this new regime was the introduction of SEPP (State and Regional Development) 2011 or the State and Regional Development SEPP.

The aims of this SEPP are:

- a) *To identify development that is State significant development,*
- b) *To identify development that is State significant infrastructure and critical State significant infrastructure,*
- c) *To confer functions on joint regional planning panels to determine development applications.*

Clause 24 of this SEPP provides transitional provisions for “*certain other existing development applications*”. This clause reads:

24 Transitional Provisions – certain other existing development applications

- (1) *The minister continues to be the consent authority for a development application for development referred to in Schedule 6 to State Environmental Planning Policy (Major Development) 2005 (as in force immediately before the amendment of that Schedule by this Policy) if the development application was made, but not determined by the Minister, before the commencement of this Policy.*
- (2) *Part 4 of this Policy does not apply to development included in clause 10 of Schedule 4A to the Act if it is subject of a development application made before the commencement of this Policy.*
- (3) *This clause is subject to Schedule 6A to the Act.*

As outlined in Section 5.2.1 of this EA, the proposed gas pipeline project is subject to the provisions of Schedule 6A of the *Part 3A Repeal Act*, and is therefore considered a *Transitional Part 3A Project* for the provisions of this legislation. Under these circumstances the provisions of Part 3A of the EP & A Act will continue to apply to this project; and therefore the terms of this SEPP will not apply to this project.

SEPP (Major Projects) 2005

The aims of this Policy are as follows:

- (a) *to identify development to which the development assessment and approval process under Part 3A of the Act applies;*

- (b) *to identify any such development that is a critical infrastructure project for the purposes of Part 3A of the Act;*
- (c) *to facilitate the development, redevelopment or protection of important urban, coastal and regional sites of economic, environmental or social significance to the State so as to facilitate the orderly use, development or conservation of those State significant sites for the benefit of the State;*
- (d) *to facilitate service delivery outcomes for a range of public services and to provide for the development of major sites for a public purpose or redevelopment of major sites no longer appropriate or suitable for public purposes;*
- (e) *to rationalise and clarify the provisions making the Minister the approval authority for development and sites of State significance, and to keep those provisions under review so that the approval process is devolved to Councils when State planning objectives have been achieved.*

This SEPP is addressed in Section 5.2.1 of this report. Essentially the Minister has declared that this project is a Major Project pursuant to the provisions of Part 3A of the EP&A Act and SEPP (Major Projects) 2005. The provisions of this policy therefore continue to apply to this project notwithstanding the repeal of Part 3A of the Environmental Planning & Assessment Act and the introduction of the State and Regional Development SEPP on the 1st October 2011.

SEPP (Infrastructure) 2007

SEPP (Infrastructure) was made by the NSW Government on the 21st December 2007. The stated aims of the SEPP are to facilitate the effective delivery of infrastructure across the State by:

- (a) *improving regulatory certainty and efficiency through a consistent planning regime for infrastructure and the provision of services, and*
- (b) *providing greater flexibility in the location of infrastructure and service facilities, and*
- (c) *allowing for the efficient development, redevelopment or disposal of surplus government owned land, and*
- (d) *identifying the environmental assessment category into which different types of infrastructure and services development fall (including identifying certain development of minimal environmental impact as exempt development), and*
- (e) *identifying matters to be considered in the assessment of development adjacent to particular types of infrastructure development, and*
- (f) *providing for consultation with relevant public authorities about certain development during the assessment process or prior to development commencing.*

SEPP Infrastructure seeks to facilitate the effective delivery of infrastructure across the State. The SEPP supports the flexibility in the location of infrastructure and service facilities along with improved regulatory certainty and efficiency.

Clause 53 of this SEPP outlines where consent is required for the purpose of pipelines and stipulates:

53 Development permitted without consent

- (1) *Development for the purpose of a pipeline may be carried out by any person without consent on any land if the pipeline is subject to a licence under the Pipelines Act 1967 or a licence or authorisation under the Gas Supply Act 1996.*
- (2) *Development for the purpose of a gas pipeline may be carried out by or on behalf of a public authority without consent on any land.*
- (3) *However, subclauses (1) and (2) apply with respect to land in Zone E1 National Parks and Nature Reserves or an equivalent land use zone only if the development:*
 - (a) *is authorised by or under the National Parks and Wildlife Act 1974, or*
 - (b) *is, or is the subject of, an existing interest within the meaning of section 39 of that Act, or*
 - (c) *is carried out on land to which that Act applies over which an easement has been granted and is not contrary to the terms or nature of the easement.*
- (4) *In this clause, a reference to development for the purpose of a pipeline includes a reference to development for any of the following purposes if the development is in connection with a pipeline:*
 - (a) *construction works,*
 - (b) *emergency works or routine maintenance works.*

Pipelines are outlined as permissible without consent, pursuant to clause 53 of SEPP Infrastructure if the pipeline is subject to a licence under the Pipelines Act 1967. A licence is required to be obtained for the proposed pipeline project and an application has been made for a licence under the Pipelines Act 1967 for this pipeline – however as of yet a licence has not yet been granted for this pipeline under this legislation. Additionally, the proposal is a project to which SEPP Major Projects applies (as outlined above) therefore approval under Part 3A is required.

Division 17 of the SEPP relates to Roads and Traffic Clause 101 of the SEPP reads:

101 Development with frontage to classified road

- (1) *The objectives of this clause are:*

- (a) *to ensure that new development does not compromise the effective and ongoing operation and function of classified roads, and*
- (b) *to prevent or reduce the potential impact of traffic noise and vehicle emission on development adjacent to classified roads.*
- (2) *The consent authority must not grant consent to development on land that has a frontage to a classified road unless it is satisfied that:*
 - (a) *where practicable, vehicular access to the land is provided by a road other than the classified road, and*
 - (b) *the safety, efficiency and ongoing operation of the classified road will not be adversely affected by the development as a result of:*
 - (i) *the design of the vehicular access to the land, or*
 - (ii) *the emission of smoke or dust from the development, or*
 - (iii) *the nature, volume or frequency of vehicles using the classified road to gain access to the land, and*
 - (c) *the development is of a type that is not sensitive to traffic noise or vehicle emissions, or is appropriately located and designed, or includes measures, to ameliorate potential traffic noise or vehicle emissions within the site of the development arising from the adjacent classified road.*

Clause 104 of the SEPP reads:

“104 Traffic-generating development

- (1) *This clause applies to development specified in Column of Table to Schedule 3 that involves:*
 - (a) *new premises of the relevant size or capacity, or*
 - (b) *an enlargement or extension of existing premises, being an alteration or addition of the relevant size or capacity.*
- (2) *In this clause, “relevant size or capacity” means:*
 - (a) *in relation to development on a site that has direct vehicular or pedestrian access to any road – the size or capacity specified opposite that development in Column 2 of the Table to Schedule 3, or*
 - (b) *in relation to development on a site that has direct vehicular or pedestrian access to a classified road or to a road that connects to a classified road where the access (measured along the alignment of the connecting road) is within 90 m of the connection – the size or capacity specified opposite that development in Column 3 of the Table to Schedule 3.*
- (3) *Before determining a development application for development to which this clause applies, the consent authority must:*

- (a) *give written notice of the application to the RTA within 7 days after the application is made, and*
- (b) *take into consideration:*
 - (i) *any submission that the RTA provides in response to that notice within 21 days after the notice was given (unless, before the 21 days have passed, the RTA advises that it will not be making a submission), and*
 - (ii) *the accessibility of the site concerned, including:*
 - (A) *the efficiency of movement of people and freight to and from the site and the extent of multi-purpose trips, and*
 - (B) *the potential to minimise the need for travel by car and to maximise movement of freight in containers or bulk freight by rail, and*
 - (iii) *any potential traffic safety, road congestion or parking implications of the development.*
- (4) *The consent authority must give the RTA a copy of the determination of the application within 7 days after the determination is made."*

Annexure 11 to this EA is a Traffic Assessment prepared by Stapleton Transportation & Planning. Traffic issues are further addressed in Section 7.8 of this EA.

SEPP (Rural Lands) 2008

SEPP Rural Lands aims to facilitate the orderly and economic use and development of rural lands for rural and related purposes. The policy applies to the Shoalhaven.

The aims of this SEPP include:

- (a) *to facilitate the orderly and economic use and development of rural lands for rural and related purposes,*
- (b) *to identify the Rural Planning Principles and the Rural Subdivision Principles so as to assist in the proper management, development and protection of rural lands for the purpose of promoting the social, economic and environmental welfare of the State,*
- (c) *to implement measures designed to reduce land use conflicts,*
- (d) *to identify State significant agricultural land for the purpose of ensuring the ongoing viability of agriculture on that land, having regard to social, economic and environmental considerations,*
- (e) *to amend provisions of other environmental planning instruments relating to concessional lots in rural subdivisions.*

The SEPP mainly concerns development application associated with rural dwellings and subdivision. The SEPP does not raise any specific issues that would be directly relevant to this pipeline project.

5.3.2 Other State Policies

5.3.2.1 The NSW State Plan

The NSW State Plan is the NSW Government's long term plan to deliver services to the people of NSW. It sets targets for service improvement across the public sector and provides a means of how the Government performs in achieving these targets.

In 2009 the NSW Government consulted with the community, business, local government and stakeholder groups. More than 3,500 groups and individuals provided their views and local knowledge to assist the Government in developing the State Plan and to make sure it reflects the needs and vision of the NSW people.

According to the NSW Government the State Plan is the community's vision for the future of NSW.

One of the stated 'visions' is to make NSW the '*Green State*'. This vision includes priorities and targets including the development of a clean energy future for NSW.

The State Plan includes a Clear Energy Strategy which in part focuses on:

- *Lower Carbon Transition Fuels, including supporting natural gas supply and pipeline projects across NSW.*

Clearly this project is consistent with this component of the strategy.

The State Plan also includes a 'Vision' of '*Supporting Business and Jobs*'. Priorities and targets of the plan with respect to the 'vision' include:

- Increasing business investment and supporting jobs; and
- Driving innovation to grow productivity.

Clearly this project is consistent with the thrust of these objectives as the proposal seeks to ensure a competitively sourced supply of Natural Gas which will improve the international competitiveness of the Shoalhaven Starches factory. This is essential for the long term viability of the plant and will assist with securing existing employment in this regional area. Maintaining international competitiveness will also ensure ongoing capital investment and associated employment opportunities on the site in the future.

Plans have also been prepared for each region in NSW, responding to the local priorities raised during the community consultations. The Shoalhaven is located within the area affected by the Illawarra Local Action Plan (LAP). The priorities for the Illawarra LAP include:

- *Supporting jobs (especially for young people).*

- *Providing more flexible and safe public transport system.*
- *Improving mental health services and health services for the elderly.*
- *Increase social housing opportunities.*

According to the Illawarra LAP in order to support business and jobs in the Illawarra, the NSW Government has developed the Illawarra Regional Business Growth plan which focuses on:

- *Promoting employment lands by improving access and services.*
- *Assisting manufacturing sector to increase their global competitiveness through innovation.*
- *Attracting skills to the region and retraining the existing workforce.*
- *Increasing local tourism including promotion of the Sea Cliff Bridge and the coastal Grand Pacific Drive.*

The proposal would be consistent with the first two priorities. The proposal seeks to provide competitively sourced supplies of natural gas to significantly improve the international competitiveness of the operations of the Company. This is essential for the long term viability of the plant and hence assists with securing existing jobs on site. Maintaining international competitiveness will also ensure continued ongoing further capital investment and associated employment opportunities on the site into the future.

5.3.2.2 NSW Coastal Policy

The NSW Coastal Policy applies:

- three nautical miles seaward of the mainland and offshore islands;
- one kilometre landward of the open coast high water mark;
- a distance of one kilometre around:
 - ⇒ all bays, estuaries, coastal lakes, lagoons and islands;
 - ⇒ tidal waters of coastal rivers to the limit of mangroves, as defined by NSW Fisheries (1985) maps or the tidal limit whichever is closer to the sea.

The subject site is partly identified by mapping supporting the NSW Coastal Policy as being affected by the provisions of the Policy. The provisions of this policy will need to be assessed in detail with respect to the proposed pipeline route. **Annexure 12** includes an analysis of the proposal in relation to this Policy.

5.3.2.3 Guidelines for Laying Proposed Cables in Watercourses

The laying of pipes across a watercourse would normally trigger the controlled activity provision of the Water Management Act (WMA). The NSW Office of Water administers the WMA, and is required to assess the impact of any proposed controlled activity to ensure that no more than minimal harm will be done to waterfront land as a consequence of carrying out the activity.

As outlined in Section 5.2 of this EA, the proposal, as a 'Major Project', is not a controlled activity proposal for the purposes of this legislation.

The Office of Water have formulated guidelines for the laying of pipes and cables within watercourses. These guidelines outline the following principles:

- *Identify the width of the riparian corridor in accordance with the NSW Office of Water's Guidelines for riparian corridors.*
- *Consider the full width of the riparian corridor and its functions in the location and installation of any pipes and cables. Where possible, the design should accommodate fully structured native vegetation.*
- *Minimise the design and construction footprint and proposed extent of disturbance to soil and vegetation within the watercourse or waterfront land.*
- *Utilise existing easements. Pipes and cables should be incorporated within existing cleared or disturbed areas with (or adjacent to) other crossing points such as roads, particularly if future maintenance and on-going access is required.*
- *Maintain existing or natural hydraulic, hydrologic, geomorphic and ecological functions of the watercourse. Demonstrate that the pipe and cable installations will not have a detrimental impact on these functions.*
- *Identify alternative options for works and detail the reasons for selecting the preferred option/s.*

Directional boring under a watercourse is preferred to trenching through a watercourse.

- *Proposals for directional boring should seek to:*
 - *minimise or avoid disturbance to channel bed and banks*
 - *minimise or avoid rehabilitation, maintenance and on-going costs after construction*
 - *minimise risks associated with cave-ins, bed collapse or frac-outs during boring*
 - *ensure depth does not result in exposure of assets if channel experiences bed or bank degradation*
 - *locate bore entry and exit points outside riparian corridors and existing vegetation*

- *address the recovery and removal of construction plant and materials, including drilling mud.*
- *Proposals for trenching should:*
 - *prepare rehabilitation plans for disturbed beds and banks*
 - *locate (lay) pipes and cables across the watercourse on the downstream side of channel bedrock outcrops (through the drop deposit zone if a plunge pool is present)*
 - *avoid outside bends – choose a straight section of the watercourse to cross*
 - *place infrastructure below calculated bankfull flow scour depths and allow a safety margin*
 - *avoid concrete caps and casings at shallow depths which may become exposed by bed lowering*
 - *ensure backfilling restores the channel shape and bed level to preconstruction condition*
 - *ensure trench is open for minimal length of time*
 - *avoid ‘stopping’ the flow of a permanent watercourse by staging the trench across the channel or minimise the time involved in stopping or intercepting flows*
 - *address additional disturbances from temporary coffer dams or diversion of flows around work site, vehicle and machinery access and crossings, material stockpiles, etc*
 - *prevent potential water quality issues (turbidity, spills)*
 - *address the recovery and removal of construction plant and materials.*

These matters are further addressed in Section 7.4.1 of this EA.

5.4 REGIONAL PLANNING STRATEGIES AND ENVIRONMENTAL PLANS (DEEMED SEPPS)

5.4.1 South Coast Regional Strategy

The primary purpose of the South Coast Regional Strategy (SCRS) is to ensure that adequate land is available and appropriately located to sustainably accommodate projected housing and employment needs for the South Coast Region for the next 25 years.

In summary the aims of the strategy include:

- *Protect high value environments including pristine coastal lakes, estuaries, aquifers, threatened species, vegetation communities and habitat corridors by ensuring that no new urban development occurs in these important areas and their catchments.*

- *Cater for a housing demand of up to 45,600 new dwellings by 2031 to accommodate the additional 60,000 people expected in the Region over the next 25 years.*
- *Increase the amount of housing in existing centres to ensure the needs of future households are better met, in particular the needs of smaller households and an ageing population.*
- *Prioritise and manage the release of future urban lands to ensure that new development occurs in and around existing well serviced centres and towns.*
- *Use the recommendations of the Sensitive Urban Lands Panel to guide the finalisation of the development form and environmental management of the 17 'sensitive urban lands'.*
- *Manage the environmental impact of settlement by focusing new urban development in existing identified growth areas such as Nowra-Bomaderry, Milton-Ulladulla, Batemans Bay and Bega.*
- *Only consider additional development sites if it can be demonstrated that they satisfy the Sustainability Criteria (Appendix 1).*
- *No new towns or villages will be supported unless compelling reasons are presented and they can satisfy the Sustainability Criteria.*
- *No new rural residential zones will be supported unless as part of an agreed structure plan or settlement strategy.*
- *Ensure an adequate supply of land to support economic growth and provide capacity to accommodate a projected 25,800 new jobs, particularly in the areas of finance, administration, business services, health, aged care and tourism.*
- *Limit development in places constrained by coastal processes, flooding, wetlands, important primary industry resources and significant scenic and cultural landscapes.*
- *Protect the cultural and Aboriginal heritage values and visual character of rural and coastal towns and villages and surrounding landscapes.*

Where development or rezoning increases the need for State infrastructure, the Minister for Planning may require a contribution to the provision of such infrastructure, having regard to the State Infrastructure Strategy and equity considerations.

According to the Regional Strategy an additional 26,500 dwellings will be required within the Shoalhaven over the next 25 years, of which approximately 15,800 can potentially be accommodated within existing urban land.

The Regional Strategy addresses water, energy and waste resources. The Strategy acknowledges the importance of access to energy and water infrastructure in supporting settlement and employment within the Region. Apart from this however the strategy has little direct relevance to this pipeline proposal.

5.4.2 Illawarra Region Environmental Plan

The Illawarra Regional Environmental Plan (IREP) 1 applies to the land through which the pipeline route is located. The IREP 1 provides a framework for local area planning within the Illawarra Region.

A series of maps are attached to the Plan which identify localities where specific policy issues apply. In relation to the subject land, the site is:

- NOT identified as a wildlife corridor;
- NOT identified as containing rainforest vegetation;
- identified as land with prime crop and pasture potential;
- identified as land with landscape or environmental attributes.

There are no provisions within IREP 1 that would apply to this project as it relates to prime crop and pasture land.

There are no other specific provisions within the regional plan that apply to land with Landscape and Environmental Attributes. The plan is supported by The Illawarra Regional Landscape and Environment Study that provides specific recommendations for broad areas along the south coast, including the land associated with this project. In terms of the area within which the subject site is located, this Study identifies the area as Illf Priority protection. The recommendation for this area under the study is:

“Prime crop and pasture land. Zoning should ensure agronomic and pastoral based enterprises only.”

The route of the proposed pipeline follows existing road reserves and will therefore have minimal impacts on agricultural land.

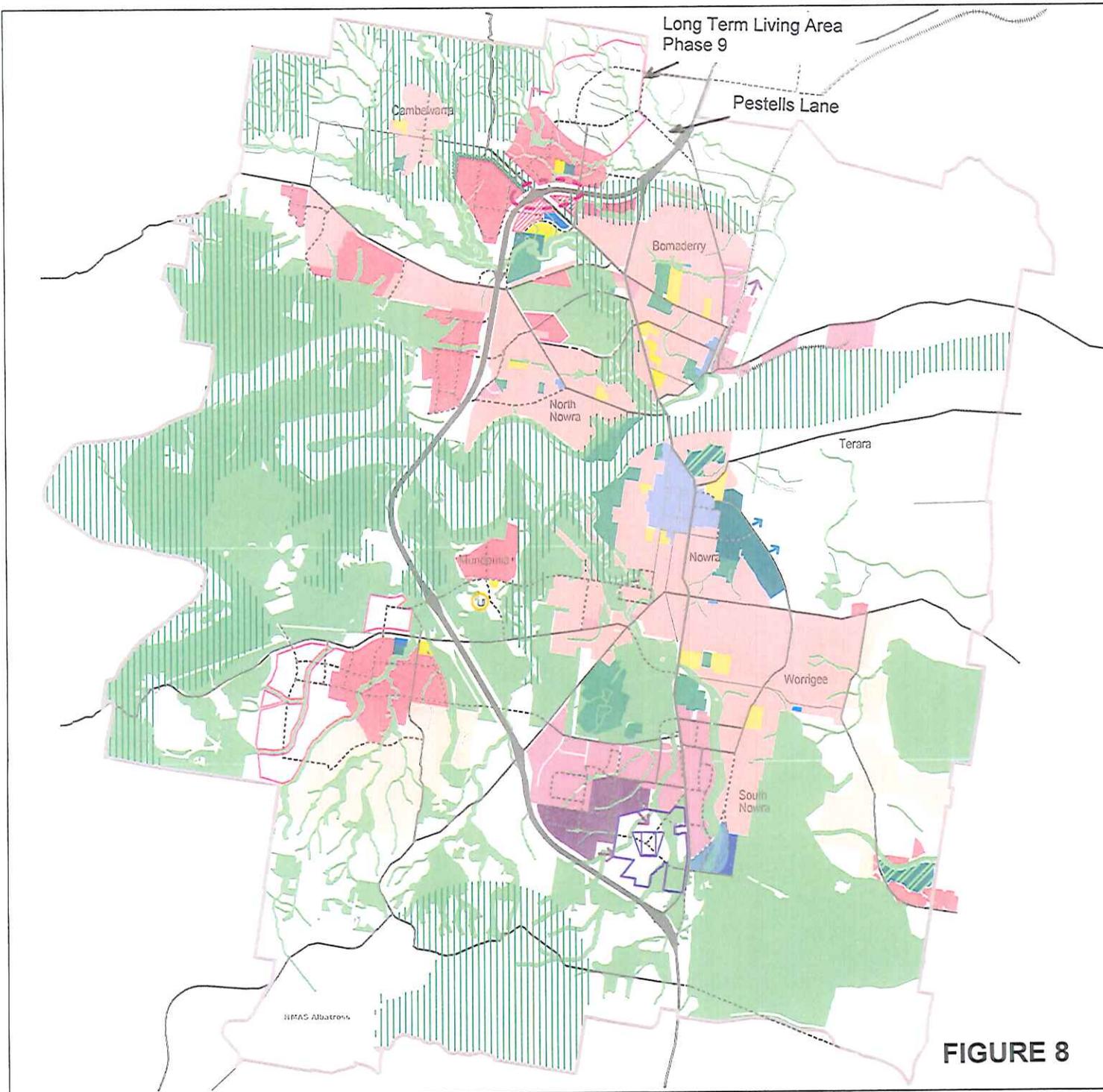
5.5 LOCAL PLANNING STRATEGIES AND PLANNING INSTRUMENTS AND POLICIES

5.5.1 Nowra Bomaderry Structure Plan

The Nowra Bomaderry Structure Plan provides the strategic framework for the future of the Nowra Bomaderry. This plan looks at the implications for the ongoing growth of the urban area and Nowra Bomaderry’s long term role as the regional service provider.

The Nowra Bomaderry Structure Plan does not itself zone land. It does however identify where future investigation should be directed to when considering where urban expansion should occur within this locality.

The Nowra Bomaderry Structure Plan identifies a future long term living area within Meroo Meadow (refer **Figure 8**). This expansion area adjoins an identified “future living



Legend

- Structure Plan Boundary
- Existing Living Area
- Future Living Area
- Possible Future Living Area
- Future Long Term Living Area
- Existing Rural Residential
- Existing CBD Area
- Existing Neighbourhood Centre
- Future Neighbourhood Centre
- Existing Local Centre
- Future Local Centre
- Existing Other Commercial
- Future Other Commercial
- Existing Industrial Land
- Future Industrial Land
- Existing School/TAFE
- Future School
- Existing University & TAFE Campus
- Existing Active Recreation
- Future Active Recreation
- Conservation & Riparian Area
- Future Active/Passive Open Space or Conservation
- Future Advanced Screening
- Scenic Protection Areas
- Rural Area
- Future Western Bypass
- Bypass alignment in this location subject to further detailed investigation as part of LEP
- Main Roads
- Local Road Network
- North Nowra Link Road Options
- South Coast Correctional Centre Site

Adopted by Council on 24th October 2006 and 25th September 2007.
Endorsed by the Department of Planning 28th February 2008.

Structure Plan

February 2008

Not To Scale

Nowra Bomaderry Structure Plan

FIGURE 8

area” which is located on the north side of Moss Vale Road. The Structure Plan identifies the Meroo Meadow future living area as Phase 9 after all the other living areas have been exhausted. It is a long term area for future investigation.

It would appear from the broad scale mapping that supports the Structure Plan that the south eastern boundary of the Meroo Meadow living area is situated along or within close proximity of the EGP. Furthermore it is understood that Council is considering the potential for Pestells Lane to become a significant traffic intersection node for future access to both the Meroo Meadow expansion area as well as to the east to Bomaderry.

The pipeline route will also pass along Pestells Lane. The planning and construction of the pipeline route will need to be assessed in light of the future development potential of this locality under the Nowra Bomaderry Structure Plan.

Shoalhaven City Council’s letter dated 19th April 2010 (**Annexure 4**) addresses this issue. Council indicates that it would be preferred that the pipeline be located on the northern side of Pestells Lane so that as land is redeveloped the pipeline will not impede potential road widening. The letter however acknowledges that given a number of possible constraints within the existing road reserve of the lane; including width and future works; the detail of pipeline placement can be a matter for further discussion as construction investigations within the laneway reserve take place.

5.5.2 Shoalhaven Local Environmental Plan 1985

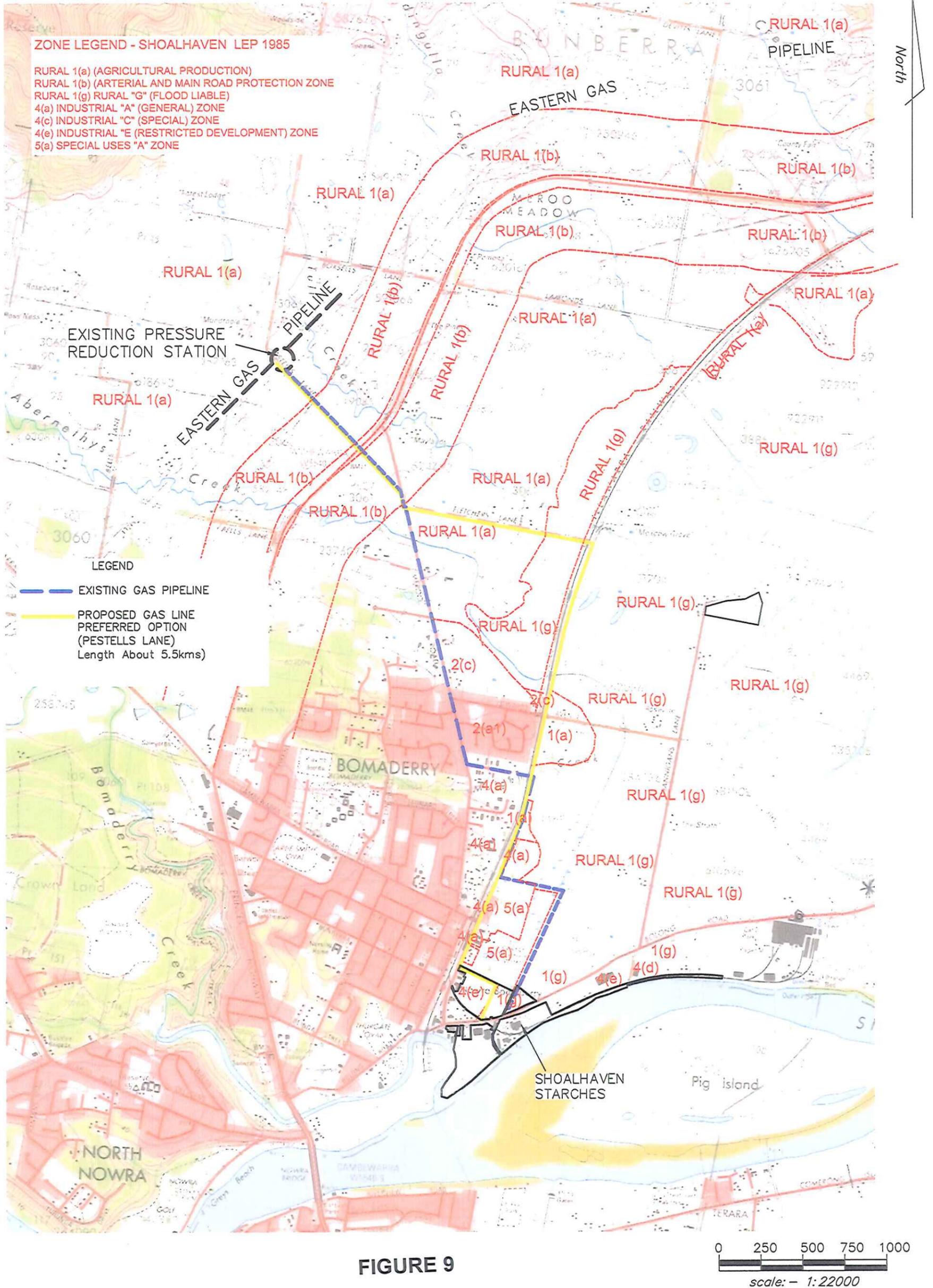
The proposed pipeline route is situated entirely within land affected by the provisions of the Shoalhaven Local Environmental Plan (SLEP) 1985. **Figure 9** shows the pipeline route and associated zones under SLEP 1985.

The pipeline route is affected by the following zoning provisions (**Table 9**):

Table 9
Zoning Provisions SLEP 1985

<i>Zone</i>	<i>Permissibility</i>	<i>Comments</i>
1(a) Rural “A” Agricultural Production Zone	Proposal not listed as prohibited use therefore permissible subject to consent.	
1(b) Rural “B” Arterial and Main Road Protection Zone	Proposal not listed as prohibited use therefore permissible subject to consent	
1(g) Rural “G” Flood Liable Zone	Proposal not listed as permissible use therefore prohibited.	Gas pipelines are not listed as a permissible use within this zone therefore by virtue of their exclusion are prohibited development. This matter is addressed separately below.

PREFERRED OPTION WITH ZONINGS



SKETCH PLAN SHOWING EXISTING AND PREFERRED OPTION FOR PROPOSED GAS LINE ROUTE FROM EXISTING GAS MAIN TO THE BOLONG ROAD FACTORY FOR THE MANILDRA GROUP

CAD FILE: 24710-01K

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A3 SIZE RATIO 1:22,000 DATE 31-5-10 REF:24710-01K

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COVER OF EXCELLENCE

Table 9 (continued)

Zone	Permissibility	Comments
4(a) Industrial "A" General Zone	Proposal not listed as prohibited use therefore permissible subject to consent	
4(e) Industrial "E" Restricted Development Zone	Proposal not listed as prohibited use therefore permissible subject to consent	
5(a) Special Use "A" Zone	Proposal not listed as permissible use therefore prohibited	This zone applies to the Sewerage Treatment Plant located off Railway parade Bomaderry. The proposed pipeline route runs along the frontage of the site however does not encroach across this zoning. The zoning therefore does not apply to this proposal.
5(b) Special Use "B" Railways Zone	Proposal not listed as permissible use therefore prohibited	Gas pipelines are not listed as a permissible use within this zone therefore by virtue of their exclusion are prohibited development. This matter is addressed separately below
Uncoloured Land	Permissible subject to consent.	Clause 36 of SLEP 1985 stipulates that Development, including the clearing of vegetation and trees, shall not be carried out on any land shown uncoloured on the map without the consent of the Council.

As is evident for the above the gas pipeline would comprise prohibited development within the 1(g) and 5(b) zones across which the route is located.

With respect to determining projects and concept plans Sections 75J(3) and 75O(3) of the EP&A Act state:

75J Giving of approval by Minister to carry out project

(1) *If:*

(a) *the proponent makes an application for the approval of the Minister under this Part to carry out a project, and*

(b) *the Director-General has given his or her report on the project to the Minister,*

the Minister may approve or disapprove of the carrying out of the project.

(3) *In deciding whether or not to approve the carrying out of a project, the Minister may (but is not required to) take into account the provisions of any environmental planning instrument that would not (because of section 75R) apply to the project if approved. However, the regulations*

may preclude approval for the carrying out of a class of project (other than a critical infrastructure project) that such an instrument would otherwise prohibit.

75O Giving of approval for concept plan

- (1) *If:*
- (a) *the proponent makes an application for the approval of the Minister under this Part of a concept plan for a project, and*
 - (b) *the Director-General has given his or her report on the project to the Minister,*
- the Minister may give or refuse to give approval for the concept plan for the project.*
- (3) *In deciding whether or not to give approval for the concept plan for a project, the Minister may (but is not required to) take into account the provisions of any environmental planning instrument that would not (because of section 75R) apply to the project if approved. However, the regulations may preclude approval for a concept plan for the carrying out of a class of project (other than a critical infrastructure project) that such an instrument would otherwise prohibit.*

Having regard to provisions of Sections 75J and 75O the Minister is not required to take into account the provisions of any EPI. The Minister may therefore grant approval to a project that is prohibited within the zoning provisions that may apply to land associated with a project. It is therefore open to the Minister to approve this gas pipeline project even though it crosses land zoned in manner that prohibits the use.

The ability for the Minister to exercise the powers under Sections 75J and 75O is however limited by virtue of Clause 8N of the EPA Regulations which specifies:

8N Projects or concept plans for which approval may not be given concerning environmentally sensitive land or sensitive coastal locations

- (1) *For the purposes of sections 75J (3) and 75O (3) of the Act, approval for a project application may not be given under Part 3A of the Act for any project, or part of a project, that:*
- (a) *is located within an environmentally sensitive area of State significance or a sensitive coastal location, and*
 - (b) *is prohibited by an environmental planning instrument that would not (because of section 75R of the Act) apply to the project if approved.*
- (2) *To avoid doubt, a project is not prohibited for the purposes of subclause (1) (b) if:*
- (a) *it is not permitted because of the application of a development standard under the environmental planning instrument, or*

(b) *it is prohibited under the environmental planning instrument but is permitted to be carried out because of the application of another environmental planning instrument to the environmental planning instrument.*

(3) *In this clause:*

environmentally sensitive area of State significance has the same meaning as it has in State Environmental Planning Policy (Major Development) 2005.

sensitive coastal location has the same meaning as it has in clause 1 of Schedule 2 to State Environmental Planning Policy (Major Development) 2005.

The pipeline route does not cross land that could be described as “environmentally sensitive area of State significance”. Furthermore the route does not cross land identified as a sensitive coastal location (refer **Figure 10**). Under these circumstances it is open to the Minister to consider and approve this concept plan and project.

In addition to the above, as the proposed pipeline project will be required to obtain a licence under the Pipeline Act 1967. Pursuant to the provisions of Clause 53 of the SEPP (Infrastructure) 2007 development for the purposes of a pipeline may be carried out on **any** land without consent.

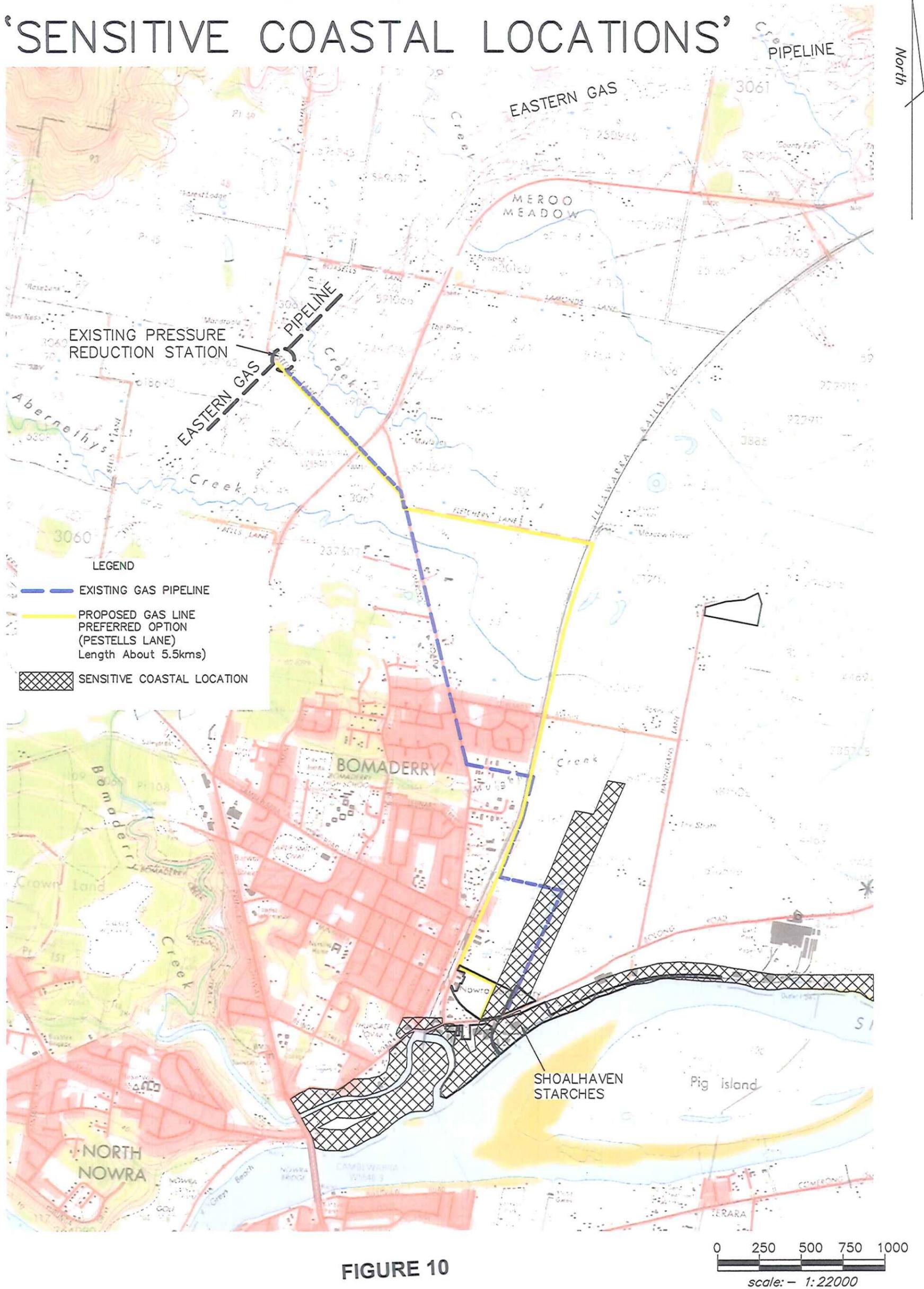
Division 5 – Environmental Management Provisions

Division 5 of SLEP 1985 sets out the provisions relating to the Environmental Management of land. The following table (**Table 10**) provides a summary of those provisions and how these relate to this proposal.

Table 10
Division 5 – Environmental Management of Land

LEP Clause	Comments on this proposal
Clause 20G – Development in the vicinity of a heritage item.	The pipeline route passes identified heritage items located at 55 Fletchers Lane and the Bomaderry Railway Station (Railway Street). In both instances it should be noted the pipeline will be sited on the opposite side of the road; and installed beneath ground level. Under these circumstances the pipeline will not have either a physical or visual relationship or affect to either of these items.
Clause 21 – Land of Ecological Sensitivity	The pipeline route is not mapped as being of ecological sensitivity, therefore this clause does not apply to this development proposal.
Clause 21A – Vegetation Linkage	The pipeline route is not within an area mapped as being within a designated vegetation linkage area.
Clause 22 – Activities in Zone No. 1(c), 7(a), 7(c), 7(d2), 7(e), 7(f1), 7(f2) and 7(f3)	This clause does not apply to the land associated with this proposal.

PREFERRED OPTION 'SENSITIVE COASTAL LOCATIONS'



SKETCH PLAN SHOWING THE PREFERRED OPTION FOR PROPOSED GAS LINE ROUTE TOGETHER WITH SENSITIVE COASTAL LOCATION AREAS FOR THE MANILDRA GROUP

CAD FILE: 24710-01K

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Table 10 (continued)

LEP Clause	Comments on this proposal
Clause 23 – Protection of Streams – this clause applies to perennial watercourses in rural zoned lands, indicated by continuous blue lines on a topographic map.	This issue is addressed in Section 7.4.1 of this EA.
Clause 24 – Water Catchment Areas	The pipeline route is not located within a drinking water catchment area.
Clause 24A – Hydrological Catchment	The pipeline route is not located within a hydrological catchment boundary.
Clause 25 – Steep lands	This clause applies to land with slopes in excess of 20%, there is no land along the pipeline route proposed to be developed which has a slope in excess of 20%.
Clause 26 – Soil, Water and Effluent Management	The EA is supported by an Erosion and Sediment Control Management Plan (Annexure 13).
Clause 27 – Acid Sulphate Soils	The issue of acid sulphate soils have been investigated by Coffey Environments (Annexure 10a). This issue is addressed in Section 7.4.1.4 of this EA.
Clause 28 – Danger of Bushfire	The pipeline route is not mapped as being bushfire prone.
Clause 29 – Development on Flood Liable Land	The pipeline route traverses flood prone land. Given the proposal involves the laying of a pipeline below ground level it is not envisaged flooding will raise significant issues with this proposal.

5.5.3 Draft Shoalhaven Local Environmental Plan 2009

Shoalhaven City Council has prepared draft LEP 2009 which seeks to accommodate the NSW Government’s standard LEP template. At the time of preparing this EA the draft LEP is currently on public exhibition.

A review of mapping that supports the draft LEP 2009 identifies that the proposed pipeline route will traverse lands within the following proposed zoning provisions.

Zone	Permissibility
RU1 Primary Production	The proposal is not listed as permissible and therefore would comprise prohibited development.
RU2 Rural Landscape	The proposal is not listed as permissible and therefore would comprise prohibited development.
SP2 Infrastructure	The proposal is not listed as permissible and therefore would comprise prohibited development.
IN1 General Industrial	The proposal is not listed as prohibited and would therefore be permissible.

6.0 THE EXISTING ENVIRONMENT

6.1 THE PHYSICAL ENVIRONMENT

6.1.1 Topography and Drainage

The Berry 1:25,000 Topographic Map indicates that the pipeline route is located at an elevation between RL < 10 m and RL 30 m above Australian Height Datum (AHD) and can be divided into two topographical settings:

- East of the South Coast Railway Line – Level to gently undulating floodplain with some minor ephemeral watercourses, flood channels and ponds; and
- West of the South Coast Railway Line – Moderately to gentle undulating rises to low hills with relatively shallow soil profiles and underlain by Nowra Sandstone. Sandstone outcrops are evident in the rail cuttings near Cambewarra Road and Edwards Avenue.

Water runoff collected to west of the South Coast Railway Line is generally diverted into nearby farmland and then channelled through ephemeral creeks such as Tullian, Abernethys and Mulgen Creeks in a south east direction towards the Shoalhaven River.

6.1.2 Local Geology, Hydrogeology and Groundwater Use

The pipeline route is generally elevated at between about RL 6.0 m (AHD) and RL 10.0 m (AHD). Where ground elevations are less than about RL 10.0 m (AHD) such as in the south-eastern portion of the site, reference to the 1:250,000 Wollongong Geological Series Sheet (S1 56-9, First Edition) prepared by the NSW Department of Mines (1952) indicates that this portion of the pipeline route is likely to be underlain by Quaternary Alluvium, gravel, swamp deposits and sand dunes.

Where ground elevations are greater than about RL 10.0 m (AHD), such as in the north-western portion of the site at Pestells Lane and also where there are some isolated rises (hills) in Railway Street and Edwards Avenue, the Geological Series Sheet indicates that this portion of the pipeline route is likely to be underlain by Undifferentiated siltstone, shale and sandstone from the Berry Formation which is categorised under the Shoalhaven Rock Group.

A survey of groundwater bores within a 500 metre radius of the proposed pipeline alignment undertaken by Coffey Environments (**Annexure 10a**) which are registered with the NSW Office of Water indicated that there are seven registered bores. There are three bores registered as monitoring bores located within 500 m of the study area to the

south-east within the Manildra Plant. These bores were installed to depths of between 4.0 m and 6.0 m.

Based on observations made by Coffey Environments (**Annexure 10a**) of the site, surrounding topography and the nearby Shoalhaven River, groundwater is generally expected to be encountered within the pipeline route as follows:

- Areas east of the South Coast Railway Line: Within 3 m of the ground surface and in some areas within about 1 m of the ground surface.
- Areas west of the South Coast Railway Line: Depths to groundwater may be variable for parts of the alignment located to the west of the South Coast Railway Line or for locally elevated areas primarily due to the presence of lower permeability residual clay soils and relatively shallow bedrock which may result in a perched water table or an aquifer within the bedrock profile, or a much deeper groundwater level. Groundwater is likely to flow in an east to south easterly direction (particularly for areas closer to the Shoalhaven River).

Groundwater levels are transient and can change with time based on climatic and other factors. In general, shallower groundwater levels would be expected in topographic low points (eg. near watercourses) or in areas of low relief (eg. within the near level floodplain areas at this site).

6.1.3 Agricultural Lands

The Department of Primary Industries uses a 5 class system to map rural land on the basis of its suitability for agriculture. It is a hierarchical system such that Class 1 is the best agricultural land and Class 5 has virtually no value for agriculture.

Class 1

Arable alluvial land with deep, fertile soils having a very good capability for agriculture. These lands have only minor or no constraints to sustained high to very high levels of production.

Class 2

Arable lands having a very good capability for agriculture. Minor to moderate constraints to sustained high levels of production are present.

Class 3

Grazing land or land well suited to pasture improvement. It may be cultivated or cropped in rotation with sown pasture. The overall production level is moderate because of edaphic factors or environmental constraints. Erosion hazard, soil structural breakdown or other factors including climate may limit the capacity for cultivation, and soil conservation or drainage works may be required.

Class 4

Land suitable for grazing but not for cultivation. Agriculture is based on native pastures or improved pastures established using minimum tillage techniques. Production may be seasonally high, but the overall production level is low as a result of major environmental constraints.

Class 5

Land unsuitable for agriculture or at best suited only to light grazing. Agricultural production is very low or zero as a result of severe constraints, including economic factors which preclude land improvement.

Under the provisions of Shoalhaven Local Environmental Plan 1985, land that is classed as 1, 2 or 3 agricultural land is classified as prime crop and pasture land.

