

Environmental Assessment

Young to Wagga Wagga Looping Pipeline Stage 2 (Bethungra to Young)



Statement of Validity

Submission of environmental assessment, prepared under Part 3A of the *Environmental Planning and Assessment Act 1979*.

Environmental assessment prepared by

Name:	Guillaume Prudent-Richard	Marcus Sainsbury
Qualifications:	Master II, Env Science	BSc, Post Grad Diploma Env. Mngt.
Address:	Level 2, 60 Marcus Clarke Street, Canberra ACT 2600	
In respect of:	Young to Wagga Wagga Looping Pipeline - Stage 2 (Bethungra to Young)	

Applicant and land details

Applicant name:	East Australia Pipeline Limited
Applicant address:	Level 19, 580 George Street, Sydney NSW 2000
Proposed development:	Construction and operation of a high pressure natural gas transmission looping pipeline from Bethungra to Young.
Land to be developed:	Land generally required for the construction and operation of the proposed pipeline, as shown in Chapter 3.

Environmental assessment

Statement of validity: I certify that I have prepared the contents of the environmental assessment in accordance with the Director-General's requirements dated 21 September 2010, and that to the best of my knowledge; the information contained in the environmental assessment is neither false nor misleading.

Signature:		
Date:	21/11/2011	21/11/2011

Environmental Assessment

Young to Wagga Wagga Looping Pipeline Stage 2 (Bethungra to Young)

Prepared for

East Australia Pipeline Pty Ltd

Prepared by

AECOM Australia Pty Ltd

Level 2, 60 Marcus Clarke Street, Canberra ACT 2600, Australia
T +61 2 6201 3000 F +61 2 6201 3099 www.aecom.com

ABN 20 093 846 925

27 June 2012

60189491

AECOM in Australia and New Zealand is certified to the latest version of ISO9001 and ISO14001.

© AECOM Australia Pty Ltd (AECOM). All rights reserved.

AECOM has prepared this document for the sole use of the Client and for a specific purpose, each as expressly stated in the document. No other party should rely on this document without the prior written consent of AECOM. AECOM undertakes no duty, nor accepts any responsibility, to any third party who may rely upon or use this document. This document has been prepared based on the Client's description of its requirements and AECOM's experience, having regard to assumptions that AECOM can reasonably be expected to make in accordance with sound professional principles. AECOM may also have relied upon information provided by the Client and other third parties to prepare this document, some of which may not have been verified. Subject to the above conditions, this document may be transmitted, reproduced or disseminated only in its entirety.

Quality Information

Document Environmental Assessment

Ref 60189491

Date 27 June 2012

Prepared by Joel Garrigues, Emma Struys, and Marcus Sainsbury

Reviewed by Peter Wright and Guillaume Prudent-Richard

Revision History

Revision	Revision Date	Details	Authorised	
			Name/Position	Signature
1	02-Aug-2011	Draft for Review	Guillaume Prudent-Richard Senior Environmental Scientist	Original signed
2	14-Oct-2011	Draft for Review	Guillaume Prudent-Richard Senior Environmental Scientist	Original signed
3	18-Nov-2011	For Adequacy Review	Guillaume Prudent-Richard Senior Environmental Scientist	Original signed
4	22-May-2012	For Exhibition	Guillaume Prudent-Richard Principal Environmental Scientist	Original signed
5	27-Jun-2012	For Public Exhibition	Guillaume Prudent-Richard Principal Environmental Scientist	