As is evident from **Figure 11** below, the pipeline route passes through lands identified as Class 2 and Class 3 agricultural quality. It should be noted however that the pipeline route follows existing made and unmade road reserves and does not cross existing farm land. In this way the pipeline route will not fragment or sterilise existing prime agricultural land.

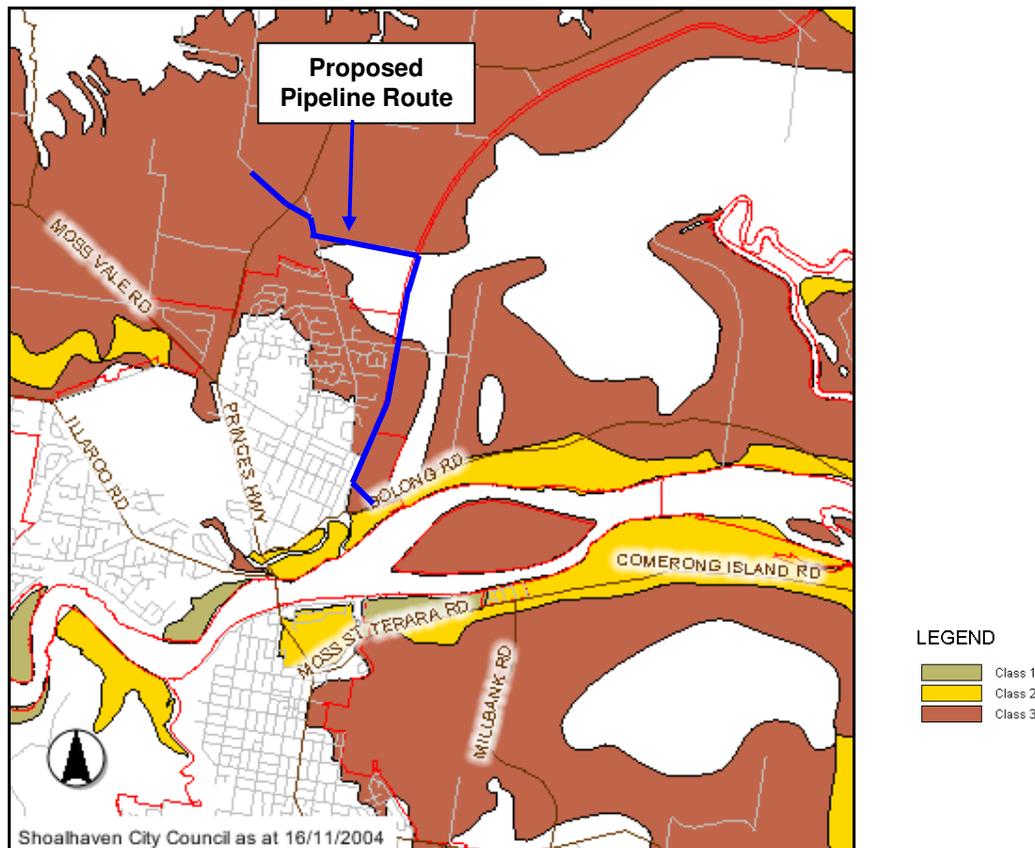


Figure 11: Agricultural Land

6.1.4 Watercourses

Watercourses

The pipeline route will not cross any major watercourses. It will however cross intermittent streams and creeks at up to possibly four (4) locations. The location of these watercourses is shown in **Figure 12** below (numbered 7, 8, 9 and 11).

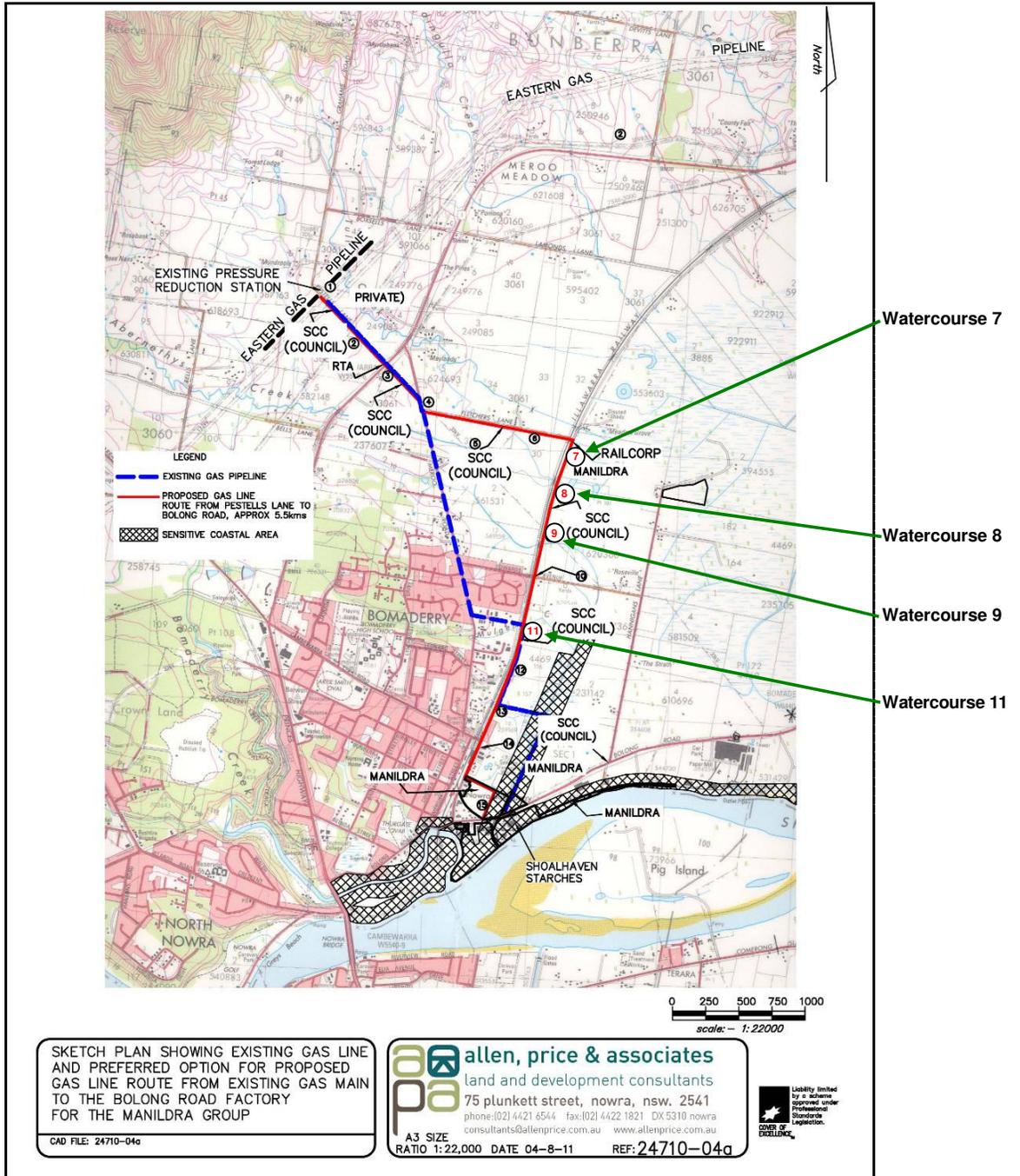


Figure 12: Location of watercourses.

SEPP 14 Wetlands

As is evident from **Figure 13** below the pipeline route avoids SEPP 14 wetland areas.

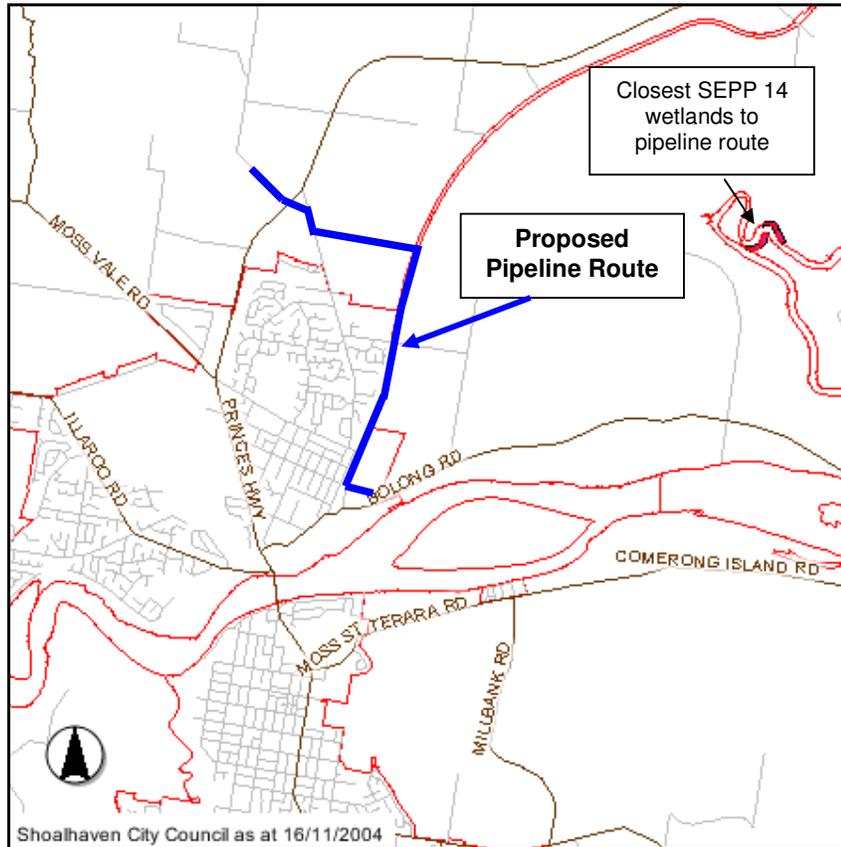


Figure 13: SEPP 14 Wetlands.

6.1.5 Vegetation

Vegetation mapping prepared by Shoalhaven City Council has been reviewed in addition to aerial photography for the locality (refer **Figure 14**).

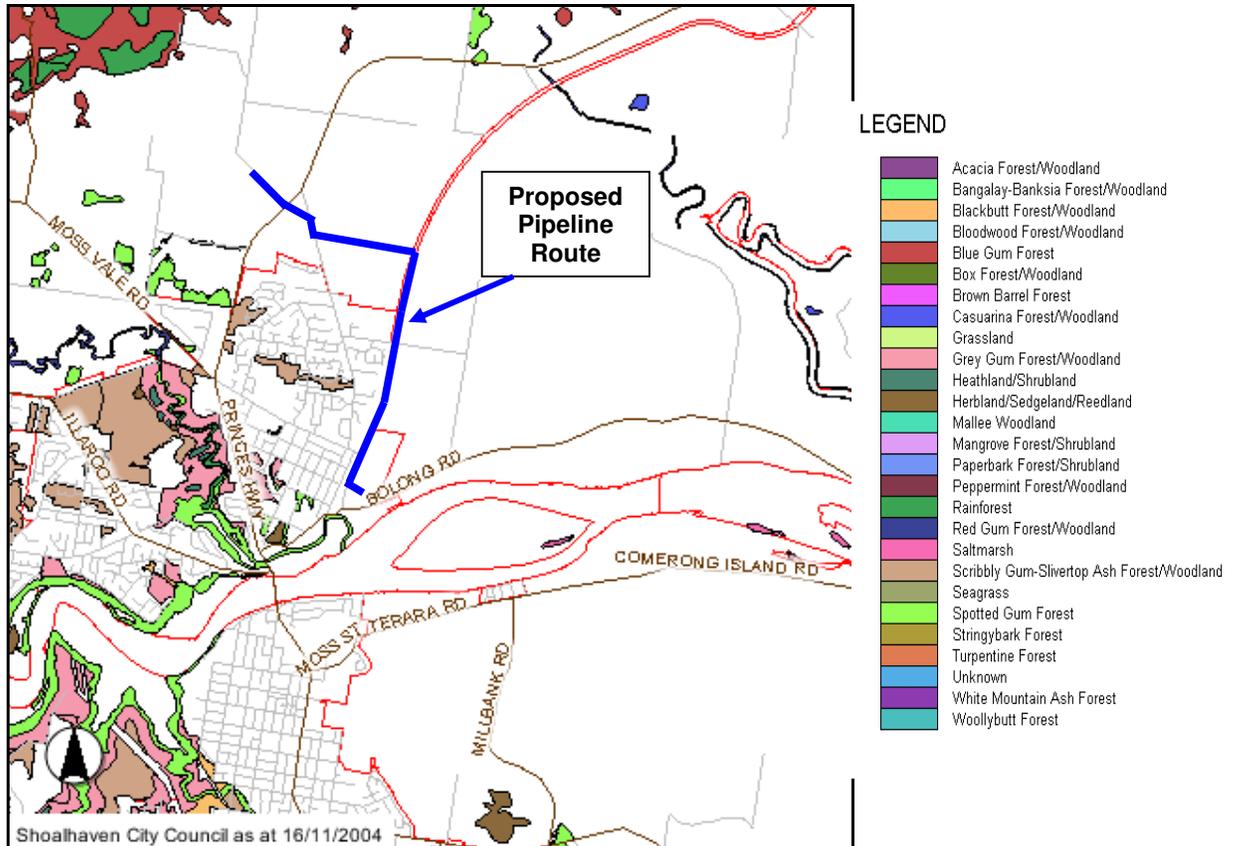


Figure 14: Vegetation

The selected pipeline route avoids areas of significant vegetation. The area through which the pipeline is situated comprises mainly farmland (used for grazing) as well as existing urban areas.

The vegetation of the pipeline route has been described in detail by Kevin Mills & Associates as part of their Flora and Fauna Assessment for this project (**Annexure 8**).

Vegetation of the Pipeline Route

KMA have divided the pipeline route into seven sections for the purposes of describing the vegetation; as follows.

A. Pestells Land (formed roadway)

The route along Pestells Lane west of the highway is about 650 metres in length. The lane is a gravel road with narrow grassed verges on both sides. The grassland is

dominated by Kikuyu Grass *Pennisetum clandenstinum*, with various pasture weeds such as Fire Weed *Senecio madagascariensis*, Paddy's Lucerne *Sida rhombifolia* and Spear Thistle *Cirsium vulgare*. Along with a few planted trees in one section, there are an occasional Black Wattle *Acacia mearnsii*.

B. Pestells Lane (unformed roadway)

This section to the east of the highway of about 500 metres in length is dominated by ungrazed and densely growing Kikuyu Grass *Pennisetum clandenstinum*. The only trees are a few planted Silky Oaks *Grevillea robusta* and an occasional Black Wattle *Acacia mearnsii*.

C. Meroo Road

This short section along Meroo Road between Pestells Lane (unformed) and Fletchers Lane is about 100 metres long. As with most of the surrounding land, the roadsides are dominated by thickly growing Kikuyu Grass *Pennisetum clandenstinum*.

D. Fletchers Lane

The Fletchers Lane route is about 1100 metres in length and contains a gravel road. The road verges, as elsewhere, are covered in a dense sward of Kikuyu Grass *Pennisetum clandenstinum*, with various other exotics, such as Paspalum *Paspalum dilatatum*, Paddy's Lucerne *Sida rhombifolia* and Flatweed *Hypochaeris radicata*. In a few low-lying places in the east, there are patches of the native wetland plant Tall Sedge *Carex appressa*. There are occasional small trees of Swamp Oak *Casuarina glauca* and Forest Red Gum *Eucalyptus tereticornis*, and various planted trees in front of the houses in the lane.

E. East of Railway Easement (old road reserve)

The route to the east of the railway line easement extends north to south for about 2100 metres. The area is mainly grazed Kikuyu Grass *Pennisetum clandenstinum* paddocks, with many other exotics. On some low-lying land, there are a few small trees of Prickly-leaved Paperbark *Melaleuca styphelioides* in the vicinity of the route, otherwise trees are absent.

F. Along Railway Street

The route along this street is about 600 metres in length and is along an urban street verge. In the far north, where the road is unformed, there is a band of native plants along the edge of the railway easement/road reserve. Many of the native plants listed in Appendix 1 were found in this small area. In the south, planted trees occur here and there along the roadside, and the grass is mostly mown. The planted trees include Jacaranda *Jacaranda mimosifolia*, Sweet Pittosporum *Pittosporum undulatum*, Crepe Myrtle *Lagerstroemia indica* and Bottlebrush *Callistemon* sp.

G. Across Manildra land at Bolong Road

This section of about 600 metres is across old grazing land and has been investigated in the past for other company facilities (KMA 2008). The paddock is largely covered in exotic grassland and other herbaceous plants. The site is dominated by Kikuyu Grass *Pennisetum clandestinum* and other introduced species such as White Clover *Trifolium repens*, Mouse-eared Chickweed *Cerastium glomeratum*, Paddy's Lucerne *Sida rhombifolia*, Fireweed *Senecio madagascariensis*, Spear Thistle *Cirsium vulgare* and Blackberry *Rubus fruticosus*. There are a few trees in the far southern part of the site and near Abernethys Creek on the eastern edge of the site; these are mostly Black Wattle *Acacia mearnsii*. In the far north-western corner there is a low-lying wet area that supports various native wetland plants.

6.1.6 Natural Hazards

6.1.6.1 Bushfire Risk

The pipeline route crosses mainly farmland that is not mapped as bushfire prone land by Shoalhaven City Council (refer **Figure 15**).

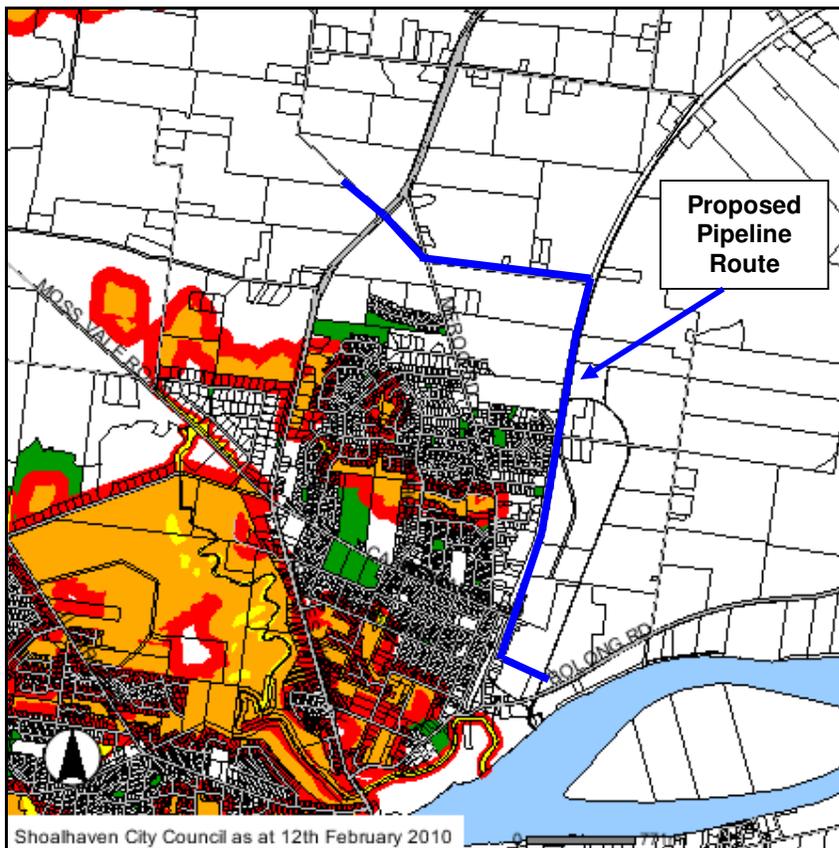


Figure 15: Bushfire Prone Land as Mapped by Shoalhaven City Council

6.1.6.2 Flooding

The north western section of the pipeline comprises elevated terrain which is not flood affected. That part of the route that passes along the eastern part of Fletchers Lane and generally south along the Illawarra Railway does pass along land that is identified by Shoalhaven City Council as being flood liable (refer **Figure 16**).

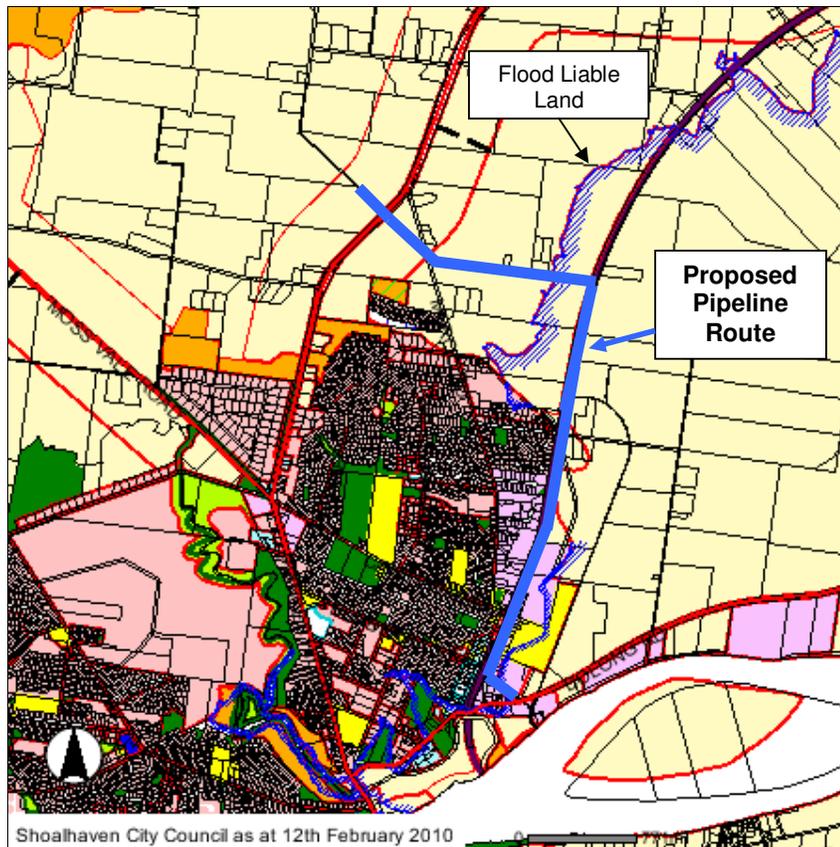
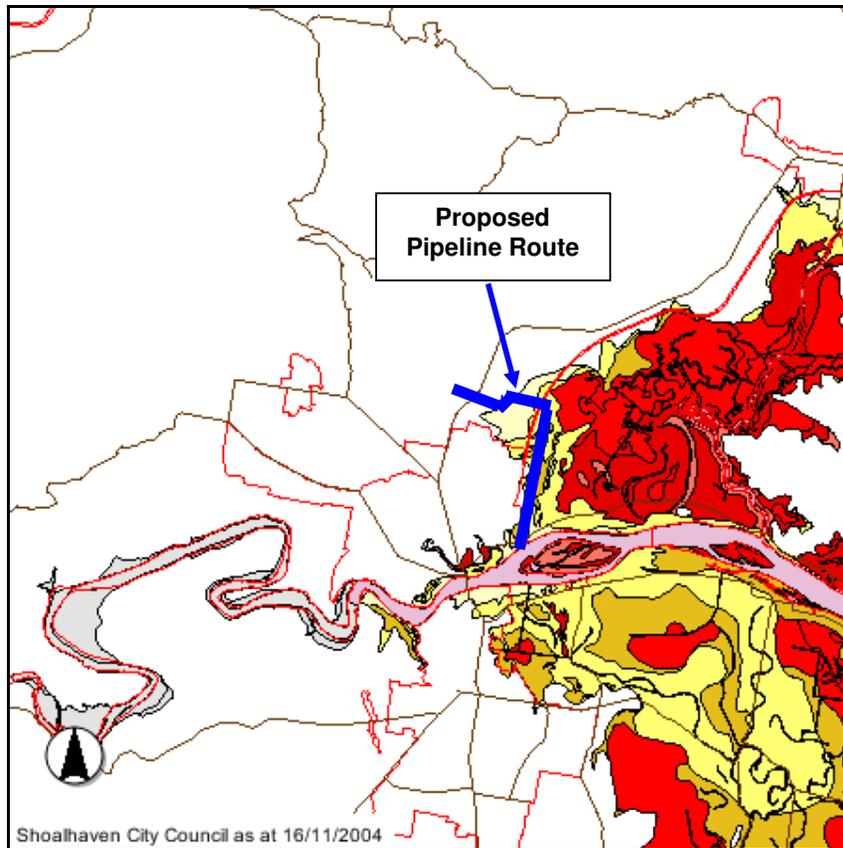


Figure 16: Extract of Shoalhaven Local Environmental Plan 1985 showing Flood Liable Land

6.1.6.3 Acid Sulphate Soils

Acid sulphate soils (ASS) contain iron sulphides and are located in low lying coastal areas.

As is evident from **Figure 17** ASS have a low probability of occurring throughout the majority of the pipeline length.



LEGEND

High Probability	Low Probability
 Bottom Sediment	 Bottom Sediment
 At or near Ground surface	 At or near Ground surface
 Within 1 metre of ground surface	 Within 1 metre of ground surface
 Between 1 and 3 metres below ground surface	 Between 1 and 3 metres below ground surface
 Greater than 3 metres below ground surface	 Greater than 3 metres below ground surface
	 No Known Occurrence
	 Disturbed Terrain

Figure 17: Acid Sulphate Soils

Figure 17 indicates the following:

- the southern portions of the pipeline route (south of Edward Street) and the northern section (westwards from Meroo Road) are generally located in areas mapped as no known occurrence of ASS;

- the southernmost portion of pipeline and the central section that travels north from Edwards Street and then west along Fletchers Lane to the intersection of Fletchers Lane and Meroo Road are generally located in areas mapped as having a low probability of ASS occurrence, being described as elevated alluvial plains and levees. ASS, if present, is considered to be sporadic in occurrence within 1 m to greater than 3 m of the ground surface.

Coffey Environments (Coffeys) were engaged by Shoalhaven Starches to undertake an investigation of ASS along the pipeline route. This is addressed in Section 7.4.1.4 of this EA.

7.0 KEY ISSUES

The following section of the EA addresses the “key Issues” identified in the Director-General’s Requirements (DGRs) dated 8th November 2010 (**Annexure 1**).

7.1 STRATEGIC JUSTIFICATION

7.1.1 Director-General’s Requirements (DGRs)

The DGRs for the project require the EA to include:

- *a strategic planning consideration of the Project and an analysis of the suitability of the gas pipeline route with respect to potential land use conflicts with existing and future surrounding land users;*
- *details of the proposed route for the gas pipeline which clearly describes the relevant ownership, land use, and zoning provisions; and*
- *an analysis of the required pipeline capacity, having regard to existing gas supplies.*

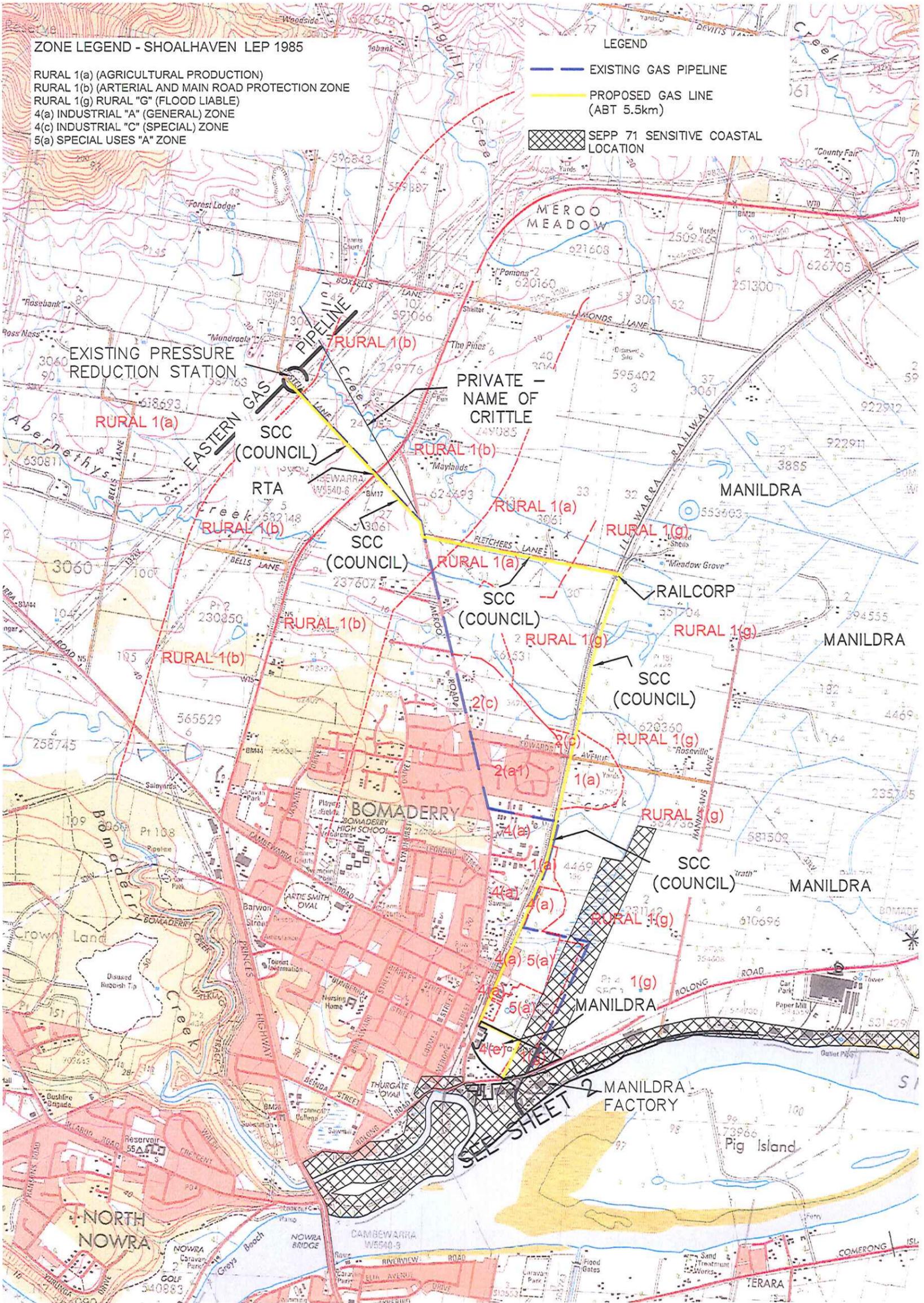
7.1.2 Strategic Justification

The preferred pipeline route mainly follows made and unmade road reserves including Pestells Lane (made and unmade); Meroo Road; Fletchers Lane as well as an unmade road reserve located along the eastern side of the Illawarra Railway. In this way the pipeline route minimises potential conflicts with other land uses.

The pipeline route mainly passes through road reserves located within farmland; and avoids residential and urban areas. In the main, as the pipeline travels along road reserves, these reserves are mainly owned by Shoalhaven City Council. The pipeline also crosses the Princes Highway (owned by RTA). (Refer **Figure 18** – land ownership.)

The only private land (other than land associated with the Manildra Group) is the location where the pipeline will tie-in to the EGP at Pestells Lane. The tie-in point is to be located on private land (Lot 4 DP 249085). An easement has been agreed to with the owners of this land and created to enabling this component of the project to proceed. A copy of the plan of easement is held in **Annexure 18**.

The northern half of the route mainly travels within the road reserves of Pestells Lane; Meroo Road and Fletchers Lane. This section of the route passes through farmland. The route will pass within relative close proximity to three dwellings, one located off the unmade section of Pestells Lane; and two located along Fletchers Lane (refer **Annexure 5**).



ZONE LEGEND - SHOALHAVEN LEP 1985

- RURAL 1(a) (AGRICULTURAL PRODUCTION)
- RURAL 1(b) (ARTERIAL AND MAIN ROAD PROTECTION ZONE)
- RURAL 1(g) RURAL "G" (FLOOD LIABLE)
- 4(a) INDUSTRIAL "A" (GENERAL) ZONE
- 4(c) INDUSTRIAL "C" (SPECIAL) ZONE
- 5(a) SPECIAL USES "A" ZONE

LEGEND

- EXISTING GAS PIPELINE
- PROPOSED GAS LINE (ABT 5.5km)
- SEPP 71 SENSITIVE COASTAL LOCATION

FIGURE 18 – LAND OWNERSHIP

0 250 500 750 1000
 scale: - 1:22000

SKETCH PLAN SHOWING EXISTING AND PROPOSED GAS LINE ROUTE FROM GAS MAIN TO THE BOLONG ROAD FACTORY FOR THE MANILDRA GROUP

CAD FILE: 24710-01C ZONINGS ADDED 21.7.09 & SEPP71 ADDED 18.11.09.DWG

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A3 SIZE
 RATIO 1:22,000 DATE 1-12-09 REF: 24710-01C



The second half of the route passes along an unmade road reserve along the eastern side of the Illawarra Railway. Whilst the northern section of this part of the route also passes through farmland; the southern part of the route follows the eastern boundary of the Bomaderry urban area. It should be noted however that the route is located within a road reserve that runs parallel to the railway line; and the route is located further to the east of the urban area; in this regard, at Edwards Avenue, a partly residential street that crosses the railway and services several rural residential allotments. The pipeline route then passes through mainly industrial development before entering the Shoalhaven Starches property.

Overall the pipeline route passes along road reserves adjacent to mainly farm land. The pipeline route has been selected to be sited away from residential areas so as to minimise impacts and potential conflicts with residents.

Furthermore siting the pipeline within road reserves ensures the project will not fragment or sterilise agricultural land.

As outlined in Section 5.5.1, the route of the proposed pipeline along Pestells Lane will be within the vicinity of areas identified for future residential development and road upgrades as part of the Nowra Bomaderry Structure Plan. (It should be noted however that this areas has not been identified by the recently exhibited draft LEP 2009.) This section of the route has been the subject of specific consultation with Shoalhaven City Council staff who now accept justification for the proposal route along Pestells Lane. **Figure 18** outlines the route of the proposed pipeline and land ownership. The route mainly utilises road reserves under the 'ownership' of Shoalhaven City Council. The exception is where the route passes under the Princes Highway which is 'owned' by the RTA. The route also passes across land owned by the Manildra Group of Companies.

Overall the underlying strategic justification for the project is to provide Shoalhaven Starches with greater access to a more competitive gas supply market and to reduce the delivered cost per year.

As outlined in Section 3.1.2 of this EA the installation of the alternative gas pipeline will provide other benefits including:

- The development of an additional gas supply infrastructure has the potential to free up capacity within the exiting ActewAGL pipeline to service increased population within the Nowra Bomaderry area as well as increase in demands from other development projects.

- Energy, including natural gas, is a major cost of operation at Shoalhaven Starches representing around 24% of the total operating costs at the plant. Competitively sourced supplies of energy, including natural gas to the plant, can therefore significantly improve the international competitiveness of the operations at Shoalhaven Starches. This is essential for the long term viability of the plant and hence helping to secure existing jobs on the site. Achieving and maintaining the international competitiveness at Shoalhaven Starches is also a prerequisite for justification for any further capital investment and associated increase in employment on the site in future.
- Improved local gas supply competition has the potential to reduce energy costs for the broader local business community. The new gas pipeline has the potential to supply other industrial consumers via infrastructure owners operated either by ActewAGL or Shoalhaven Starches.
- Improved regional gas supply competition and potential reduced costs for industry associated with a duopoly of regional gas supplier options. The new gas pipeline will enable supply to local industry from either the Australian Energy Market Operator (AEMO) infrastructure, designated as an uncontrolled asset owned by Jemena, via gas reserves owned and supplied independently by either Mobil Exxon, Santos or Origin Energy.
- Increased security of energy (gas) supply. The new lateral gas pipeline will enable supply either by ActewAGL or Shoalhaven Starches systems. This will reduce loss of supply associated with maintenance or unplanned outages.
- The increased availability of natural gas, an energy source with approximately two-thirds of the greenhouse gas emissions of coal (on an energy equivalent basis) will allow management of greenhouse gas mitigation and associated cost savings over time.

7.1.3 Ecologically Sustainable Development

Schedule 2 of the Environmental Planning and Assessment Regulations 2000 makes specific mention of resource development and impact assessment in terms of Ecologically Sustainable Development (ESD) principles and as such, the EA has also taken into consideration these principles.

The principles of ESD recognise the importance of development that meets the needs of the present generations without compromising the ability of future generations to meet their own needs.

The four principles that underpin ESD include:

- The precautionary principle.
- The principle of intergenerational equity.
- The principle of biological diversity and ecological integrity.
- The principle of improved valuation of environmental resources.

These principals are designed to place greater importance on the biophysical and socio-economic environment and how a development is likely to modify the local and regional environment in both positive and negative terms.

Precautionary principle

The precautionary principle states that:

If there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.

- (a) *In the application of the precautionary principle, public and private decisions should be guided by: careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment;*
- (b) *and an assessment of the risk-weighted consequences of various options.*

In order to satisfy the precautionary principle, emphasis must be placed on the anticipation and prevention of environmental damage, rather than a reaction to it. During the planning phase for the project and throughout the preparation of the EA, Shoalhaven Starches engaged specialist consultants to examine the existing environment, predict possible impacts and recommend mitigation measures in order to ensure that the level of impact satisfies statutory requirements and reasonable community expectations.

Throughout the formulation of the project, Shoalhaven Starches and its consultants have adopted a precautionary approach to the potential, likely and actual environmental impacts particularly in regard to the ecological damage, by undertaking an analysis of the risks posed by the project and carrying out appropriate baseline investigations and environmental evaluation. The mitigation measures have therefore been planned with a comprehensive knowledge of the existing environment and the potential risk of environmental degradation posed by project activities.

The implementation of the mitigation measures have been formalised by Shoalhaven Starches as part of a draft Statement of Commitments (refer Section 9.0).

The precautionary principle has been considered during all stages of the design and assessment of the project. The approach as adopted, ie. risk analysis, initial

assessment, consultation, specialist investigations and safeguard design; provides a high degree of certainty that the project would not result in any major unforeseen impacts.

Principle of inter-generational equity

The principle of inter-generational equity states that:

The present generation should ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations.

The proposed pipeline route land utilises existing road reserve corridors suitable for the project. The project would not result in any impacts that are likely impact on the health, diversity or productivity of the Shoalhaven for future generations.

The project has been specifically designed to reduce potential environmental risks and mitigation measures would be implemented to minimise adverse effects on the environment. The project is therefore considered to be consistent with the principle of inter-generational equity.

Principle of biological diversity and ecological integrity

The principle of biological diversity and ecological integrity state that:

Conservation of biological diversity and ecological integrity should be a fundamental consideration.

The project has been designed to avoid impacts on biological diversity and ecological integrity wherever possible. In particular, the pipeline route selection avoids native vegetation.

The project corridor has generally been sited on previously cleared and disturbed land and is not recognised as having significant ecological value or habitat potential for a diverse flora and fauna community. No threatened species have been identified as likely to be impacted by the project.

The proposed pipeline is considered to be consistent with the principle of biological diversity and ecological integrity.

Principle of improved valuation of environmental resources

The principle of improved valuation of environmental resources states that:

Environmental factors should be included in the valuation of assets and services, such as:

- (i) polluter pays – that is, those who generate pollution and waste should bear the cost of containment, avoidance and abatement;*

- (ii) *the users of goods and services should pay prices based on the full life cycle of costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any waste; and*
- (iii) *environmental goals, having been established, should be pursued in the most cost effective way, by establishing incentive structures, including market mechanisms, that enable those best placed to minimise benefits and minimise cost to develop their own solutions and responses to environmental problems.*

The potential environmental benefits that the project would offer to future generations are considered significant and include:

- Reduce greenhouse emissions from power generation.
- Improve local air quality.
- Potential economic advantages.

Shoalhaven Starches principal objective for this project is to utilise a valuable resource in an environmentally responsible and cost competitive manner. Given the importance to the State of securing energy supplies in light of the continued growth of domestic and industrial markets, Shoalhaven Starches is confident that the project demonstrates that an appropriate value has been placed on the natural resources in question and to those elements of the existing environment likely to be impacted by the project.

The economic rationalisation behind the project indicates that the utilisation of the gas resources in the proposed manner will assist in the ongoing development of cleaner electricity generation whilst increasing the operation and hence profitability of the existing Shoalhaven Starches operation.

The proposed pipeline is an integral part of Shoalhaven Starches objectives for the reduction of greenhouse gas emissions. Therefore the project is considered to be consistent with the principle of improved valuation of environmental resources.

Cumulative impacts

Cumulative environmental impacts arise when the project is considered in conjunction with existing or ongoing development, and the potential negative impacts and positive benefits that the project would create when considered in this form. All development projects have potential negative and positive cumulative impacts.

Examples of potential positive cumulative impacts of the proposed pipeline include:

- The use of natural gas as a fuel for electricity generation and associated positive environmental impacts, such as reduced air emissions.
- Ensuring the continued sustainable Shoalhaven Starches operation and maintaining jobs and general economic productivity.

- Increase awareness of natural gas opportunities.

Where Shoalhaven Starches has direct control over potential negative cumulative impacts, it is considered that the proposed mitigation measures will reduce the impact to as low as reasonable practicable.

7.2 HAZARDS AND RISK

The EA, in accordance with the DGRs is required to address:

- **Hazards and Risk** – including:
 - *A screening of potential hazards associated with the gas supply infrastructure to determine the potential for offsite impacts; and*
 - *should potential off-site impacts be identified, a Preliminary Hazard Analysis (PHA) must be prepared in accordance with the Department's guidelines.*

Shoalhaven Starches engaged URS Australia Pty Ltd (“URS”) (in association with Plannager Risk Management Consultants Pty Ltd and Pinnacle Risk Management Pty Ltd) to prepare a Preliminary Hazard Analysis of the project and to satisfy the DGRs with respect to this issue. A copy of the report prepared by URS forms **Annexure 14** to this EA. The findings of this analysis are included in this section of the EA.

URS carried out a multi-discipline review having regard to the following Policies, Guidelines and Plans:

- State Environment Planning Policy No. 33 – Hazardous and Offensive Development.
- Applying SEPP 33 – Hazardous and Offensive Development Application Guidelines (DUAP).
- Hazardous Industry Planning Advisory Paper No. 3 – Environmental Risk Impact Risk Assessment Guidelines.
- Hazardous Industry Planning Advisory Paper No. 6 – Guidelines for Hazard Analysis.
- AS/NZS 4360:2004 Risk Management (Australian Standards).
- HB 203:2006 Environmental Risk Management – Principles & Processes (Australian Standards).
- Multi-Level Risk Assessment (DUAP).

A multi-discipline hazard identification workshop (facilitated by Plannager Risk Management Consultants Pty Ltd) was used to perform hazard identification (HAZID) to identify and assess the hazards on the selected route.

An assessment of activities and operations along the proposed pipeline construction route was undertaken in consultation with Jemena, the current gas off-take operator. In addition an investigation of affected industries and community activities such as fuel storages and/or potential high risk areas including schools, pre-schools, aged care facilities, hospitals and medical practices was also undertaken.

After consultation and data collection the proposed design was modified to reduce the key risks identified. The HAZID was then updated by URS.

Following the initial HAZID process, the pipeline design and route details were modified to include additional protection in areas assessed as higher risks and mitigation actions identified to reduce the risks.

Pinnacle Risk Management Pty Ltd was engaged by URS to perform a quantitative risk Hazard Analysis (HAZAN) on those areas of key risk identified along the pipeline route based on information from current stakeholders and industrial operations.

The highest industrial risk zones identified were:

1. Kells Caltex Distribution (2 x 60-100 kL fuel tanks disused) – Lot 1B Cambewarra Road, Bomaderry – Current Tanker truck parking area approximately 60 m from the proposed gas pipeline.
2. Hitchcock’s Haulage – 14 Concord Way, Bomaderry – 35 and 25 kL above ground horizontal diesel storage tanks approximately 100 m from the proposed gas pipeline.

The two locations were assessed quantitatively for Jet Fire, Flash Fire and Explosion risks and the results are in **Table 11**.

Table 11
Bomaderry Pipeline – Quantitative Risk Assessment

<i>Risk Event Category</i>	<i>Jet Fire Likelihood</i>	<i>Flash Fire Likelihood</i>	<i>Explosion Likelihood</i>
Unit	Times/year	Times/year	Times/year
Event Basis	4.5×10^{-6} per km per year x 0.32 km	1.8×10^{-6} per km per year x 1.6 km	2.7×10^{-6} per km per year x 0.45 km
Frequency	1.4×10^{-6}	2.9×10^{-6}	1.2×10^{-6}
Risk Class – Safety and Health	Low II	Low II	Low II
Risk Class – Financial	Moderate II / III	Low II	Moderate II / III

A Class I area indicates a high level of risk which is intolerable and where risk reduction is required. This requires the reduction of frequency and/or consequence.

A Class II area indicates a moderate level of risk. Whilst the risk is not unacceptable, there should be practical measures taken to lower the risk if economically viable. For risks where further mitigation is not economically viable, judgement needs to be exercised as to whether the level of risk is acceptable or not. This area is the beginning of the ALARP region (ie. as low as reasonably practicable).

A Class III area indicates a low level of risk and is broadly considered to be acceptable. Further risk mitigation may not be required / appropriate. However, low and accepted risks should be monitored and routinely reviewed to ensure that they remain acceptable. Few risks remain static. This area includes ALARP as well as what are known as trivial or negligible risks.

The risk analysis undertaken by URS (in association with Plannager Risk Management Consultants Pty Ltd and Pinnacle Risk Management Pty Ltd) concludes:

“Following the adoption of risk mitigation actions, the overall Preliminary Hazard Analysis did not identify any major risks on the proposed Shoalhaven Starches Pipeline Project. The highest risk levels were identified as low-moderate. These related to bushfire and lightning risk, train derailment and potential incidents at the proposed Pestells Lane metering station. These were addressed using additional control measures to the proposed modified pipeline design.”

7.3 NOISE AND VIBRATION

With respect to “Noise and Vibration” the DGRs require:

- *a noise impact assessment, including an assessment of noise impacts and road traffic noise during both construction and maintenance;*
- *consideration of potential vibration impacts from excavation works; and*
- *details of the proposed noise mitigation, monitoring and management measures.*

The EA is supported by a Construction Noise and Vibration Management Plan prepared by Day Design Pty Ltd (DD). A copy of this assessment forms **Annexure 16** to the EA. This section of the EA is based upon the findings of this Construction Noise and Vibration Management Plan.

7.3.1 Measured Ambient Noise Levels

7.3.1.1 Measured Ambient Noise Levels

In order to assess the severity of potential noise impacts within residential areas it is necessary to measure the ambient background noise level at the times and locations of worst possible annoyance. The lower the background noise level, the more perceptible the intrusive noise becomes and the more potentially annoying.

The places of potential worst possible annoyance according to DD are the residences located along the route of the proposed pipeline, particularly those near Edwards Avenue where ambient noise levels are lower than those at other residential areas.

Noise monitors were placed by DD at the following locations between the following dates:

- Location A – 100 Pestells Lane, Meroo Meadow (06/01 – 13/01/2011);
- Location B – 55 Fletchers Lane, Meroo Meadow (06/01 – 13/01/2011); and
- Location C – 65A Edwards Avenue, Bomaderry (21/01 – 28/01/2011)

Background noise levels were measured at each location over a minimum period of 7 days and are presented in **Figures 19, 20, 21 and 22** and also in **Table 12** below.

The measured background noise is representative of the background noise at the nearest residences in the absence of noise from the subject development, as required by the NSW Office of Environment and Heritage in Section 4.3 of the NSW *Industrial Noise Policy*.

Table 12
Rating Background Level

Noise Measurement Location	Time Period	Rating Background Level
Location 'A' – 100 Pestells Lane, Meroo Meadow	Day (7 am to 6 pm)	37 dBA
Location 'B' – 55 Fletchers Lane, Meroo Meadow	Day (7 am to 6 pm)	32 dBA
Location 'C' – 65A Edwards Avenue, Bomaderry	Day (7 am to 6 pm)	30 dBA

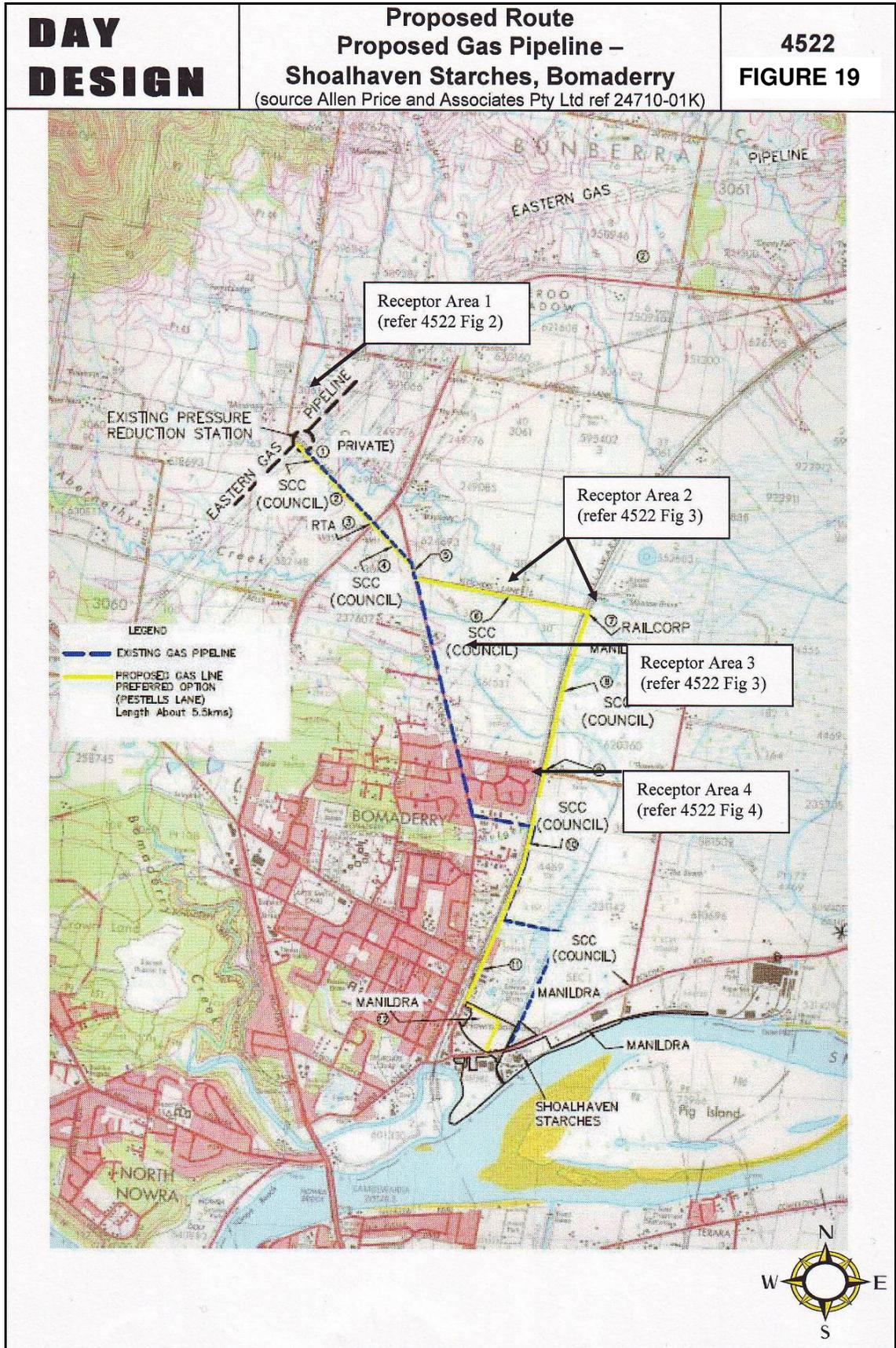


Figure 19: Proposed route showing Receptor Areas 1 to 4.

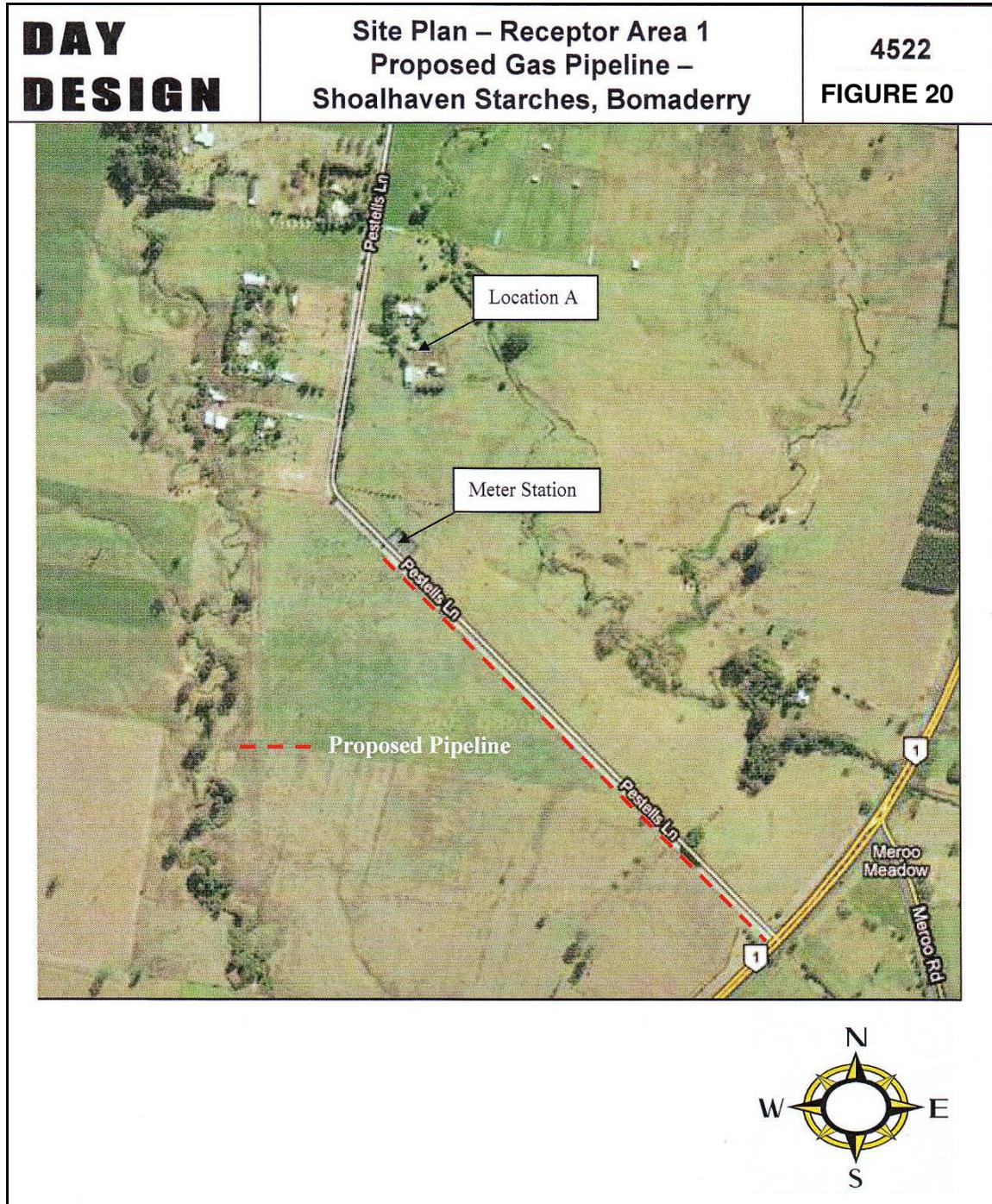


Figure 20: Site Plan – Receptor Area 1.

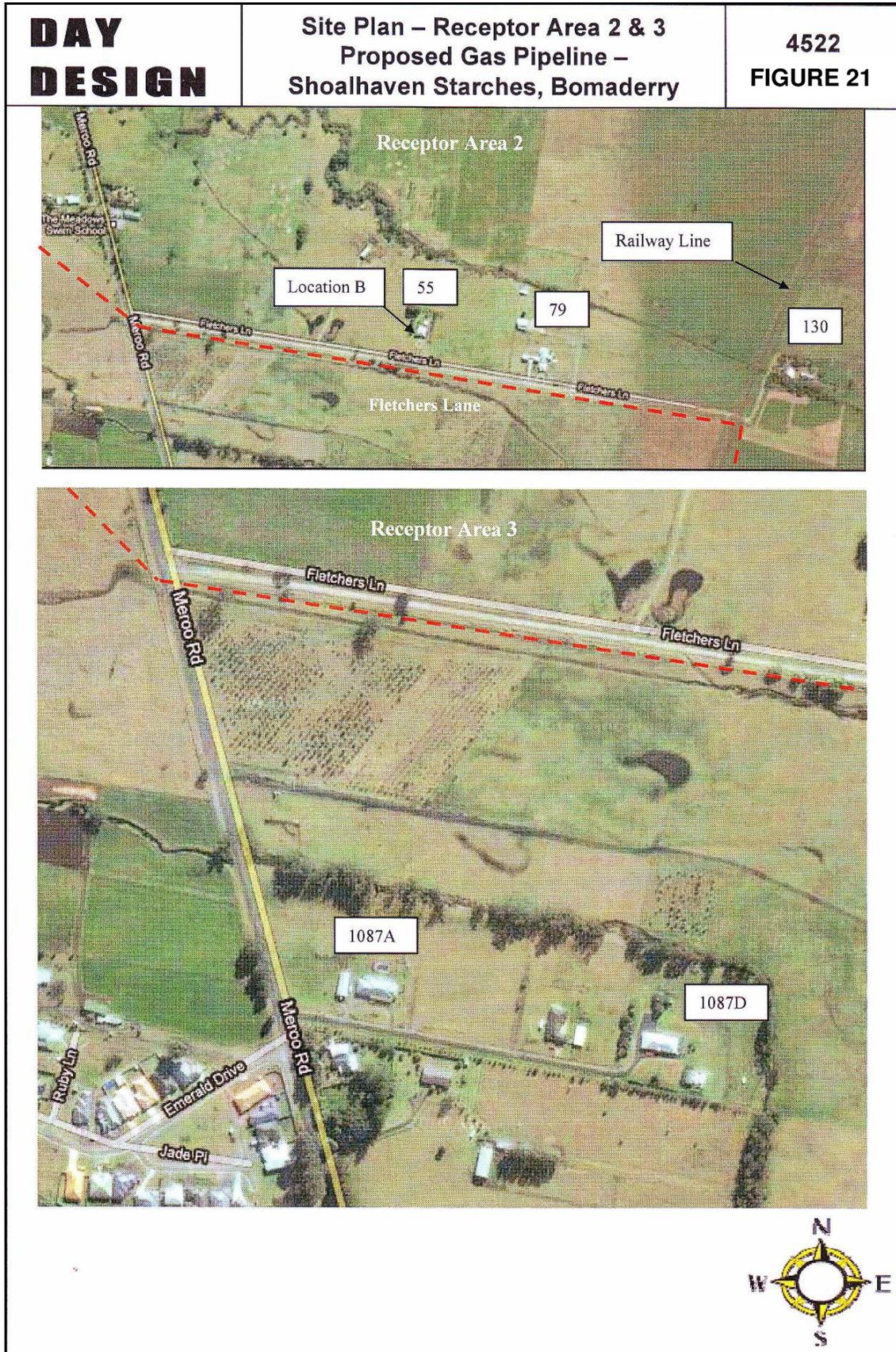


Figure 21: Site Plan – Receptor Areas 2 and 3.



Figure 22: Site Plan – Receptor Area 4.

7.3.2 Acceptable Noise Levels

7.3.2.1 Australian Standard AS2436

The Australian Standard AS2436–2010 *“Guide to Noise and Vibration Control on Construction, Demolition and Maintenance Sites”* provides guidance on noise control in respect to construction, demolition and maintenance sites. The Standard also provides guidance for the preparation of noise and vibration management plans.

Section 1.5 ‘Regulatory Requirements’ of the Standard states:

“Legislation associated with the control of noise and vibration on and from construction, demolition and maintenance sites in Australia is generally the responsibility of the relevant State or Territory government, local council or a designated statutory authority.”

Consequently the Standard does not provide specific noise criterion rather sets out practical methods for determining the potential for noise and vibration impact on the community from construction, demolition and maintenance sites.

A qualitative method is described of the standard, which is designed to avoid the need for complex noise predictions by following a series of questions relating to, for example, whether the noise is likely to be loud, have annoying characteristics or affect sleep.

In the event that any of these outcomes are likely, a more detailed and quantitative approach should be adopted.

In relation to carrying out detailed noise impact assessments, the standard states:

“Regulatory authorities may have relevant policies and/or guidelines for the control of noise and vibration on construction sites. These should also be referred to when developing noise and vibration management plans for such projects.”

In NSW this is the NSW Office of Environment and Heritage’s *Interim Construction Noise Guideline 2009* as outlined in Section 7.3.2.2 below.

The Standard further states that if noisy processes cannot be avoided, then the amount of noise reaching the receiver should be minimised and goes on to provide advice and recommendations to reduce noise and vibration impacts as far as reasonably practicable.

The assessment carried out by DD was prepared having regard to AS2436-2010.

7.3.2.2 OEH Construction Noise Guideline

The NSW Office of Environment and Heritage published the *Interim Construction Noise Guideline* in July 2009. While some noise from construction sites is inevitable, the aim of the Guideline is to protect the majority of residences and other sensitive land uses from noise pollution most of the time.

The Guideline presents two ways of assessing construction noise impacts; the quantitative method and the qualitative method.

The quantitative method is generally suited to longer term construction projects and involves predicting noise levels from the construction phase and comparing them with noise management levels given in the guideline.

The qualitative method for assessing construction noise is a simplified way to identify the cause of potential noise impacts and may be used for short-term works.

In this instance, according to DD, the quantitative method is the most appropriate and has been used in the assessment carried out by DD.

Normal construction hours are defined by the OEH as follows:

- 7:00 am to 6:00 pm Monday to Friday;
- 8:00 am to 1:00 pm Saturday; and
- No work on Sunday or Public Holiday.

Table 2 in Section 4 of the Guideline sets out noise management levels at affected residences and how they are to be applied during normal construction hours. The noise management level is derived from the rating background level (RBL) plus 10 dB in accordance with the Guideline. This level is considered to be the 'noise affected level' which represents the point above which there may be some community reaction to noise.

The 'highly noise effected' level of 75 dBA represents the point above which there may be strong community reaction to noise. This level is provided in the Guideline and is not based on the RBL. Restrictions to the hours of construction may apply to activities that generate noise at residences above the 'highly noise affected' noise management level.

Based on the varying RBL levels at residential receiver locations, DD recommend the following noise management levels during all aspects of the construction phase (**Table 13**).

Table 13
L_{eq} Noise Management Levels from Construction Activities

<i>Receptor Location</i>	<i>Noise Management Level</i>	<i>How to Apply</i>
Residential (Location A)	47 (= 37 + 10) dBA	The noise affected level represents the point above which there may be some community reaction to noise. <ul style="list-style-type: none"> ▪ Where the predicted or measured L_{Aeq (15 min)} noise level is greater than the noise affected level, the proponent should apply all feasible and reasonable* work practices to meet the noise affected level. ▪ The proponent should also inform all potentially impacted residents of the nature of works to be carried out, the expected noise levels and duration, as well as contact details.
(Location B)	42 (= 32 + 10) dBA	
(Location C)	40 (= 30 + 10) dBA	
	Highly noise affected 75 dB(A)	The highly noise affected level represents the point above which there may be strong community reaction to noise. <ul style="list-style-type: none"> ▪ Where noise is above this level, the relevant authority (consent, determining or regulatory) may require respite periods by restricting the hours that the very noisy activities can occur, taking into account: <ol style="list-style-type: none"> 1. times identified by the community when they are less sensitive to noise (such as before and after school for works near schools, or mid-morning or mid-afternoon for works near residences) 2. if the community is prepared to accept a longer period of construction in exchange for restrictions on construction times.

* Section 6, "work practices" of *The Interim Construction Noise Guideline*, states: - "there are no prescribed noise controls for construction works. Instead, all feasible and reasonable work practices should be implemented to minimise noise impacts.

This approach gives construction site managers and construction workers the greatest flexibility to manage noise". Definitions of the terms feasible and reasonable are given in Section 1.4 of the Guideline.

7.3.2.3 OEH Vibration Guideline

The NSW Office of Environment and Heritage published the *Assessing Vibration: A Technical Guideline* in February 2006. This guideline is based on the British Standard BS 6472:1992 "Evaluation of human exposure to vibration in buildings (1 Hz to 80 Hz)."

The guideline presents preferred and maximum vibration values for use in assessing human responses to vibration and provides recommendations for measurement and evaluation techniques. The guideline considers vibration from construction activities as Intermittent Vibration. Table 2.4 of the guideline sets out limits for Vibration Dose Values to assess intermittent vibration and is replicated in **Table 14** below for residential receptor locations.

Table 14
Vibration Dose Values (VDV) from Construction Activities

<i>Receptor Location</i>	<i>Daytime</i>	
	<i>Preferred value (m/s^{1.75})</i>	<i>Maximum value (m/s^{1.75})</i>
All Residences	0.20	0.40

The British Standard BS 7385-2:1993 “*Evaluation and Measurement for Vibration in Buildings – Part 2: Guide to Damage Levels from Groundborne Vibration*” provides guide values for transient vibration relating to cosmetic damage, replicated in **Table 15** below for residential buildings.

Table 15
Transient Vibration Guide Values for Cosmetic damage

<i>Type of building</i>	<i>Peak component particle velocity in frequency range of predominant pulse</i>	
	<i>4 Hz to 15 Hz</i>	<i>15 Hz and above</i>
Residential	15 mm/s at 4 Hz increasing to 20 mm/s at 15 Hz	20 mm/s at 15 Hz increasing to 50 mm/s at 40 Hz and above

In DD’s view, an overall peak particle velocity of **15 mm/s** at the boundaries will comply with the recommended values in **Table 15** and is an acceptable criterion for intermittent vibration to prevent cosmetic damage to the adjacent residential buildings.

7.3.3 Construction Noise Emission

According to DD the main sources of noise on the site during construction will be during the directional drilling works lasting up to approximately 3 weeks, potential rock hammering where required for short periods and the pipe installation works lasting approximately 5 weeks.

The noise emission has been calculated to the following residential areas and uses the relevant measured background noise levels from Section 7.3.2.1 to establish noise management levels in those areas (see **Figures 19 to 22**):

- Receptor Area 1 – Pestells Lane residences (background noise - Location A);
- Receptor Area 2 – Fletchers Lane residences and Meroo Road residences north of Fletchers Lane (background noise – Location B);

- Receptor Area 3 – Residences located on Meroo Road to the south of Fletchers lane (background noise – Location B);
- Receptor Area 4 – Residences located on Edwards Avenue and to the south in Alfred Street and Lillian Place (background noise - Location C)

7.3.3.1 Construction Plant Noise Emission

The installation of the pipeline will be continuous during the hours of construction with various items of plant operating in different locations along the route. For example, the trenchers will be operating ahead of the welders, pipe laying and backhoes, over a distance of up to 800 metres, depending on the section of the route being worked on at the time. The drilling rig will be located at various locations temporarily, *ie.* the Princes Highway, Meroo Road, the railway line crossing and Edwards Avenue, for approximately 3 or 4 days at each location.

Rock hammering may potentially occur on the southern side of Edwards Avenue and further to the south along Railway Street where there are isolated sections of heavily weathered sandstone.

Table 16 below shows examples of the type of plant and equipment to be used during the construction phase with indicative overall sound power levels (L_w) in decibels re: 1 pW.

Schedules of the sound power levels for the main construction equipment were extracted from the Day Design database of Sound Power Levels and the Australian Standard AS2436–2010 “*Guide to Noise Control on Construction, Maintenance and Demolition Sites*”.

Table 16
Pipeline Installation - Plant and Equipment - Sound Power Levels

<i>Description</i>	<i>Sound Power Level (dBA)</i>
Directional Drilling Rig	106
Backhoe	94
Trencher	110
Loader	105
Welding Rig (Diesel)	95
Dewatering Pump	90
Truck	107
Staff Car / 4WD	70
Hydraulic Rock Breaker	118

7.3.3.2 Predicted Construction Noise Emission

Knowing the sound power level of a noise source (see **Table 16** above), the sound pressure level (as measured with a sound level meter) can be calculated at a remote location using suitable formulae to account for distance losses, atmospheric effects, etc.

The level of noise from the construction activities is calculated (using computer modelling) to be as shown in **Tables 17, 18, 19** and **20** below.

Table 17
Predicted $L_{eq\ 15\ minute}$ Construction Noise Levels – Receptor Area 1
(Without Noise Control)

<i>Receptor Locations</i>	<i>Activity</i>	<i>Predicted Sound Level (dBA)</i>	<i>Noise Management Level (dBA)</i>	<i>Compliance (Yes/No)</i>
Receptor Area 1 (Pestells Lane)	Drilling (Princes Highway crossing)	49	47	No + 2dB
	Backhoe	37	47	Yes
	Trencher	53	47	No + 6 dB
	Loader	49	47	No + 2 dB
	Welding Rig (Diesel)	38	47	Yes
	Dewatering Pump	34	47	Yes
	Truck	51	47	No + 4 dB
	Combined	57	47	No + 16 dB*

* See Section 7.3.5

Table 18
Predicted $L_{eq\ 15\ minute}$ Construction Noise Levels – Receptor Area 2
(Without Noise Control)

<i>Receptor Locations</i>	<i>Activity</i>	<i>Predicted Sound Level (dBA)</i>	<i>Noise Management Level (dBA)</i>	<i>Compliance (Yes/No)</i>
Receptor Area 2 (Fletchers Lane)	Drilling (Meroo Road crossing)	55	42	No + 13 dB
	Drilling (at Railway Line)	59	42	No + 17 dB
	Backhoe	60	42	No + 18 dB
	Trencher	75	42	No + 33 dB
	Loader	71	42	No + 29 dB
	Welding Rig (Diesel)	61	42	No + 19 dB
	Dewatering Pump	56	42	No + 14 dB
	Truck	73	42	No + 31 dB
	Combined	78	42	No + 36 dB*

* See Section 7.3.5

Table 19
Predicted $L_{eq\ 15\ minute}$ Construction Noise Levels – Receptor Area 3
(Without Noise Control)

<i>Receptor Locations</i>	<i>Activity</i>	<i>Predicted Sound Level (dBA)</i>	<i>Noise Management Level (dBA)</i>	<i>Compliance (Yes/No)</i>
Receptor Area 3 (residences on the eastern side of Meroo Road, south of Fletchers Lane)	Drilling (Meroo Road crossing)	45	42	No + 3 dB
	Drilling (at Railway Line)	46	42	No + 4 dB
	Backhoe	38	42	Yes
	Trencher	55	42	No + 13 dB
	Loader	49	42	No + 7 dB
	Welding Rig (Diesel)	39	42	Yes
	Dewatering Pump	34	42	Yes
	Truck	51	42	No + 9 dB
	Combined	58	42	No + 16 dB*

* See Section 7.3.5

Table 20
Predicted $L_{eq\ 15\ minute}$ Construction Noise Levels – Receptor Area 4
(Without Noise Control)

Receptor Locations	Activity	Predicted Sound Level (dBA)	Noise Management Level (dBA)	Compliance (Yes/No)
Receptor Area 4 (residences in Edwards Avenue and south e.g. Alfred Street and Lillian Place)	Drilling (Edwards Avenue Crossing)	61 to 72	40	No + 21 to 32 dB
	Backhoe	60	40	No + 20 dB
	Trencher	75	40	No + 35 dB
	Loader	71	40	No + 31 dB
	Welding Rig (Diesel)	61	40	No + 21 dB
	Dewatering Pump	56	40	No + 16 dB
	Truck	73	40	No + 33 dB
	Rock Hammering (if required)	75	40	No + 35 dB
	Combined	80	40	No + 40 dB*

* See Section 7.3.5

All calculations and predictions according to DD consider attenuation from geometric divergence (distance attenuation) only and are based on the nearest potentially affected residences in the vicinity of the work at any given location.

For instance, directional drilling at the railway line will affect the residence at 130 Fletchers Lane more so than those at 55 and 79 Fletchers Lane (see **Figure 19**). Similarly trenching and backfilling operations, for example, will affect the residences at 55 and 79 Fletchers Lane more so than at 130 Fletchers Lane.

Further south, drilling at the Edwards Avenue intersection will affect the residence at 65A Edwards Avenue more so than those to the west of the railway line in Alfred Street (see **Figure 19**). However as works progress south, Alfred Street and Lillian Place residences will be exposed to noise emission from excavation works. Similarly if rock hammering is required in this area the residents in Alfred Street and Lillian Place will be the most potentially affected.

In every case **Tables 17 to 20** inclusive show the highest predicted noise level at the most affected residence in each residential area, for each individual construction activity, at any given time. Residential areas are shown in the attached **Figures 20 to 22**.

The predicted levels of noise from the construction activities are generally in excess of the noise management levels in Section 7.3.2.2 of this EA.

To minimise the noise impact from the construction activities DD recommend that the noise controls and management plan detailed in Section 7.3.4 of this report be implemented.

7.3.3.3 *Vibration Emission*

According to DD it is difficult to accurately predict levels of ground borne vibration at remote locations as there are many variables to consider including the surrounding terrain, strata and rock density.

Previous measurements of ground borne vibration from rock hammering show that levels can vary significantly at different distances and locations. Given the distances from neighbouring residences to any potential rock hammering on site, according to DD, vibration levels are likely to be well under the required maximum levels established in Section 7.3.2 of this report. However, DD recommend that compliance monitoring of ground borne vibration is carried out along the route, wherever rock hammering is required.

7.3.3.4 *On-Road Traffic Noise*

The DGRs require an assessment of on-road traffic noise generated by the proposal. Motor vehicle movements, for example trucks and staff vehicles, are considered part of the construction works and assessed under the OEH's *Interim Construction Noise Guideline*.

Consideration is given to heavy vehicles as part of the overall construction activities and predicted levels for 'trucks' are given in **Tables 17 to 20** inclusive.

With regard to staff vehicles, details have been supplied by STAP in their "*Shoalhaven Starches, Bomaderry Proposed Gas Pipeline Construction Traffic Impact Assessment*" (**Annexure 11**).

According to STAP there are a total of 25 staff vehicle movements per peak arrival or departure hour. Details of designated parking areas along the route have not yet been finalised although it is assumed temporary 'work-zones' will be established along the route as works progress.

Based on the assumption that an average of 8 staff vehicles arrive or leave any particular work-zone in any given 15 minute period, the predicted $L_{eq, 15 \text{ minute}}$ noise level is **45 dBA** at, for example, a distance of 20 metres. This is based on a 15 minute sound power level ($L_w, 15 \text{ minute}$) for one vehicle as shown in **Table 16** and the predicted level will vary depending on the distance to residences (eg. at a distance of 35 metres the predicted level is 40 dBA $L_{eq, 15 \text{ minute}}$).

A minimum distance of 35 metres from any staff parking area to any residence will ensure the noise management levels are met at all receptor areas from staff vehicle noise emission.

Recommendations to minimise the noise impact from motor vehicles accessing the site during the construction works are detailed in Section 7.3.4.

7.3.3.5 Fixed Plant Noise Emission

There is no significant noise producing fixed plant associated with the ongoing operation of the gas pipeline. A pressure reduction facility will be located opposite Shoalhaven Starches complex on the northern side of Bolong Road.

An existing pressure reduction facility is located at the Pestells Lane Meter Station and is reported to be indicative of that which is proposed on the Shoalhaven Starches site. Measurements of the existing pressure reduction facility have been used by DD to calculate the L_{10} octave band, and overall 'A' frequency weighted, sound power levels, in decibels re: 1 pW, shown in **Table 21** below. Measurements were conducted by DD in December 2011 described in **Annexure 16** to this EA.

Table 21
Pressure Reduction Facility L_{10} Sound Power Levels

<i>Description</i>	<i>Sound Power Levels (dB)</i> <i>at Octave Band Centre Frequencies (Hz)</i>								
	<i>dBA</i>	<i>63</i>	<i>125</i>	<i>250</i>	<i>500</i>	<i>1k</i>	<i>2k</i>	<i>4k</i>	<i>8k</i>
Pressure Reduction Facility	76	84	80	69	63	63	67	71	71

Shoalhaven Starches operates under Environment Protection Licence 883 issued by the NSW Office of Environment and Heritage. The licence sets acceptable $L_{10, 15 \text{ minute}}$ noise limits at various receptor locations that are not to be exceeded for the overall, ongoing operation of the entire complex.

In order for any new items of fixed plant not to increase existing levels to beyond acceptable limits, design goals of a minimum 10 dB below the OEH criteria are set. These are as follows:

- 28 dBA ($L_{10, 15 \text{ minute}}$) at locations in Terara on the south side of the Shoalhaven River;
- 28 dBA ($L_{10, 15 \text{ minute}}$) at locations in Nowra on the south side of the Shoalhaven River;
- 32 dBA ($L_{10, 15 \text{ minute}}$) at locations in Meroo Street, Bomaderry;
- 30 dBA ($L_{10, 15 \text{ minute}}$) at other locations in Bomaderry.

Based on an indicative sound power level, shown in **Table 21**, for the proposed gas pressure reduction facility, the calculated sound pressure level is less than **15 dBA** at the nearest residential receptor location (Meroo Street) and less than **5 dBA** at each of the other locations.

Noise emission from the pressure reduction facility will be inaudible at all residential receptors and as such, no further consideration is given to fixed plant noise emission in this report.

7.3.4 Noise Control Recommendations

According to DD the predicted level of noise emission from the construction activities is likely to be in excess of the noise management levels established in Section 7.3.2.2, at least on some occasions.

It should be noted however, that individual residences along the route, will only be affected by noise emission for a short period of time compared to the total 10 week construction period. For instance the installation works will move at approximately 500 to 800 metres per day for up to approximately 5 weeks. As such any single residence will be exposed to noise emission from various items of plant for less than one week.

Therefore, DD recommend the following engineering and management noise controls to minimise noise impact from all construction activities at any single residence.

7.3.4.1 Engineering and Practical Noise Controls

Australian Standard AS2436-2010, Appendix C, Table C3 provides the relative effectiveness of various forms of noise control that may be applicable and implemented on various construction sites and projects. Table C3 is replicated in **Table 22** below.

Table 22
Relative Effectiveness of Various Forms of Noise Control

<i>Control by</i>	<i>Nominal Noise Reduction Possible, dB</i>
Distance	Approximately 6 dB for each doubling of distance
Screening	Normally 5 dB to 10 dB maximum 15 dB
Enclosure	Normally 5 dB to 25 dB maximum 50 dB
Silencing	Normally 5 dB to 10 dB maximum 20 dB

Generally, erecting temporary sound barrier screens around construction sites is an effective way of reducing noise emission. However, in this instance according to DD, given the short duration of works and the short time activities will occur near to any given residences, it is not practicable to construct temporary sound barriers along the construction route to minimise pipe installation works. The time taken to erect and dismantle barriers is likely to be as long as, or longer than individual construction activities passing any given property. However, if rock hammering or drilling is to occur in any one location for more than 3 or 4 days consideration may be given to erecting, for example, timber hoardings around the site.

Engine exhaust silencers may be fitted to the mobile plant such as the loader, trencher, backhoe and the truck and consideration should be given to any plant already acoustically treated when assessing tenders. All plant and machinery should be selected with consideration to low noise options where practicable and available.

Care should be taken to ensure that not more than one item of plant is operating simultaneously within close proximity of any given residence. This will reduce the combined noise levels shown in **Tables 17 to 20** by a further 3 to 5 dB.

Tables 23 to 26 below show the predicted levels of noise emission from each item of plant following the implementation of practical noise controls such as screening around fixed plant and fitting silencers or selecting silenced mobile plant.

Table 23
Predicted L_{eq} 15 minute Construction Noise Levels – Receptor Area 1
(With Noise Control)

<i>Receptor Locations</i>	<i>Activity</i>	<i>Predicted Sound Level (dBA)</i>	<i>Noise Management Level (dBA)</i>	<i>Compliance (Yes/No)</i>
Receptor Area 1 (Pestells Lane)	Drilling (Princes Highway crossing)	42	47	Yes
	Backhoe	30	47	Yes
	Trencher	46	47	Yes
	Loader	42	47	Yes
	Welding Rig (Diesel)	38	47	Yes
	Dewatering Pump	27	47	Yes
	Truck	44	47	Yes

Table 24
Predicted L_{eq} 15 minute Construction Noise Levels – Receptor Area 2
(With Noise Control)

<i>Receptor Locations</i>	<i>Activity</i>	<i>Predicted Sound Level (dBA)</i>	<i>Noise Management Level (dBA)</i>	<i>Compliance (Yes/No)</i>
Receptor Area 2 (Fletchers Lane)	Drilling (Meroo Road crossing)	48	42	No + 6 dB
	Drilling (at Railway Line)	52	42	No + 10 dB
	Backhoe	53	42	No + 11 dB
	Trencher	68	42	No + 26 dB
	Loader	64	42	No + 22 dB
	Welding Rig (Diesel)	54	42	No + 12 dB
	Dewatering Pump	49	42	No + 7 dB
	Truck	67	42	No + 25 dB

Table 25
Predicted $L_{eq 15 \text{ minute}}$ Construction Noise Levels – Receptor Area 3
(With Noise Control)

<i>Receptor Locations</i>	<i>Activity</i>	<i>Predicted Sound Level (dBA)</i>	<i>Noise Management Level (dBA)</i>	<i>Compliance (Yes/No)</i>
Receptor Area 3 (residences on the eastern side of Meroo Road, south of Fletchers Lane)	Drilling (Meroo Road crossing)	38	42	Yes
	Drilling (at Railway Line)	39	42	Yes
	Backhoe	31	42	Yes
	Trencher	48	42	No + 6 dB
	Loader	42	42	Yes
	Welding Rig (Diesel)	32	42	Yes
	Dewatering Pump	27	42	Yes
	Truck	44	42	No + 2 dB

Table 26
Predicted $L_{eq 15 \text{ minute}}$ Construction Noise Levels – Receptor Area 4
(With Noise Control)

<i>Receptor Locations</i>	<i>Activity</i>	<i>Predicted Sound Level (dBA)</i>	<i>Noise Management Level (dBA)</i>	<i>Compliance (Yes/No)</i>
Receptor Area 4 (residences in Edwards Avenue and south e.g. Alfred Street and Lillian Place)	Drilling (Edwards Avenue Crossing)	54 to 65	40	No + 14 to 25 dB
	Backhoe	53	40	No + 13 dB
	Trencher	68	40	No + 28 dB
	Loader	64	40	No + 24 dB
	Welding Rig (Diesel)	54	40	No + 14 dB
	Dewatering Pump	49	40	No + 9 dB
	Truck	67	40	No + 27 dB
	Rock Hammering (if required)	68	40	No + 28 dB

The above predictions assume a conservative reduction of a maximum 7 dB from either screening around fixed plant or silencing mobile plant. These predictions are an estimate only and greater attenuation may be achieved in practice once full details of all plant and equipment are known.

It can be seen from **Tables 23 to 26** that predicted noise levels are well below the 'highly noise affected' level of 75 dBA above which there may be strong community reaction to noise at all receiver locations.

There is still potential for noise management levels to be exceeded on some occasions and we therefore recommended the following noise management controls to minimise the impact on residential receivers.

7.3.4.2 Noise Management Controls

The following noise management controls are derived from or are in accordance with recommendations given in Australian Standard AS2436-2010 and the OEH's *Interim Construction Noise Guideline* according to DD.

Periods of Respite

Noisy construction activities such as drilling at the Edwards Avenue intersection only operate for 2 to 3 hours at a time. This will reduce the noise impact at the nearby residences. Ensure activities in any one location are staggered, for instance, if rock hammering or drilling is occurring at one location, do not operate additional excavations or other noisy plant at the same location until the activity is completed.

Work Practices

Workers and contractors be trained in work practices to minimise noise emission including:

- Employ the use of broadband audible reversing alarms on all mobile plant.
- Avoid dropping materials from a height.
- Avoid shouting and talking loudly outdoors.
- Avoid the use of radios outdoors that can be heard at the boundary of residences.
- Turn off equipment when not being used.
- Carry out work only within the recommended hours of operation (see Section 7.3.2.2).

Heavy Vehicles and Staff Vehicles

- Keep truck drivers informed of designated vehicle routes, parking locations, acceptable delivery hours or other relevant practices (for example, minimising the use of engine brakes, and no extended periods of engine idling).
- Locate site vehicle entrances away from residences where practicable.
- Optimise the number of vehicle trips to and from the site – movements can be organised to amalgamate loads rather than using a number of vehicles with smaller loads.
- Staff parking areas should be located as far from residential receiver locations as practicable.
- No motor vehicles should access the site via, or park within, residential areas prior to 7:00 am in order avoid sleep disturbance. For example whilst works progress through receptor area 4 from north of Roseville Road to south of Alfred Street (see **Figure 22**).

Community Relations

A Liaison Officer should maintain liaison between the neighbouring community and the contractor and communication lines should be opened early, prior to commencement of any works. Communication should be made with all affected residences via a range of media including, for example, individual contact and letter box drops.

Inform the neighbours about the nature of the construction stages. The neighbours should be notified when the excessively noisy operations (such as the use of the drilling rig) are to be carried out.

Consultation and cooperation between the contractor and the neighbours and the removal of uncertainty and rumour can help to reduce adverse reaction to noise.

Managing a Noise Complaint

The Liaison Officer should receive and manage noise complaints. All complaints should be treated promptly and with courtesy. Should a justified noise complaint not be resolved, noise monitoring may be carried out at the affected receptor location and appropriate measures be taken to reduce the noise emission as far as reasonably practicable.

Where it is not practicable to stop the noise, or reduce the noise, a full explanation of the event taking place, the reason for the noise and times when it will stop should be given to the complainant.

The following guidelines are recommended in Section 6 of the *Interim Construction Noise Guideline* to manage a noise complaint:

- Provide a readily accessible contact point, for example, through a 24 hour toll-free information and complaints line.
- Give complaints a fair hearing.
- Have a documented complaints process, including an escalation procedure so that if a complainant is not satisfied there is a clear path to follow.
- Call back as soon as possible to keep people informed of action to be taken to address noise problems. Call back at night-time only if requested by the complainant to avoid further disturbance.
- Provide a quick response to complaints, with complaint handling staff having both a good knowledge of the project and ready access to information.
- Implement all feasible and reasonable measures to address the source of complaint.
- Keep a register of any complaints, including details of the complaint such as date, time, person receiving complaint, complainant's contact number, person referred to, description of the complaint, work area (for larger projects), time of verbal response and timeframe for written response where appropriate.

7.3.4.3 Vibration Monitoring

DD recommend that the level of vibration be measured during the rock hammering and trenching in the event that rock hammering is required or complaints arise regarding vibration from any nearby residences.

The vibration measurements can be carried out using either an attended or an unattended vibration monitor. An unattended vibration monitor should be fitted with an alarm in the form of a strobe light or siren to make the plant operator aware immediately when the vibration limit is exceeded. The vibration monitor should be set to trigger the alarm when the overall Peak Particle Velocity (PPV) exceeds **15 mm/s** at the nearest residential building.

7.3.5 Department of Planning and Infrastructure Adequacy Review

The NSW Department of Planning & Infrastructure, as part of their adequacy review of the original EA, has requested additional information with respect to noise impacts (refer **Annexure 3**). Following a review of the Department's comments and subsequent discussions between Departmental staff and DD, this section of the EA addresses each of the issues raised by the Department.

- 1. The noise assessment predicts the level for each item of plant and equipment to be used during construction individually and compares each noise source to the relevant criteria in OEH's Interim Construction Noise Guideline (ICNG). In order to ensure that the highest potential level of noise is presented, all items of plant and equipment should be added together and remodelled collectively.*

In order to address the Department's request DD have calculated the combined level of all plant at each receptor location in **Tables 17 to 20** inclusive.

This combined noise impact significantly overstates the potential noise impact as this will never occur in practice.

The works will progress at a rate of approximately 500 to 800 metres per day, consequently different items of plant will be at different locations at any given time, affecting different receptors. The predicted noise level shown in each table, for each individual item of plant is based on that item being as close as possible to the respective receptor at the time. The cumulative impact will therefore not be the acoustic sum of the individual levels predicted for each item of plant. The cumulative level of noise at each receptor will not be significantly greater than the highest individual level represented in each table.

In any event additional recommendations are made in Section 7.3.4.1 and 7.3.4.2 'periods of respite' in relation to managing the potential for cumulative impacts.

- 2. The EA predicts a number of exceedences of the relevant ICNG criteria (and in some cases emissions could be up to a level where there could be strong community reaction). The EA proposes a number of source controls to mitigate these impacts (e.g. exhaust silencers and use low noise machinery) but does not quantify how effective these measures would be at attenuating noise. When the noise emissions are remodelled, it should take into account these measures.*

To address the department's request **Tables 23 to 26** inclusive show estimated noise levels following a conservative reduction from source noise controls. Actual attenuation from these measures or the reasonability and feasibility of implementing them over such a short project should be determined once the contractor and exact items of plant have been selected.

Recommendations made in Section 7.3.4.2, under work practices are examples of ways of minimising noise emission from construction activities, where practicable. The objective of the OEH's ICNG is to implement all feasible and reasonable work practices to minimise noise impacts, providing a holistic and pragmatic approach to noise reduction without prescribing specific noise controls.

Selecting quieter, low noise machinery is a good way to reduce noise, for example using a 12 tonne excavator in preference to a 30 tonne excavator if it is capable of doing the task and is economically viable. It is difficult to quantify a reduction like this without knowing the proposed plant however, noise reductions of 10 dB are likely.

Similarly low noise / alternative work practices could reduce the noise impact by, for example, using concrete saws in preference to rock breaking machinery.

The level of attenuation achieved from mobile plant exhaust silencers, can vary considerably, depending on the cost, age of the plant, etc. This project is of relatively short duration and it may not be reasonable to expect a fleet of plant to be fitted with silencers for the sake of the project, however, should any plant already be fitted with silencers this may be a consideration when selecting tenders or individual items of plant from a fleet.

3. *If there are still exceedences of the relevant ICNG criteria once the construction noise levels have been remodelled, the company should consider what other reasonable and feasible noise management and mitigation measures it could implement to further reduce construction noise and/or what community consultation activities it would carry out to reduce these impacts on surrounding receivers.*

Any exceedences of the noise management levels will be for a relatively short duration at any effected residence, specifically less than a total of one week (see Section 7.3.4.2).

Advice is given in Section 7.3.4.2 under 'community relations' and 'managing a noise complaint' for examples of carrying out community consultation.

With the potential for rock hammering it is particularly important to inform all potentially affected residences on the southern side of Edwards Avenue, for example between 72B to the east and Samuel Street to west as well as all residences in Lillian Place and on the eastern side of Alfred Street. This should be confirmed once the location and extent of rock hammering is known.

Consultation should be via letter box drops initially, several weeks prior to commencement, detailing the reason for hammering, the date/s hammering will occur, the duration and between which hours. The letter should contain a contact name and number for queries or complaints and follow up letters should be delivered closer to the

time. The company's liaison officer should visit the homes in the immediate vicinity of the rock hammering works and discuss the details with the owners.

If a temporary site office is established on the job, a notice board should be placed prominently outside and updated regularly with details of noisy events and contact details of a liaison officer for members of the community.

If there is potential for rock hammering to continue at one location for more than 3 or 4 days, consideration may be given to temporary noise barriers and a determination may be made once the extent of hammering is known.

4. *The noise assessment indicates that no rock hammering equipment would be used during construction whereas the geotechnical report states that a 20 tonne excavator equipped with rock bucket, rock hammer or ripping tyne would be used to penetrate highly weathered (Class V) sandstone during construction. The revised EA must clarify whether or not rock hammering equipment would be used during construction and, if so, the noise impacts of this must be assessed.*

An assessment of the potential noise impacts associated with potential rock hammering activities has been addressed in this revision. Please see Section 3 page 5, Table 6.5, Section 6.3 of the Noise Impact Assessment prepared by DD; **Table 20**, Section 7.3.3.3 of this EA; and the response to point 3 above.

5. *Finally, the revised EA should clarify whether the proposed pressure reduction facility would generate noise and, if so, the noise impacts of this must be assessed.*

Refer to Section 7.3.3.5 of this EA.

7.3.6 Construction Noise Impact Statement

The Construction Noise and Vibration Plan prepared by DD concludes:

"The predicted level of noise emission from the construction activities is likely to be in excess of the noise management levels, at least on some occasions. Provided the recommendations in Section 7 of this report are implemented and adhered to, the level of noise and vibration from the construction works for the Shoalhaven Starches Gas Pipeline Project will be minimised in accordance with the NSW Office of Environment and Heritage's Interim Construction Noise Guideline and Australian Standard AS2436 – 2010 as detailed in Section 5 of this report."