Table of Contents

Part I – Introduction and Background Information	1
1.0 Introduction	2
1.1 Proposal Overview	2
1.2 The proponent	2
1.3 Environmental assessment overview	2
1.4 Structure of this Report	3
2.0 Strategic Context and need for the Proposal	5
2.1 Current and expected energy and gas demand	5
2.2 Need for the proposal	6
3.0 Description of the Study Area	7
3.1 Natural environment	8
3.2 Human environment	8
3.3 Proposal description	9
4.0 Project Description	10
4.1 Proposal Specification	10
4.2 Pipeline Construction Activities	10
4.3 Construction Workforce and Accommodation	18
4.4 Commissioning Activities	18
4.5 Commissioning	19
4.6 Operational Activities	19
4.7 Decommissioning	23
Part II – Environmental Assessment Process	24
5.0 Consultation Process	25
5.1 Consultation with stakeholders and other relevant authorities	25
6.0 Planning and Legislative Requirements	30
6.1 Changes to Part 3A of the EP&A Act	30
6.2 EP&A Act	30
6.3 Environmental Planning Instruments	32
6.4 Other NSW Legislation	33
6.5 Commonwealth Legislation	35
7.0 Environmental Assessment Process	37
7.1 Environmental assessment requirements	37
7.2 Overview and environmental risk assessment methodology	37
7.3 Environmental risk assessment analysis	38
7.4 Outcomes of the environmental risk assessment	45
7.5 Assessment approach	45
Part III – Environmental Assessment	47
8.0 Biodiversity	48
8.1 Methods and Objectives	48
8.2 Results	48
8.3 Potential Impacts on Biodiversity Values	62
8.4 Proposed Mitigation Measures	67
8.5 Preliminary Offset Strategy for Residual Impacts	69
8.6 Conclusion	70
9.0 Heritage	71
9.1 Aboriginal heritage	71
9.2 Historical heritage	84
9.3 Potential Impacts on Heritage Values	84
9.4 Proposed Mitigation Measures	85
10.0 Human Amenity	87
10.1 Characterisation of human receptors	87
10.2 Noise and vibration	87
10.3 Air Quality	103
10.4 Traffic and Transport	106
11.0 Socio-economic Impacts	110

	11.1	Socio-economic overview and demographics of the study area	110
	11.2	Potential Socio-economic Impacts	112
	11.3	Proposed Mitigation Measures	113
12.0		Land Use Planning	114
	12.1	Assessment of land use impacts	114
	12.2	Local Government Area Description	115
	12.3	Potential Impacts on Land Use	115
13.0		Preliminary Hazard and Risk Assessment	117
	13.1	AS 2885 qualitative risk assessment	117
	13.2	Quantitative risk assessment	121
	13.3	Further assessment	123
	13.4	Proposed Mitigation Measures	123
14.0		Surface and Groundwater	126
	14.1	Assessment approach	126
	14.2	Existing environment	141
	14.3	Potential impacts on Surface and Groundwater	141
	14.4	Proposed Mitigation Measures	142
15.0		Infrastructure	144
	15.1	Assessment Methodology	144
	15.2	Existing Infrastructure	144
	15.3	Potential Impacts on Infrastructure	145
	15.4	Proposed Mitigation Measures	146
16.0		Other Issues	149
	16.1	Resource and waste management	149
	16.2	Contaminated land	152
	16.3	Geology and soils	153
	16.4	Visual amenity	157
	16.5	Greenhouse Gas Emissions and Climate Change	159
	16.6	Cumulative impacts with other major developments	161
17.0		Draft Statement of Commitments	163
	17.1	Overview	163
	17.2	Draft Commitments	163
18.0		Conclusions	174
		References	175

List of Figures

Figure 1 – Land use map of the Proposal, demonstrating land capability	7
Figure 2 – Typical ROW Layout	11
Figure 3 – Typical trenching methods would be used for the majority of the route	13
Figure 4 – Typical lowering activity methods would be used for the majority of the route	14
Figure 5 – Adding concrete weights at a watercourse crossing	15
Figure 6 – Dam and pump process	16
Figure 7 – Flume process	17
Figure 8 – Overview of Part 3A Environmental Assessment Process	32
Figure 9 – Ecological Communities and Habitat Feature maps	52
Figure 10 – Section of Stage 1 ROW where construction has been recently completed	62
Figure 11 – Heritage sites and management recommendations.	74
Figure 12 – Human receptors and noise offset buffers	89
Figure 13 – Wagga Wagga and Young Wind Roses (BoM, 2011)	103
Figure 14 – Water environment of the proposal study area.	131
Figure 15 – Overview of Geological setting.	155
Figure 16 – Landscape features of the existing environment taken 8 th February 2011	157
Figure 17 – Site visit showing landscape shortly after rehabilitation (Stage 1)	158