7.4 SOIL AND WATER

In terms of "Soil and Water" the DGRs require:

- o ***Soil and Water*** – including:

- *an assessment of the water quality impacts associated with the construction and operation of the Project, with particular reference to impacts on aquatic ecology, riparian zones, surface water and groundwater impacts along the proposed route;*
- *detailed information which describes how those water bodies or water courses would be traversed and measures that would be used to avoid or minimise any predicted impacts;*
- *consideration of sea level rise and how this would be managed;*
- *consideration of acid sulfate soils and how they would be managed if detected; and*
- *specific reference to how erosion and sedimentation would be managed during construction.*

7.4.1 Water Quality Impacts

7.4.1.1 Surface Waters

Shoalhaven Starches engaged Allen Price & Associates (APA) to address the water quality impacts associated with the project. APA have prepared an Erosion and Sediment Control Plan (ESCP) for the project which is included as **Annexure 13** to this EA. The ESCP describes the watercourses likely to be impacted by the proposed route and potential impacts with specific reference to how erosion and sedimentation would be managed during construction. This section of the EA is based upon the findings of this report.

The ecological aspects of the project were examined separately by Kevin Mills & Associates (**Annexure 8**) and addressed separately in Section 7.6 of the EA.

The report prepared by APA seeks to broadly address erosion and sediment control issues outlined in the DGR's requirements, under the heading of Soil and Water requiring:

- *“specific reference to erosion and sedimentation management during construction”.*
- *“detailed information describing how water bodies or water courses would be traversed and proposed measures to avoid or minimise any predicted impacts”.*

The DGRs are addressed in the report by APA in accordance with the guidelines, principles and recommended standards for managing erosion and sediment control, outlined in Landcom's *Managing Urban Stormwater – Soils and Construction, Volume 1, 4th Edition (The Blue Book), and Volume 2A- Installation of Services.*

According to APA the main aims of erosion and sediment control (ESC) for this project are:

- *Protect disturbed areas from the eroding action of stormwater runoff.*
- *Prevent sediment from disturbed soils entering into watercourses and stormwater systems by providing filtration to remove sediment from stormwater.*
- *Divert clean stormwater runoff that would naturally flow through the proposed construction areas, preventing it from becoming polluted by sediment from soils that have been disturbed during excavation.*
- *Aid in rehabilitating disturbed soils, riparian zones and watercourses.*

Erosion and Sediment Control Management

Assessing Constraints and Opportunities

As much of the route is located over land with negligible grade, minimal land degradation was observed by APA. Areas along the banks of watercourses where the proposed gas pipeline will cross were found to be susceptible to erosion and degradation. There are no areas along the route according to APA that were found to require stabilisation due to past erosion and sediment control issues.

The majority of vegetation along the route is grass and weed found within the road reserves. Native trees were found in all road reserves along the route. Some of these will require removal to facilitate pipeline construction.

The proposed route is mainly flat with a 'gentle' slope to the south east, toward Abernethys Creek and the Shoalhaven River. Some areas are steeper along the route, although generally short in length. These areas require greater erosion and sediment control.

There are a number of watercourses and drainage lines that can be used to facilitate erosion and sediment control.

Tunnel erosion may pose a problem on the steeper sections along the route, which are adjacent to a number of watercourses. These areas will need further investigation during detailed design. Trench stops and bulk heads may need to be used to stop erosion and damage to the gas pipe or other related issues from occurring.

No areas were observed by APA that could take surplus excavated materials since the majority of the route is within road reserves or adjacent to prime agricultural land.

Erosion and sediment control measures chosen need to minimise adverse impacts to existing vegetation and local wildlife. The passage of native animals through the site shall be allowed and the effect of erosion and sediment controls on native vegetation be considered when selecting controls.

The proposed route was originally selected to minimize disturbance to wildlife and sensitive environmental areas. Correct selection and placement of erosion and sediment controls will further minimise impacts to the environment.

Opportunity exists for minor route alteration during detailed design. Such would seek to avoid specific areas along the route that constrain the construction of the proposed gas pipeline, and save time and money by reducing the amount of erosion and sediment control required.

Erosion and Sediment Control Management Procedures

The following list describes general erosion and sediment control procedures, described by APA, to be incorporated into the CEMP for the project:

- All works are to be carried out in accordance with Landcom's *Managing Urban Stormwater; Soils and Construction Volume 1, 4th Edition, March 2004 & Volume 2A*.
- The contractor shall take all reasonable measures to minimise the effects of dust emissions from the site including the spreading of mulch in areas where construction has been completed.
- All topsoil from the construction areas is to be stripped and stockpiled. Stockpiles are to be located outside areas of concentrated stormwater runoff and are required to be grass seeded or mulched if they are to remain for longer than fourteen (14) days.
- The movement of machinery over the site should be limited to the construction areas to avoid disturbance to existing vegetated areas. No-go areas are to be marked off prior to commencement of works. Machinery should be inspected prior to exiting construction area to ensure excess mud and debris is not tracked onto roadways. During and on completion of the workday contractors should inspect to ensure the roadways adjacent to the project site are free of excess mud/debris and clean if necessary.

- Areas of the site that are disturbed by construction works are to be topsoiled, seeded and fertilised immediately after construction works in the particular area have finished and not left till the end of the overall construction.
- Construction areas shall not be left in an open and disturbed state for more than fourteen (14) days. Areas expected to be left open for periods longer than this are to be seeded.
- Filter fences are to be removed only after all disturbed areas have established a good grass covering, minimum 70%.
- Any existing bare or disturbed areas of the site not affected by the construction works are to be topsoiled, seeded and fertilised as soon as practicable after each phase of work.
- Sediment and erosion control structures are to be maintained on a daily basis during construction and on a minimum of weekly basis during the six month liability period (or as required depending upon weather conditions). All material removed from the traps is to be spread and grass seeded or disposed of, off site in an approved manner.
- All imported fill is assumed to be a material other than dispersive clay. All fill material is to be tested for dispersibility prior to placement on the site and if found to be dispersive the superintendent is to be notified prior to placement of any fill for advice on treatment of dispersive soils.
- Sediment fence/filter can be used as erosion and sediment control around stockpiles, adjacent to the main trench, around areas where underboring of watercourses will occur and be installed around the perimeter of wetlands, and should be installed at all drainage structures receiving stormwater runoff from excavated areas. Filter/sediment fences are to be constructed from an approved filter material and erected in accordance with the manufacturer's instructions.
- Swales and table drains along the route should have staked straw bale or socked mesh dams installed on road reserve shoulders that receive runoff stormwater runoff from excavated soils.
- Waste generated by the construction process should be collected and retained on site in appropriate containers and be removed offsite to a licensed landfill when appropriate

- Washing out of concrete truck chutes should occur at specific locations pre-determined prior to construction. Bermed pits with a large enough volume to take multiple pours should be excavated for this purpose. Material from the pits shall be disposed of and the pits regraded when all concrete work is complete.
- Materials that may be brought on site for construction of the proposed gas main include:
 - Aggregate of various sizes for trench backfill, bedding, and other applications.
 - Pipe and associated fittings.
 - Wood in various forms for staking, marking alignment and forming for concrete work.
 - Paint for marking alignments and the location of various utilities.
 - Where possible materials should be placed above ground on pallets or alternative.

Section 3 of the APA report (**Annexure 13**) provides general assessment of erosion and sediment controls required for specific locations along the gas pipeline route.

Site Specific Erosion and Sediment Control Management

Trenching

There are differing requirements for erosion and sediment control depending on whether the proposed trench runs across grade, down grade or obliquely. The gradient of the land is also an important factor.

Much of the length of the proposed gas pipeline route is flat with exceptions at watercourse crossings, Edwards Avenue and Railway Street.

Across grade:

- Heaped soil from trench to be placed on up-hill side to form an earth bank.

Down grade:

- Measures to be taken to filter sediment laden water downstream.
- Sediment fences can be used at the majority of steep sections on the proposed site to catch silt.
- Earth banks can be used across backfilled sections of the trench to slow moving water down and direct it out away from trench.

- Trench stops may be required on slopes that grade down to watercourse crossings.

Obliquely:

- Heaped soil from trench to be placed on up-hill side to form an earth bank.
- Steep grades may require trench stops.

Soil and Stockpile Management

Stockpiles will be required along the proposed route to store materials, excavated soil and top soil. The most suitable location for these stockpiles would most likely be over the backfilled trench of the previously completed stage or on the opposite side of the road reserve within the verge or footpath. The stockpile size and spread needs to be limited to allow machinery to pass, and also to reduce the mass sitting above the newly installed gas main and other existing services.

Erosion and sediment control will consist of sediment fence and straw bale filters on the low side of the stockpile. Dust emissions need to be minimized. Due to the relatively short construction period required during staged construction, stockpiles would not be in place for more than one week maximum, although it may be possible to utilize one stockpile location for a number of consecutive stages of construction.

Road Reserves

A number of road reserves will be impacted by construction of the proposed gas pipeline. Section 3.4 of the APA report included in **Annexure 13** assesses each systematically and addresses general erosion and sediment controls required.

A small portion of Railcorp's land (20-50m) will be used for the proposed gas main. The track in the reserve is active with passenger and freight trains passing through each day to the nearby Bomaderry Railway Station and Manildra Factory. Manildra's private rail reserve will also require underboring, adjacent to Bolong Road.

Watercourse Crossings

Four watercourse crossings along the gas pipeline route have been identified by APA. These are located at positions 7, 8, 9 and 11 along the route as shown in **Figure 12**. The watercourses to be crossed include:

1. A small drainage channel, at the outlet of the first culvert/bridge immediately downstream of Fletchers Lane, flowing onto the floodplain and eventually into the Tullian Creek (position 7, **Figure 12**). Refer **Figure 23** and **Plate 11**.

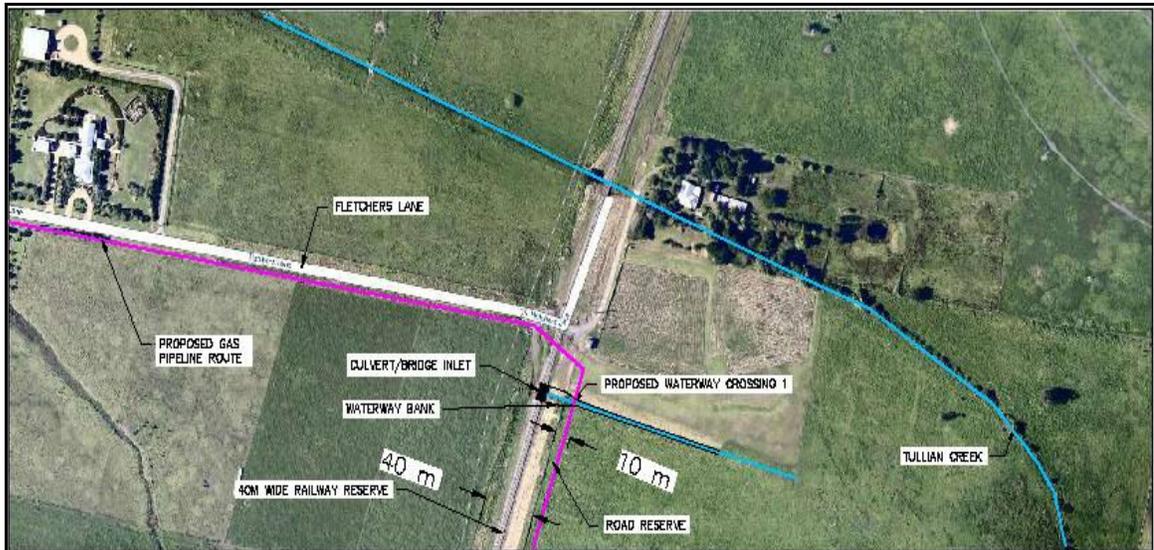


Figure 23: Plan view of watercourse crossing 1 (position 7).



Plate 11: View of first watercourse crossing (position 7, Figure 12) showing boundary between road reserve and Railcorp's rail reserve.

2. A small tributary watercourse of Tullian Creek, flowing through the 2nd main railway bridge/culvert south of Fletchers Lane. An intermediate culvert with no watercourse is located between watercourse 1 and watercourse 2 (position 8, **Figure 12**). Refer **Figure 24** and **Plate 12**.

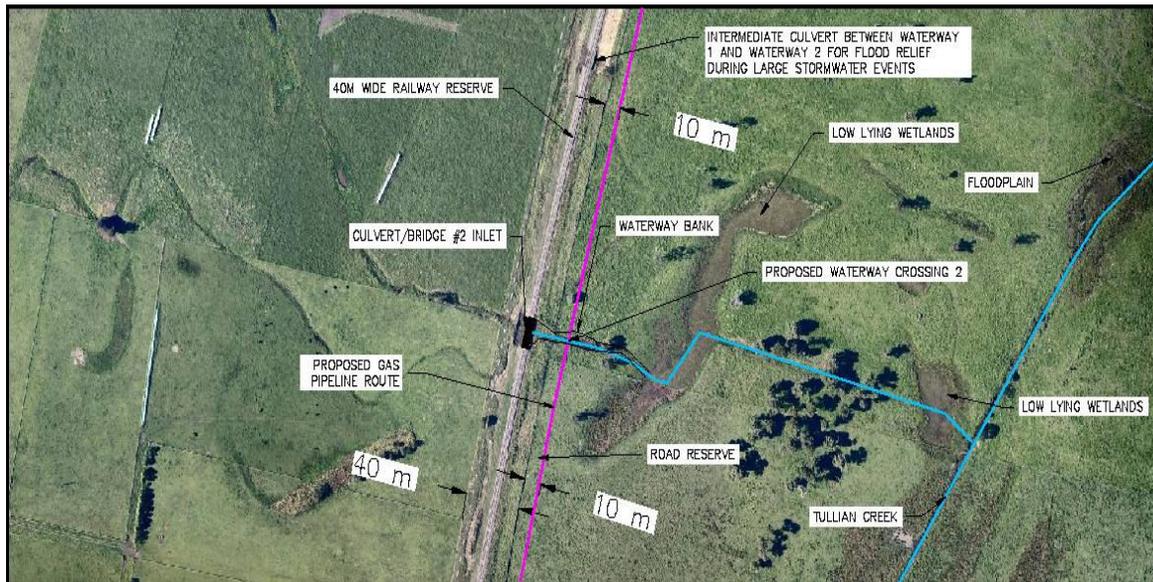


Figure 24: Plan view of watercourse crossing 2 (position 8).



Plate 12: View of second watercourse crossing (position 8 **Figure 12) adjacent to Railcorp's rail reserve.**

3. Abernethys Creek (position 9, **Figure 12**). Culvert/bridge No. 3 is located just upstream of the crossing point in the railway reserve. Refer **Figure 25** and **Plate 13**.

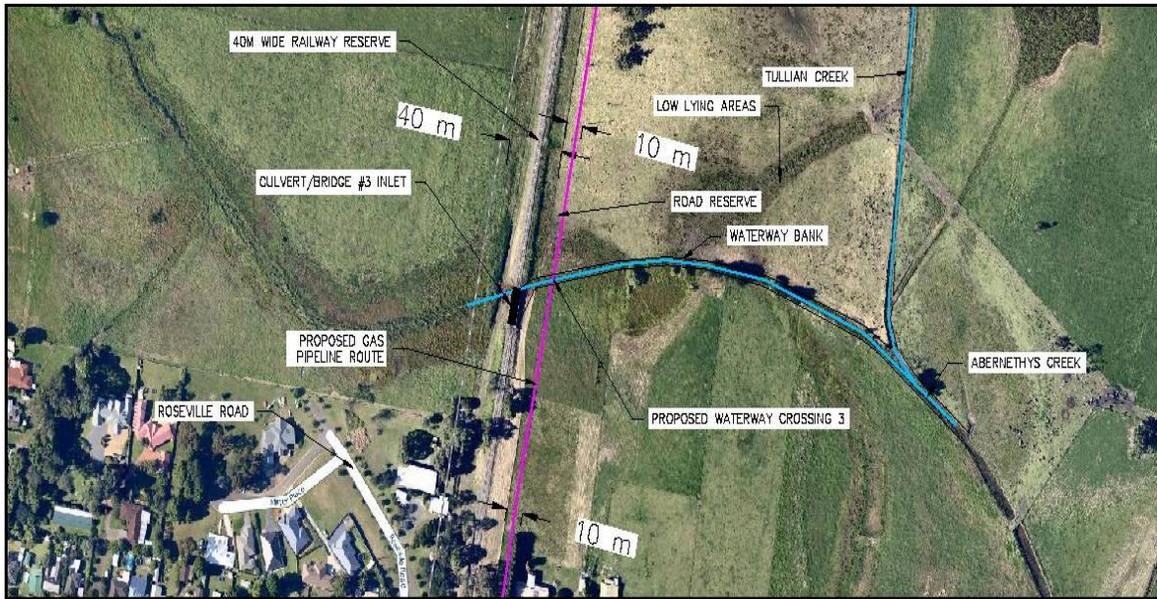


Figure 25: Plan view of watercourse crossing 3 (position 9).



Plate 13: View of third watercourse crossing (position 9, Figure 12).

4. Mulgen Creek (position 11, **Figure 12**). Culvert/bridge #4 is located just upstream of the crossing point in the railway reserve. Refer **Figure 26** and **Plate 14**.



Figure 26: Plan view of watercourse crossing 4 (position 11).



Plate 14: View of fourth watercourse crossing (position 11, **Figure 12).**

The proposed watercourse crossings are also shown in detail in APA drawing 24710-04 sheets 1 – 16 (which forms **Annexure 13** to this EA).

Figure 27 are images of typical cross sections of horizontal (mechanical) boring techniques under a watercourse. **Figure 28** provides long and cross sections of the proposed crossing of watercourse 3.

The immediate area surrounding watercourses (riparian zones) are susceptible to erosion and sedimentation due to the increased possibility of flowing water in these areas. The four watercourses are minor and flow intermittently throughout the year, depending on the size of the storm event affecting the associated catchment. Erosion and sediment control management for watercourse crossings will depend on the weather preceding, during and after proposed construction period. The ESCP should provide alternative controls based on weather forecasts and size of storm events expected.

Watercourse crossings will not be made by open trenching. All watercourses will be crossed by mechanical underbore, to mitigate impacts on watercourses and surrounding riparian zones. Open trenching shall be stopped at the boundary of the core riparian zone watercourse and trench stops put in place until a suitable watercourse crossing has been made. The width and boundaries of watercourse riparian zone are addressed in the separate geomorphic assessment in this section of the EA.

Watercourses will require temporary vehicle crossings for stabilised machinery access over the 5 m – 7 m wide right-of-way to be built within un-formed road reserves. Significant erosion and sedimentation is possible at watercourse crossings and adequate control measures are needed to mitigate impacts to soils, vegetation and watercourse geomorphic condition.

Stabilised work sites approximately 20 m x 40 m are to be positioned at either side of watercourse crossings for underbore machinery to be positioned to lay pipe under the bed of the watercourses. Stabilised work sites are also required at other locations along the proposed route where underboring is required and other machinery will be best positioned during non-work periods. Stabilised work sites are to be built only when required as staged construction of the pipeline progresses along the route. Rehabilitation is to begin immediately when trenches and watercourse crossings are backfilled and completed, respectively.

The proposed gas pipeline is to be buried under watercourse beds with a minimum depth of cover from the bed to the top of pipe equal to 2.0 m minimum. This value will increase if scour is an issue at the watercourse crossing.

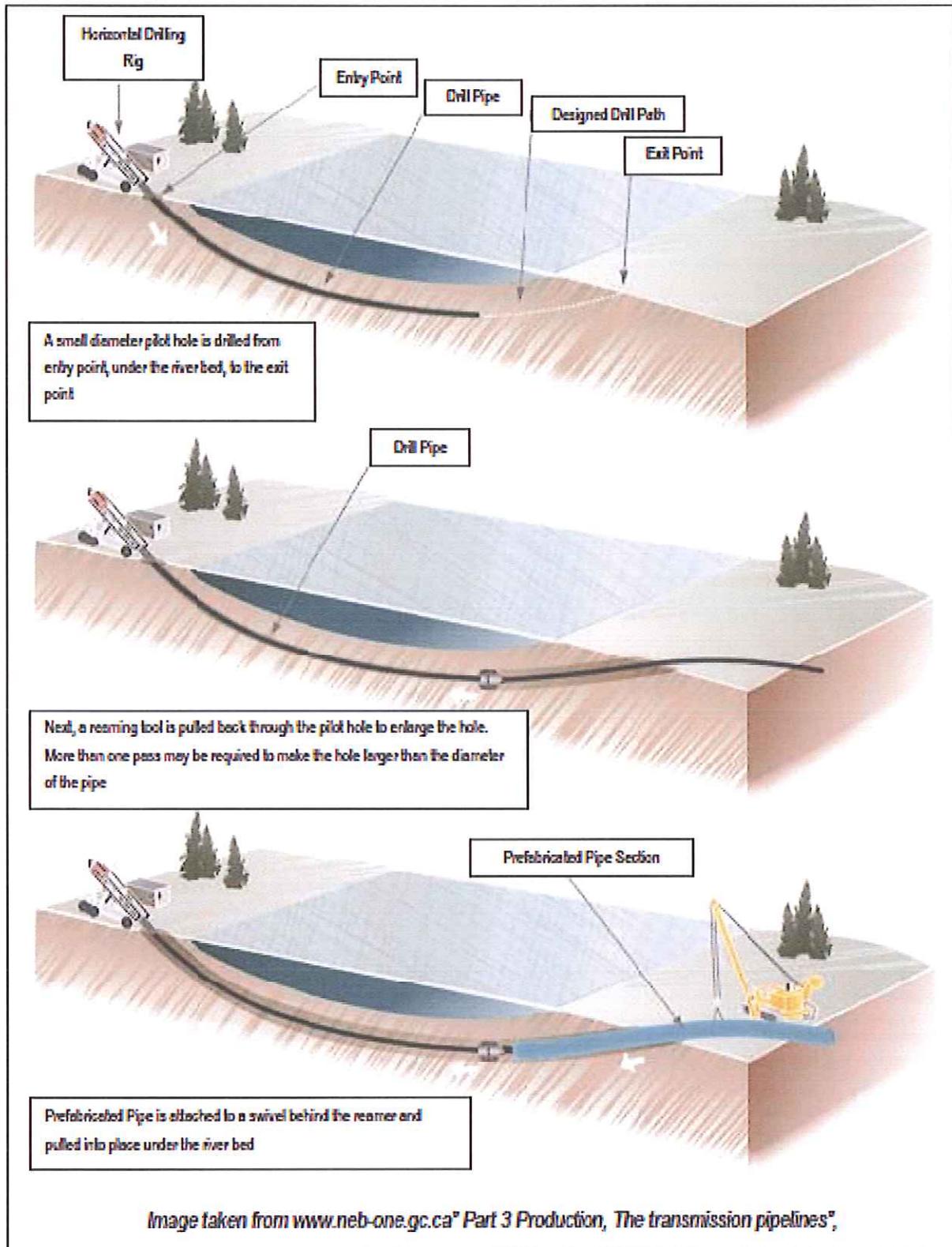
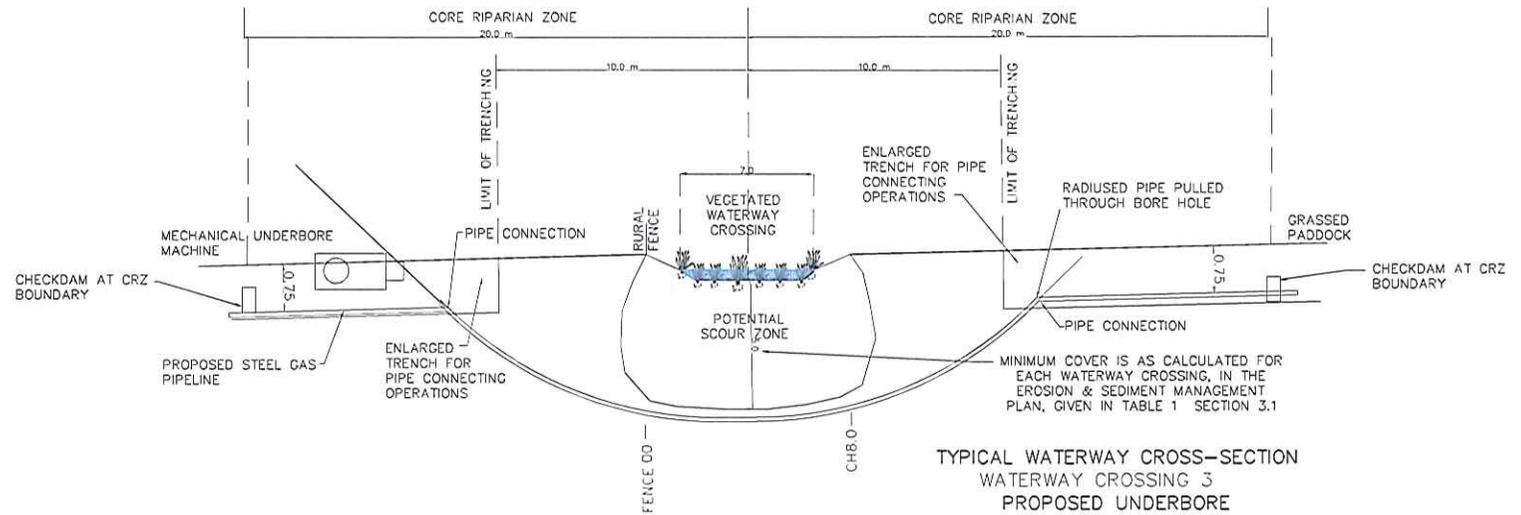
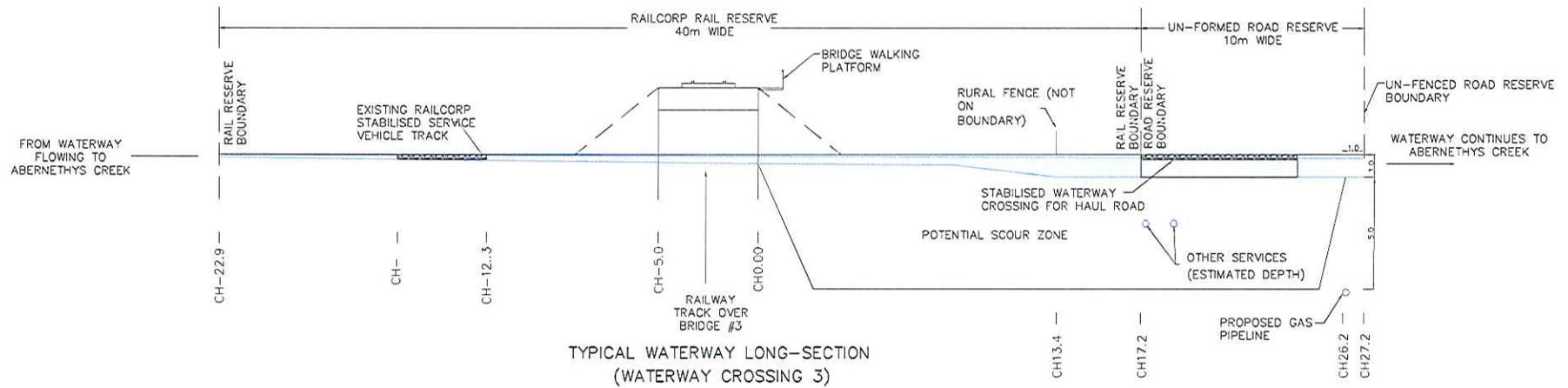


Figure 27: Typical Horizontal Boring Technique



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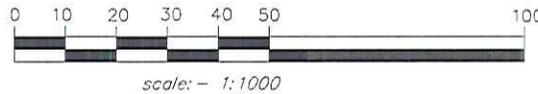


Figure 28: Sections of Waterway Crossing 3

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APPENDIX E: TYPICAL SECTIONS – WATERWAY CROSSING 3 SHOWING UNDERBORE & SCOUR ZONES FOR PROPOSED GAS PIPELINE AT MEROO MEADOW AND BOMADERRY FOR SHOALHAVEN STARCHES

REF. No. 24710 sheet 1 of 1
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There is potential for fluvial geomorphic impacts on the proposed gas pipeline at watercourse crossings. Changes may occur to the watercourse characteristics, especially from the scouring action of flowing water at the outlet of the culverts and bridges immediately upstream of the proposed watercourse crossings. A geomorphic assessment has been undertaken of the watercourse crossings and associated core riparian zones to assess this potential by APA.

To mitigate impacts on the pipeline due to fluvial geomorphic changes, the effect of scour on the watercourse crossing was determined and the scour depth at each watercourse crossing calculated to determine the depth of cover required under each watercourse bed being crossed.

Fluvial Geomorphic Assessment

To ensure on-going stability of the creeks being crossed by the proposed pipeline, a geomorphic assessment of the four proposed watercourse crossings has been undertaken in order of the watercourses as identified in **Figure 12**.

Over time, the shape, size and behaviour of active watercourses change, which increases the potential for significant impacts to the proposed gas pipeline at the watercourse crossing points. APA have assessed the degree of impact that is likely to occur to the pipeline at the watercourse crossings.

The objectives of the geomorphic assessment carried out by APA are:

- *determine current geomorphic condition of the watercourses and their associated riparian zones;*
- *determine geomorphic history of the proposed watercourse crossings;*
- *determine future geomorphic effects on the watercourses and impacts on the pipeline at the watercourse crossings;*
- *provide machinery and construction site setbacks from watercourses;*
- *Provide recommendations to mitigate potential geomorphic impacts to the pipeline, and to mitigate impacts of construction on riparian zone and bank stability.*

To meet the objectives, APA undertook the following:

- site inspections of watercourses and riparian zones;
- determine watercourse categories for riparian zone distance classification of watercourse crossings;
- modelling to determine characteristic behaviour of watercourses and floodplain due to stormwater runoff;

- determine culvert and bridge flood outlet velocities;
- calculate depth of scour at outlet of culverts and bridges;
- Outline pipeline construction impacts to the watercourse and riparian zones and mitigation measures.

Site Setting

The proposed pipeline will cross four watercourses between Fletchers Lane and Railway Street, on the northern bank of the Shoalhaven River, and Lower Shoalhaven River Floodplain, within the 10 m wide unformed road reserve directly adjacent the Illawarra Railway reserve and Railway track. These are located along the proposed route as shown in **Figure 12** with each watercourse crossing location numbered 7, 8, 9 and 11. The locations of these watercourses are also located on detailed plans included in **Annexure 5** of this EA.

Figure 29 below shows the boundaries of four catchments (CA1 to CA4) that flow into local watercourses, and more specifically into the culverts and bridges at proposed pipeline watercourse crossings. The catchments are bounded by Cambewarra Road, Moss Vale Road, Tourist Road and Cambewarra Lookout Road. Stormwater runoff flows into tributaries over Cambewarra Mountain, into the Tullian and Abernethys Creeks and eventually onto the Lower Shoalhaven River Floodplain. Catchment peak flow rate calculations are included in Appendix H of APA's report which forms **Annexure 13** to this EA.

An elevated railway track formed of fill and capped with blue metal ballast approx 2 - 3 m above the natural surface level, is located centrally in a 40 m wide rail reserve running in a north-south direction, on the Lower Shoalhaven River Floodplain.

Flood water from Abernethys Creek and Tullian Creek are prevented from building up behind the elevated railway track by a number of concrete box culverts and steel bridges. The proposed gas pipeline route runs parallel to the railway line, within the un-named road reserve positioned directly downstream of the track on the Lower Shoalhaven River floodplain.

Photographs taken of the proposed route by APA are included in Appendix B of their report which forms **Annexure 13** to this EA.

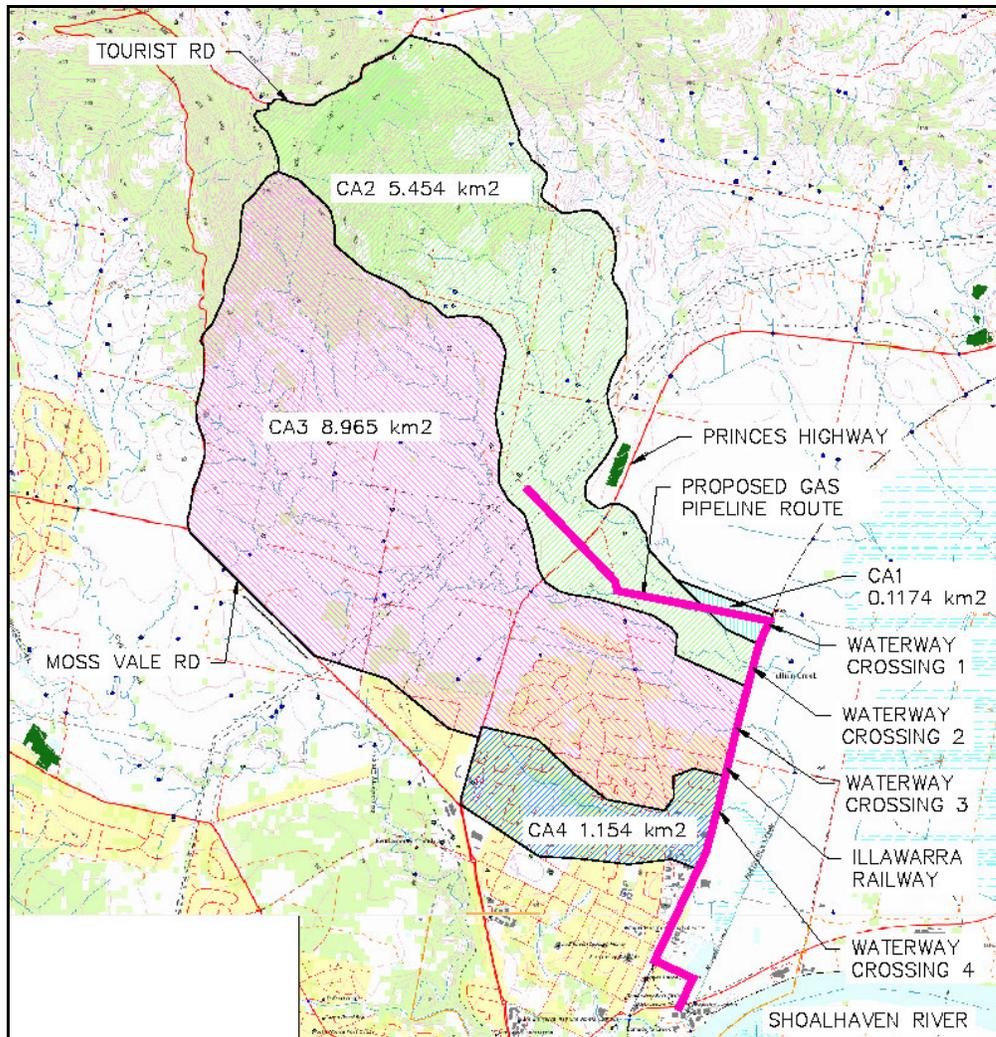


Figure 29: Catchment details for proposed gas pipeline geomorphic assessment.

Watercourse History

Changes to these watercourses appear to have occurred only recently from European settlement in the area.

According to APA early Parish maps identify that the four watercourses are approximately in the same locations as they can be seen today.

Information obtained by APA from the NSW Office of Environment and Heritage shows the single track, Illawarra Railway continued from Kiama Station and terminated at Bomaderry Station on the 2nd of June 1893.

According to APA it would seem that the culverts and bridges located just upstream of the watercourse crossings were built for natural watercourses that existed prior to construction of the elevated railway.

The configuration of the watercourses, upstream of the railway line was observed by APA (**Annexure 13**) to have changed based on the differences noticed between the latest 1:4000 topographic map of the and a 1:4000 topographic map dated 31st of May 1895. It is most likely that natural watercourses leading into low lying areas were extended as modified drainage channels and continued through to the Tullian and Abernethys Creeks.

Although these findings show that the watercourses being crossed by the proposed gas pipeline have changed slightly over the last 116 years, according to APA it is unlikely that significant changes will occur at the watercourse crossing positions due to upstream varying conditions. Most of the areas immediately upstream of the watercourse crossings are stable due to being occupied and utilized for farming or residential housing. The culverts and bridges at these positions are fixed and are likely to remain fixed points of impact for the lifespan of the pipeline.

Soil and Land

Meroo Meadow and Bomaderry are situated adjacent to and partly on the Lower Shoalhaven River floodplain. Soils types in this area originate from Permian siltstone and shales of the Berry Formation, and Gerringong Volcanics (mainly west of the Princes Highway), with quaternary river alluvium in the Shoalhaven floodplain (mainly east of the Princes Highway).

Soils are typical of the area and do not require special treatment during excavation, except where acid sulphate soils are disturbed. The main component of significance in these soils is iron sulphide, which reacts with the atmosphere to form sulphuric acid. Erosion and excavation provides the means by which the iron sulphide is uncovered or disturbed and therefore exposed to the atmosphere. The area surrounding Meroo Meadow and Bomaderry contains small wetland areas prone to flooding with a low probability of disturbing acid sulphate soils along the proposed gas pipeline route. These areas are shown in the Shoalhaven LEP and should be identified in the ESCP, with appropriate treatment procedures developed. Section 7.4.1.4 of this EA addresses the issue of Acid Sulphate Soils in further detail.

According to APA, rainfall erosivity factor (R) for soils in the region is approximately 4250 mm/ha.hr.yr, as shown on Map 11: Rainfall Erosivity of the Wollongong 1:250,000

topographic Sheet, obtained from Landcom's *Managing Urban Stormwater – Soils and Construction*, Volume 1, 4th Edition, March 2004. The soils are described as having 'low permeability and low wet bearing strength, high run-on; localized shallow soils with localized rock outcrop.

The proposed route follows a path mainly over 'prime agricultural land'. The current Shoalhaven Local Environmental Plan (1985) states that land classified as 1, 2 or 3 under the Department of Primary Industry's land classification system is regarded as '*prime crop and pasture*' land. The proposed route is situated mainly through class 2 classified areas. Even though the proposed route is through prime agricultural land, it is located over existing formed and unformed road reserves, and a small portion of the railway reserve.

The longitudinal and transverse grade of the proposed route is generally flat, with gentle fall predominately toward the south-east. A number of areas along the route are relatively steep both longitudinally and transversely (greater than 1:4). Fortunately the longitudinal grades of watercourses at proposed crossings are relatively flat and grade back toward the north and north-west. These positions are located generally at the Edwards Avenue intersection, and along the un-named road reserve and Railway Street, adjacent to the train track.

The watercourse cross sections at crossing points are trapezoidal, with flat bottomed beds. The longitudinal grade of the watercourse beds at proposed crossings points are 0.4%, 0.5%, 0.5% and 0.8% respectively. Gradients were determined according to APA from 1:4000 topographic map contours.

The transverse gradient of land at the crossings is flat along the un-named road reserve, except for the land to the south of proposed watercourse crossing at position 9, which falls relatively steeply back toward the watercourse from Edwards Avenue. The watercourse crossing at position 11 is situated in a gully, with two steep sections either side grading back toward the watercourse.

The potential for sedimentation and erosion issues is greatest at the steeper locations of the proposed gas pipeline route, especially adjacent to watercourses, table drains, culverts and the stormwater system.

Watercourse and Riparian Zone Assessment

Riparian lands are transition zones between terrestrial and aquatic environments. Section 5.2 of the Landcom's *Managing Urban Stormwater – Soils and Construction*,

Volume 1 Fourth Edition (Blue Book) describes three broad categories for riparian land. These include:

Category 1 – Environmental Corridor

Category 2 – Terrestrial and Aquatic habitat

Category 3 – Bank stability and water quality

Depending on the category, different management regimes apply to each. Site investigation, and study of the draft Shoalhaven LEP has determined that the riparian zones of the watercourses at the crossing locations, as given in **Figure 12** are categorised as follows;

- Watercourse crossing 1 : Category 3
- Watercourse crossing 2 : Category 3
- Watercourse crossing 3 : Category 2
- Watercourse crossing 4 : Category 2

Although watercourse crossings 1 and 2 could be classed as category 2, since they have the potential to allow animals to cross over from one side of the floodplain to the other side, the watercourses are greatly modified and located mainly on grazed agricultural land.

Watercourse classification is used to identify minimum riparian corridor widths along watercourses. Category 2 – Terrestrial and Aquatic Habitat classification aims to provide for a viable and robust node or reach of riparian habitat (both aquatic and terrestrial), with minimum CRZ width of 20 m (measure from top of bank) along both sides of the watercourse with a 10 m vegetated buffer zone either side.

The aim of maintenance and restoration of Category 2 watercourses is to maintain native riparian vegetations, water quality, bank stability and provide suitable native animal habitats.

Due to the nature of these category 2 watercourses, at the crossing locations with cattle grazing within the 20 m wide CRZ over both banks, and the lack of existing diversified vegetation, the 10 m wide vegetation buffer is not considered necessary.

Watercourses classified as Category 3 require minimisation of sediment and nutrient transfer to provide bank stability, water quality and native vegetation protection. These are generally achieved where possible by emulating a naturally functioning stream, providing terrestrial and aquatic vegetated habitat refuges, using pipes and other

engineering devices as a last resort and treating stormwater runoff before discharging to riparian zones or watercourse.

The two Category 3 watercourses are highly modified from natural conditions with a lack of diversified native vegetation. Cattle graze within the 10 m wide core riparian zones on either bank.

Soil Analysis

Soil data was obtained from a borehole log report prepared by Coffey Environments (**Annexure 10a**). Boreholes 17, 16, 12 and 10 correspond to watercourse crossing locations 7, 8, 9 and 11.

In general, the soils at proposed watercourse crossings were fine grained, cohesive, highly plastic, clays and sandy clays, with shear saturated shear strengths between 100 and 400 kPa.

A soil sieve analysis for grain size was not made.

Vegetation

Vegetation within the watercourses and riparian zones were found to be common between the four watercourse crossings. Remnant vegetation adjacent the proposed gas pipeline route on the Shoalhaven floodplain is most likely from forested or saline wetlands, which would have been removed to make way for the railway reserve, train track and agriculture (dairy farming).

Overall condition of existing riparian vegetation was poor with low structural and floristic diversity, significant weed infestation, and exposed soils observed along stream banks.

The main vegetation type found in riparian zones was kikuyu grass with sporadic plantings of native trees and shrubs, mainly at low lying areas downstream on the floodplain.

Watercourse vegetation consists mainly of aquatic weeds and reed beds that have grown through the grass lined watercourses.

Extensive weed infestations were identified along all of the proposed watercourse crossings, which included a number of noxious weeds, listed under class 4 and 5 of the Shoalhaven Local Government Area.

Lantana and blackberry was found at number of locations along the un-named road reserve and watercourse crossings. It is recommended that these be removed during work site and haul road preparation to improve overall ecosystem health and allow the re-establishment of native species.

Lantana can be removed by cutting and mulching back into the ground. This method will provide some soil protection following weed removal to reduce both erosion and further weed infestation.

A vegetation management plan (VMP) is generally required to ensure riparian areas are managed appropriately and in accordance with strategic objectives. The VMP outlines management zones and establish guidelines for riparian management, focusing on the required actions to carry out the above recommendations. In addition, the VMP also incorporates site specific measures relating to personnel access, weed management, incident management, ASS, surface drainage and erosion controls.

According to APA, a VMP is not considered necessary for this project as the proposed pipeline route is mainly located along road reserves with little to no native vegetation along the route being disturbed. The majority of vegetation being disturbed is kikuyu grass, which can be replaced by seeding or turfing.

While a VMP is considered unnecessary for this project APA recommend that the ESCP should address in detail the rehabilitation of disturbed vegetation, seeking to ensure that disturbed areas are rehabilitated to existing conditions. Areas along the proposed route with native vegetation, such as watercourses and road verges that contain shrubs and trees, should be identified and if native vegetation needs to be disturbed how it will be replaced.

Erosion and Scour

Fluvial scour and bank erosion was observed by APA at each of the watercourse crossing locations. The majority of scour and erosion has occurred between the proposed watercourse crossings and the culvert or bridge in the railway reserve immediately upstream of the crossing points. Limited erosion and scour has occurred downstream of the watercourse crossings.

Outlets of culverts and bridges are known areas of significant scour and erosion. The watercourse crossings were modelled by APA to estimate the maximum scour depth due to a 1 in 100 year flood event. This assists in determining the minimum depth of cover required to mitigate scour impacts on the gas pipeline under the watercourse crossings. It should be noted however that over time, a balance is reached at scour holes, where the depth remains constant and does not keep on growing, unless a significant morphologic change occurs to the watercourse. Eroded sediment is transported from upstream and gets deposited at the scour hole. The 1 in 100 year storm event was chosen since it is used by Shoalhaven Council for their planning policies.

Scour Depth

There is potential for a buried pipeline to be uncovered at watercourse crossings. The minimum depth of burial, or soil cover over the pipeline is stipulated so that damage is prevented to the pipeline. Once buried, the pipeline is to remain in its covered state unless specifically removed.

Determining an adequate amount of cover over a pipeline that crosses under the bed of a watercourse requires consideration of the effect of scour caused by the flooding characteristics of the watercourse and the floodplain immediately within the vicinity of the crossings. As water flows through a watercourse or over a surface, scour or erosion of the surface will occur when conditions are suitable. This is generally dependant on the characteristics of the watercourse; materials used to construct the watercourse; flow velocity and soil type.

Using information from site inspections and desktop analysis APA utilised the HY-8 software from the United States Department of Transportation – Federal Highway Administration, to determine scour potential and minimum depth of cover required between the beds of each watercourse crossing. This software is based on the document, *'Hydraulic Design of Energy Dissipaters for Culverts and Channels'*, Publication No. FHWA-NHI-06-086 July 2006 Hydraulic Engineering Circular No. 14 Third Edition which is also used as a reference manual for the *Australian Rainfall and Runoff Manual*.

Annexure 13 to this EA presents preliminary scour depth modelling results obtained from a simplified deterministic analysis. Statistical variance of the storm events, sediment transport, flow rates, etc. are not considered. Modelling was determined to be feasible, without the need for detailed survey data of the flood plain and watercourses, by APA obtaining relative measurements of bridges and culverts, watercourses, railway track and ballast, and undertaking a desktop study to obtain interpolated data from existing topographic maps and soil test results.

APA recommend that probabilistic modelling of scour depth be undertaken as part of the detailed design of the gas pipeline, and results compared with those presented in this report.

According to APA the most significant form of scour occurring at the watercourse crossings is localised scour at the outlet of bridge/culverts, due to the large catchment coupled with the size of the bridge/culverts, and constriction of the watercourses as they

flow under the railway track, increasing the velocity through the opening. Scour depth analysis is addressed in **Table 27** below.

Geomorphic Assessment Conclusions and Recommendations

The following is a summary of the conclusions and recommendations from APA following their geomorphic assessment of the proposed pipeline route:

- *Changes to waterway morphology is limited with no major changes to waterways observed in 116 year period.*
- *Minor morphological changes are occurring at outlets of bridges/culverts under railway tracks, just upstream of proposed waterway crossings.*
- *The major cause of morphological change is erosion occurring at proposed waterway crossings, from localised fluvial scour at outlet of culvert/bridges.*
- *Velocity of flow over proposed waterway crossings is above 2.0m/s, at three of the four waterway crossings, meaning there is a very high chance of scour occurring at these locations.*
- *The lack of healthy, diverse and continuous riparian vegetation along the bank of each waterway within the unnamed road reserve is contributing to bank erosion and instability.*
- *It is likely that revegetation works within the riparian zone will prevent bank recession continuing due to fluvial scour during small stormwater events.*
- *Protecting the toe and banks of waterway crossings along the width of the road reserve, increasing groundcover and promoting binding root growth as close to the toe of the bank as possible may be adequate to resist scour.*
- *The Core Riparian Zones of all waterways at their proposed crossings are highly degraded due to weed infestation, large flows and velocities, and the lack of an appropriate cattle grazing setback. It is recommended that waterway crossings 1 and 2 be classified as Category 3, and waterway crossings 3 and 4 be classified as Category 2, as per the draft Shoalhaven LEP, and section 5.2 of Landcom's Blue Book;*
- *Category 3 waterways have no CRZ width requirements, whilst Category 2 waterways require a 40m wide CRZ over the waterways with 10m wide vegetation buffer zone either side of the CRZ.*
- *Table 27 below shows scour depths and expected length of scour hole in meters downstream of culvert/bridge outlet. It can be seen that the calculated scour depths may not be reached at the pipeline crossing, especially if the proposed crossing points are at the outer boundary of the un-named road reserve. Since there is approximately 15m of railway reserve between the culvert/bridge and the common boundary between railway reserve and road reserve, it is estimated that greatest amount of scour will occur mainly within the railway reserve, and possibly decrease in depth as it approaches the waterway crossings.*

- *From the scour depth results, the minimum pipeline depth of cover at waterway crossing 3 will need to be increased from the minimum 2.0m, to a minimum of 5.1m. The minimum 2m depth of cover under the waterway beds at waterway crossings 1, 2, and 4 should be satisfactory.*
- *Further variance based modelling of scour at the waterway crossings is required, during detailed design, to take into consideration statistical variance of scour depth variables. The estimated scour hole lengths show that the calculated scour depths may be reached at waterway crossings 2 and 4. See Appendix E for further Detail*

Table 27

Summary of Watercourse Crossings and Scour Results

<i>Watercourse</i>	<i>Watercourse cross-section</i>			<i>Long-Grade</i>	<i>1%AEP Flow Rate</i>	<i>Soil Shear Strength</i>	<i>Culvert Outlet Velocity</i>	<i>Scour Depth</i>	<i>Scour Hole Length</i>
	<i>Depth (m)</i>	<i>Bed Width (m)</i>	<i>Bank Widths (m)</i>						
1	0.5	5.0	1	0.3	2.84	100	1.20	0.9	4
2	1.5	6.5	2	0.5	64.4	200	3.06	2.3	12
3	1.0	7.0	1	0.5	132	100	3.72	5.1	30
4	0.8	5.0	1	0.8	30.0	400	2.72	3.4	14

Site Rehabilitation, Maintenance and Monitoring

Continual site remediation and restoration is required during the construction of the proposed pipeline. Progressive re-vegetation, removal of temporary erosion and sediment control measures, and site stabilisation requires detailed planning.

Rehabilitation, maintenance and monitoring of the pipeline route shall be established as part of the ESCP. The photographic evidence presented in the report prepared by APA (**Annexure 13**) can be used to aid rehabilitation of disturbed sites, back to pre-existing conditions shown in the photos.

As outlined APA do not recommend that a VMP is necessary for the proposed pipeline given to the lack of diversified vegetation found along the proposed route and watercourse crossings. To ensure adequate rehabilitation of each watercourse's CRZ, APA recommend that vegetation rehabilitation and maintenance should be addressed as part of the ESCP, with all native trees and shrubs along the proposed route identified, and all native trees that are to be disturbed to facilitate pipeline construction identified on the plan. For those areas requiring disturbance of native vegetation, the ESCP should outline replacement species and their proposed location.

Top soils removed for trenching and work site preparation shall be stockpiled and reutilised over backfilled trenches and at rehabilitated work sites. If required, a topsoil mix shall be prepared and approved if further topsoil is required for adequate site rehabilitation.

Vehicle watercourse crossings are to remain in place for the full rehabilitation period. Once rehabilitation has been established, vehicle crossings shall be removed and the watercourses filled and regarded to match upstream and downstream conditions. Jute mesh is to be laid and secured over disturbed watercourse crossing locations and the area re-vegetated through the jute mesh. If heavy flows are expected through re-vegetated watercourses before adequate vegetation is established to protect the watercourse, a temporary bypass around the disturbed watercourse may be required, which is to be installed in accordance with the blue book.

Staged construction as proposed provides favourable conditions for re-vegetation. Progressive re-vegetation aims to minimise the area of disturbance during construction. Works should be staged and each stage stabilised immediately on completion of trench backfilling, or on removal of stockpiles placed over previously backfilled trenches. Since the majority of disturbed soils are within agricultural land (pasture), the predominant vegetation affected is grass (kikuyu). The most immediately effective method of stabilization is to seed the disturbed area.

Maintenance and monitoring of erosion and sediment controls and rehabilitated areas is required on a periodic basis to ensure the effectiveness of any mitigation measures implemented during and following the completion of the construction phase. APA recommend that erosion and sediment controls are to remain in place after site works are officially completed, for a period not less than 6 months, or until 75% of the site has been adequately rehabilitated. This is to be decided by the superintendant of the project. **Table 28** below gives monitoring requirements, frequency of monitoring and the person responsible for monitoring and maintenance.

As will be outlined in the draft Statement of Commitments included in Section 9.0 of this EA the monitoring program would need to be undertaken to assess the outcomes of the works undertaken including areas of potential erosion and ground instability associated with construction impact. The monitoring program should include monitoring and maintenance of any bank stabilisation and stream bed and bank rehabilitation. The rehabilitation will need to be monitored until all crossing sites are identified as stable by an independent, suitably qualified certifier.

Table 28
Rehabilitation Monitoring Requirements

<i>Monitoring Requirement</i>	<i>Frequency</i>	<i>Responsibility</i>
Erosion and sediment control inspections	Weekly during construction and rehabilitation periods, and immediately after any storm event.	Project Environmental Officer
Inspection of watercourses	Fortnightly until completion of entire project.	Project Environmental Officer
Inspection of vegetation	As per vegetation management section of ESCP.	Project Environmental Officer
Photographic evidence (riparian zones and watercourses)	Fortnightly.	Project Environmental Officer

Monitoring should also be undertaken for the rehabilitation of native riparian vegetation where native riparian vegetation has been removed as part of the project and rehabilitated following construction. The Office of Water recommends a maintenance period of 5 years after final planting. The rehabilitation of other non native vegetation in riparian areas should be maintained until it is established and the area has been certified as stable by a suitably qualified independent certifier.

Recommendations

The “Erosion and Sediment Control Plan” (**Annexure 13**) prepared by APA makes the following recommendations:

“Based on the site investigation conducted by Allen, Price and Associates, the Shoalhaven Starches gas pipeline project is achievable with the installation and maintenance off simple erosion and sediment controls during construction. To move the project forward with regards to erosion and sediment control of the proposed project, the following recommendations are made ;

- *Determine the exact route that the proposed gas pipeline will follow.*
- *Begin development of the Environmental Management System, and the Construction Environmental Management Plan.*
- *Prepare Erosion and Sediment Control Plan for the site.*
- *Prepare Vegetation Management Plan.*
- *Obtain detailed survey of the entire site, including upstream and downstream floodplain and watercourses, and areas beyond the road reserves where sediment laden waters may be carried.*
- *Undertake variance based modelling to determine scour depth at watercourse crossings.*

- *Ensure all erosion and sediment control requirements will be met by becoming familiar with the legislative requirements relating to Erosion and sediment management of linear service projects.*
- *Notify land owners along the proposed route of any erosion and sediment controls that require construction on their property. Obtain written permission.*
- *Discuss requirements with Shoalhaven City Council.”*

7.4.1.2 Flooding and Sea Level Rise

As outlined in Section 7.4.1, the DGRs for this project require:

- *“consideration of sea level rise and how this would be managed.”*

NSW Government Policy on Sea Level Rise

The NSW Department of Planning has issued a policy statement entitled “NSW Sea Level Rise Policy Statement” October 2009 which outlines the NSW Government’s attitude towards the impacts of sea level rise on regional planning and new development.

The policy states the following:

The NSW sea level rise planning benchmarks are an increase above 1990 mean sea levels of 40 cm by 2050 and 90 cm by 2100, with the two benchmarks allowing for consideration of sea level rise over different timeframes. The benchmarks were established by considering the most credible national and international projects of sea level rise and take into consideration the uncertainty associated with sea level rise predictions. The Government will continue to monitor sea level rise observations and projections and will periodically review these planning benchmarks, with the next review likely to coincide with the release of the fifth IPCC report, due in 2014.

and

The sea level rise planning benchmarks will support consistent consideration of the influence of sea level rise on any coastal hazards and flooding risks that may influence a development or redevelopment site. The benchmarks are not intended to be used to preclude development of land that is projected to be affected by sea level rise. The goal is to ensure that such development recognises and can appropriately accommodate the projected impacts of sea level rise on coastal hazards and flooding over time, through appropriate site planning, design and development control.

Flood Risk Management Guide: Incorporating Sea Level Rise Benchmarks in Flood Risk Assessments

The NSW Department of Environment, Climate Change and Water has issued a report entitled ‘Flood Risk Management Guide: Incorporating Sea Level Rise Benchmarks in Flood Risk Assessments’, August 2010.

The report adopts the planning benchmarks of the *NSW Government Policy on Sea Level Rise* and provides guidance as to how to apply sea level rise benchmarks to flood risk assessments which are undertaken for flood affected areas.

The Guide states the following:

This guide applies to areas where projected sea level rise is likely to have a discernable impact on predicted flood levels. This includes the NSW Coastal Zone and areas in the vicinity of lower coastal waterways, including rivers, creeks, estuaries and ICOLLs. In particular, this is likely to apply if the land is:

- *likely to be inundated if water levels were 1.0 m above the upper limit of the current tidal range, generally defined by mean high water springs*
- *likely to be inundated if water levels were 1.0 m above the current flood planning level*
- *within 1.5 m of the maximum historic height of the entrance berm or the upper limit for management intervention identified in entrance management plans for any ocean entrance to the waterway which controls flooding (this commonly applies to ICOLLs)*
- *below 4 m AHD.*

The Guide also states:

Where a flood investigation has been prepared, the modelling can be updated to include sea level rise projections or a conservative assumption can be made about sea level rise impacts. Where the site is below 4 m AHD, an appropriate conservative assumption to estimate the 1-in-100 year ARI flood level is to add the sea level rise benchmarks to the 1-in-100 year ARI flood level relevant to the site.

Comments

Appendix E of APA's "Erosion and Sediment Control Plan" which forms **Annexure 13** to this EA addresses issues arising from flooding and in particular sea level rise on the gas pipeline project.

According to APA, Shoalhaven City Council commissioned revised flood modelling of the Lower Shoalhaven River Floodplain to assess the impacts of climate change induced sea level rise on flood levels. The results of this investigation are included within the climate change assessment report titled '*Lower Shoalhaven River Floodplain Management Study and Plan – Climate Change Assessment (CCA)*'.

Based on the findings of the "CCA Report" using the 1% AEP flood event for comparison, during the proposed gas pipeline's minimum service design life of 30 years the amount of flood level rise along the proposed pipeline route due to sea level rise is insignificant. The possible increase in flood levels across the proposed gas pipeline route due to sea level rise is comparatively small with respect to current flood levels

during the 1% AEP flood event (0.36% max). Due to this, erosion and sediment control during construction of the proposed gas pipeline will not be affected by sea level rise, nor will there be need to tailor erosion and sediment control to compensate for sea level rise.

The proposed pipeline route is located approximately 12 to 15 km from the entrance of the Shoalhaven River. The position of the proposed gas pipeline corresponds to cells 8 and 14 of Figure 1 in the “CCA Report. Based upon the findings of the “CCA Report”, by 2050 the anticipated benchmark 400 mm rise in sea level will possible cause a corresponding 10 mm flood level rise during the 1% AEP flood event. By 2100 the increase to the flood level during the 1% AEP flood event across the site from an anticipated 900 mm rise in sea level will be approximately 20 mm.

Figure 46 of the Lower Shoalhaven River Flood Study (April 1990) shows the peak flood level during the 1% AEP flood event to be approximately 5.6 m AHD. Comparing the existing 1% AEP flood extent, to the anticipated 1% AEP flood event in the years 2050 and 2100 respectively as outlined in the “CCA Report” according to APA there will be no significant change to the flood extent across the proposed gas pipeline route.

Referring to Figure 3 of the “CCA Report”, the flood hazard category in the year 2050 over the area where the proposed gas pipeline will be situated remains consistent with the existing flood hazard category of ‘High Hazard Flood Storage’ as shown in Figure 2 of the ‘Lower Shoalhaven River Floodplain Risk Management Plan’.

According to APA as over half of the proposed gas pipeline route will be situated within a High Hazard flood storage area on the Shoalhaven River floodplain. It is APA’s view that there will be insignificant impacts to the gas pipeline, with respect to erosion and sediment control.

7.4.1.3 Groundwater

The DGRs in part required that an assessment of the impacts of the proposed pipeline construction and operation on groundwater be provided.

Coffey Environments were engaged by Shoalhaven Starches to undertake a geotechnical assessment of the pipeline route. This assessment is included within **Annexure 10a** to this EA. Included within **Annexure 10a** is the following assessment of the potential for groundwater to be affected by the proposed pipeline route.

“Significant groundwater inflows are generally not expected within 1.5m of the ground surface in the majority of the project area. Shallow inflows may occur at geographical low points such as those located in Lot 16 DP1121337 and Lot 2 DP825808 and between Railway Street and Fletchers Lane where groundwater inflows are expected in excavations within 1.50m below ground surface level.”

Groundwater inflows are not expected to pose a major constraint to excavations for the proposed pipeline route however the following needs to be considered:

- *Excavation and pipe laying methods should be employed that take into account the management of groundwater inflows. This may include such measures as avoiding excavations being open for prolonged periods; and*
- *Potentially aggressive nature of the groundwater and the need to design accordingly to minimise the deterioration of buried steel and concrete components.*

Where groundwater inflows are encountered they should be able to be controlled by pumping from sumps.

Care should be taken to manage the impact of construction machinery and earthworks at this site. The majority of the soils will be prone to softening upon exposure to rainwater or groundwater. Trafficking of the site for construction machinery may be difficult in some areas following periods of wet weather.”

Following the review of the initial EA document the Department of Planning & Infrastructure and NSW Office of Water requested additional information in relation to:

- The quantity of likely volumes of groundwater to be extracted to assess potential impacts and the need for any licensing.
- The impact of underboring on local groundwater.
- How groundwater inflows would be managed during construction (particularly during trenching and underboring) including the protocol to be followed if found to be contaminated.

Coffey Environments were engaged by Shoalhaven Starches to carry out a review of hydrogeological information in relation to the proposed gas pipeline route to supplement their report held in **Annexure 10a**. Their supplementary report is included in **Annexure 10b** to this EA.

In addition URS Australia were engaged by Shoalhaven Starches to provide guidelines for the management of groundwater inflows along the pipeline construction. A copy of URS Australia’s report with respect to this matter is also included in **Annexure 10b** to this EA.

Based on a desktop review of data obtained during the investigations mentioned above, undertaken in relation to their report included in **Annexure 10a**, as well as groundwater levels, bore construction details, lithology, topology, and bore yield information available from NSW DPI Office of water, Coffey Environments have estimated daily groundwater discharge volume has been calculated for four segments (A-D) along the path of the proposed pipeline (refer **Table 29**).

Table 29

Estimated Groundwater Seepage Segment Summary

Segment	From Coffey Test Location	To Coffey Test Location	Estimated Daily Groundwater Ingress (L/day)
A	CBH01	CTP05	60 – 600
B	CTP08	CTP11	48 – 480
C	CTP11	CTP13	59 – 590
D	CTP19	CTP21	20 – 200
Estimated Total			187 – 1870

* Quoted locations taken from Coffey 2011 Assessment (**Annexure 10a** to EA).

The estimated ingress rates are based on a number of assumptions made by Coffey Environments including that underboring of stream crossings takes place and does not account for direct and or indirect inflow of stream water during excavation and or installation works at stream crossings.

It is noted that the likely range of groundwater to be based on limited hydrogeological information, and may be variable, depending on intersected lithology, standing groundwater levels, final excavation depths, installation specifics and weather conditions during and preceding the works.

According to Coffey Environments extracted groundwater should be sampled and tested to assess contamination status as well as salinity (TDS) for protection of beneficial use and discharge requirements.

As outlined above URS Australia have provided guidelines for the management of groundwater inflows along the pipeline construction (also **Annexure 10b**); the following is an extract from the URS Australia submission detail these guidelines:

URS has developed proposed guidelines below, based on Coffey Environments letter to Cowman Stoddart as part of the EA review process, dated December 2011 titled: "ADDITIONAL INFORMATION ON HYDROGEOLOGY PROPOSED GAS PIPELINE, BOMADERRY, NSW".

In assessing the pipeline route geotechnical issues from bores and trenches, Coffey Environments indicated a range of estimated water inflow rates at various locations but did not address potential water quality parameters such as pH, total suspended solids (TSS) and total dissolved solids (TDS).

URS' 2009 Manildra Bomaderry Lateral FEED study and subsequent review dated March 2010, the pipeline route was assessed to identify potentially acid sulphate soil zones which may result in trench waters that may potential require acid neutralisation treatment prior to disposal.

URS has proposed, as part of the FEED study that pipeline trench open times be limited to a minimum to avoid oxidation and potential acid formation for both excavated trench soils and any trench water in the potentially identified acid sulphate soil areas, located predominantly in the southern sections the proposed lateral pipeline route.

URS suggest any significant trench water inflows first be characterised, by measurement of pH, total suspended solids (TSS) and total dissolved solids (TDS). Any trench water inflows, if deemed excessive, after meeting test parameters to ensure qualities similar to local stormwater catchments into local receiving roadside drainage criteria, would be pumped out for the trench. Disposal as required, would be into the appropriately designed roadside settlement drains and structures used to control runoff and erosion.

*Proposed guidelines for acceptance for surface discharge are proposed as below in **Table 30**.*

Table 30
Surface Water Discharge Acceptance Guidelines

<i>Parameter</i>	<i>Unit</i>	<i>Value</i>
<i>pH</i>		<i>6 – 8</i>
<i>TDS</i>	<i>mg/L</i>	<i>7500</i>
<i>TSS</i>	<i>mg/L</i>	<i>400</i>

If excessive TSS is encountered, suitable hay bail sediment filters would be used to reduce TSS to an acceptable level and any filtered trench water would be allowed to drain into the natural stormwater drainage systems as part of any stored trench excavation materials runoff and erosion controls along the pipeline route.

Should, however, the trench water be found to exceed the guidelines from the influence of acid sulphate soils, potentially encountered along the proposed pipeline route, trench water will be pumped out into a suitable IBC container, assessed and treated to meet criteria suitable for disposal into the Shoalhaven City Council trade waste sewage treatment plant criteria prior to disposal at the facility. Any required pH, TSS or TDS adjustment would be carried out as required prior to disposal.

Should any additional extraordinary pollutants be encountered as part of the excavations the trench soils and water would be investigated and classified into the appropriate Hazardous material or Hazardous liquid waste classification and treated appropriately prior to disposal.

7.4.1.4 Acid Sulphate Soils (ASS)

The DGRs require that consideration of ASS be undertaken and how they would be managed if detected.

Coffey Environments (“Coffeys”) were engaged by Shoalhaven Starches to undertake an assessment of and provide advice in relation to the potential for ASS to be present along the pipeline route.

Scope of Works

In preparing this assessment Coffeys:

- Reviewed ASS Risk Maps of the area to check the probability of ASS occurrence.
- Undertook soil sampling and measuring the pH from 33 selected soil samples for ASS purposes.
- Carried out screening tests using hydrogen peroxide on 33 soil samples to check for potential presence of ASS.
- Based upon the field screening, twelve (12) soil samples were selected for analysis using the Chromium Reducible Sulfur method to check the presence/absence of ASS.

Previous Reports

Numerous geotechnical investigations have been carried out across parts of the Manildra Group (Shoalhaven Starches) lands and nearby areas by Coffeys and others over the last 10 to 15 years.

ASS Visual Indicators

According to Coffeys obvious visual evidence of ASS such as scald areas, iron leaching or jarosite staining were not noted on the surface of the areas associated with the pipeline route.

Sampling and Analysis Plan

The Acid Sulfate Soil Management Advisory Committee ASSMAC (1998) guidelines provide guidance on the number of sampling locations for assessing sites with respect to ASS. The guidelines suggest a sampling frequency of about 1 location for every 75 m to 100 m for linear projects.

Based on the results of the desktop study, Coffeys considered that a sample location spacing of about 200 m was sufficient to gain a preliminary appreciation of the potential for ASS to exist along pipeline route as this area was mapped as a low probability of ASS occurrence in the upper 1 – 3 m and the anticipated depth of disturbance is about 1.2 m.

Soil samples were typically collected at 0.5 m intervals within natural soils in the upper 2.5 m, or at major changes in soil stratigraphy (whichever was more frequent). Samples

were initially screened for ASS using hydrogen peroxide and following the results of the screening, samples were selected for additional testing using the Chromium Reducible Sulfur (Scr%) method.

In order to assess the significance of the ASS potential, the laboratory results were compared by Coffeys to action levels in the Acid Sulfate Soil Manual (1998) prepared by the Acid Sulfate Soil Management Advisory Committee (ASSMAC 1998).

The ASSMAC action criteria triggers the need to prepare a management plan and obtain development consent. The action criteria are based on oxidisable sulfur concentrations for three differing soil textures. The manual provides different action levels depending on the amount of ASS that is to be disturbed. As the exact volume of ASS to be disturbed by the project is not known, the action criteria for a project that will disturb greater than 1000 tonnes of ASS materials has been adopted as a conservative criteria at this stage. The action criteria provided in the ASSMAC manual are summarised in **Table 31** below.

Table 31
ASSMAC (1998) Acid Sulfate Soil Action Criteria*

Soil Texture Category	Approximate Clay Content (%)	Action Criteria*	
		Sulfur Trail Percent Oxidisable Sulfur	Acid Train
		(S_{POS} or S_{CR}) (%)	TAA, TPA or TSA (mol H⁺/tonne)
Coarse	< 5%	0.03	18
Medium	5% to 40%	0.03	18
Fine	> 40%	0.03	18

Notes: * Action criteria where greater than 1000 tonnes of ASS is to be disturbed
S_{POS} Peroxide oxidisable sulphur
S_{CR} Chromium reducible sulphur
TAA Total Actual Acidity
TPA Total Potential Acidity
TSA Total Sulfidic Acidity

Soil Sampling

During drilling and test pitting, collection of ASS samples was undertaken by Coffeys for the purposes of acid sulfate soil screening and analysis.

Thirty (30) soil samples were sent to SGS environmental for ASS screening tests. Based on the screening results, 12 soil samples were selected for analysis using the Chromium reducible sulfur method (SCR) by at the SGS laboratory.

Acid Sulfate Soil Test Results

Acid Sulfate Soil Screening

A field pH below 4 can indicate that actual acid sulfate soils are present (*ie.* soils in which oxidation of iron sulfides has occurred and have produced acid). Generally a pH drop below 3 following oxidation with hydrogen peroxide indicates the probable presence of unoxidised sulfides in the samples, and for the purposes of the screening test, is taken as an indication of the probable presence of potential acid sulfate soils.

The screening results indicated the following:

- All samples screened recorded pH values greater than 4 and less than 6.7; and
- The rate of reaction observed for each soil sample on contact with hydrogen peroxide was generally slight with only CTP19 (2.0 - 2.1 m), CTP21 (0.5 - 0.6 m) and CTP21 (1.0 - 1.1 m) elevated to very vigorous with gas evolution and heat generation, commonly > 80 degrees.

Comparison of Acid Sulfate Soil Laboratory Results to Action Criteria

Several samples recorded exceedances above the action criteria.

Exceedances of TAA were recorded in several samples. Based on a review of the SKCL results according to Coffeys the majority of the TAA exceedances are not attributed to sulfuric acidity except for CTP14/1.5 - 1.7 m and therefore these soils are not expected to be ASS.

An oxidisable sulphur concentration exceeding the action criteria of 0.03% was recorded at CP09/0.5 - 0.7 m.

Discussion and Recommendations

In relation to ASS, Coffeys make the following conclusion with respect to the pipeline route:

“Some sections of the proposed pipeline extend through areas mapped as having a low probability of acid sulfate soil occurrence. Field observations generally correlated well with the acid sulfate soil risk map. Field screening and laboratory results generally indicated that ASS are not likely to be present at the majority of the site. Based on the results of this assessment it is considered that ASS are likely to be encountered along the lower lying parts of the pipeline route located in Lot 2 and Lot 5 and in the vicinity of creek crossings at CTP09 and CTP12. ASS may also be encountered sporadically up to the intersection with Fletchers Lane and could be located in old paleochannels. It is unlikely that ASS would be intersected in the pipeline construction based on the proposed excavation depths along the majority of Railway Street and Fletchers and Pestells Lane. We recommend that the previous ASSMP (Report Ref: ENVIWOLL00187AB-R02, dated 26 March 2009) prepared for the proposed packing plant (lot 2 and 5) be extended to incorporate other sections of the proposed pipeline where ASS could be intersected.”

7.4.2 Geotechnical Conditions

Whilst not a specific issue identified by the DGRs, an issue originally identified by the Preliminary Environmental Assessment prepared by Cowman Stoddart Pty Ltd for this project, concerned the geotechnical subsurface conditions that are likely to occur along the gas pipeline route.

Shoalhaven Starches engaged Coffeys to undertake a geotechnical investigation along the pipeline route. Their assessment is included with **Annexure 10a** to this EA. This section of the EA is based upon the findings of this assessment.

7.4.2.1 Subsurface Conditions

The generalised subsurface conditions encountered across the pipeline route are summarised by Coffeys as follows:

PAVEMENT (Asphalt or Concrete)	ASPHALT: Dark grey asphalt pavement about 0.1m in thickness and associated with Railway Street, Meroo Road and the Princes Highway.
FILL	Clayey Sandy GRAVEL to Sandy Gravelly CLAY - typically comprised crushed roadbase or stripped natural gravelly clay soils, predominantly taken from the laneway surface and pushed to the side of the road to form a shoulder. Typically to depths between about 0.0 m - 0.6 m.
TOPSOIL	Sandy CLAY/ CLAY: low to high plasticity, brown, with some silt and roots. Encountered in most test pits (CTP07 to CTP26) to depths beneath ground surface ranging from 0.0m to 0.5m.
ALLUVAL/ ESTUARINE	CLAY: High plasticity, dark grey/black with some silt and fine grained sand and trace roots. Encountered only at test pits CTP09 and CTP12.
ALLUVIAL	Alluvial soils were found 19 out of the 26 locations across the site. Where encountered, this unit comprised Sandy CLAY/ Clayey SAND/ CLAY: Medium to high plasticity, brown, orange-brown, with some silt and trace roots. Sand fraction is generally fine to medium grained. The top of this unit was encountered between 0.15 m and 0.80 m below ground surface level. The consistency of the soil in this unit ranged from soft to hard.
RESIDUAL SOIL	Sandy CLAY/Clayey SILT: medium plasticity, iron stained orange/brown with some fine to coarse grained angular sandstone gravel and a trace of roots. The top of this unit was encountered (CBH02 to CTP11 with the exception of CTP10) between 0.0 m and 1.60 m below ground surface level. The consistency of these soils is generally very stiff to hard.
EXTREMELY WEATHERED MATERIAL	Sandy Clayey GRAVEL/ Sandy Gravelly CLAY/ CLAY: Fine to coarse grained, orange brown with some pale yellow/brown pockets and some cobbles. The top of this unit was encountered between 0.8 m and 1.60 m below ground surface level. The consistency of this unit was generally hard.
HIGHLY WEATERED SANDSTONE (Class V)	Fine to medium grained, iron stained orange/brown. Sandstone was encountered at locations CBH02, CBH03, CBH05 and CTP07 and CTP11. The top of this unit was encountered between 0.5 m and 1.80 m below ground surface level and the type of equipment that encountered 'very slow progress' is noted on the relevant engineering log. The sandstone was assessed to be of low to medium strength.

No unusual odours or oily sheens were noted in soils during the drilling or test pitting at the site.

Apart from the fill, the subsurface conditions encountered are consistent with the published geological information.

Groundwater seepages or inflows were generally observed between 0.5 m and 2.5 m at specific locations.

7.4.2.2 Discussion and Recommendations

Excavation Conditions

The investigation of the proposed gas pipeline route carried out by Coffeys comprised test pits and boreholes which were terminated at depths between 0.55 m and 3.0 m below existing ground surface level to assess the subsurface conditions.

The depth of excavation for the proposed pipeline construction varies from about 1 m to 2.4 m as follows:

- 2.4 m below the top of rails at a railway crossing;
- 1.5 m below the base of the curb and guttering at a road crossing (including the Princes Highway); and
- 1.2 m below ground surface in other areas.

The site model and test pit/borehole logs according to Coffeys generally indicate the following units may be encountered within excavations for trenches at this site:

- soft to hard fine grained (clays); and/or
- medium dense to very dense coarse grained soils (sands and gravels), and/or
- weathered sandstone rock (eg. refer to CBH03 and several other locations).

At Lot 16 DP 1121337 and Lot 2 DP 825808 and test pit locations CTP09 and CTP12 (numbering by Coffeys), soft Clay/sandy Clay soils were encountered to a depth of 1.50m below existing ground surface level. The clay soil was categorised as Alluvial or Estuarine and best described as high plasticity, brown to dark grey/black with some silt and trace roots. The soil in these areas was observed to have a field moisture content greater than its plastic limit and an undrained shear strength of around 20 kPa. At CTP09 the soft clay soil was underlain by medium dense, wet clayey sand and at CTP12 the soft clay was underlain by stiff wet clay.

The majority of the soil strength material encountered at this site should be able to be excavated using a hydraulic excavator.

The highly weathered sandstone (Class V) which was encountered near the level of ‘very slow progress’ at the test locations will require use of a larger excavator (eg.20 tonne) equipped with a rock bucket, rock hammer or ripping tyne to penetrate. Where the rock strength becomes low strength or better or if ironstone bands are encountered within the weathered rock, productivity for trenching is expected to be slower and a rock hammer or rock saw is may to be required.

Batter Slopes and Excavation Support

According to Coffeys, trenches up to 0.6 m deep may be able to be excavated with near vertical sides provided surcharge loads are kept clear of the crest and workers are not required to enter the unsupported excavation. Shoring boxes should be used in excavations deeper than 0.6 m where workers have to enter excavations that are not battered in accordance with the recommendations in **Table 32** below. Appropriate safety procedures should be implemented for all excavations in accordance with relevant OH&S legislation.

Where excavations are not to be supported by shoring or retaining structures, unsupported batters should be constructed according to Coffeys to slopes not steeper than the batter slopes given in **Table 32**.

Table 32
Recommended Batter Slopes For Trenches

Material	Permanent Batter ⁽¹⁾	Temporary Batter ⁽²⁾
Topsoil, Fill or Soft Soils	4H:1V	3H:1V
Alluvial Soil (Firm to Hard)	3H:1V	2H:1V
Residual Soil (Very Stiff to Hard)	2H:1V	1.5H:1V
Class V Sandstone	1.5H:1V	1H:1V

Notes:

- 1 Permanent Batters refer to batters permanently constructed and left in place over the design life of the pipeline.
- 2 Temporary Batters are batter constructed for construction purposes. If steeper batters than these are proposed, then this would need to be assessed by a geotechnical engineer.

The recommendations made in **Table 32** by Coffeys are based upon the following assumptions:

- The ground surface is horizontal beyond the crest of the excavation;
- The slopes are well drained with no seepage and runoff concentrated on or above the batter slopes;

- No surcharge loads (such as buildings) are located within a horizontal distance of the cut crest equal to the vertical height of the cut.
- No significant water inflows are encountered within the depth of cut.

Flatter batters than those recommended in **Table 32** may be required if the above assumptions do not apply and in particular where Very Soft to Soft Clay Alluvial soils are encountered.

Creek Crossings and Rail Crossing

Two sites of concern are located at topographical low points being a drainage channel and Abernethys creek respectively. At these locations, the walls of the test pit excavations were observed to be collapsing under their own weight. According to Coffeys care will need to be exercised in this area and trenches may require flatter batters or permanent shoring with adequate drainage during construction for the proposed gas pipeline.

Trenching at these locations and near creek crossings will according to Coffeys be problematic. To avoid trenching through these areas, Coffeys recommend that underboring of drainage channels and creek crossings be considered. This is recommended in order to:

- Minimise the development of an alternate erosion path potentially exposing the gas pipeline;
- Avoid development of a erosion point retreat or weak point in the bed of the creek.

If under boring is to be employed, then Coffeys suggest that several boreholes or piezocones be carried out at these areas prior to the commencement of site works to better understand the properties of the underlying soil profile at these locations. Depending on the likely depth of underbore, Coffeys suggest that they be terminated at least 6 m (and potentially deeper) below existing ground surface level, in order to better assess the subsurface conditions.

For the rail crossing area, according to Coffeys, the pipeline may need to be deepened to accommodate the minimum requirements of Railcorp with respect to installation of services beneath Railcorp railway areas. Coffeys recommend that Railcorp be consulted prior to finalising the design level of the underbore beneath the Rail track area. A track monitoring plan, a Railcorp approved surveyor and a suitably qualified geotechnical engineer (approved by Railcorp) will need to be engaged to monitor the condition of the track during underboring.

Retaining Structures

Where there is insufficient room to batter excavations, retaining structures will be required according to Coffeys to retain soils and possibly the more weathered rock. In this case it is likely that the most practical solution for the support of trenches would involve the installation of temporary shoring boxes braced with props.

The design of shoring will need to be carried out by a company experienced in the design of such systems. The assumed lateral pressure distributions may need to be modified to account for material layering, surcharge loads due to the ground level not being horizontal, any concentrated pad or strip footing loadings, or hydrostatic pressure due to build-up of water behind the wall (eg. from broken services).

Backfill and Compaction of Materials within Trenches

Coffeys have also made recommendations concerning the type, compaction and testing of the backfill materials. The further design of the gas pipeline may have other specific requirements to ensure uniform support of the gas pipeline is maintained.

According to Coffeys the materials used for backfilling of the trenches should be materials capable of providing uniform basal, wall and cover support for the service pipes. In general this material should comprise a granular soil such as a uniform sand or fine gravel sourced from an alluvial quarry or crushed rock quarry source.

According to Coffeys the excavated materials from the trenches are not considered suitable materials for backfilling in the immediate vicinity of the pipeline due to the difficulty in achieving uniform basal, wall and roof support for the pipeline. Granular materials 'flow' around pipelines and would be suitable for this purpose. The excavated materials from the pipeline trenches could be used as cover materials once suitably compacted soils have covered the installed pipe.

Suitable sand or gravel backfill materials should be compacted to achieve a minimum density index of at least 70%. Regular testing of the density of backfill materials around the pipeline should be carried out by an appropriately qualified Geotechnical Testing Authority in accordance with the guidelines for trenching works in AS3798-2007.

7.5 AIR QUALITY

The DGRs require the provision of an air quality impact assessment including an assessment of predicted dust emissions during construction.

The EA is supported by an Air Quality Impact Assessment prepared by Stephenson Environmental Management Australia (SEMA). A copy of this assessment forms

Annexure 17 to the EA. This section of the EA is based upon the findings of this Air Quality Impact Assessment.

7.5.1 Existing Environment

The primary air pollution sources that influence local air quality within the vicinity of the pipeline route, are likely to be minor emissions of dust and some minor stack and fugitive air emissions from:

- Agricultural activities.
- The Shoalhaven Starches factory.
- Other local industries in the vicinity of the southern section of the route along Meroo Road and Railway Street.
- To a lesser extent vehicle exhaust emissions, from the local road network and heavy vehicle bypass route between Bombaderry and the Princes Highway.

The nearest sensitive receptors to the Project, with respect to potential air quality impacts from construction are residential properties along the route of the pipeline, in particular:

- along Railway Street,
- where the pipeline crosses Edwards Avenue, and
- properties along Alfred Street that back on to South Coast Railway line.

The majority of the pipeline route runs through open rural land in the north through Pestells Lane and Fletchers Lane and then follows the South Coast Railway, where it is mostly shielded from the neighbouring residences by the rail corridor and a strip of bushland. The corridor and bushland will provide some physical shielding with respect to any fugitive dust emissions as well as some visual screening during construction.

7.5.2 Existing Climate

Winds

The predominant winds are from the west-north-west to west for most of the year. In summer there is also dominance of north-easterlies and westerlies. In winter the westerlies are the most common.

Temperature and Rainfall

According to SEMA based on temperature data recorded over 45 years, the annual average maximum and minimum temperatures experienced are 21.3°C and 11.3°C, respectively. The maximum monthly average temperatures are recorded in January and February at 25.8°C. July is the coldest month, with an average minimum temperature of 6.2°C.

The annual average humidity reading from 45 years of collected data at 9 am is 70%.

The month with the highest 9 am humidity on average is February with 76%. At 3:00 pm the annual average humidity reading is 58%, with the highest average humidity being in February and March with 63%.

Rainfall data collected over 58 years reveals that March is on average the wettest month, with a mean rainfall reading of 130.4 mm. July is the driest month with an average rainfall of 55.7 mm. The average annual rainfall is 1135 mm and the average number of rain days is 130.

Existing Air Quality

There has been no monitoring undertaken specifically for this project, but data is available from the NSW Office of Environment and Heritage (OEH) monitoring network. The station that is closest to the project site is at Albion Park South, approximately 50 kilometres to the north of the proposed route. It is situated in a semi-rural area in the south of the Illawarra basin and the air quality is expected to be similar to the project site.

A review of the most recent data for 2010 and 2011 by SEMA indicates that the air quality is typically very good with no exceedances of the ambient air quality goals for nitrogen dioxide, particulate matter (less than 10 microns), ozone and sulphur dioxide.

7.5.3 Construction Impact Assessment

Construction Sources

According to SEMA the most significant types of emissions to air during construction of pipeline that have the potential to impact on air quality of neighbouring residences if not appropriately managed would primarily consist of:

- Dust emissions from both the mechanical disturbance and wind erosion of exposed soil piles during the digging of trenches to lay the pipeline.
- Wind blown road dust from vehicles traversing unsealed access roads and tracks.
- Exhaust emissions from the range of motor vehicle and mobile plant required for excavation laying of the pipe for the Project.

Specifically, SEMA expect the major potential dust sources during the construction phase to include:

- Clearance of vegetation, rock and soil material.
- General surface earthworks and excavation works.
- Topsoil and soil handling (stockpiling, loading, dumping).

- Levelling and grading of disturbed soil surfaces.
- Passage of construction and administrative vehicles over unsealed sections of road or localised unconsolidated soil surfaces.
- Wind erosion of unstable/uncovered surfaces and stockpiles and other unconsolidated surfaces.

Potential for Construction Air Quality Impact

According to SEMA airborne particles (dust) are typically less than 100 micrometres in aerodynamic diameter and are referred to as Total Suspended Particulates (TSP). The fraction of these particles that are less than 10 micrometres in equivalent aerodynamic diameter is referred to as PM10. The impact of dust emissions principally relates to the potential effect on human health on inhalation of particles in the air, and it is the finer fraction that has the greater potential to cause respiratory health effects.

A secondary effect relates to the deposition of the coarse fraction of dust onto surfaces (soiling of material surfaces), which is an impact on amenity and considered a nuisance. Typical, deposition effects are confined to short ranges, as the high settling velocity of the coarse particles means that the larger particulate matter sediments out from the dust plume in the near vicinity of the operations.

Construction activities will create particulate (dust) emissions which, if uncontrolled, will add to those levels from other activities, particularly agricultural activities within the area. The construction dust emissions are expected to be relatively minor given the duration and location of the pipeline. These emissions will still need to be controlled and managed in accordance with good dust management practices. These practices are discussed in Section 7.5.4 of this report.

Analysis of the local wind climate indicates that the prevailing winds are typically from the west, which means that the majority of sensitive receptors to the west of the pipeline will have less potential for exposure to any uncontrolled emissions.

However, it is expected that the resultant offsite impacts on the nearest sensitive receptors, will be negligible with the implementation of good dust management practices.

7.5.4 Construction Mitigation and Management Measures

Suitable dust management practices will be adopted where necessary during the construction phase. Some typical dust control practices include:

- Construction or erection of drift fencing (that is; fences fitted with shade cloth).
- Where possible, minimise disturbed and exposed areas.

- Locate stockpiles as far away from public and residential areas as possible.
- Dust control on short term stockpiles (project duration is less than 3 months) will be controlled using water sprays, drift fencing and/or daily inspections.
- Progressively revegetate disturbed and exposed areas as soon as possible.
- Restrict construction traffic to defined areas and speed limits.
- Where possible, seal internal construction related roads with road base rock or gravel or use of water sprays if this is impracticable.
- Install and use rumble grids at site exit points to minimise dust and mud on public roads.
- Cover all truck loads that enter or leave the site.
- Inspect equipment and vehicle exhaust emissions at start-up and during pipeline laying program.
- No fires – burning of any material will not be permitted.
- Properly maintain dust control structures and processes.
- During dry and windy conditions spray water over road surfaces to prevent wind erosion.
- Cease or limit relevant excavation and construction activities when winds are strong and from an unfavourable direction. This will ensure that, if uncontrollable, excessive dust generated cannot impact on sensitive receptors.

7.5.5 Operational Impact Assessment

Operational Sources

The pipeline will be mostly buried without any release points under normal circumstances. A pressure reduction facility will be located at the end of the pipeline, opposite the Shoalhaven Starches factory site on Bolong Road. The purpose of the facility is to reduce gas pressure from approximately 10,000 kPa to 3,500 kPa. As result of the pressure reduction a significant drop in gas temperature will occur. Therefore, in order to prevent liquids forming in the gas stream, a gas heater will be utilised, which will emit mainly oxides of nitrogen and carbon dioxide.

The gas heater will be similar to the existing ActewAGL gas heater approximately 500 metres to the east along Bolong Road.

The operator of the gas pipeline, ActewAGL, advises that their operational procedures for the pressure reduction facility are to minimise fugitive discharge of natural gas from the pipeline at all times. ActewAGL also confirms that this facility is for pressure reduction purposes rather than as an emergency gas pressure release to atmosphere or as a flare. The natural gas contained in the pressure reduction facility is the product for which ActewAGL received revenue for conveying intact inside the pipe and not releasing to atmosphere.

Therefore, the small amount of gas that would ever be released from this facility during a maintenance procedure would be considered a negligible emission. When this emission is combined with the remote location and prevailing winds it would be considered to have a minimal impact on air quality in the immediate area; and no regional greenhouse gas emission impact.

Potential Operational Air Quality Impacts

The gas heater will be a bath type and installed just upstream of the pressure reduction skid. The heater will be located on vacant land owned by Shoalhaven Starches on the north side of Bolong Road at least 500 metres from the nearest sensitive receptors to the west.

The emissions from the gas heater will be relatively minor by comparison to the existing emission from the Shoalhaven Starches factory site and vehicle traffic. These emissions combined with the remote location and prevailing winds are anticipated to have negligible impact on the air quality in the area.

7.5.6 Conclusions

The Air Quality Impact Assessment undertaken for the proposed gas pipeline project prepared by SEMA concludes:

“This air quality impact assessment has identified negligible air quality impacts associated with the construction and operation of the proposed gas pipeline.

Dust emissions during the construction phase will be managed by implementing best practice dust control measures such as minimising exposed areas, rehabilitation and revegetation upon completion of work and using water sprays if required.

Exhaust emissions from mobile plant during construction are expected to be minor.

These emissions combined with the relatively remote location and buffer distances are expected to have negligible air quality impacts on neighbouring sensitive receptors.

Dust monitoring has not been considered for this project because of the short term nature and the narrow corridor of disturbance. However, if the best practice dust control measures were not implemented then this decision may need to be revisited.

During the operational phase of the pipeline, there will be emissions from the gas heater and infrequent gas venting for maintenance and emergency purposes at the gas reduction facility. However, given the relatively remote location and prevailing westerly winds the impacts of these events are also expected to be negligible at the nearest sensitive receptors.

Therefore, it is concluded that there would not be any significant air or greenhouse gas emission from this pressure reduction facility during normal operations or routine maintenance. In emergency situations the pressure would be relieved using standard procedures. This would not involve the pressure reduction facility.

In addition, the construction of the pipeline will allow Shoalhaven Starches to proceed with the development of an efficient gas fired co-generation plant to supply electricity and steam to the factory, which will assist in reducing greenhouse gas emissions by reducing the requirements for less efficiently produced energy supplied from the grid. The additional gas supply will also facilitate a reduction in the future reliance on coal fired energy when further plant upgrades are required.”

7.6 BIODIVERSITY

The DGRs require the EA to address:

- *measures taken to avoid impacts on biodiversity;*
- *accurate estimates of any proposed vegetation clearing;*
- *a detailed assessment of the potential impacts of the project on any terrestrial or aquatic threatened species, populations, ecological communities or their habitats, regionally significant remnant vegetation and/or vegetation corridors; and*
- *measures to ensure the project maintains or improves the biodiversity values of the region in the medium to long term.*

The EA is supported by a Flora and Fauna Assessment prepared by Kevin Mills & Associates (KMA). A copy of this assessment forms **Annexure 8** to the EA. This section of the EA is based upon the findings of this Flora and Fauna Assessment.

7.6.1 Fauna and Fauna Habitat

According to KMA there is very little native habitat along the route of the proposed gas pipeline; natural habitat is completely absent from the area. The fauna species that have been recorded in the Bomaderry area have been identified in the Flora and Fauna Assessment. These species were recorded in the area during this and previous surveys by KMA. Fauna species are generally those associated with farmland and urban settings.

The habitat along the route is almost entirely exotic grassland, mostly dominated by the introduced Kikuyu Grass *Pennisetum clandestinum*. Most of the trees, which are not particularly common, are also introduced. Wetlands occur nearby in some places, but the route does not cross any natural wetland. No forest or other natural vegetation community is affected by the proposed route of the pipeline.

7.6.2 Threatened Species, Populations and Communities

7.6.2.1 Threatened Species

Threatened species are listed on schedules under the New South Wales *Threatened Species Conservation Act 1995* (TSC Act). Under the TSC Act, species of plants and animals are listed either as "critically endangered", "endangered", "vulnerable" and "presumed extinct"; "endangered populations" can also be listed. Species are also listed in a similar way under the *Fisheries Management Act 1994*.

Information on the occurrence of threatened species in New South Wales can be obtained from the NSW Wildlife Atlas, which is maintained by the National Parks and Wildlife Service (NPWS). The Wildlife Atlas was reviewed by KMA for threatened species previously recorded in the local area, within about 10 kilometres of the Shoalhaven Starches factory; these species have been listed by the Flora and Fauna Assessment carried out by KMA, together with each species' classification under the TSC Act, and a summary assessment of their potential to occur along the pipeline route.

No threatened species were recorded during the various local surveys by KMA over several years. Based on an assessment of the habitat preferences and habitat requirements of the threatened species known to occur in the local area, according to KMA no threatened species are expected to occur along the pipeline route. According to KMA no species listed under the *Fisheries Management Act 1994* occur in the local area.

According to KMA five threatened plant species have been recorded within about 10 kilometres of the study area. None of the species was recorded in the surveys along the pipeline route and according to KMA none are expected to occur along the pipeline route given the highly modified nature of the area. Five threatened mammals have previously been recorded in the local area; these are mostly old records. No threatened mammal species are expected to occur in this area, other than the Grey-headed Flying-fox. Fourteen (14) threatened bird species have been recorded in the local area. One or two, such as the Square-tailed Kite and Osprey, could occur in the vicinity of Shoalhaven Starches' land, for example on the Shoalhaven River or along Broughton

Creek. However, because of the absence of suitable habitat, no threatened bird species are likely to occur along the pipeline route. The absence of forest and woodland precludes most of the species ever occurring in the area. Two threatened frog species have been recorded in the local area although the record of one of the species, the Giant Burrowing Frog, was based on scant evidence and has never been confirmed. There is no habitat for this frog in the area. The potential for the other species, the Green and Golden Bell Frog, to occur on the subject land was assessed previously by KMA due to the presence of a wet area near Bolong Road; the species was not recorded.

7.6.2.2 Endangered Populations

Endangered populations are listed in Schedule 1, Part 2 in the TSC Act. According to KMA, no endangered populations have been declared in this area. The listed endangered population of Nowra Mallee Ash *Eucalyptus langleyi* occurs on sandstone at Bomaderry Creek, well to the west of the study area.

7.6.2.3 Endangered Ecological Communities

Endangered ecological communities are listed in Schedule 1, Part 3 of the TSC Act. There, according to KMA, are no endangered ecological communities in study area.

7.6.3 Impact of the Proposed Pipeline

7.6.3.1 Assessment under Part 3A

Guidelines for Threatened Species Assessment

Guidelines that identify matters relevant to the assessment of potential impact on threatened species, populations or ecological communities of proposed development under Part 3A of the *Environmental Planning and Assessment Act 1979* (NSW) have been prepared by the Department of Environment and Conservation (now Department of Environment and Climate Change) and the Department of Primary Industries (DEC July 2005).

The *Guidelines for Threatened Species Assessment* identify the following objectives in regard to conserving threatened species, etc.:

- 1 *“Maintain or improve biodiversity values (i.e. there is no net impact on threatened species or native vegetation).”*
- 2 *Conserve biological diversity and promote ecologically sustainable development.*
- 3 *Protect areas of high conservation value (including areas of critical habitat).*
- 4 *Prevent the extinction of threatened species.*

- 5 *Protect the long-term viability of local populations of a species, population nor ecological community.*
- 6 *Protect aspects of the environment that are matters of national environmental significance.”*

Matters of National Environmental Significance (NES) are those matters listed under the *Environment Protection & Biodiversity Conversation Act 1999* (Commonwealth); these matters are not listed under state legislation, although there is considerable overlap in the species and communities that area listed.

The *Guidelines* outline a broad five-step process for assessing impacts on threatened species. Note that ‘threatened species’ refers here to species, populations and communities listed as threatened under the *Threatened Species Conservation Act 1995* (NSW) or the *Fisheries Management Act 1994* (NSW).

As this project is being assessed under Part 3A of the *EP&A Act*, the investigation and report prepared by KMA follows the *Guidelines* where relevant.

Step 1 – Preliminary Assessment

“*The main purpose of a preliminary assessment is to determine the likelihood of the study area and subject site supporting threatened species*” (*Guidelines*, page 2). As noted in the *Guidelines*, this step is primarily a ‘desktop’ study, using existing information, literature and data bases to identify relevant threatened species. The *Guidelines* state that the following matters should be included in the preliminary assessment:

- a description of the location and nature of the proposed development;
- a description of dominant vegetation types;
- a description of habitat features;
- a list of threatened species that are known or likely to occur within the study area;
- an assessment of which of the threatened species that are known or likely to occur are likely to be directly or indirectly affected by the proposal provides a list of factors for consideration in identifying adverse impacts. This list is not necessarily exhaustive and is not development-specific.”

Step 2 – Field Survey and Assessment

The *Guidelines* then state that, “*the required intensity and extent of survey will vary greatly depending upon the species likely to be present, size of the development area, the level of biological and habitat diversity on the site, and the type and complexity of vegetation on the site.*”

The *Guidelines* point out the need “to ensure that a reliable assessment of the presence or absence of threatened species can be made”. It is also noted that consideration needs to be given to the relevance of climatic or seasonal conditions for the target species.

Where relevant, the survey methods set out in the document titled *Threatened Species Survey & Assessment: Guidelines for Developments and Activities* (DECC 2004) should be followed. As noted above, the level of the survey depends upon site conditions.

The outcome of Step 2 should be that adequate field surveys are undertaken for all target species identified in Step 1 such that confident statements can be made regarding the potential for the presence of the species on the subject site. In some instances, the precautionary principle should be adopted and the presence of a species assumed for the purposes of impact assessment.

Step 3 – Evaluation of Impact

This step involves identifying the potential magnitude and extent of the impact, if any, the development will have on each of the target species.

The *Guidelines* suggest that “impacts will be more significant if:

- *areas of high conservation value are affected;*
- *individual animals and/or plants and/or subpopulations that are likely to be affected by the proposal play an important role in maintaining the long-term viability of the species, population or ecological community;*
- *habitat features that are likely to be affected by the proposal play an important role in maintaining the long-term viability of the species, population or ecological community;*
- *the duration of impacts are long-term;*
- *the impacts are permanent and irreversible.” (Guidelines page 4)*

Step 4 – Avoid, mitigate and then offset

Where there is a potential to impact on threatened species, this should be addressed through, firstly, avoiding the impact; this may mean making some changes to the proposed development. If avoidance is not possible, then some form of mitigation may be required. Finally, if neither avoidance nor mitigation are possible, then some form of offset or compensation will be required. This could entail the rehabilitation of similar habitat nearby.

Step 5 – Key thresholds

The *Guidelines* state that “the development application needs to contain a justification of the preferred option based on:

- whether or not the proposal, including actions to avoid or mitigate impacts or compensate to prevent unavoidable impacts will maintain or improve biodiversity values.
- whether or not the proposal is likely to reduce the long-term viability of a local population of the species, population or ecological community.
- whether or not the proposal is likely to accelerate the extinction of the species, population or ecological community or place it at risk of extinction.
- whether or not the proposal will adversely affect critical habitat.”
(*Guidelines* page 4)

Appendix 3 to the *Guidelines* contains more detail for identifying potential impacts on threatened species.

The assessment process under the *TSC Act 1995* commonly known as the ‘seven part test’ is not used for Part 3A matters. The matters to be considered in the assessment of a Part 3A development are determined by the Minister for Planning for each development (i.e. the Director-General’s Requirements (**Annexure 1**)).

The following discussion prepared by KMA addresses the five steps as set out above from the Part 3A *Guidelines*.

Step 1 – Preliminary Assessment

The *Guidelines* state that certain matters should be included in the preliminary assessment. These are primarily concerned with descriptions of the development, the vegetation types, habitats, the threatened species known and likely to occur in the area and those threatened species that may be impacted by the proposed development. Descriptions of the project area and its environment, and the survey methods employed in the study are the Flora and Fauna Assessment prepared by KMA. Detailed descriptions of the proposed development are detailed in Section 3.2 of the EA.

Step 2 – Field Survey and Assessment

Field surveys were undertaken by KMA in the study area most recently in March 2011; earlier surveys have been undertaken on parts of this area and on nearby sites over several years. These surveys included general flora and fauna surveys, where all species were identified and documented, including plant communities and habitats. The assessment of the survey results, particularly in regard to the presence of threatened

species, etc. is provided in the assessment carried out by KMA (**Annexure 8**). All known or potential threatened species and communities have been identified by KMA.

Step 3 – Evaluation of Impact

The impact of the proposed development was assessed by KMA under several key headings.

Threatened Plant Species

The surveys of the study area carried out by KMA did not find any threatened plant species and according to KMA none are expected to be found in the area because of the lack of any suitable habitat for such species. In KMA's view, threatened plants could not occur in the highly modified landscape through which the pipeline is located.

Threatened Animal Species

As with threatened plant species, according to KMA the habitat along the proposed pipeline route could not support any threatened animal species, the habitats found there are far too modified and do not contain critical habitat components for any of the locally recorded species. In KMA's view, threatened fauna is most unlikely to occur in the highly modified landscape through which the pipeline is located.

Endangered Ecological Communities

The nearby wetlands are part of listed endangered ecological communities, for example east of the sewerage works. The pipeline route does not impinge upon any of these wetlands. There is no forest or woodland listed communities on or near the pipeline route.

General Impact on Flora and Fauna

There are no stands of natural vegetation along the pipeline route, although one small linear strip of native plants grows at the far northern end of Railway Street. Otherwise, native plants are very scattered and low in abundance along the route. There are no natural habitats along the route. According to KMA the impact upon native flora and fauna is negligible.

Step 4 – Avoid, mitigate and then offset

There is very little likelihood of impacting upon threatened species, etc. As assessed above, no such species etc. are known or expected to occur along the route of the pipeline. No mitigation or offset measures are required in this case according to KMA.

Step 5 – Key thresholds

According to KMA, there are no impacts on threatened species, etc. and therefore no measures are required to maintain or improve biodiversity values. The proposal is not likely to reduce the long-term viability of a local population of the species, population or ecological community. Nor is the proposal likely to accelerate the extinction of the species, population or ecological community or place it at risk of extinction. No critical habitat occurs in or near the study area.

7.6.3.2 Director-General's Requirements

The DGR's regarding the issue of biodiversity and this project, are specifically addressed by KMA as follows:

Measures taken to avoid impacts on biodiversity

The route of the pipeline was chosen to traverse road verges and road reserves, none of which contain natural plant communities. There are only scattered native plants and some minor areas of modified animal habitat along this route. According to KMA biodiversity is very low in these areas; native animals that are present are those that are associated with farmland and urban settings and native plants and mainly scattered and growing amongst the dominant exotic flora.

Accurate estimates of any proposed vegetation clearing

The vegetation to be cleared is exotic; and according to KMA there are no natural plant communities along the route.

A detailed assessment of the potential impacts of the project on any terrestrial or aquatic threatened species, populations, ecological communities or their habitats, regionally significant remnant vegetation and/or vegetation corridors

The potential to impact upon threatened species described by KMA and summarised above. KMA conclude the proposed gas pipeline could not have a significant impact upon such species. The surveys along the pipeline route did not locate any regionally significant species or community, remnant native vegetation, animal habitat or habitat corridor.

Measures to ensure the project maintains or improves the biodiversity values of the region in the medium to long term

KMA conclude the pipeline project could not have a detrimental impact upon biodiversity values. A few minor recommendations are identified by KMA to ensure that there are no detrimental impacts on the nearby environment of native plants and animals.

7.6.4 Adequacy Review – Office of Water Comments

The following section of the EA addresses matters raised in the response from the Office of Water to the Department of Planning & Infrastructure dated 16 November 2011 as part of the adequacy review of the original EA. (and which is addressed in section 7.3 of **Annexure 8** to this EA).

The Wetland Vegetation near Bolong Road

As noted above, this area supports some native wetland vegetation amongst the paddock weeds. The area seems to remain wet for much of the time so these species can survive here. It is a wetland by definition, namely “an area where water sits for long enough to influence the plants that grow there”.

The area is, according to KMA, an unnatural wetland because of changes in natural topography to the north and west, causing water to remain in the area. Additionally, Council machinery traversed the area some time ago and created holes that now often contain water.

The question is whether this “wetland” is of any value. KMA undertook targeted surveys for threatened frogs and found none. The vegetation community is not natural and KMA conclude that the wetland is not of particular value and does not need to be avoided by the pipeline.

Groundwater Dependent Ecosystems

The *NSW State Groundwater Dependent Ecosystems Policy* (Department of Land and Water Conservation 2002) states “groundwater is the water beneath the earth’s surface that has filtered down to the zone where the earth or rocks are fully saturated. ... The top of this saturated zone is called the watertable.” The *Policy* continues: “Groundwater dependent ecosystems ... therefore, are ecosystems which have their species composition and their natural ecological processes determined by groundwater [as defined above].”

The Office of Water in their response is presumably referring to natural or semi-natural dependent communities that may occur along the route and that are of habitat value. KMA have dealt with the whole proposed route and found no natural communities along the route of the pipeline. The wetland area noted above is probably dependent upon a high watertable, although the height of the watertable is variable. The wetland is an artificial community and according to KMA is of little value to local native plants and animals and not important to rare or threatened species or communities.

7.6.5 Conclusion

The Flora and Fauna Assessment prepared by KMA makes the following conclusion with respect to this project:

The proposed gas pipeline is assessed in this report under the Guidelines for Part 3A developments (DECC 2005) and the Director-General's Requirements for this project as provided for under the Part 3A application to the Department of Planning.

The proposed natural gas pipeline from Meroo Meadow to the Shoalhaven Starches Factory in Bolong Road, Bomaderry will not have a significant impact upon native flora and fauna. There are no areas of high biodiversity value on the route or immediately adjacent to the route. The proposal is not likely to have an adverse impact on species, populations and ecological communities listed under the New South Wales Threatened Species Conservation Act 1995; no threatened species, populations or ecological communities are known or likely to occur on the pipeline route. Nor was any regionally significant vegetation, habitat or species located along the route of the pipeline.

The Flora and Fauna Assessment prepared by KMA makes the following recommendations with respect to the pipeline project:

Recommendations

- (i) *Care is required when constructing the pipeline across low-lying areas to ensure that the movement of soil is minimised. A soil and water management plan should be prepared to facilitate good on-site management of erosion, etc. during construction.*
- (ii) *If street trees are removed from along Railway Street, or elsewhere, they should be replaced. The species to be used should be determined through consultation with Shoalhaven City Council and the local residents.*

7.7 ABORIGINAL HERITAGE

The DGRs for this project require sufficient information to demonstrate the likely impacts on Aboriginal Heritage values/items and proposed mitigation measures.

The EA is supported by an Aboriginal and Historic Heritage Assessment prepared by Kayandel Archaeological Services ("Kayandel"). A copy of this assessment forms **Annexure 9** to the EA. This section of the EA is based upon the findings of this Aboriginal and Historic Heritage Assessment.

7.7.1 Methodology

The assessment undertaken by Kayandel involved the completion of an archaeological field survey in order to assess the potential that the pipeline route contains Aboriginal cultural remains. The assessment is also concerned with identifying how, if at all, the

proposed works will affect Aboriginal cultural heritage along the pipeline route. A breakdown of the various tasks that have been undertaken to achieve these objectives is summarised as follows.

Background Research

The following background tasks were undertaken prior to the field survey:

- Published archaeological texts were consulted to develop a regional archaeological context for the study area.
- A search of the Aboriginal Heritage Information Management System (AHIMS), maintained by the Department of Environment, Climate Change and Water (DECCW), was conducted to determine whether any sites or areas of sensitivity had previously been recorded within or near the study area.
- A search of the AHIMS report catalogue was conducted to identify previous archaeological studies that had been carried out in the area. These reports were able to provide information on the local archaeological context(s) and assisted with the development of predictions for site location within the study area; and
- Enquiries were made to identify any Aboriginal history, ethnography, environmental and climate information relevant to the general area.

Field Survey

The archaeological field survey was conducted by Kayandel on Friday, 11 March 2011. The survey was conducted utilising standard pedestrian survey techniques. Aboriginal community representatives that assisted in completing the survey and assessment were Graham Connolly of Jerrinja Consultants; Graeme Smith of Nowra Local Aboriginal Land Council; and Lionel Mongta, a Yuin traditional owner.

7.7.2 Indigenous Community Involvement

The Office of Environment and Heritage (OEH) recognises and values Aboriginal cultural heritage. OEH recognises that Aboriginal people who hold cultural knowledge should be provided an opportunity to inform OEH of the cultural significance of objects or places, and have an input into the management of their cultural heritage.

OEH sets out a process for identifying Aboriginal parties who may have information on the cultural significance of objects or places, and providing Aboriginal people with opportunities to comment on the methods used to identify and assess objects or places, and opportunities to contribute to the development of management options and

recommendations. The process must be followed if an application is made to OEH under Part 6 of the National Parks and Wildlife Act, 1974, as amended.

Community Notification and Registration

Shoalhaven Starches released a statement seeking to identify and invite Aboriginal groups and/or people who hold cultural knowledge relevant to determining the significance of Aboriginal object(s) and/or place(s) within the area to register an interest for further consultation. The purpose of community consultation with Aboriginal people was to assist Shoalhaven Starches in the preparation of an application for an AHIP and to assist the Director General of OEH in his or her consideration and determination of the application and may also be used in the assessment of impact and determination of approval of the project.

The date for which comments regarding the proposed activities were to be received was 4 March 2011. As at the close of business on 9th March 2011, responses had been received from Jerringa LALC, Nowra LALC and Lionel Mongta.

Review of Draft Report

All Registered Aboriginal Parties (RAPs) were provided links to the draft final archaeological report, and/or paper copies of the report where requested. Comments on the final archaeological draft report were actively sought. All reasonable care was taken by Kayandel to incorporate the recommendations of the RAPs involved. However, comments were not provided by all RAPs.

Community Requests and Outcomes

The stakeholders identified through the consultation process participated on the survey conducted in 11 March 2011 and contributed the following comments after review of this report;

- **Jerringa Consultants-** Graham Connolly of Jerringa Consultants expressed agreement with the recommendations outlined in the report.
- **Yuin Traditional Owner-** Lionel Mongta expressed a preference for a representative to be present during initial ground disturbance due to the low ground visibility during the survey.
- **Nowra Local Aboriginal Land Council-** Nowra Local Aboriginal Land Council were not able to be contacted to provide comments.

7.7.3 Principal Findings and Conclusions

Survey Areas

The four areas surveyed by Kayandel were the Pestells Lane area, Fletchers Lane area, South Coast Railway/Railway Street area and Bolong Road area.

Pestells Lane

Visual inspection was made of the area of the proposed gas pipeline along Pestells Lane. This area comprises two landform types; the first is an unsealed, all weather gravel road and adjacent grassy verges that are used infrequently and only by local residents; the second is a grassy open paddock subjected to animal grazing. Dense verge and pasture grasses limit visibility considerably.

According to Kayandel the potential for stone artefacts to be present in the survey area is assessed as very low, and the potential for the existence of all other forms of Aboriginal Heritage as negligible.

No evidence of Aboriginal occupation of the study area was identified by Kayandel during the completion of this area of the field survey. Additionally, no locations were identified by Kayandel that meet the criteria for identification as Potential Archaeological Deposits.

Fletchers Lane

Visual inspection was made of the area of the proposed gas pipeline along Fletchers Lane. The survey area is an unsealed all weather gravel surface with private residences located to the north and private farmland to the south. The verges of Fletchers Lane have been impacted greatly by introduced grasses, and road construction and use.

The high levels of recent land use impacts in this area has also reduced the potential for virtually all forms of Aboriginal cultural heritage to be negligible according to Kayandel, and stone artefacts very low.

No evidence of Aboriginal occupation of the study area was identified by Kayandel during the completion of this area of the field survey. Additionally, no locations were identified that meet the criteria for identification as Potential Archaeological Deposits.

South Coast Railway area/Railway Street

Visual inspection was made of the area of the proposed gas pipeline along the South Coast Railway and Railway Street. This survey area can be divided into two areas; the first is the Southern Coast Railway as it traverses open paddocks, and the second is the same railway line as it runs adjacent to Railway Street. In the open areas dense pasture

grasses limited visibility considerably, while earthworks, road construction and use, railway construction and use, drainage works and other construction activities highly impacted the survey area in the urban environment. The visibility of the verges is also limited by introduced grasses.

Kayandel identified there was no evidence of Aboriginal occupation of this area. Additionally, no locations were identified that meet the criteria for identification as Potential Archaeological Deposits.

Bolong Road area

Visual inspection was made by Kayandel of the area of the proposed gas pipeline in the Bolong Road area. This area is highly industrialised and adjacent to Bolong Road, a highly utilised transport corridor. Dense verge grasses limit visibility considerably, while continuous industrial activity, earthworks, construction and the implementation and use of essential services such as pipelines, telecommunications cables and electricity, impact highly the survey area.

No evidence of Aboriginal occupation of the study area was identified by Kayandel during the completion of this area of the field survey. Additionally, no locations were identified that meet the criteria for identification as Potential Archaeological Deposits.

7.7.4 Conclusions

The Aboriginal and Historic Heritage Assessment prepared by Kayandel concludes with respect to this project:

All four areas have been highly impacted by constant and considerable use and visibility is assessed as low to negligible. Considering the formation history of this low-lying floodplain, the survey area exists within an environmental context that does not appear conducive to Aboriginal occupation. Indeed, with Aboriginal activity in the area likely to involve the exploitation of swamps and marshlands which is poorly conducive for the preservation of identifiable cultural heritage, the likelihood for the presence of Aboriginal heritage evidence is low. The potential for stone artefacts to be present in the survey area is assessed as very low, and the potential for the existence of all other forms of Aboriginal Heritage as negligible.

No mature native trees of sufficient age to host Aboriginal cultural modification are located within any of the survey areas and there are no rock outcrops present which have the potential to host evidence of rock shelters or grinding grooves. Additionally, suitable sources of stone for lithic acquisition are absent.

No evidence of Aboriginal cultural heritage or values were uncovered in the study area during this investigation. The topographical nature of the local environment and its land use history reduces the likelihood for such identifications. The presence low density artefact scatters consistent with

background discard cannot be dismissed even in areas with considerable land use impact; however, their potential to be found in situ or informative for scientific research is low.

The results of the survey are consistent with other investigations within or near the current survey area which reveal little or no evidence of Aboriginal activity. In 1992 Navin concluded that the archaeological potential of the area in the vicinity of the Shoalhaven River is generally low, a supposition supported by this investigation. Navin suggests the Shoalhaven River may have acted as an access corridor in the past and although no material evidence was found during that or later surveys, this is a possibility. Indeed, Aboriginal people may have occasionally visited the study area but the resulting artefactual evidence is unlikely to be sufficient to contribute to our understanding of local indigenous land use.

These conclusions have been drawn from the research conducted during the compilation of this report and the pedestrian inspection of the survey area. The consultant is satisfied that the provided recommendations made below will ensure that the Aboriginal archaeological resource and the potential resource will not be adversely affected without prior consideration.

7.7.5 Management Recommendations

The following recommendations made by Kayandel are based on:

- The legal requirements of the National Parks and Wildlife Act 1974 whereby it is illegal to damage, deface or destroy an Aboriginal object without first obtaining the written consent of the Director General of National Parks & Wildlife Service;
- The requirements of the Code of Practice for Archaeological Investigation of Aboriginal objects in NSW (DECCW 2010); and
- The findings of the heritage study presented in this report.

Kayandel recommend that:

1. *All sections of the present study area, as shown in Figure 5 are free from archaeological constraints and do not required further archaeological assessment.*

In addition it is recommended that:

2. *Should Aboriginal objects be found during the proposed works in those areas not previously sanctioned by an Aboriginal Heritage Impact Permit (AHIP), work must stop and the DECCW contacted to inspect the artefacts.*
3. *Otherwise there are no archaeological constraints on the proposed development with regard to Aboriginal archaeological sites.*

Community Recommendations

Lionel Mongta, a Yuin Traditional Owner, expressed a preference for a representative to be present to monitor the initial ground disturbance. This was not deemed necessary by

Graham Connolly of Jerringa Consultants and according to Kayandel all management recommendations were agreed to.

7.8 TRAFFIC AND TRANSPORTATION

In terms of traffic and transportation the DGRs require the EA to include:

- *an assessment of the potential for disruption to traffic and increase in traffic movements during the construction phase; and*

The EA is supported by a Traffic Impact Statement prepared by Stapleton Transportation & Planning (STAP). A copy of this assessment forms **Annexure 11** to the EA. This section of the EA is based upon the findings of this Traffic Impact Assessment.

7.8.1 Work-Zone Vehicle Generation

The construction of the pipeline project will generate staff and heavy vehicle (material delivery) trips on a daily basis over the course of the construction period. Up to 25 staff would be employed during the construction period, with the potential for all staff to be on-site (*ie.* within the work-zone) on any one-day. In addition, trucks bringing materials to the Site are estimated at 10 trucks per day for the majority of the construction period, and up to 13 trucks per day in the final two-weeks of construction.

The work-zone staff and material demands raise issues in regard to traffic generation and parking demand, as well as the provision of an appropriately safe and efficient work-zone environment such as that existing access, traffic and parking demands are not significantly impacted.

7.8.2 Potential Impacts

7.8.2.1 Traffic

Traffic Generation and Peak Periods

As outlined above the construction work-zone could generate a demand for up to 25 staff; and up to 13 trucks on a daily basis. Considering a worst case assessment, where all staff drove individually to/from the work-zone, a total of 25 staff vehicle trips could be generated during the arrival peak at the start of the work day, and in the departure peak at the end of the work day. Additionally, the start of work each day could entail a requirement for 2 – 3 trucks worth of materials.

The total potential generation of the work-zone could therefore be up to 30 vehicles per hour (vph) during an arrival peak hour and the departure peak hour.

Based on standard construction work hours (7:00 am through to 4:00 pm/5:00 pm) according to STAP the majority of staff trips will occur outside of the existing local

commuter peak periods, which – based on their previous work in the local area – occur between 8:00 am and 9:00 am, and then between 5:00 pm and 6:00 pm.

At some locations where the work-zone has the potential for impact on traffic flows (*ie.* it requires the use of part of the carriageway) night and weekend works may be required; however, these would be coordinated to commence and end outside of the commuter peak periods.

Trip Distribution

According to STAP the distribution of trips will be based on the location of the work-zone over the course of the construction of the pipeline.

For the Bolong Road and Railway Street sections, trips will arrive from and depart to Bolong Road (in turn to/from the east and west); and from Cambewarra Road (and in turn to/from the Princes Highway and Meroo Road).

For the railway corridor section, access is to be provided from Fletchers Lane, and as such trips will arrive from the north (Princes Highway) and south (Cambewarra Road); the same distribution of trips would occur for the Fletchers Road construction, and for the crossing of Meroo Road.

No direct access to the pipeline route will be required/provided from the Princes Highway; the provision of appropriately located work-zones for the boring task on the southern side of the Highway (and for the western side of Meroo Road) will need to be determined.

Access to Pestells Lane is available via the Highway directly.

Traffic Impacts

Based on their previous work in the local area, including the completion of numerous traffic surveys and detailed trip assignments, STAP conclude that the very short term generation of these moderate levels of traffic would have little if any impact on the operation of local roads or intersections. This conclusion is supported by:

- The variety of access routes available to each of the sections of the pipeline route, and therefore the minimisation of additional flows in any single location (other than the immediate work-zone area).
- By association, the minimal additional flows at any single local or sub-regional intersection.

- The available capacity in local roads (and specifically Railway Street and Fletcher Lane), such that the total flows during the construction phase would be unlikely to exceed RTA environmental amenity targets or general capacity limits as outlined in the RTA Guide, and AustRoads *Guide to Traffic Engineering Practice Part 2: Roadway Capacity*.
- The provision of appropriate traffic management measures.

7.8.2.2 Work-Zone Operations

It is essential to ensure that the construction traffic does not significantly impact the existing operation of local roads in terms of general accessibility and safety.

Given these circumstances the construction work-zone will at all times be required to operate under appropriate traffic management and control to ensure the safety of construction employees, passing traffic, pedestrians and cyclists (though STAP notes that there is little pedestrian or cycle demand along most sections of the pipeline route).

To this end, STAP recommend that a detailed Construction Traffic Management Plan (CTMP) be developed and implemented in compliance with the appropriate Australian Standards, and further to consultation with Council and the RTA.

STAP address specific access and traffic control measures which we would need to be addressed in any CTMP.

Bolong Road

Boring will be used to install the pipeline across (under) Bolong Road between the primary SSPL site to the south and the future SSEP Packaging Plant to the north. The crossing location is to be finalised, but at this time is proposed in close proximity to the railway corridor that crosses Bolong Road (refer **Plate 15**).



Plate 15: Bolong Road looking west to the railway corridor.

These works would require the excavation of a bore pit on both sides of Bolong Road; the workspace area is to be determined, but it is anticipated that it would be located on SSPL land. No disturbance to the road surface is anticipated.

STAP identify that some boring techniques have a requirement for the bore head to be followed across the road/area being crossed. While not anticipated, if this were to be the case then full traffic control would be required. Bolong Road is an important collector and sub-regional route. It would be inappropriate to close Bolong Road during weekday daylight hours (generally 6:00 am to 7:00 pm). Any activity requiring work on the road should therefore be undertaken during the night and/or on weekends. According to STAP, night or weekend work along Bolong Road would have little impact on traffic arising from partial lane closures and reduction of speed limits, particularly given such would involve only a short-term duration.

In order to minimise additional access requirements to the Bolong Road work-zone, STAP recommend the use of available space within the future SSEP Packaging Plant site (accessed from railway Street) for construction and staff vehicles; this site can provide parking in close proximity to the work-zone. Any additional requirement for truck parking within either the road or rail reserve (*ie.* immediately adjacent to the work-zone) will need to be considered as part of the CTMP.

Railway Street, Future Packaging Plant to Cambewarra Road

It is anticipated that the majority of the work-zone along Railway Street (between the future SSEP Packaging Plant site and Cambewarra Road) can be contained within the road reserve (refer **Plate 16**). However, there may be a demand for the use of the kerbside lane in some locations.



Plate 16: Railway Street looking north from outside the SSEP Packaging Plant; note wide verge available.

Parking is currently not permitted along the eastern side of a significant section of Railway Street as a result of the width of the carriageway, particularly in close proximity to the Cambewarra Road intersection, and near the future SSEP Packaging Plant site where the western verge is minimal (refer **Plate 17**). Parking is generally available on the western side of the carriageway, provided by verge parking (gravel) and by some wider sections of run-off adjacent to local businesses (refer **Plate 18**).



Plate 17: Railway Street looking north adjacent to the narrower section of carriageway restricted by the narrow western verge adjacent to the railway corridor.



Plate 18: Railway Street towards Cambewarra Road, with wide western verge/frontage to local sites.

Given the short duration construction timeframe STAP indicate the temporary provision of a work-zone requiring the use of the kerbside lane could still provide two-way traffic

flow in most sections of Railway Street. Appropriate traffic management would be required, but the lack of significant parking demand and the available width of carriageway and verge would, in STAP's view, not require the provision of one-way traffic flow (ie. stop-go conditions) though this could be employed if necessary with little impact based on the relatively low flows along Railway Street. Such measures would be fully detailed in the CTMP.

As a means of maintaining as short a work-zone length as possible, and reduce additional on-street parking demand, STAP recommend that construction vehicle parking be provided off-street within the future SSEP Packaging Plant site for parking for this section of the construction phase.

Railway Street and Cambewarra Road Intersection

STAP anticipate that the majority of the work zone in Railway Street through the intersection with Cambewarra Road can be contained within the road reserve. However, the appropriate management of truck access to this section will need to be examined, as the use of the eastern kerbside lane (ie. the southbound Railway Street through lane) would potentially reduce the swept path available for vehicles turning to and from Cambewarra Road (refer **Plate 19**).



Plate 19: Railway Street and Cambewarra Road intersection
– swept path for trucks from Cambewarra Road to Railway Street south
would generally exclude the use of the kerbside (eastern) lane for the work-zone.

Should additional width for the work-zone be required, it may be necessary that a stop-go operation be provided. The existing traffic flow between Railway Street and Cambewarra Road is moderate at best through the day; nonetheless, STAP recommend

that if a partial closure is required then night works be investigated to minimise impacts on existing traffic flows.

As for the southern Railway Street section of the route, STAP suggest that parking could be provided in the future SSEP Packaging Plant site if required.

Railway Street north of Cambewarra Road

STAP anticipate that the majority of the work-zone along Railway Street north of Cambewarra Road can be contained within the available wide road reserve (refer **Plate 20**). The formed carriageway width in this section of Railway Street provides for formal kerbside parking only for a short distance, after which a narrower carriageway is available with wide grassed verges on both sides of the road (refer **Plate 21**). Traffic generation along this section of Railway Street is very low, based on the small number of adjoining sites and no through traffic.



Plate 20: Railway Street immediately north of Cambewarra Road.



Plate 21: Railway Street further north with narrower carriageway.

Given the relatively short duration of the construction phase, and the availability of the wide reserve, it is STAP's view that existing two-way traffic flow could be retained along this section of Railway Street for the duration of the project, ie. there would be no significant impact on existing traffic or parking demands. However, if some of the carriageway were required for the work-zone then a simple stop-go operation may be required. These operations would need to be detailed in the CTMP.

It is STAP's opinion that the provision of staff parking along Railway Street for this phase of construction would have little impact on either traffic flows or existing parking demand (minimal); although, the use of the future SSPL Packaging Plant site, or space within the adjacent railway reserve, provides alternative options for construction staff parking.

Railway Corridor

According to STAP works within the railway corridor would have no direct impact on traffic flows, as the project would generate minor peak flows to [access] this section of the route, with vehicles access anticipated to be provided via Fletchers Lane. STAP notes that access from the northern end of Railway Street would similarly not compromise existing traffic capacity or safety as a function of the low existing and construction traffic demands.

Appropriate signage and access to the corridor would need to be detailed in the CTMP, as would the provision of a suitable access point which ensures only construction access is provided.

The installation method for the pipeline across the railway line (at Fletchers Lane) is still to be determined, but it is likely that boring will be required. The provision of a work zone or work-zones to provide for boring (or indeed other installation method) will likely require some type of temporary traffic management at the crossing point, which would need to consider the angled turn of the Fletchers Lane carriageway immediately east of the railway. Based on the very low traffic flow at this location, it is STAP's view that simple management control around any work-zone would be more than adequate.

Edwards Avenue

The construction of the pipeline within the rail reserve under Edwards Avenue would be carried out using boring. Works sites would be established on both sides of Edwards Avenue, and tunnels bored from both sides of the road. The use of boring allows Edwards Avenue to be retained for two-way traffic flows, which are minor. According to STAP the potential for traffic control if the bore head needs to be followed may be required.

The Edwards Avenue railway bridge provides only one-way flow, and has weight restrictions which may require material trucks to be limited to using the railway corridor for access (refer **Plate 22**). As for the access to the railway corridor from Fletchers Lane, any potential access point from Edwards Avenue to the railway corridor would need to be appropriate controlled, and detailed in the CTMP.



Plate 22: Edwards Avenue looking west towards narrow bridge over railway.

Fletchers Lane

It is anticipated that the majority of the work-zone in Fletchers Lane between the railway corridor and Meroo Road can be contained within the road reserve and kerbside lane (refer **Plate 23**). Fletchers Lane provides a narrow graded carriageway with wide grassed verges on both sides of the road. Traffic generation along Fletchers Lane is low, based on the small number of adjoining sites and no through traffic.



Plate 23: Fletchers Lane at Meroo Road, short formal carriageway then gravel.

Given the relatively short duration for the construction phase, and the availability of the reserve, it is STAP's view that existing two-way traffic flow could be retained within Fletchers Lane for the duration of the project, *ie.* there would be no significant impact on existing traffic demands. Even if some of the carriageway were required for the work-zone then the sight distances available along what is a very straight road would generally allow for safe passing of a work-zone in a single lane, or at worst the provision of a simple stop-go operation, and which could be detailed in the CTMP.

Meroo Road and Fletchers Lane

Boring will be used to install the pipeline under Meroo Road at Fletchers Lane (refer **Plate 24**). As for the railway crossing and Edwards Avenue crossing, the provision of work-zones on one or both sides of the carriageway will require further assessment, specifically accounting for the turning demand to/from Fletchers Lane; the higher speed in this section of Meroo Road (80km/h); and the retention of verge width appropriate to the speed and traffic flow (*ie.* as a run-off safety consideration).



Plate 24: Meroo Road at Fletchers Lane

While the CTMP would detail such provisions, a temporary work zone with lower speeds and appropriate barriers may be appropriate if the work-zone/s are required within the existing road reserve (*ie.* if they cannot be contained outside of the reserve) or if the bore-head needs to be followed during the crossing. Given the flow along Meroo Road, and its importance as a distributor between the Princes Highway and Bomaderry, STAP's opinion that night and weekend works would likely to be required for any road closure requirements.

Princes Highway

The Princes Highway crossing will be completed using boring. Works would include excavation of a bore pit on both sides of the Highway (a workspace area of approximately 20 metres by 40 metres is anticipated at this time). No disturbance to the road surface is anticipated.

As previously outlined some boring techniques require the bore head to be followed across the road that is being crossed. If this is the case then full traffic control would be required. STAP notes that the RTA would generally not allow the closure of any lanes along the Princes Highway during daylight hours (generally 6:00 am to 7:00 pm) and as such any activity requiring work on the road would have to be done at night and on weekends.

While access to the northern side of the Princes Highway is available via Pestells Lane (refer **Plate 25**), the access point to a potential work-zone on the southern side of the Highway will need to be determined; further to the correspondence from the RTA and our review of the location, access from the Princes Highway itself would be impractical, and as such a potential access lane from Meroo Road should be investigated (potentially along the existing channel which travels north-west from just north of Fletchers Lane to the proposed crossing point).



Plate 25: Princes Highway at Pestells Lane.

The provision of a work-zone along the northern side of the Highway at Pestells Lane will also require safety management, specifically accounting for the turning demand to/from Pestells Lane; the higher speed along this section of the Highway (100km/h); and the retention of verge width appropriate to the speed and traffic flow (ie. as a run-off safety consideration).

7.8.2.3 General Impact Minimisation Strategies

STAP recommend that the following impact mitigation strategies would maximise the safety and efficiency of the pipeline construction, and are recommended for implementation by the construction contractor.

- A Construction Traffic Management Plan (CTMP) must be developed in consultation with the RTA, police and Council in accordance with the appropriate Australian Standards. The CTMP would detail: -
 - Construction hours and protocols for both RTA and Council roads;
 - Heavy vehicle and construction warning signs to be installed at key locations around the work-zone as it progresses;
 - Appropriate management of construction traffic where traffic flow is affected by the construction pipeline, and in particular at locations where the pipeline crosses the road or is located along and within the road reserve;
 - Installation of appropriate traffic control and warning signs where potential safety risk issues exist;
 - Appropriate management of the transportation of construction materials to maximise vehicle loads and thereby minimise vehicle movements;
 - Installation of specific warning signs at local access roads to the construction corridor to warn existing road users of entering and exiting traffic;
 - Appropriate mitigation to be provided where the pipeline crosses property access points or otherwise impacts access to adjoining sites. Wherever possible, all property access crossings would be completed in one day, with any open trenches covered overnight;
 - Distribution of warning notices to advise local road users, residents and site owners of scheduled construction activities and the potential impacts they may have on access (in particular); and
 - Induction of staff and truck drivers on the requirements of the CTMP.
- To as great an extent as possible, the disruption to private property access must be minimised for the duration of the construction works, with access restored and maintained at each property as soon as practicable as work moves along the pipeline corridor.

- The reinstatement of road and reserve surfaces to previous condition is essential; any damage to roads or reserves where vehicles have been entering/exiting the work-zone must also be appropriately reinstated.

7.8.2.4 Conclusions and Recommendations

STAP conclude that the construction of the gas pipeline can be undertaken in a manner that provides a safe and efficient manner subject to the provision of appropriate traffic management controls. Specifically STAP conclude:

- *The traffic generation of the Construction Project is low, and distributed to the available road network [generally outside of existing commuter peak periods] would not impact existing levels of service or capacities.*
- *Where the work-zone can be provided in a road or rail reserve, the potential for impact on the existing traffic and parking demands is low, as a function of both a low base demand and a low potential construction demand.*
- *In key locations boring will be utilised to retain traffic flows along key roads; any potential disruption to traffic flows along key roads – including the Princes Highway, Meroo Road and Bolong Road – would require additional consideration to ensure minimal impact; this would most likely require night or weekend works with appropriate traffic control.*
- *STAP recommends the preparation and implementation of a detailed Construction Traffic Management Plan, which must detail: -*
 - *Access points to work sites*
 - *Staff parking areas*
 - *Safety management proposals with reference to Australian Standards*
 - *Traffic management proposals with reference to Australian Standards*
 - *Means of distributing information to local residents and business owners that may be temporarily impacted by the construction.*

Following our assessment of the key issues associated with the construction of the gas pipeline, and with the application of the recommendations outlined above, STAP has concluded that the Construction Project is supportable from an access, traffic and parking perspective.

7.9 INFRASTRUCTURE IMPACTS

The DGRs for this project also require the EA to provide:

“An assessment of the impacts on any road or rail infrastructure and proposed measures to mitigate these impacts.

The EA is supported by a report prepared by Allen, Price & Associates Pty Ltd (APA) (Surveyors and Engineering Consultants) which provides an assessment of impacts to infrastructure along the proposed pipeline route and details measures to mitigate these impacts (**Annexure 15**). This assessment however is not just limited to road and rail (as required by the DGRs) but also examines impacts in relation to water, sewer, telecommunications, stormwater, electricity and other gas services (which addresses issues also identified following consultation with Shoalhaven City Council).

A site investigation was made by APA to determine areas where the proposed gas pipeline will impact on public and private infrastructure during construction.

Annexure 15 to this EA contains figures, photographs and drawings of the proposed route in relation to the Infrastructure Assessment.

Road reserves along the pipeline route form the main areas where the proposed gas main will lay. To take into consideration the effect of moving machinery, the entire width of the reserves were assessed for impacts by APA which encompasses the 5 – 7 m wide right-of-way to be constructed over the proposed route. Widths of reserves vary from 10 to 12 metres.

The proposed gas main will lay in the following road reserves:

- Pestells Lane;
- The Princes Highway;
- Meroo Road;
- Fletchers Lane;
- An un-named road reserve located to the east of and parallel to Railcorp's railway reserve;
- Railway Street;
- Bolong Road.

A small portion of Railcorp's railway reserve will be utilised to route the proposed gas pipeline. This is located at the intersection of Fletchers and the un-named road reserve parallel to the rail reserve, Meroo Meadow. According to APA no significant impacts to rail infrastructure is expected in this small portion of railway reserve by the construction of the SSGM.

Road reserves form the majority of the proposed route with approximately 30% of the road reserves containing bitumen sealed roadways, 20% containing unsealed roadways,

and 50% containing no formal roadway. A brief explanation of these road reserves now follows:

Pestells Lane

Pestells Lane is managed by Shoalhaven City Council. It is divided into two by the Princes Highway and consists of a formed, unsealed section to the west, and unformed section to the east of the Princes Highway.

The reserve width is approximately 10 m. Pavement width is approximately 4 m with its centreline offset to the north approximately 5 m.

The proposed route along Pestells Lane contains no houses except for one rural property located approximately 100 m north-west from the Meroo Road intersection.

The route commences at the existing valve and meter station at Pestells Lane.

Pestells Lane continues along the same alignment, unformed, on the opposite side of the Princes Highway and intersects with Meroo Road. The gradient of the land adjacent to the road reserve is mainly flat with the only exception where the road intersects the Princes Highway, and the gradient becomes steep for approximately 15 – 20 m down the highway embankment on the east side.

The Princes Highway

The Princes Highway is a two way, bitumen sealed, arterial road managed by the Road and Traffic Authority (RTA). The road reserve width varies considerably along its length through Meroo Meadow and Bomaderry. At the intersection with Pestells Lane, it varies between 40 to 90 m wide. The road pavement is approximately 20 m wide and centred within the reserve at this point.

The proposed gas main route continues in a south easterly direction along the formed, unsealed section of Pestells Lane until it is approximately 50 m from the Princes Highway. Here it will most likely be angled south for approximately 10 – 20 m, then back toward the highway to be passed through an under-bore, perpendicular to the highway.

The main infrastructure within the road reserve include road pavement, above ground power cables, Telstra service and stormwater drainage.

Meroo Road

Meroo Road is managed by Shoalhaven City Council, is bitumen sealed and is located at Meroo Meadow. The proposed SSGM will lay within a short section of Meroo Road as it transitions from Pestells Lane, under Meroo Road and into Fletchers Lane.

The road is sparsely populated with houses within the vicinity of the proposed gas main route at this point. The closest house is approximately 100 m to the north.

The road pavement is approximately 8 m wide, located centrally in the 20 m wide road reserve.

The road reserve is congested at the proposed Meroo Road crossing, with ActewAGL gas main, water main, Telstra service, table drains and other drainage infrastructure. The intersection of Meroo Road with Fletchers Lane contains a similar number of infrastructure.

Fletchers Lane

Fletchers Lane is a formed, unsealed road located at Meroo Meadow and managed by Shoalhaven City Council. It lays in an east-west direction. It intersects Meroo Road to the west, Railcorp's railway reserve to the east, and an un-named road reserve running parallel to the Railcorp's railway reserve.

The road is sparsely populated with three houses on the northern side and paddock to the south.

Road pavement is approximately 5 m wide and located 1.5 – 2 m offset to the north of the road reserve centreline.

The proposed gas line extends along Fletchers Lane until it changes direction into the railway reserve. The direction changes again approximately 50 m to the south and the pipe is to be passed through an under-bore of the railway tracks, into the opposite side of the railway reserve and continue through to the un-named road reserve.

Un-named Road Reserve

An un-named road reserve exists adjacent to Railcorp's railway reserve, on the west side. It is un-fenced on the east boundary which gives the neighbouring property access to use it as pasture land. A rural fence separates it from Railcorp's railway reserve on the west boundary. There are no houses along this road reserve until its intersection with Edwards Avenue, where a single property is located adjacent to the road reserve.

Three watercourse crossings will be made by the proposed gas main through this road reserve. Depending on minor route alterations at the detailed design stage, another watercourse crossing may be required at the Fletchers Lane and un-named road reserve intersection. The proposed route is shown to by-pass this watercourse and cross into the un-named road reserve further down Railcorp's railway reserve.

The un-named road reserve is intersected by Edwards Avenue and continues south, parallel to the Railcorp's railway reserve until it joins with Railway Street.

Infrastructure contained within the road reserve include water main, rural gates and fencing, vegetation, sewer rising main, power poles. Telegraph poles exist approximately 50 m apart from each other along the boundary between the road and railway reserve.

The existing ActewAGL gas pipeline servicing the Shoalhaven Starches factory enters into this road reserve adjacent to the large railway bridge over a minor watercourse located approximately 380 m north of the road reserve's end. It runs parallel to Railcorp's railway reserve and continues through into Railway Street road reserve.

Edwards Avenue

Edwards Avenue road reserve is approximately 18 m wide containing a 6 m wide bitumen sealed pavement centrally located within the reserve. The road is located within Bomaderry and managed by Shoalhaven City Council. It lays in an east-west direction and intersects with the un-named road reserve parallel to the Railcorp's railway reserve, although vehicular access to the un-named road reserve is blocked by gate and fence.

The intersection contains houses on all quadrants, although only two houses are located on the east side where the un-named road reserve is.

To minimise impacts to the pavement and seal, an under-bore is proposed for routing the Shoalhaven Starches gas main. Edwards Avenue contains a number of services at the proposed crossing point. Laying in an east-west direction are Telstra service cables, and water main. A sewer rising main and water main cross under Edwards Avenue, parallel to the un-named road reserve. Integral power poles are located approximately in the centre of the un-named road reserve, located at the intersection.

Railway Street

Railway Street road reserve is made up of two sections. The first is un-formed and connects onto the end of the un-named road reserve. It is approximately 200 m in length spanning across the west boundary of Lot 1 DP 774892. It terminates at the beginning of the sealed section of Railway Street, at the driveway to Lot 1 DP 774892. The sealed section begins at this point and continues in a southerly direction toward the end of Railway Street, where it intersects with Bolong Road.

The unformed section of road reserve contains existing infrastructure. The existing ActewAGL gas pipeline servicing the Shoalhaven Starches factor runs parallel to the unformed section of Railway Street. It eventually changes direction by 90 degrees and

exits the sealed section of the road reserve, approximately 40 m south of Lot 1 DP 774892. A water main and two sewer rising mains are also located along the length of the unformed section of Railway Street.

As the proposed gas pipeline continues through the sealed section of Railway Street, the proposed pipeline route crosses one of the most congested sections of the entire route, in relation to underground service, utilities and infrastructure, except for Bolong Road.

The road pavement along Railway Street varies from 5 m to 10 m wide, within a road reserve approximately 20 m wide. The proposed pipeline route is proposed to run along the east side of the road reserve, where many gravel and concrete driveways are situated.

Impacts to infrastructure within this road reserve include: sewer rising main, Telstra service, water main, power poles, kerb & gutter, stormwater drainage pipes, culverts and pits.

Bolong Road

The proposed pipeline is to be routed along Bolong Road reserve after exiting a proposed gas pressure reduction facility on Shoalhaven Starches' land.

Bolong road is an arterial road jointly managed by the RTA and Shoalhaven City Council. At the proposed crossing point, the reserve is 20 m wide with a pavement width approximately 11 m. The pavement is located with its centreline approximately 0.5 m offset to the north.

The construction of new civil works along Bolong Road as part of Shoalhaven Starches factory upgrade project has increased the potential for impacts by the proposed gas pipeline. The crossover point for the proposed gas main contains both new road and rail infrastructure.

Although the crossing of Bolong Road is confined to a small area, the road reserve is one of the most congested along the proposed route. Many services cross perpendicularly to the proposed SSGM crossing point. Detailed survey and route design will aid in mitigating impacts at this point.

The report by APA contains details of the infrastructure that will be impacted and methods to mitigate the impacts. Existing infrastructure along the route may constrain construction of the gas pipeline and so an assessment of the possible impacts to infrastructure has been made by APA. The infrastructure found along the route includes:

- Road seal and pavement;

- Stormwater drainage;
- Sewer drainage;
- Water mains;
- Telecommunications;
- Power distribution;
- Other gas services.

Potential impacts to existing infrastructure have been identified by APA along the entire length of the route, although certain areas contained significantly more impacts. These areas include:

- The proposed gas main tie-in point to the existing valve and meter station on Pestells Lane.
- Crossing of the Princes Highway back into Pestells Lane.
- Crossing of Meroo Road.
- Crossing of Fletchers Lane.
- Crossing of Railcorp's railway reserve, and the un-named road reserve to the east.
- Crossing of Edwards Avenue intersection.
- Along entire length of route on Railway Street.
- Bolong Road crossing.

Recommendations made by APA in relation to infrastructure impacts associated with the proposed gas pipeline, include:

- *“Contact infrastructure owners and operators to determine their requirements, eg. minimum clearances, emergency procedures, obtaining exact location details of underground infrastructure.*
- *Re-examine proposed route and alter to minimise impacts to above ground infrastructure.*
- *Obtain a detailed survey of the entire route to accurately locate infrastructure above and below ground of the proposed route.*
- *Obtain detailed erosion and sediment control plan.*
- *Re-examine proposed route to minimise infrastructure impacts further, based on detailed survey and information obtained from infrastructure owner and operators.*
- *Develop detailed construction timetable.*

- *Organise de-commissioning and/or removal of any infrastructure with owners and managers, including the provision of temporary measures to allow continued functioning of essential services.*
- *Make contact with Shoalhaven City Council regarding traffic control during construction. Develop traffic control plan.”*

7.10 LAND CONTAMINATION

An issue that was not raised by the DGRs; but which was identified by the PEA was the issue of land contamination.

Shoalhaven Starches engaged Coffey Environments (“Coffeys”) to carry out a land contamination assessment along the route of the proposed pipeline. A copy of Coffey’s assessment is included in **Annexure 10a** of this EA. This section of the EA is based upon the findings of this assessment.

7.10.1 Previous Reports

Numerous geotechnical investigations have been carried out across parts of the Manildra Group (Shoalhaven Starches) lands and nearby areas by Coffeys and others over the last 10 to 15 years.

Coffeys carried out a preliminary environmental site assessment and geotechnical investigation (Report Ref: ENVIUNAN00111AA, dated 25 June 2008) for the Shoalhaven Starches Expansion Project, including a proposed packaging plant which was to be developed on the piece of vacant land at Lot 16 DP 1121337 and Lot 2 DP 825808 and through which the proposed gas pipeline is shown to intersect.

Elevated concentrations of zinc and lead were noted in groundwater sampled from one well within Lots 2 and 16 above drinking water and/or protection of freshwater aquatic ecosystem trigger values. The source of the metals was not known and could be associated with background concentrations.

7.10.2 Site History and Observations

Information on the site history was obtained from:

- Review of selected aerial photographs;
- Review of previous Coffey Reports conducted within close proximity to the area;
- Interviews with available people familiar with the history and operations of the site; and
- Collation of the above.

7.10.2.1 Summary of Site History

In general, historical information suggested that properties along Railway Street have been a mixture of residential and commercial/industrial land uses whilst the majority of other areas along the proposed pipeline route have generally been vacant for rural landuse and mainly used for grazing.

Aerial photographs indicate that since 1961, Lot 16 DP 1121337 and Lot 2 DP 825808 appeared to be vacant and grassed. The amount of ground disturbance and density of industrial building surrounding Railway Street appears to have significantly increased in the late 1970s and early 1980s. The remainder of the proposed pipeline route to the north appears to have remained predominantly vacant/rural land.

A sewage treatment plant has been located on the eastern side of Railway Street since about 1975. A rail line has existed to the west of Railway Street including structures associated with former rail activities.

A search of the NSW OEH website by Coffeys did not show any listings of sites within the Bomaderry area.

Two phone interviews were conducted by Coffeys with Steve Thompson and Ron Arthur, who are responsible for rural properties located between Railway Street and Fletchers lane, Bomaderry. The interview was aimed at identifying potential areas of concern as a result of contaminating activities or events which may not have been recorded by the OEH database but may have had the potential to have an impact on the proposed pipeline route.

Steve Thompson indicated that he was not aware of any contaminating activities or large events occurring in the study area besides common agricultural practices.

Ron Arthur who has lived in the area for the last 20 years indicated that he has mechanically sprayed the weeds in his paddocks using the chemical Bromide in the past. He also indicated that the old rail yard located to the south of Cambewarra Road on the western side of Railway Street was known to have stored railway sleepers treated with copper arsenic in the past.

7.10.2.2 Site Observations

Coffey's staff made observations before the initial phase of fieldwork. Additional observations were made during the several phases of fieldwork which took place.

Lot 16 DP 1121337 and Lot 2 DP 825808

The southernmost portion of the investigation area comprises Lot 16 DP 1121337 and Lot 2 DP 825808, which is the parcel of land located on the northern side of Bolong Road, directly across the road from the existing Shoalhaven Starches factory site.

The land is part of a vacant grass covered area used to keep horses. Some ponding of water was noted at the time of fieldwork as a result of heavy rainfall events which preceded the fieldwork in Railway Street. The ground surface in these paddocks was noted to be spongy and soft under foot and the ground slope appeared to fall towards the south east.

Industrial premises were located to the west of this area along Railway Street and included Bomaderry Sheet Metal, Langford Auto Repairs, JJ Kiteley (Sheet metal), Bomaderry Smash repairs, Shoalhaven Glass and Mirrors, and All Breeds dog and cat grooming. A sewer pumping station is located just outside the southern part of this area near Bolong road. This area has a 3 m wide easement for a sewer line from Bolong Road to the adjacent sewage treatment plant to the north.

The existing road pavements in Railway Street were noted to be quite deteriorated with some potholing observed.

A former railway yard/depot which is located approximately 100 m south west of the intersection between Railway Street and Cambewarra Road was observed to have some old paint cans, bricks, rusty wire and random domestic waste such as rusty cans and plastic bags around its outskirts.

This structure is located within 20 m of the proposed pipeline alignment. Evidence of groundwater monitoring wells was noted opposite this area.

No other obvious evidence of waste materials or stressed vegetation was noted in along this section of the proposed pipeline alignment.

Railway Street to Pestells Lane

The pipeline route follows the Council owned road reserve to Fletchers Lane and then diverts along the southern shoulders of Fletchers Lane and Pestells Lane to the Jemena owned High Pressure Gas Transfer Station. The ground surface level varies between about RL 4 m (AHD) near Abernethys Creek to about RL 28 m (AHD) at the Gas Transfer Station.

This section of the proposed pipeline travels along a road reserve between Railway Street and Fletchers Lane crosses rural land which is currently used for cattle grazing. Ponding of water was noted at several locations along this section of the route, with the ground surf generally being spongy underfoot.

Fletchers Lane is in part un-surfaced. Generally the laneway was elevated in the order of 500 mm above the surrounding rural land and therefore did not have any significant ponding of water observed on its surface at the time of our investigation. Some filling up to 400 mm high was observed near the rail level crossing at the eastern end of Fletchers Lane and along the southern road shoulder near the intersection of Fletchers Lane and Meroo Road. The fill observed at site 2 was assessed to be in the order of 108 m³ with dimensions in the order of 3 m wide, 0.3 m high and 90 m long. The volume of fill in this area may however considerably differ as the road shoulder was covered in dense grass and also contained a significant amount of graded/cut road surface material.

Pestells Lane is an unsurfaced rural laneway that is used to service the gas pipeline transfer station and several paddocks which appear to be currently used for cattle grazing. The shoulders of the laneway were mounded up with the cut material to form a road shoulder which was about 400 mm above the existing road surface. No ponding of water was observed along the laneway, however several of the adjacent paddocks did comprise some minor gully erosion and water was observed ponding on the ground surface in these areas.

7.10.3 Potential Areas of Environmental Concern (AEC) and Contaminants of Concern (COC)

Based on the site history information and site observations potential Areas of Environmental Concern (AEC) and Contaminants of Concern (COC) were identified by Coffeys. These are summarised in **Table 33**.

Table 33
Summary of Potentially Contamination Activities, AECs, Likelihood of Contamination and COCs

AEC	Potentially Contaminating Activity	Sub Component / Description	Potential Areas of Environmental Concern	Likelihood of Contamination*	Potential Chemicals of Concern
AEC 1	Storage and use of fuels and chemicals.	Storage and use of fuels and chemicals associated with operations in the former rail yard/depot.	Areas adjacent to the former rail yard/depot. Typically contamination associated with these container storage areas is in near surface soils. <i>(Soil and groundwater media potentially affected)</i>	Moderate likelihood of contamination from potential storage of various chemicals/liquids including possible spillages and presence of former underground storage tanks.	TPH, BTEX, PAH, VHC.
AEC 1	Fill of unknown origin and quality.	Fill soils imported to the site as part of landfilling activities to raise site levels.	The filling history of the areas covered by this assessment is unknown. Extensive filling is not expected based on the site history information. Some relatively shallow fill soils are anticipated along Railway Street to raise site levels for pavements. Some fill soils were noted in parts of Railway Street and Fletchers Lane. Other areas are not expected to have significant amounts of fill soils. <i>(Soil media potentially affected)</i>	Generally a low likelihood of contamination across the majority of areas.	TPH, BTEX, PAH, OCP, OPP, PCB, heavy metals and asbestos.
AEC 3	Potential leaks from sewer line and nearby Sewage Treatment Plant.	—	The central and northern parts of Lots 2 and 5. <i>(Soil and groundwater media potentially affected)</i>	Moderate likelihood of contamination as anecdotal evidence suggested a leak had occurred from a sewer line which runs through the central part of the packing plant. The integrity of adjacent sewage treatment works infrastructure is also not known.	TPH, faecal Coliforms, pathogens, nutrients, heavy metals (and potentially asbestos from ruptured pipe).
AEC 4	Potential application of pesticides and fertilisers.	Possible use of pesticides in areas where current or previous agricultural activities take place.	Based on anecdotal evidence and a review of historical aerial photographs, and the history of the general area, application of pesticides and fertilisers could have occurred in all parts of the areas covered by this assessment.	Low likelihood of contamination.	OCP, OPP, heavy metals.

Notes:

* It is important to note that this is not an assessment of the financial risk associated with the AEC in the event contamination is detected, but a qualitative assessment of the probability of contamination being detected at the potential AEC based on the site history study and field observations.

TPH	Total Petroleum Hydrocarbons	Heavy Metals	arsenic, cadmium, chromium, copper, lead, nickel, mercury, zinc
BTEX	Benzene, Toluene, Ethylbenzene, Xylene	OCP	Organochlorine Pesticides
PAH	Polycyclic Aromatic Hydrocarbons	OPP	Organophosphorous Pesticides
PCB	Polychlorinated Biphenyl	VHC	Volatile Halogenated Compounds

7.10.4 Sampling and Analysis Plan

"Contamination" of land, as defined in the Contaminated Land Management Act (1997),

means the presence in, on or under the land of a substance at a concentration above the concentration at which the substance is normally present in, on or under (respectively) land in the same locality, being a presence that presents a risk of harm to human health or any other aspect of the environment.

The site sampling and analysis plan was designed by Coffeys to target soil contamination at the site at selected locations along the pipeline route. The *NSW EPA (1995) Sampling Design Guidelines* provides guidance on the number of sampling locations required to assess a site with respect to contamination for characterising a site based on detecting a circular hotspot (and also subject to results of site history and identified AECs).

For this linear pipeline route assessment, observations of the subsurface materials was carried out from 26 test locations spaced at approximately 200 m intervals (subject to access), targeting various landforms and potential AECs. Information previously collected by Coffey from Lots 2 and Lot 16 was used to supplement this assessment. Sampling locations comprised of five (5) boreholes (CBH01 to CBH05) seventeen (17) surface samples (SS01 to SS17) and twenty one (21) test pits (CTP05 to CTP26). Contamination samples were collected from twenty six (26) locations being SS01 – SS17 and CTP18 to CTP26. The boreholes and test pits were used to gain a preliminary appreciation of the likely subsurface conditions along the proposed pipeline alignment using a targeted sampling approach. A summary of the test locations is provided in **Table 34** below:

Table 34
Summary of Sampling Locations

Area	No. of Locations	Location Identification
Railway Street	10	CBH01 to CBH05 and SS01 to SS05
Rural Land (Railway Street to Fletchers Lane)	24	CTP06 to CTP17 and SS06 to SS17
Fletchers Lane and Pestells Lane	19	CTP18 to CTP26 and SS30 to SS39

Following receipt of initial results additional soil sampling was carried out from a low elongated fill mound located in the vicinity of test pit CTP21 where asbestos was detected. An additional 10 surface samples (SS30 – SS39) were collected from this mound at approximately 10 m intervals to further assess the potential extent of the impact.

For this preliminary assessment a direct assessment of groundwater quality was not carried out.

7.10.5 Assessment Criteria

7.10.5.1 Soil Vapour Criteria

For the purposes of their assessment the generalised soil vapour criteria presented in **Table 35** have been used by Coffeys as a guide to the potential for hydrocarbon contamination. These criteria have been developed by Coffey Environments to assist in the assessment of hydrocarbon contamination levels in soil. It is important to note that these generalised criteria are only a guide and that the PID has a different response to different chemicals.

Table 35
Generalised Soil Vapour Criteria

<i>PID reading as ppm isobutylene</i>	<i>Generalised soil gas content description</i>
< 20 ppm	NEGLIGIBLE
20 to 60 ppm	LOW
60 to 300 ppm	MODERATE
> 300 ppm	SIGNIFICANT

7.10.5.2 Soil Investigation Levels (SILs)

The laboratory results were compared by Coffeys to the following references:

- NSW DEC (2006) Guidelines for the NSW Site Auditor Scheme 2nd Ed. and the National Environment Protection (Assessment of Contamination) Measure (NEPM) (NEHF F Commercial/Industrial); and
- NSW EPA (1994), Guidelines for Assessing Service Station Sites.

The NSW DEC (2006) Guidelines for the NSW Site Auditor Scheme and the NEPM summarises the National Environmental Health Forum (NEHF) investigation levels for

protection of human health for different land uses and also provides guidelines for provisional phytotoxicity investigation levels (referred to as environmental investigation levels in the NEPM) for a range of contaminants in soils. The site landuse is intended for ongoing industrial use; therefore the results have been compared by Coffeys to NEHF F criteria for commercial/industrial landuse. Phytotoxicity criteria for the protection of plants are generally not applicable for commercial/industrial sites.

NSW EPA (2006) Guidelines do not provide threshold levels for volatile petroleum hydrocarbon compounds. NSW EPA (1994) *Guidelines for Assessing Service Station Sites* provide an indication of acceptable cleanup levels for petroleum hydrocarbons compounds at service station sites to be reused for sensitive land uses. The EPA has advised that these guidelines should also be used for less sensitive land-uses. For semi-volatile petroleum hydrocarbons (C16 – C35 and >C35) investigation levels are provided in the NSW EPA (2006) Guidelines, however, these are based on the NEPM health-based criteria, which require the laboratory analysis to unequivocally differentiate between aromatic and aliphatic compounds. According to Coffeys, if this cannot be done, the C10 – C40 criteria in the service station guidelines should be applied. For this investigation, Coffeys adopted the service station guidelines for all petroleum hydrocarbon fractions.

There are currently no national or OHE endorsed guidelines relating to human health of environmental investigation of material containing asbestos on sites. NSW DEC (2006) advise that until such guidelines become available, auditors must exercise their professional judgement when assessing if a site is suitable for a specific use in the light of evidence that asbestos may be a contaminant of concern. NSW DEC (2006) states that NSW Health will provide advice to auditors on a case-by-case basis where appropriate. The NSW DEC previously provided interim advice that “*no asbestos in the soil at the surface is permitted*”. Enhealth (2005) ‘*Guidelines for Asbestos in the Non-Occupational Environment*’, provides some guidance on assessing and managing asbestos in soil although does not provide a threshold concentration or investigation level for asbestos. For this site Coffeys adopted *non-detect* as an investigation level for asbestos.

The adopted Soil Investigation Levels (SILs) are summarised in **Table 36**.

Table 36
Soil Investigation Levels

<i>Contaminant</i>	<i>Human Health Investigation Level (HIL) (mg/kg)</i>
Arsenic	500 ¹
Cadmium	100 ¹
Chromium (III)	600,000 ¹
Copper	5,000 ¹
Nickel	3,000 ¹
Lead	1,500 ¹
Zinc	35,000 ¹
Mercury	75 ¹
Benzene	1 ²
Toluene	130 ²
Ethylbenzene	50 ²
Total Xylene	25 ²
Benzo(a)pyrene	5 ¹
Total PAHs	100 ¹
Aldrin + Dieldrin	50 ¹
Chlordane	250 ¹
DDT + DDD + DDE	1,000 ¹
Heptachlor	50 ¹
Total PCB	50 ¹
Asbestos	ND ³

Notes:

- 1 NSW DEC (2006) Guidelines for the NSW Site Auditor Scheme (2nd Edit.) and NEPC (1999) National Environmental Protection (Assessment of Site Contamination) Measure (NEPM) NEHF F.
- 2 NSW EPA (1994) Guidelines for Assessing Service Station Sites, Table 3.
- 3 On the advice of the NSW Department of Health, the NSW EPA have advised NSW Site Auditors (Site Auditors Meeting 1st March 2000) that "no asbestos in the soil at the surface is permitted". The phrase 'at the surface' has not been defined.

7.10.6 Field Investigations

The subsurface investigations carried out by Coffeys comprised in total five (5) boreholes (CBH01 to CBH05), seventeen (17) surface samples (SS01 to SS17) and twenty one (21) test pits (CTP05 to CTP26).

The test pits were approximately positioned 200m apart and as close as possible to the proposed pipeline route.

Surface Samples were taken during a site walkover which included scanning for underground services. These locations were positioned as close as possible to the proposed pipeline route between Railway Street and Fletchers Lane.

An additional 10 surface samples were collected from an elongated fill mound off Fletchers Lane at approximately 10 m intervals.

The five boreholes were located in Railway Street and were chosen over test pits due to there being a relatively large number of services present within the narrow road verges and beneath the road pavements.

7.10.6.1 Soil Sampling

During test pitting, environmental samples were collected.

7.10.6.2 Soil Vapour

Soil vapour tests were carried out by Coffeys using a Mini Rae 2000 Photoionisation Detector (PID) fitted with a 10.6 eV lamp and calibrated with isobutylene gas at a concentration of 100 ppm. This instrument allows rapid, semi quantitative analysis of ionisable volatile organic compounds in the soil.

Soil vapour testing was carried out at surface sample locations SS01 to SS17 and test pit locations CTP18 to CTP26 at depths up to 0.3m below existing ground surface level. Soil vapour tests were not carried out in the remaining boreholes as they were primarily geotechnical boreholes.

These soil samples were collected in duplicate into tightly sealed plastic bags. The headspace air above each sample was measured with a Mini Rae 2000 photoionisation detector (PID) fitted with a 10.6 eV lamp and calibrated with isobutylene gas at a concentration of 100 ppm. This instrument allows rapid, semi quantitative analysis of ionisable volatile organic compounds in the soil.

7.10.6.3 Laboratory Analysis

Chemical Testing

Laboratory analysis of the primary and intra duplicate samples was undertaken by the primary laboratory SGS Environmental Services (SGS) located in Alexandria NSW, a laboratory which is NATA accredited for the tests performed.

The soil samples were tested for those chemicals of concern as indicated in **Table 36** of Section 7.10.5.2.

7.10.7 Laboratory Analytical Programme

7.10.7.1 Contamination Assessment

Samples were selected for analysis mainly based on geological origin/fill type of the material, field screening, observations and site location.

The following is a summary of the primary sample analysis:

- 16 soil samples for BTEX;
- 16 soil samples for heavy metals;
- 16 soil samples for OCP;
- 16 soil samples for PCB; and
- 26 soil samples for asbestos.

Original laboratory sheets and analytical procedures are included in Appendix E.

7.10.8 Contamination Assessment Results

7.10.8.1 Soil Vapour

The soil samples from borehole soil gas vapour tests recorded negligible to low PID readings ranging between 0.0 and 9.5 ppm. According to Coffeys, this is generally consistent with field observations and the laboratory-tested soil samples.

7.10.8.2 Comparison of Result to Soil Investigation Levels

Of the samples tested no exceedences were recorded above the adopted SILs except for sample CTP21 (0.1-0.2m) which recorded chrysotile asbestos.

7.10.9 Discussion and Recommendations

The results of the assessment carried out by Coffeys identified some potentially contaminating activities and associated AECs and COCs along the proposed pipeline route. These were associated with:

- Storage and use of fuels and chemicals with operations at the former rail yard depot (Railway Street);
- Fill of unknown origin and quality;
- Possible leaks from the sewer line and nearby treatment plant; and
- Potential application of pesticides and fertilisers (mainly in rural areas, but could have occurred across all parts of the assessment area).

The AECs were assessed as having a low to moderate likelihood of contamination being present.

Evidence of petroleum or other contaminant impacts were not recorded in the sample locations excavated opposite the former rail depot. Observations made of this area noted evidence of possible former groundwater monitoring wells suggesting evidence of previous assessments. Coffeys recommend that careful observations are made during trenching works within this general area for evidence of odorous or discoloured soils which could suggest evidence of contamination. If evidence of such contamination is noted then, advice should be sought from an experienced environmental consultant and these soils should be kept separate to other soils and adequately managed.

Fill soils were observed at locations along Railway Street and at one location on Fletchers Lane and one location on Pestells Lane. The fill along Railway Street had the appearance of mainly road making materials. The other fill at Fletchers and Pestells Lane was described as topsoil fill, but likely to comprise mixtures of topsoil and road making materials on the road verge. Evidence of contamination was generally not recorded in the fill except for one sample where asbestos was detected on Fletchers Lane. Ten additional soil samples were collected and analysed in this area to further assess the potential extent of the asbestos. No further asbestos was identified. The source of the asbestos is not known at this stage, but could be associated with one or more sources such as former break pads or discarded wastes. The presence of asbestos in this area would need to be taken into consideration in the earthworks component of the pipeline construction to adequately manage potential risks to human health and appropriate management and disposal of excavated soils.

When handling such materials the work must be carried out by appropriately qualified and licensed contractors in accordance with all relevant codes of practice and standards such as *National Occupational Health and Safety Commission (2005): Code of Practice for the Safe Removal of Asbestos (2nd Ed)[NOHSC:2002(2005)]*.

Evidence of contamination impacts from the sewer or the treatment plant were not recorded within Lots 2 and 16 from previous works carried out by Coffeys in this area. Elevated concentrations of zinc and lead were noted in groundwater sampled from one well above drinking water and/or protection of freshwater aquatic ecosystem trigger values. The source of the metals was not known and was noted as potentially being associated with background concentrations. Due to the proximity of the adjacent treatment plant, we recommend that any trench dewatering from trenching in Lots 2 and 16 be adequately tested and managed with due regard to potential contaminants.

Other evidence of contamination was not identified across the assessment area.

8.0 ENVIRONMENTAL RISK ANALYSIS

The DGRs for the project require the provision of a General Environmental Risk Analysis to identify potential environmental impacts (construction and operation), proposed mitigation measures, potentially significant residual environmental impacts after the application of proposed mitigation measures and an appropriately detailed impact assessment of any additional key environmental impacts identified through the risk analysis.

This section of the EA provides an environmental risk assessment of the proposed pipeline construction and operation undertaken in accordance with the environmental risk matrix set out in **Table 37** having regard to the findings of the analysis of key issues as described in Section 7.0 of this EA.

Environmental Risk

The assessment was undertaken by examining the potential consequence and likelihood that environmental impacts will occur with management controls in place = Residual Risk. Residual risk can be either:

- **Unacceptable** – Any hazard that has this risk ranking is beyond effective administrative management and must be avoided by the adoption of elimination, substitution, isolation or engineering control.
- **High** – Significant environmental issues requiring intervention by management and workforce consultation to control methods of work performance, design, employment conditions and other project-controlled matters.
- **Medium** – Risk is low as reasonably practicable. Risk has been reduced by use of appropriate environmental management controls.
- **Low** – Any hazard that has this risk ranking is generally acceptable. The work environment and methodology presents minimal risks to the environment.

Table 38 shows a summary of the level of residual environmental risk for all aspects considered in the preparation of this EA. No environmental aspect scored a residual risk ranking of high or unacceptable, therefore with the appropriate mitigation measures in place the project residual risk was assessed to be as low as reasonably practical.

Table 37
Environmental Risk Matrix

<i>Consequence of Occurrence</i>	<i>Likelihood of Occurrence</i>			
	<i>Very likely Could happen any time</i>	<i>Likely Could possibly occur sometime</i>	<i>Unlikely Could possibly occur but very rarely</i>	<i>Very unlikely May possibly occur but probably never will</i>
Major Destruction of sensitive environmental features. Severe impact on ecosystem. Widespread and persistent damage to a significant area of land and/or surface or groundwater resources.	Unacceptable	Unacceptable	High	Medium
Serious Long term impact of regional significance on sensitive environmental features. Significant medium-long term impacts to fauna and flora populations or habitat with negative impact on ecosystem.	Unacceptable	High	Medium	Low
Moderate Short term impact on sensitive environmental features. Significant short term changes to flora and fauna populations, habitat and/or aquatic ecosystems. Non-persistent but possibly widespread damage to land; damage that can be remediated without long term impacts.	High	Medium	Low	Low
Minor Impact on fauna and flora populations and/or habitat but no negative effects on ecosystem. No significant impact on water resources or sensitive environmental features.	Medium	Low	Low	Low

Table 38
Summary of Residual Impact Assessment

<i>Aspect</i>	<i>Potential Impact</i>	<i>Proposed Mitigation</i>	<i>Consequence</i>	<i>Likelihood</i>	<i>Level of Risk</i>
Hazards and risk	Damage to pipeline and explosion caused by bushfire.	Section 7.2	Serious	Unlikely	Medium
	Damage to pipeline and explosion caused by lighting.	Section 7.2	Serious	Unlikely	Medium
	Train derailment and impacts to pipeline.	Section 7.2	Serious	Unlikely	Medium
	Potential incidents at proposed Pestells Lane metering station.	Section 7.2	Serious	Unlikely	Medium
Noise and vibration	Disturbance to sensitive receptor from noise and vibration.	Section 7.3	Minor	Likely	Low
Surface water	Adverse effects on aquatic fauna and habitats due to the generation of fugitive sediment.	Section 7.4.1	Moderate	Unlikely	Medium
	Disturbance of Acid Sulphate Soils and increasing acidity of watercourses.	Section 7.4.1.4	Moderate	Unlikely	Medium
	Adverse effects on aquatic fauna and riparian vegetation due to altered flow regime.	Section 7.6	Minor	Unlikely	Low
Sea Level Rise	Increased risk from flooding.	Section 7.4.1.2	Minor	Likely	Medium
Groundwater	Reduced groundwater availability for other users due to trench dewatering.	Section 7.4.1.3	Minor	Very unlikely	Low
	Deterioration in groundwater quality affecting suitability for water uses.	Section 7.4.1.3	Moderate	Very unlikely	Low
Air quality	Decrease in local air quality due to dust emissions.	Section 7.5	Minor	Very likely	Medium
	Decrease in air quality due to vehicle or machinery.	Section 7.5	Minor	Very likely	Medium

Table 38 (continued)

<i>Aspect</i>	<i>Potential Impact</i>	<i>Proposed Mitigation</i>	<i>Consequence</i>	<i>Likelihood</i>	<i>Level of Risk</i>
Ecology	Significant impacts to threatened species.	Section 7.6	Serious	Unlikely	Medium
	Reduced conditions favourable for plant growth due to disturbance.	Section 7.6	Minor	Likely	Low
	Introduction of new weeds or increased weed density and distribution.	Section 7.6	Moderate	Likely	Medium
Aboriginal cultural heritage	Disturbance to known Aboriginal or non-aboriginal sites of significance (without prior approval).	Section 7.7	Serious	Very unlikely	Low
	Disturbance to unknown Aboriginal or non-aboriginal sites of significance.	Section 7.7	Serious	Unlikely	Medium
Traffic and transport	Road and traffic disruption during construction.	Section 7.8	Moderate	Likely	Medium
	Road and traffic disruption during operations.	Section 7.8	Minor	Unlikely	Low
Land contamination	Disturbance of contaminated soils and adverse impacts to human health and the environment.	Section 7.10	Serious	Unlikely	Medium
Visual amenity	Reduced visual amenity short-term.		Minor	Very likely	Medium
	Reduced visual amenity long-term.		Minor	Unlikely	Medium

9.0 DRAFT STATEMENT OF COMMITMENTS

Section 75F(6) of the EP&A Act states that the Director-General may require the proponent to include in an EA a Statement of the Commitments the proponent is prepared to make for environmental management and mitigation and management measures on the site.

The draft Statement of Commitments is designed to effectively manage and mitigate the environmental effects of the project.

Table 39 shows the draft commitments and identifies the desired outcomes, actions and timing of the stated commitments.

Notwithstanding the commitments made in **Table 39** Shoalhaven Starches is committed to implementing all mitigation measures set out in Sections 7.0 and 8.0 of this EA.

Table 39
Draft Statement of Commitments

<i>Outcomes</i>	<i>Action</i>	<i>Timing</i>	<i>EA Section No.</i>
1. Ecological Management			
Minimise impacts of on flora and fauna across project corridor and surrounding area	1.1 Maintain strict control on clearance envelope. Ensure no clearing to occur outside of surveyed pipeline corridor.	Prior to and during corridor preparation.	7.6
	1.2 Care is required when constructing the pipeline across low lying areas to ensure that the movement of soil is minimised. An Erosion and Sediment Control Plan should be prepared to facilitate good on-site management of erosion during construction.	Prior to construction.	7.6
	1.3 If street trees are removed from Railway Street or elsewhere, they should be replaced. The species to be used should be determined through consultation with Shoalhaven City Council.	Rehabilitation period.	7.6
	1.4 Minimise extent of vegetation clearance where possible.	During corridor surveying and clearing activity.	7.6
	1.5 Avoid unnecessary removal of hollow-bearing trees identified during corridor surveying.	During corridor surveying and clearing activity.	7.6
	1.6 Retain all understorey and groundcover from pipeline corridor to ensure retention of natural seed stocks to facilitate rehabilitation program.	During corridor preparation.	7.6

Table 39 (continued)

<i>Outcomes</i>	<i>Action</i>	<i>Timing</i>	<i>EA Section No.</i>
	1.7 The areas of the proposed pipeline corridor which have not been assessed should be before construction begins.	Prior to construction.	7.6
	1.8 Local native plant species must be used to rehabilitate native riparian vegetation disturbed by the project.	Post construction.	
	1.9 Undertake weed monitoring and management program along pipeline corridor.	Post rehabilitation.	7.6
	1.10 Consult with landholders regularly to ensure rehabilitation objectives are being achieved.	Ongoing (periodic).	7.6
2. Cultural Heritage			
Employees and contractors aware and respectful of Aboriginal heritage values of project site and surrounding area.	2.1 Include specific Aboriginal heritage awareness in project induction program.	Site induction process.	7.7
	2.2 CEMP to include specific action should unknown sites or items be discovered during corridor creation or any other period. Consult with OHE and stakeholders as required.	Construction period.	7.7
3. Surface and Groundwater Management			
Maintenance of soil value for rehabilitation and minimisation of soil loss through erosion.	3.1 The CEMP for the project is to make provision for erosion and sediment control.	Prior to construction.	7.4.1
	3.2 A comprehensive Erosion and Sediment Control Plan (ESCP) is to be prepared for the project in accordance with the recommendations of the Erosion and Sediment Control Management Plan prepared by Allen Price & Associates (refer 24710).	Prior to construction.	7.4.1
	3.3 Observe strict controls over the stripping, stockpiling and protection of topsoils and trench spoil during pipeline installation.	All stages.	7.4.1
	3.4 Replace trench spoil and topsoils as soon as practicable.	Completion of backfilling activities.	7.4.1
	3.5 Install silt fencing or otherwise to protect topsoil stocks where delays prevent replacement.	Construction period.	7.4.1
	3.6 Re-establish soil conservation systems (where applicable) on freehold lands to agreed condition.	Rehabilitation period	7.4.1

Table 39 (continued)

<i>Outcomes</i>	<i>Action</i>	<i>Timing</i>	<i>EA Section No.</i>
	<p>3.7 Prepare activity specific water crossing construction method statements. In this regard all watercourse crossings are to be directionally bored:</p> <ul style="list-style-type: none"> • with entry and exit points sufficiently setback to allow for desired Category 2 riparian objectives to be met; and • which calls for designed scour depth and safety margin. 	Prior to construction.	7.4.1
	<p>3.8 Based upon results of this EA it is considered Acid Sulphate Soils are likely to be encountered along low lying parts of the pipeline route located in Lots 4 and 5 and in the vicinity of creek crossings (reference CTP09 and CTP12). ASS may also be encountered sporadically up to the intersection with Fletchers Lane. The previous ASSMP prepared for the proposed SSEP Packing Plant be extended to incorporate other sections of the proposed pipeline where ASS could be intersected.</p>	Prior to construction.	7.4.1
	<p>3.9 Appropriate safety procedures should be implemented for all excavations in accordance with relevant OH&S legislation and the findings and recommendations of the assessment carried out by Coffeys (Annexure 10a).</p>	All stages.	7.4.2
	<p>3.10 The Office of Water is to be consulted if groundwater de-watering is necessary during construction to determine if an approval is required.</p>	During construction.	
	<p>3.11 Each watercourse is to be assessed to determine whether the soils are sodic or non-sodic within the flood liable land. The soil properties (such as sodicity) at watercourse crossings need to be assessed to determine appropriate crossing methodologies and rehabilitation measures. The investigation should be undertaken before construction commences.</p>	Prior to construction.	

Table 39 (continued)

<i>Outcomes</i>	<i>Action</i>	<i>Timing</i>	<i>EA Section No.</i>
4. Traffic Management			
Minimise the impact of the project on the areas of normal traffic flow. Traffic safety considerations	4.1 Prepare a Construction Traffic Management Plan which details: <ul style="list-style-type: none"> • Access points; • Staff parking; • Safety management proposals; • Traffic management proposals; • Consultation and liaison with adjacent property owners who may be affected by construction. Remediate any damage to roads/access tracks caused by the construction of the pipeline.	Planning stages.	7.8
	4.2 Erect appropriate road signage along project site as per NSW RTA requirements.	Construction period.	
	4.3 Minimise overall impacts of project on major traffic flows.	Construction period.	
	4.4 Inform all potentially affected residents adjoining the gas pipeline corridor of proposed traffic arrangements. Provide alternate access to landholders where access is disrupted.	Construction period.	
5. Air Quality			
Complete proposed development without exceeding OEH air quality criteria objectives.	5.1 Dust emissions during construction phase will be managed by implementing best practice dust control measures such as minimising exposed areas, rehabilitation and revegetation upon completion of work and using water sprays if required.	When required.	7.5
	5.2 Suppress dust along unsealed site access roads. Restrict project vehicle speeds along the ROW.	When required.	7.5
	5.3 Limit topsoil stripping and trenching during high winds.	When required.	7.5

Table 39 (continued)

<i>Outcomes</i>	<i>Action</i>	<i>Timing</i>	<i>EA Section No.</i>
6. Documentation			
Documents governing planning, construction and operation.	6.1 Prepare and implant a CEMP for the project.	Pre-commencement.	
	6.2 Encourage strict observation of published construction plans and site specific work procedures.	All stages.	
	6.3 Ensure all construction and operating conditions are available to personnel.	Pre-commencement.	
7. Overall Project			
All approved activities to occur within the defined corridor boundaries.	7.1 Survey and clearly mark the boundary of the pipeline construction corridor.	Prior to commencement of disturbances.	
	7.2 Construction plans and induction program clearly state responsibilities of contractors to observe disturbance limitations.	During tender process and contractor inductions.	
	7.3 Construct and operate in accordance with Australian Standard AS2885 series and the Australian Pipeline Industry Association (APIA) Code of Environmental Practice 2005.	During construction and operations.	
8. Operating Hours			
Management of construction activities in accordance with approved operating hours.	8.1 Undertake all construction activities associated with the project that would generate an audible noise at any residential premises between 7:00 am to 6:00 pm Monday to Friday; 8:00 am to 1:00 pm on Saturday.	Duration of construction period.	7.3
	8.2 Limit construction materials deliveries along gas pipeline to operating hours as above.	Duration of construction period.	
9. Noise and Vibration			
All construction activities undertaken in appropriate manner to minimise noise and vibration impacts on surrounding environment.	9.1 All plant and machinery should be selected with consideration to low noise options where practicable and available.	All stages.	7.3
	9.2 Noisy construction activities (such as drilling at the Edward Avenue intersection) only operate for 2 – 3 hours at a time to reduce noise impacts at nearby residences. Ensure activities in any one location are staggered. For instance, if rock hammering or.	All stages.	7.3

Table 39 (continued)

<i>Outcomes</i>	<i>Action</i>	<i>Timing</i>	<i>EA Section No.</i>
	drilling is occurring at one location do not operate additional excavators or other noisy plant at the same location until the activity is complete		
	9.3 Workers and contractors be trained in work practices to minimise noise emissions.	All stages.	7.3
	9.4 Truck drivers to be informed of designated vehicle routes, parking locations and acceptable delivery hours.	All stages.	7.3
	9.5 Work site vehicle entrance to be sited away from residences where practicable.	Prior to construction.	7.3
	9.6 Optimise the number of vehicle trips to or from site.	All stages.	7.3
	9.7 Staff parking should be sited away from residential areas where practicable.	All stages.	7.3
	9.8 No motor vehicles should access site prior to 7:00 am in order to avoid sleep disturbance.	All stages.	7.3
	9.9 A community liaison officer should be available to consult with neighbouring property owners and contractors. The community liaison officer should also receive and manage noise complaints.	Prior to construction and all stages.	7.3
	9.10 Vibration measurements be undertaken during installation in the event that rock hammering is required or complaints regarding vibration are made. Vibration measurements can be carried out using either an attended or unattended vibration monitor.	Construction period.	7.3
	9.11 Publish working hours clearly in all site induction documents.	Pre-commencement.	7.3
	9.12 Observe stated operating hours.	Construction period.	
	9.13 Encourage all employees and contractors to drive in courteous manner and avoid undue generation of traffic noise.	All stages.	

Table 39 (continued)

Outcomes	Action	Timing	EA Section No.
	9.14 Ensure all equipment is in good working order and noise attenuation equipment installed on all machinery.	All stages.	
	9.15 Ensure deliveries of construction materials and equipment occur within operating hours.	Construction period.	
10. Rehabilitation			
Rehabilitation of gas pipeline corridor as soon as practicable.	10.1 Vegetation rehabilitation and maintenance should be addressed in the ESCP (see SOC 3.2) and as outlined in Section 3.11 of the Erosion & Sediment Control Plan prepared by Allen Price & Associates (refer 24710).	Prior to construction.	7.4.1
	10.2 Ensure topsoil and trench spoil are clearly segregated within pipeline corridor.	Duration of construction period.	7.4.1
	10.3 Ensure topsoil is not placed back across working area until trench is adequately compacted to avoid settling.	Rehabilitation period.	7.4.1
	10.4 Stabilise topsoil with retained vegetation as soon as practicable to encourage natural regeneration of disturbed corridor.	Rehabilitation period.	7.4.1
	10.5 Materials used for backfilling and trenches should be materials capable of providing uniform basal, wall and corner support for the service pipes. The excavated materials from the trenches are not considered suitable materials for backfilling in the immediate vicinity of the pipeline.	Construction period.	7.4.2.2
	10.6 Local native plant species must be used to rehabilitate native riparian vegetation disturbed by the project.	Following construction.	
	10.7 Rehabilitation should include the rehabilitation of watercourse crossings and the rehabilitation phase should continue until all watercourse crossing sites are identified as stable by an independent suitably qualified certifier. Any trench areas should be maintained until they are certified as stable.	Following construction.	

Table 39 (continued)

<i>Outcomes</i>	<i>Action</i>	<i>Timing</i>	<i>EA Section No.</i>
	10.8 Re-establish previous land uses as soon as practicable after trench backfilling.	As area becomes available.	7.4.1
	10.9 Ensure land profile is re-established to previous or agreed condition.	Ongoing with periodic monitoring.	7.4.1
	10.10 Conduct ongoing monitoring and maintenance of disturbed lands. The monitoring program would need to be undertaken to assess the outcomes of the works undertaken including areas of potential erosion and ground instability associated with construction impact. The monitoring program should include monitoring and maintenance of any bank stabilisation and stream bed and bank rehabilitation. The rehabilitation will need to be monitored until all crossing sites are identified as stable by an independent suitably qualified certifier. Monitoring should also be undertaken for the rehabilitation of native riparian vegetation where native riparian vegetation has been removed as part of the project and rehabilitated following construction. The Office of Water recommends a maintenance period of 5 years after final planting. The rehabilitation of other non native vegetation in riparian areas should be maintained until it is established and the area has been certified as stable by a suitably qualified certifier.	Ongoing.	7.4.1
	10.11 Monitor corridor for weed species growth.	Ongoing.	7.4.1
	10.12 Undertake weed control and eradication where needs identified.	Ongoing / project life.	7.4.1

Table 39 (continued)

<i>Outcomes</i>	<i>Action</i>	<i>Timing</i>	<i>EA Section No.</i>
11. Waste Management			
Management of waste materials produced during construction phase.	11.1 Waste generated during construction is collected at staging points for regular removal by contractor.	Duration of construction period.	
	11.2 Waste materials collected for recycling where possible.	Duration of construction period.	
12. Consultation			
All stakeholders are satisfied with the outcomes of consultation.	12.1 Establish a 24 hour toll-free complaints telephone line.	Prior to construction period.	
	12.2 Advertise to the community that construction is going to commence and provide regular updates of project details.	Duration of construction period.	
	12.3 Put the project as an Agenda item for the Community Consultative Committee.	Ongoing.	
13. RailCorp Requirements			
To satisfy RailCorp requirements for the project.	13.1 Shoalhaven Starches agree to provide an accurate survey locating the development with respect to the rail boundary and rail infrastructure. This work is to be undertaken by a registered surveyor, to the satisfaction of RailCorp's representative.	Prior to Construction	
	13.2 Prior to the issue of a Construction Certificate Shoalhaven Starches will undertake a services search to establish the existence and location of any rail services. Persons performing the service search shall use equipment that will not have any impact on rail services and signalling. Should rail services be identified within the subject development site the Applicant must discuss with the Rail Authority as to whether these services are to be relocated or incorporated within the development site.	Prior to Construction	

Table 39 (continued)

<i>Outcomes</i>	<i>Action</i>	<i>Timing</i>	<i>EA Section No.</i>
	13.6 Shoalhaven Starches undertake to enter into an agreement with RailCorp defining the controls to be implemented in managing the access required and/or the potential impacts of the development on RailCorp, and the involvement of RailCorp staff in ensuring the appropriate safety and technical standards are complied with throughout the development.	Prior to Commissioning of Pipeline	

10.0 CONCLUSION

This Environmental Assessment addresses a proposal made by Shoalhaven Starches Pty Ltd which seeks to install a 5.5 km gas pipeline connecting the Shoalhaven Starches factory site at Bolong Road, Bomaderry directly to the Eastern Gas Pipeline at Pestells Lane, Meroo Meadow. The objective of the pipeline is to provide Shoalhaven Starches with greater access to a competitive gas supply market.

The proposed pipeline route project has been devised to address key issues raised by relevant government agencies and the local community.

This EA has been prepared in accordance with Part 3A of the EP&A Act 1979 to assess the potential environmental impacts associated with the project.

In accordance with the NSW Department of Planning Director-General's Requirements a range of environmental investigations were undertaken to assess the potential environmental impacts of the project. These included assessment on key issues involving potential impacts on biodiversity; Aboriginal heritage; hazards and risks; surface and groundwater; and traffic. In addition, a general environmental risks analysis was undertaken and an assessment of the project against the principles of Ecologically Sustainable Development was undertaken.

The EA found that the project can be approved under Part 3A of the EP&A Act 1979. The project is generally consistent in context and character with the land along the route. Furthermore, the highly disturbed nature of the pipeline corridor significantly reduces the likelihood of adverse environmental impact.

Where the pipeline construction activities have the potential to cause minor short term environmental impacts, proposed mitigation measures will reduce that impact to as low as reasonably practical.

Operation of the pipeline will not result in any significant environmental impact as it will involve minimal maintenance and the risk assessment concluded that there was a low risk on all threats.

Since the project is unlikely to significantly affect the environment and a number of benefits have been identified, this EA recommends that the project receive approval, subject to the implementation of the draft Statement of Commitments included in this EA.



STEPHEN RICHARDSON
TOWN PLANNER CPP MPIA

ANNEXURE 1

**Summary of
the Director-General
of Planning & Infrastructure
Requirements**

ANNEXURE 1

ANNEXURE 1

SUMMARY OF DIRECTOR-GENERAL OF PLANNING & INFRASTRUCTURE REQUIREMENTS

<i>Requirements</i>	<i>Comments</i>
GENERAL REQUIREMENTS	
<p>The Environmental Assessment (EA) must include:</p> <ul style="list-style-type: none"> • An Executive Summary; 	<p>Executive summary provided, pages (i) – (iii) of EA.</p>
<ul style="list-style-type: none"> • A detailed description: <ul style="list-style-type: none"> – existing site characteristics and environmental features; – alternatives considered; – construction and operation details that clearly define the proposed corridor; – infrastructure and watercourse crossing methods; and – engineering and/or architectural plans for the proposed works. 	<p>Section 3.0 provides a detailed description of projects.</p> <p>Plans of the project are also included in Annexures 5 to 7.</p>
<ul style="list-style-type: none"> • a Project justification with consideration of Project objectives, Project alternatives, benefits and impacts of the Project and the suitability of the site (corridor); 	<p>Section 3.1 of the EA addresses the need and justification of project.</p>
<ul style="list-style-type: none"> • consideration of the Project against relevant statutory provisions including the consistency of the Project with the objects of the <i>Environmental Planning and Assessment Act 1979</i>; 	<p>Section 5.0 of the EA addresses the statutory provisions associated with the project.</p>
<ul style="list-style-type: none"> • an assessment of the key issues and potential impacts outlined below, during construction and during operation; 	<p>Section 7.0 of the EA addresses the key issues associated with the project.</p>
<ul style="list-style-type: none"> • a draft Statement of Commitments, outlining environmental management, mitigation and monitoring measures; 	<p>Section 9.0 of the EA provides a draft Statement of Commitments for the project.</p>
<ul style="list-style-type: none"> • a conclusion justifying the Project, taking into consideration the suitability of the site, and the costs and benefits of the Project; and 	<p>Section 10.0 of the EA is a conclusion justifying the project.</p>
<ul style="list-style-type: none"> • a signed certification by the author of the EA that the information in the EA is neither false nor misleading. 	<p>Signed certification for the EA is provided at the beginning of the EA.</p>

<i>Requirements</i>	<i>Comments</i>
KEY ISSUES	
<ul style="list-style-type: none"> • Strategic Justification – including: <ul style="list-style-type: none"> – a strategic planning consideration of the Project and an analysis of the suitability of the gas pipeline route with respect to potential land use conflicts with existing and future surrounding land users; 	Refer Section 7.1 of EA.
<ul style="list-style-type: none"> – details of the proposed route for the gas pipeline which clearly describes the relevant ownership, land use, and zoning provisions; and – an analysis of the required pipeline capacity having regard to existing gas supplies. 	
<ul style="list-style-type: none"> • Hazards and Risk – including: <ul style="list-style-type: none"> – a screening of potential hazards associated with the gas supply infrastructure to determine the potential for off-site impacts; and – should potential off-site impacts be identified, a Preliminary Hazard Analysis (PHA) must be prepared in accordance with the Department's guidelines (see attached). 	Refer Section 7.2 of EA.
<ul style="list-style-type: none"> • Noise and Vibration – including: <ul style="list-style-type: none"> – a noise impact assessment, including an assessment of noise impacts and road traffic noise during both construction and maintenance; – consideration of potential vibration impacts from excavation works; and – details of the proposed noise mitigation, monitoring and management measures. 	Refer Section 7.3 of EA.
<ul style="list-style-type: none"> • Soil and Water – including: <ul style="list-style-type: none"> – an assessment of the water quality impacts associated with the construction and operation of the Project, with particular reference to impacts on aquatic ecology, riparian zones, surface water and groundwater impacts along the proposed route; – detailed information which describes how those water bodies or water courses would be traversed and measures that would be used to avoid or minimise any predicted impacts; – consideration of sea level rise and how this would be managed; – consideration of acid sulfate soils and how they would be managed if detected; and – specific reference to how erosion and sedimentation would be managed during construction. 	Refer Section 7.4 of EA.

Requirements	Comments
<ul style="list-style-type: none"> • Air Quality – including: <ul style="list-style-type: none"> – an air quality impact assessment, including an assessment of predicted dust emissions during construction. 	Refer Section 7.5 of EA.
<ul style="list-style-type: none"> • Biodiversity – including: <ul style="list-style-type: none"> – measures taken to avoid impacts on biodiversity; – accurate estimates of any proposed vegetation clearing; 	Refer Section 7.6 of EA.
<ul style="list-style-type: none"> – a detailed assessment of the potential impacts of the project on any terrestrial or aquatic threatened species, populations, ecological communities or their habitats, regionally significant remnant vegetation and/or vegetation corridors; and – measures to ensure the Project maintains or improves the biodiversity values of the region in the medium to long term. 	
<ul style="list-style-type: none"> • Aboriginal Heritage – including: <ul style="list-style-type: none"> – sufficient information to demonstrate the likely impacts on Aboriginal Heritage values/items and proposed mitigation measures. 	Refer Section 7.7 of EA.
<ul style="list-style-type: none"> • Traffic and Transportation – including: <ul style="list-style-type: none"> – an assessment of the potential for disruption to traffic and increase in traffic movements during the construction phase; and – an assessment of the impacts on any road or rail infrastructure and proposed measures to mitigate these impacts. 	Refer Sections 7.8 and 7.9 of EA.
<ul style="list-style-type: none"> • General Environmental Risk Analysis – including an environmental risk analysis to identify potential environmental impacts (construction and operation), proposed mitigation measures, potentially significant residual environmental impacts after the application of proposed mitigation measures and an appropriately detailed impact assessment of any additional key environmental impacts identified through the risk analysis. 	Refer Section 8.0 of EA.



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Mr Ming Leung
Site Manager
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PO Box 123
NOWRA NSW 2541

Our Ref: MP 10_0108

Dear Mr Leung,

Director General's Requirements Shoalhaven Starches Pipeline Project (MP 10_0108)

The Department has received your application for the Shoalhaven Starches Pipeline Project.

I have attached a copy of the Director General's requirements for the Project. These requirements have been prepared in consultation with the relevant Government authorities, and are based on the information you have provided to date. I have also attached a copy of the government authorities' comments for your information. Please note that the Director General may alter these requirements at any time.

If your proposal is likely to have a significant impact on matters of National Environmental Significance, it will require an approval under the Commonwealth *Environment Protection Biodiversity Conservation Act 1999* (EPBC Act). This approval is in addition to any approvals required under NSW legislation. It is your responsibility to contact the Department of Environment, Water, Heritage and the Arts in Canberra (6274 1111 or <http://www.environment.gov.au>) to determine if the proposal requires an approval under the EPBC Act. If it is determined that an approval is required under the EPBC Act, please contact me immediately as supplementary Director-General's requirements may need to be issued.

It would be appreciated if you can contact the Department at least two weeks before you propose to submit your Environmental Assessment for the Project. This will enable the Department to determine the:

- applicable fee (see Division 1A, Part 15 of the Environmental Planning and Assessment Regulation 2000);
- consultation and public exhibition arrangements; and
- number of copies (hard-copy or CD-ROM) of the Environmental Assessment that will be required for exhibition purposes.

Once the Department receives the Environmental Assessment, it will review it in consultation with the relevant agencies to determine if it adequately addresses the Director General's requirements, and may require you to revise it prior to public exhibition.

The Department is required to make all the relevant information associated with the Project publicly available on its website. Consequently, it would be appreciated if you can ensure all documents submitted to the Department are in a suitable format for the internet.

If you have any enquiries about these requirements, please contact Anna Bradley on 9228 6503 or anna.bradley@planning.nsw.gov.au.

Yours sincerely,

8.11.10

Chris Wilson
Executive Director
Major Projects Assessment
As delegate for the Director-General

Bridge St Office 23-33 Bridge St Sydney NSW 2000 GPO Box 39 Sydney NSW 2001 DX 22 Sydney
Telephone: (02) 9228 6111 Facsimile: (02) 9228 6191 Website planning.nsw.gov.au

Director-General's Requirements

Section 75F & 75M of the *Environmental Planning and Assessment Act 1979*

Application Number	Concept Plan: MP 10_0144 Project Application: MP 10_0108
Project	Concept Plan: To investigate an area for the proposed gas pipeline for the Shoalhaven Starches factory. Project Application: Construction of a gas pipeline 5.5km in length to service the Shoalhaven Starches factory, Bomaderry.
Site	Land within the Shoalhaven local government area. The pipeline will run east south-east from the existing Eastern Gas Pipeline at Pestells Lane, Meroo Meadow to the boundary of the Shoalhaven Starches site at Railway Road, Bomaderry.
Proponent	Shoalhaven Starches Pty Ltd
Date of Issue	8 November 2010
General Requirements	<p>The Environmental Assessment (EA) must include:</p> <ul style="list-style-type: none"> • an executive summary; • a detailed description of the Project including: <ul style="list-style-type: none"> – existing site characteristics and environmental features; – alternatives considered; – construction and operation details that clearly define the proposed corridor; – Infrastructure and watercourse crossing methods; and – engineering and/or architectural plans for the proposed works. • A Project Justification with consideration of Project objectives, Project alternatives, benefits and impacts of the Project and the suitability of the site (corridor); • consideration of the Project against relevant statutory provisions including the consistency of the Project with the objects of the <i>Environmental Planning and Assessment Act 1979</i>; • an assessment of the key issues and potential impacts outlined below, during construction and during operation; • a draft Statement of Commitments, outlining environmental management, mitigation and monitoring measures; • a conclusion justifying the Project, taking into consideration the suitability of the site, and the costs and benefits of the Project; and • a signed certification by the author of the EA that the information in the EA is neither false nor misleading.
Key Issues	<ul style="list-style-type: none"> o Strategic Justification – including: <ul style="list-style-type: none"> – a strategic planning consideration of the Project and an analysis of the suitability of the gas pipeline route with respect to potential land use conflicts with existing and future surrounding land users; – details of the proposed route for the gas pipeline which clearly describes the relevant ownership, land use, and zoning provisions; and – an analysis of the required pipeline capacity, having regard to existing gas supplies. o Hazards and Risk – including: <ul style="list-style-type: none"> – a screening of potential hazards associated with the gas supply infrastructure to determine the potential for offsite impacts; and – should potential off-site impacts be identified, a Preliminary Hazard Analysis (PHA) must be prepared in accordance with the Department's guidelines (see attached).

	<ul style="list-style-type: none"> o Noise and Vibration – including: <ul style="list-style-type: none"> - a noise impact assessment, including an assessment of noise impacts and road traffic noise during both construction and maintenance; - consideration of potential vibration impacts from excavation works; and - details of the proposed noise mitigation, monitoring and management measures. o Soil and Water – including: <ul style="list-style-type: none"> - an assessment of the water quality impacts associated with the construction and operation of the Project, with particular reference to impacts on aquatic ecology, riparian zones, surface water and groundwater impacts along the proposed route; - detailed information which describes how those water bodies or water courses would be traversed and measures that would be used to avoid or minimise any predicted impacts; - consideration of sea level rise and how this would be managed; - consideration of acid sulfate soils and how they would be managed if detected; and - specific reference to how erosion and sedimentation would be managed during construction. o Air Quality – including: <ul style="list-style-type: none"> - an air quality impact assessment, including an assessment of predicted dust emissions during construction. o Biodiversity – including: <ul style="list-style-type: none"> - measures taken to avoid impacts on biodiversity; - accurate estimates of any proposed vegetation clearing; - a detailed assessment of the potential impacts of the project on any terrestrial or aquatic threatened species, populations, ecological communities or their habitats, regionally significant remnant vegetation and/ or vegetation corridors; and - measures to ensure the project maintains or improves the biodiversity values of the region in the medium to long term. o Aboriginal Heritage – including: <ul style="list-style-type: none"> - sufficient information to demonstrate the likely impacts on Aboriginal Heritage values/items and proposed mitigation measures. o Traffic and Transportation – including: <ul style="list-style-type: none"> - an assessment of the potential for disruption to traffic and increase in traffic movements during the construction phase; and - an assessment of the impacts on any road or rail infrastructure and proposed measures to mitigate these impacts. o General Environmental Risk Analysis – including an environmental risk analysis to identify potential environmental impacts (construction and operation), proposed mitigation measures, potentially significant residual environmental impacts after the application of proposed mitigation measures and an appropriately detailed impact assessment of any additional key environmental impacts identified through the risk analysis.
References	<p>The EA should take into account relevant Government technical and policy guidelines, as well as industry guidelines and relevant strategic plans. While not exhaustive, guidelines and plans which may be relevant to the Project are included in the attached lists.</p>
Consultation	<p>During the preparation of the EA, you should consult with the relevant local, State or Commonwealth government authorities, service providers, community groups or affected landowners.</p> <p>In particular, you must consult with:</p> <ul style="list-style-type: none"> • Department of Environment, Climate Change and Water; • NSW Industry and Investment; • NSW Office of Water; • NSW Roads and Traffic Authority; • Shoalhaven City Council; • Shoalhaven Water;

	<ul style="list-style-type: none"> • relevant rail infrastructure provider / owner; • relevant local Aboriginal communities and Local Aboriginal Land Councils; and • the local community <p>The EA must clearly indicate issues raised by stakeholders during consultation, and how those matters have been addressed in the EA.</p>
Deemed refusal period	<p>Under clause 8E(2) of the <i>Environmental Planning and Assessment Regulation 2000</i>, the applicable deemed refusal period is 60 days from the end of the proponent's EA period for the Project.</p>

Policies, Guidelines & Plans

Hazards & Risk

State Environmental Planning Policy No. 33 – Hazardous and Offensive Development
 Applying SEPP 33 – Hazardous and Offensive Development Application Guidelines (DUAP)
 Hazardous Industry Planning Advisory Paper No. 3 – Environmental Risk Impact Assessment Guidelines
 Hazardous Industry Planning Advisory Paper No. 6 – Guidelines for Hazard Analysis
 AS/NZS 4360:2004 Risk Management (Standards Australia)
 HB 203: 203:2006 Environmental Risk Management – Principles & Process (Standards Australia)
 Multi-Level Risk Assessment (DUAP)

Noise & Vibration

NSW Industrial Noise Policy (DECC)
 Environmental Noise Control Manual (DECC)
 Environmental Noise Management – Assessing Vibration: a technical guide (DEC)
 Environmental Criteria for Road Traffic Noise (NSW EPA)
 Technical basis for guidelines to minimise annoyance due to blasting overpressure and ground vibration (ANZEC)
 Interim Construction Noise Guideline (DECC)
 DIN 4150 Part-3 - Structural Vibration: effects of vibration on structures (ISO, 1999)

Soil & Water

Surface Water

National Water Quality Management Strategy: Australian Guidelines for Fresh and Marine Water Quality (ANZECC/ARMCANZ)
 National Water Quality Management Strategy: Australian Guidelines for Water Quality Monitoring and Reporting (ANZECC/ARMCANZ)
 Using the ANZECC Guideline and Water Quality Objectives in NSW (DEC)
 State Water Management Outcomes Plan
 Managing Urban Stormwater: Soils & Construction (Landcom)
 Managing Urban Stormwater: Treatment Techniques (DECC)
 Managing Urban Stormwater: Source Control (DECC)
 Floodplain Development Manual (DIPNR)
 Floodplain Risk Management Guideline (DECC)

Groundwater

National Water Quality Management Strategy Guidelines for Groundwater Protection in Australia (ARMCANZ/ANZECC)
 NSW State Groundwater Policy Framework Document (DLWC, 1997)
 NSW State Groundwater Quality Protection Policy (DLWC, 1998)
 NSW State Groundwater Quantity Management Policy (DLWC, 1998)
 Murray-Darling Basin Commission. Groundwater Flow Modelling Guideline (Aquaterra Consulting Pty Ltd)
 Guidelines for the Assessment & Management of Groundwater Contamination (DECC, 2007)

Soil

Acid Sulfate Soil Manual (DLWC, 1998)

Air Quality

Protection of the Environment Operations (Clean Air) Regulation 2002
 Approved Methods for the Modelling & Assessment of Air Pollutants in NSW (DEC)
 Approved Methods for the Sampling & Analysis of Air Pollutants in NSW (DEC)

Biodiversity

Draft Guidelines for Threatened Species Assessment under Part 3A of the *Environmental Planning and Assessment Act 1979* (EP&A Act) (DEC)

Policy & Guidelines - Aquatic Habitat Management and Fish Conservation (NSW Fisheries)

State Environmental Planning Policy No. 44 - Koala Habitat Protection

State Environmental Planning Policy No. 14 - Coastal Wetlands

Aboriginal Heritage

Draft Guidelines for Aboriginal Cultural Heritage Assessment and Community Consultation (DoP and DEC)

Traffic & Transport

Guide to Traffic Generating Development (RTA)

Road Design Guide (RTA)

ANNEXURE 2
REQUIREMENTS
OF
GOVERNMENT AGENCIES

ANNEXURE 2

REQUIREMENTS OF GOVERNMENT AGENCIES

<i>Government Agency</i>	<i>Issues</i>	<i>Section in EA Addressed</i>
Office of Environment & Health	OEH had no further requirements in addition to those referred in DGRs.	
Department of Industry & Investment	A Pipeline Licence is required to be submitted pursuant to the Pipeline Act 1967. An application has been by Shoalhaven Starches (Licence 40). Refer attached letter.	
Roads and Traffic Authority	RTA only concern is the Princes Highway. Submission provides set of conditions that RTA would require compliance.	
Office of Water	<ul style="list-style-type: none"> • Consideration needs to be given to ensuring the pipeline is situated below potential scour depth of bed of watercourse. • A reasonable setback should be provided from banks of watercourses (and associated riparian vegetation for entry/exit points for bore crossings of watercourses. • Rehabilitation of disturbed areas following construction. • Contingency planning if problems occur with plant operation for watercourse crossings. 	<p>Refer Section 7.4.1.1 and Annexure 12.</p> <p>Refer Annexure 12.</p> <p>Refer Statement of Commitments – Section 9.0.</p> <p>If problems arise with underboring, given watercourses are intermittent, trenching could occur, however such would need to be planned during dry weather.</p>
Railcorp	Railcorp were notified of the proposal. Railcorp have not outlined any requirements that need to be addressed but rather provided a list of conditions to be satisfied for construction works.	
Shoalhaven City Council	<p><u>Strategic Planning Matters</u></p> <p>Consideration of future strategic planning impacts arising from the Nowra Bomaderry Structure Plan and Draft LEP 2009.</p> <p><u>Works within local road reserves</u></p> <p>Need to consider public and private infrastructure within existing road reserves.</p> <p><u>Water and Sewer</u></p> <ul style="list-style-type: none"> • Minimum horizontal and vertical distance to apply to pipeline. • Plans will need to be submitted for Shoalhaven Water determination for the whole extent of works. 	<p>Refer Sections 5.5.1 and 5.5.3 of EA.</p> <p>Refer Section 7.9 of EA.</p> <p>Refer Section 7.9 and Annexure 14 of EA.</p>

From: Julian Thompson <Julian.Thompson@environment.nsw.gov.au>
To: Anna Bradley <Anna.Bradley@planning.nsw.gov.au>
CC: Stefan Press <stefan.press@environment.nsw.gov.au>
Date: 22/10/2010 4:42 pm
Subject: Shoalhaven Straches Pipelien Project- Part 3A - draft DG-EARs-MP10_0108

Hi Anna,

I refer to the draft DG-EARs for the above project which you forwarded to DECCW for comment on 11 October 2010. We have reviewed the draft DG-EARs prepared by the Department of Planning and have no comments to make. They seem adequate in the circumstances.

Regards

Julian.

Julian Thompson
Head Operations Unit - South East Region
NSW Department of Environment, Climate Change & Water
11 Farrer Place, PO Box 622, Queanbeyan 2620 ph. 62297065 fax. 62297006
www.environment.nsw.gov.au<<http://www.environment.nsw.gov.au>>

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Any views expressed in this email are those of the individual sender except where the sender expressly and with authority states them to be the views of the Department of Environment, Climate Change & Water NSW.

PLEASE CONSIDER THE ENVIRONMENT BEFORE PRINTING THIS EMAIL



Industry & Investment

File No: 2010-0294

Mr Brian Hanley
Manager Energy and Sustainability
Shoalhaven Starches Pty Ltd
36 Bolong Road
BOMADERRY NSW 2541

Dear Mr Hanley

Application for Pipeline Licence

We hereby acknowledge receipt of Shoalhaven Starches Pty Limited's application, dated 19 March 2010, for a pipeline licence pursuant to section 12 of the NSW *Pipelines Act 1967*. Receipt of your cheque no. 391567 for the application fee of \$2640.00 is also acknowledged.

The proposed pipeline has been assigned Pipeline Licence No. 40. This should be referred to in any future correspondence.

As discussed with you, before we can commence processing your application we require the finalisation of two issues, as follows:

1. The lapse of seven days from the date of publication of the supplied advertisement in the Daily Telegraph on Saturday 20 March 2010; and
2. A schedule of lands that lists each of the parcels of land affected by both route options. That schedule in a table should list, in sequential order: the parcel number (as determined by our company); the Lot Number, or description if a road, road reserve or Crown Land; Deposited Plan; Folio Identifier; Owner; Local Government Area; Parish; and County. We require this schedule before we can issue appropriate notifications relating to Native Title, our first process step.

We understand that other information in support of your application will be provided once the final route and design have been determined.

I have assigned the responsibility for processing this application to Warren Woodhouse who can be reached on 8281 7438 or warren.woodhouse@industry.nsw.gov.au. Please feel free to contact Warren or myself on 8281 7739 or peter.lansdown@industry.nsw.gov.au at any time.

Yours sincerely

Peter Lansdown
Manager Supply and Networks Performance
Energy Branch

23 March 2010

Level 17, 227 Elizabeth Street, Sydney NSW
(Postal Address: GPO Box 3889 SYDNEY 2001)
Tel: 8281 7777 Fax: 8281 7452
ABN 72 189 919 072-002
www.industry.nsw.gov.au

heard by the Supreme Court of New South Wales, Queens Square, Sydney at 9:00 am on 26/03/2010. Copies of documents filed may be obtained from the Plaintiff's address for service.

2. The Plaintiff's address for service is R.I.F. & Associates Pty. Ltd. Level 4, 197 Clarence Street, Sydney, NSW 2000.

3. Any person intending to appear at the hearing must file a notice of appearance in accordance with the prescribed form together with any affidavit on which the person intends to rely, and serve a copy of the notice and any affidavit on the Plaintiff at the Plaintiff's address for service at least 3 days before the date fixed for the hearing.

Date: 17 March 2010
Name of Plaintiff's legal practitioner:
Renae Fowler - (02) 8023 4255

NOTICE OF APPLICATION FOR WINDING UP ORDER IN THE SUPREME COURT OF NEW SOUTH WALES No. 5773/09

CROWS NEST RETAIL PTY LTD
ACN 126 435 881

1. A proceeding for the winding up of Crows Nest Retail Pty Ltd was commenced by the Plaintiff, Chief Commissioner of State Revenue, on 16 December 2009 and will be heard by the Supreme Court of New South Wales at Queens Square, Sydney at 9:00 am on 30 March 2010. Copies of documents filed may be obtained from the Plaintiff's address for service.

2. The Plaintiff's address for service is:

MATTHEWS FOLBIGG PTY LTD, Solicitors
The Barrington Level 7, 10-11 Smith Street, Parramatta NSW 2150

3. Any person intending to appear at the hearing must file a notice of appearance, in accordance with the prescribed form, together with any affidavit on which the person intends to rely, and serve a copy of the notice and any affidavit on the Plaintiff at the Plaintiff's address for service at least 3 days before the date fixed for the hearing.

Date: 18/3/2010
Name of Plaintiff's legal practitioner: Jeffrey Brown

NOTICE OF APPLICATION FOR WINDING UP ORDER IN THE SUPREME COURT OF NEW SOUTH WALES No. 00290980 of 2009

NUMBER 1 DEMOLITION & EXCAVATION (NSW) PTY LTD
(ACN 133 044 916)

A proceeding for the winding up of NUMBER 1 DEMOLITION (NSW) PTY LTD ACN 133 044 916 commenced by the Plaintiff (INSTANT HIRE PTY LTD ACN 002 285 761) on 23 October 2009 and continued by the substituted Plaintiff BLACKTOWN WASTE SERVICES PTY LTD ACN 102 880 944 will be heard by the Supreme Court of New South Wales at Law Courts Building Queens Square Sydney at 11:50 am on 25 March 2010. Copies of documents filed may be obtained from the Plaintiff's address for service.

The Plaintiff's address for service is LEGAL RECOVERY SOLUTIONS 39 Boomerang Road, SPRINGWOOD NSW 2777. Telephone (02) 4751 4743. Fax (02) 4751 9411.

Any person intending to appear at the hearing must file a notice of appearance in accordance with the prescribed form, together with any affidavit on which the person intends to rely, and serve a copy of the notice and any affidavit on the Plaintiff at the Plaintiff's address for service at least 3 days before the date fixed for the hearing.

Date: 18 March 2010
Name of plaintiff or plaintiff's legal practitioner:
Anil Ivan Herat

record of a claim being received from you. If you wish to lodge a claim and receive a dividend please contact my office for a proof of debt for your completion and return to me by 23 March 2010 (at least 21 days before the declaration of dividend). If you do not prove your debt on or before this date I shall proceed to declare and pay this dividend without regard to your claim.

Individual dividends of less than \$25 will not be paid.

Dated this 15th March 2010
Antony de Vries, Trustee de Vries Tayeh
Level 3, 95 Macquarie Street, Parramatta NSW 2150

GREATER BUILDING SOCIETY LTD
(ABN 88 087 651 956)
AFSL 237476

Gives Notice of Changes to the Schedule of Fees, Charges, Transaction Limits and Contact Details.

Terms and Conditions Part 2

In this change effective 22 March 2009 we have:

Removed the Inactive Account Fee payable on Bonus Saver accounts.

Changed Business Account* cheque deposits from \$0.47 to \$0.50 per item.

Changed the Deposit Account and Business Account transaction fee for an EFTPOS transaction for purchases only from \$0.20 to \$0.40.

Raised the Fee Allowance from \$2.50 per month to \$3.00 per month for Deposit Accounts and Business Accounts.

Changed the Fee Rebate from \$0.50 for each \$250.00 your account is in credit to \$3.00 for each \$1,000.00 your account is in credit for Deposit Accounts and Business Accounts.

*A Business Account means a Business Access Account, Greater Business Optimiser Account and Business Line of Credit loan account.

Updated copies of the relevant booklet are available at all branches or by visiting our website at www.greater.com.au.

service on 9282 1422.

Note: All Private Party Classified Advertisements must be pre-paid.

The company reserves the right to alter, omit or republish electronically any advertisements and while every care is exercised it is not responsible for errors, mis-classification or non-insertion. No allowances will be made for errors unless attention is drawn to them on the day of publication. All settings and classifications must adhere to our rules. The company reserves the right to refuse any ad or part of an ad, including URL's, at its discretion.

All prices quoted in Herald Classifieds must be GST inclusive.

NOTICE: DISCRIMINATION IN ADVERTISING

Advertisements in breach of the New South Wales Anti-Discrimination Act (Section 51) can lead to fines of \$1000. Advertisers should acquaint themselves with the requirements of Section 51. Guidelines are available from the Anti-Discrimination Board, Level 17, 201 Elizabeth St, Sydney NSW 2000. PO Box A2122, Sydney South NSW 1235. Tel: 9268 5555.

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The Herald may be bought at leading newsagents in other States. Files may be inspected at the following offices of Fairfax Media Limited.

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Perth: 14 Kings Park Road, W. Perth. Ph. 481 3171.
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*1-3 week prices for the Sydney Morning Herald: NSW \$1.30, Gold Coast \$1.30, Brisbane \$1.60, Far North \$2.50, Victoria \$1.60, SA \$2.60, Western Australia \$2.60, Tasmania \$1.90, Northern Territory \$2.60

*Saturday prices for the Sydney Morning Herald: NSW \$2.30, Southern \$2.80, Far North \$4.20, Victoria \$3.10, SA \$3.10, Western Australia \$4.30, Tasmania \$3.30, Northern Territory \$5.80

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10 BARNBURY GATE, 21 BARNBURY GROVE, DULWICH HILL NSW 2203.

AFTER 14 days from publication of this notice an application for Probate of the Will dated 15 May 2007 of MARIA MICHNOWSKI late of Eastwood in the State of New South Wales. Widow. will be made by Helena Downie, the Executor named in the Will. Creditors are required to send particulars of their claims upon the Estate to Messrs BOND & BOND, Solicitors, Suite 2D, Level 2, 16-18 Bridge Street, Epping NSW 2121.

AFTER 14 days from the publication of this notice an application for Probate of the Will dated 4 January 2010 of JANN MCKEAGUE GREEN late of Double Bay. Recruitment Consultant deceased will be made by Andrew Lloyd Williams the Executor named in the said Will. Creditors are required to send particulars of their claims upon the Estate to W P MCELHONE & CO Solicitors of 275 George Street Sydney, Telephone 9299 4901.

AFTER 14 days from publication of this notice an application for Probate of the Will dated 10 February 1999 of CEDRIC ALFRED WATERS, late of 177 Woodville Road, Merrylands, retired will be made by Laraine Gray and Danielle Agnew Executors named in the said Will. Creditors are required to send particulars of their claims upon his Estate to GOLDRICK FARRELL MULLAN solicitors Level 12, 100 Victoria Street Pacific Highway Chatswood 2067.

AFTER 14 days from publication of this notice an application for Probate of the Will dated 21 June 2006 of MARY TOWNSEND (also known as Mollie Townsend) late of Hunters Hill, Retired, deceased will be made by Ann Maria Townsend and Mary Therese Townsend, the Executors named in the said Will. Creditors are required to send particulars of their claims upon this Estate to: HUNT & HUNT 1 Innovation Road North Ryde NSW 2113 DX 23503 Eastwood Tel: (02) 9604 5700 Fax: (02) 9604 5799 Ref ICM/AXFA:9529791.

AFTER 14 days from publication of this notice an application for Probate of the Will dated 18 October 1999 and codicil dated 2 June 2006 of BARBARA LILLIAN AMESBURY late of 24 Malvern Street, Miranda NSW, retired nurse, will be made by Stephen Amesbury and Tina Ivison, Executors of the Will. Creditors are required to send particulars of their claims on her Estate to T. Ivison, 47 The Esplanade, Sylvania, NSW 2224.

AFTER 14 days from publication of this notice an application for Administration of the Estate of GREGORY JAMES POLLOCK late of Grella in the State of New South Wales. Shot Firer, will be made by Pamela Mary Pollock, the mother of the deceased and that an application will be made to dispense with or reduce the penalty of the administration bond. Creditors are required to send particulars of their claims upon his Estate to: DAVES & VARY PTY LTD, Solicitors 39 Menlyn Street, Moaga NSW 2731. DX 2501. C/CHUCA Telephone: 03 5482 2555 Ref: TMK:CMcL 20094140

AFTER 14 days from publication of this notice an application for Probate of the will dated 25 June 1999 of RONALD WILLIAM OATES late of 263/2 Daves Road, Belrose, NSW 2085, will be made by Anthony James Oates. Creditors are required to send particulars of their claims upon her Estate to QUAY LEGAL GROUP, Level 6, 280 George Street, Sydney 2000. Ph: 9221 4244, Ref JN:MG:2034

AFTER 14 days from publication of this notice an application for Probate of the Will dated 23 July 2008 of RUSSELL JOHN FINDLAY late of 9/35 Almorah Road, Epsom, New Zealand will be made by Jillian Frances Findlay, Messrs D'ANIELLO SOLICITORS Suite 004, 4-12 Garfield Street FIVE DOCK NSW 2046 Tel: 9713 9155 Ref :AD/080094

AFTER 14 days from publication of this notice an application for Administration of the unadministered Estate (De Bonis Non) of the Estate of REGINALD DOLMAN late of North Manly, Zoo Keeper, will be made by Barbara Josephine Sims and Gabrielle Francis Klauzner, daughters of the deceased, and application will be made to dispense with the administration bond. Creditors are required to send particulars of their claims upon his Estate to: HPL Lawyers, 17B Albert Street, Freshwater 2096 (PO Box 705, Freshwater NSW 2096).

AFTER 14 days from publication of this notice an application for Probate of the Will dated 3 October 2002 of MARGARET CLAIRE BURNET late of Baukham Hills in the State of New South Wales, Housewife, will be made by DAVID ANTHONY BURNET and DIANNE ELIZABETH PAGE the Executors of the Will. Creditors are required to send particulars of their claims upon her estate to:

**MATTHEWS FOLBIGG PTY LTD, Solicitors
The Barrington Level 7, 10-14 Smith Street,
Parramatta NSW 2150
DX 8233 PARRAMATTA
Telephone: 9635 7966
Reference: HRY:100557**

AFTER 14 days from publication of this notice an application for Administration of the Estate of ALEXANDER JOHN LAING late of Balmoral Village, New South Wales, will be made by James Cameron Melville Laing the son of the deceased. Creditors are required to send particulars of their claims upon his Estate to OUR LAWYERS OUR CONVEYANCERS, Cnr Queen Street & Albert Lane, Milltagong NSW 2575, DX 4964 Bowral. Ph: 4872 4004, Ref: CB:KW:6049

AFTER 14 days from publication of this notice an application for Probate of the Will dated 15 April, 2008 of PAUL CARUANA late of Ramsgate, retired Machine Operator, will be made by Lucy Caruana the Executor named in the Will. Creditors are required to send particulars of their claims upon her Estate to SLATTERY JURO & COMPANY Solicitors, PO Box 57 Ramsgate NSW 2217.

AFTER 14 days from publication of this notice an application for Probate of the Will dated 6 June 2005 of JOY LINDCK late of Ettalong Beach, deceased will be made by Jo-Ann Lane and Karyn McMahon (in the will called Karyn Lwock) the Executors named in the said Will. Creditors are required to send particulars of their claims upon her Estate to ROBERTS MANN SOLICITORS of B Tebbutt Street, Windsor NSW 2756 DX 8603 Windsor Ph: 4577 5666

MANILDRA GROUP

Public Notice

Pestels Lane, Meroo Meadow Option A or Devitts Lane Meroo Meadow Option B to Bomaderry Natural Gas Pipeline Project.

Notification of Intention to apply for a licence, Pipelines Act 1967 Section 13 (3).

It is notified that Shoalhaven Starches Pty Ltd of 36 Bolong Road, Bomaderry NSW 2540 is making a submission for a pipeline licence under the NSW Pipelines Act, 1967. The licence is to construct and operate a pipeline to transfer natural gas from the Eastern Gas Pipeline to the Shoalhaven Starches Plant at Bomaderry.

Enquiries for information may be addressed to the applicant on (02) 44238200 or email: gaspipeline@manildra.com.au or to the Director-General of the Department of Industry and Investment, GPO Box 3889 Sydney NSW 2001 or (02) 82817777.

www.manildra.com.au

18/3/10

CM K +

VESPERS - 1610

S-27

THEATRE DIRECTORY

The Sydney Morning Herald



MANILDRA GROUP

Postal Address
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Telephone: (02) 4423 8200
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7 April 2010

Mr Peter Lansdown
Manager Supply and Network Performance
Energy Branch
Dept Industry & Investment
GPO Box 3889
SYDNEY NSW 2001

Attention: Warren Woodhouse

Shoalhaven Starches – Application for Pipeline Licence

Further to your letter of 23 March 2010 file No: 2010-0294 we have attached the schedule of lands as requested.

If you require any additional information please feel free to contact me on Ph: 02 44238 388 or via my email address.

Regards

Brian Hanley
Energy & Sustainability Manager
Shoalhaven Starches

OPTION A		FROM PESTELLS LANE		APA REF 24710 VERSION 'H'		DATE	6-Apr-10
PARCEL	DESCRIPTION	FOLIO IDENTIFIER	OWNER	LOCAL GOVERNMENT AREA	PARISH	COUNTY	POSTAL ADDRESS
1	LOT 4 DP 249085		WJ & HL CRITTLE PTY LTD	SHOALHAVEN CITY	BUNBERRA	CAMDEN	PRINCES HWY MEROO MEADOW
2	PESTELLS LANE		SCC COUNCIL	SHOALHAVEN CITY	BUNBERRA	CAMDEN	PO BOX 42 NOWRA NSW 2541
3	PRINCES HIGHWAY		RTA	SHOALHAVEN CITY	BUNBERRA	CAMDEN	
4	PESTELLS LANE		SCC COUNCIL	SHOALHAVEN CITY	BUNBERRA	CAMDEN	PO BOX 42 NOWRA NSW 2541
5	MEROO ROAD		SCC COUNCIL	SHOALHAVEN CITY	BUNBERRA	CAMDEN	PO BOX 42 NOWRA NSW 2541
6	FLETCHERS LANE		SCC COUNCIL	SHOALHAVEN CITY	BUNBERRA	CAMDEN	PO BOX 42 NOWRA NSW 2541
7	ILLAWARRA RAILWAY		RAILCORP	SHOALHAVEN CITY	BUNBERRA	CAMDEN	
8	ROAD RESERVE		SCC COUNCIL	SHOALHAVEN CITY	BUNBERRA	CAMDEN	PO BOX 42 NOWRA NSW 2541
9	EDWARDS AVENUE		SCC COUNCIL	SHOALHAVEN CITY	BUNBERRA	CAMDEN	PO BOX 42 NOWRA NSW 2541
10	ROAD RESERVE		SCC COUNCIL	SHOALHAVEN CITY	BUNBERRA	CAMDEN	PO BOX 42 NOWRA NSW 2541
11	RAILWAY STREET		SCC COUNCIL	SHOALHAVEN CITY	BUNBERRA	CAMDEN	PO BOX 42 NOWRA NSW 2541
12	LOT 16 DP1121337	16/1121337	MANILDRA	SHOALHAVEN CITY	BUNBERRA	CAMDEN	36 BOLONG ROAD BOMADERRY NSW 2541
OPTION B		FROM DEVITTS LANE					
1	LOT 3 DP840940	3/840940	GWEN R KETTERINGHAM	SHOALHAVEN CITY	BUNBERRA	CAMDEN	B680 PRINCES HWY JASPERS BRUSH NSW 2535
2	PRINCES HIGHWAY		RTA	SHOALHAVEN CITY	BUNBERRA	CAMDEN	
3	LOT 41 DP829070	41/829070	JEAN M. WALSH	SHOALHAVEN CITY	BUNBERRA	CAMDEN	10 TURNERS LANE BERRY NSW 2535
4	LOT 42 DP829070	42/829070	JOHN & DOROTHY O'NEIL	SHOALHAVEN CITY	BUNBERRA	CAMDEN	31 MORSCHELS LANE MEROO MEADOW NSW 2540
5	LAMONDS LANE		SCC COUNCIL	SHOALHAVEN CITY	BUNBERRA	CAMDEN	PO BOX 2052 BOMADERRY NSW 2541
6	LOT 105 DP872949	105/872949	GREGORY & KAREN SHOWELL	SHOALHAVEN CITY	BUNBERRA	CAMDEN	6 WILLIAM STREET KEIRAVILLE NSW 2500
7	ILLAWARRA RAILWAY		RAILCORP	SHOALHAVEN CITY	BUNBERRA	CAMDEN	
8	ROAD RESERVE		SCC COUNCIL	SHOALHAVEN CITY	BUNBERRA	CAMDEN	PO BOX 2052 BOMADERRY NSW 2541
9	LOT 2 DP1109510	2/1109510	MANILDRA FLOUR MILLS	SHOALHAVEN CITY	BUNBERRA	CAMDEN	THE CRESCENT AUBURN NSW 2144
10	LOT 4 DP1109510	4/1109510	MANILDRA	SHOALHAVEN CITY	BUNBERRA	CAMDEN	36 BOLONG ROAD BOMADERRY NSW 2541
11	LOT 1 DP594555	1/594555	MARIO & MARIA & CARMELO SAVOCA	SHOALHAVEN CITY	BUNBERRA	CAMDEN	104 SHOALHAVEN STREET NOWRA NSW 2541
12	LOT 23 DP811233	23/811233	MANILDRA	SHOALHAVEN CITY	BUNBERRA	CAMDEN	36 BOLONG ROAD BOMADERRY NSW 2541
13	LOT 164 DP4469	164/4469	MANILDRA	SHOALHAVEN CITY	BUNBERRA	CAMDEN	36 BOLONG ROAD BOMADERRY NSW 2541
14	LOT 1 DP235705	1/235705	MANILDRA	SHOALHAVEN CITY	BUNBERRA	CAMDEN	36 BOLONG ROAD BOMADERRY NSW 2541
15	LOT 3 DP581502	3/581502	MICHAEL & PENELOPE PICKUP	SHOALHAVEN CITY	BUNBERRA	CAMDEN	120 HANIGANS LANE BOLONG NSW 2540
16	LOT 2 DP 581502	2/581502	ANTHONY WYETH	SHOALHAVEN CITY	BUNBERRA	CAMDEN	44 TELOPEA STREET REDFERN NSW 2016
17	LOT 1 DP833181	1/833181	DOUGLAS & ANNE-MARIE ABBOTT	SHOALHAVEN CITY	BUNBERRA	CAMDEN	80 HANIGANS LANE BOLONG NSW 2540
18	LOT 4 DP610696	4/610696	MANILDRA	SHOALHAVEN CITY	BUNBERRA	CAMDEN	36 BOLONG ROAD BOMADERRY NSW 2541
19	LOT 1 DP131008	1/131008	MANILDRA	SHOALHAVEN CITY	BUNBERRA	CAMDEN	36 BOLONG ROAD BOMADERRY NSW 2541
20	BOLONG ROAD		SCC COUNCIL	SHOALHAVEN CITY	BUNBERRA	CAMDEN	PO BOX 42 NOWRA NSW 2541
21	LOT 1 DP605942	1/605942	JEFOOT PTY LTD	SHOALHAVEN CITY	BUNBERRA	CAMDEN	PO BOX 2052 BOMADERRY NSW 2541
22	LOT 3 SEC 1 DP3885	3/01/3885	JEFOOT PTY LTD	SHOALHAVEN CITY	BUNBERRA	CAMDEN	PO BOX 2052 BOMADERRY NSW 2541
23	LOT 143 DP1069758	143/1069758	MANILDRA	SHOALHAVEN CITY	BUNBERRA	CAMDEN	36 BOLONG ROAD BOMADERRY NSW 2541