List of Abbreviations

AC	Alternating current
AHIMS	Aboriginal Heritage Information Management System
ALARP	As Low As Reasonably Practical
APIA	Australian Pipeline Industry Association
ANZECC	Australian and New Zealand Environment Conservation Council
ARTC	Australian Rail Track Corporation
CEEC	Critically Endangered Ecological Community
CEMP	Construction Environmental Management Plan
CLM Act	Contaminated Land Management Act 1997
CMA	Catchment Management Authority
dB	Decibel
DECC	Department of Environment and Climate Change
DGR	Director-General Requirements
DOL	Department of Lands
DPI	Department of Primary Industries
DSEWPac	Department of Sustainability, Environment, Water, Population and Communities
DTI	Department of Trade and Investments
DWE	Department of Water and Energy
EA	Environmental Assessment
EEC	Endangered Ecological Communities
EP&A Act	<i>Environmental Planning and Assessment Act 1979</i>
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
ERW	Electric Resistance Welded
FM Act	<i>Fisheries Management Act 1994</i>
FHA	Final Hazard Analysis
GIS	Geographic Information System
GWh	Gigawatt /hour
HDD	Horizontal Directional Drilling
IDO	Interim Development Order
KP	Kilometre Point
LEP	Local Environment Plans
LGA	Local Government Area
kN	Kilonewton
kPa	Kilopascal
LHPA	Livestock Health and Pest Authority
LNG	Liquefied Natural Gas
LPMA	Land and Property Management Authority
MAOP	Maximum Allowable Operating Pressure
ML	Megalitre
MLV	Mainline valve
MPa	Megapascal
MSDS	Material Safety Data Sheet
MWh	Megawatt hour
MSP	Moomba to Sydney Pipeline
NES	matter of national environmental significance
NDT	Non Destructive Testing
NOW	NSW Office of Water
NSW	New South Wales
NPWS	National Parks and Wildlife Service
NW Act	<i>Noxious Weeds Act 1993</i>
OEH	Office of Environment and Heritage
OEMP	Operational Environmental Management Plan
PFM	Planning Focus Meeting
PHA	Preliminary Hazard Analysis
PIG	Pipeline Inspection Gauge

pmPy	Per million per year
PoEO Act	<i>Protection of the Environment Operations Act 1997</i>
ppv	Peak particle velocity
QRA	Quantitative Risk Assessment
RBL	Rating Background Levels
ROW	Right of Way
RTA	Roads and Traffic Authority
SAOP	Safety and Operating Plan
SCADA	Supervisory Control and Data Acquisition
SEPP	State Environmental Planning Policy
SMS	Safety Management Study
SPI	Sound Power Level
SWL	Sound Watts Level
TJ	Tera Joules
TSC Act	Threatened Species Conservation Act 1995
VCA	Vegetation Classification and Assessment
WARR Act	Waste Avoidance and Recovery Act 2001
WONS	Weeds of National Significance

Executive Summary

The Young to Wagga Wagga Looping Pipeline, Stage 2 (Bethungra to Young) (the Proposal) is a continuation of the Stage 1 (Wagga Wagga to Bethungra) pipeline project. The Stage 1 project was approved in 2010 under Part 3A of the *Environmental Planning and Assessment Act 1979* (EP & A Act) and constructed. Following recent changes to the EP&A Act, the Proposal is identified as a “*transitional Part 3A project*” where the Minister for Planning is the determination authority. As part of the approval process, this Environmental Assessment (EA) addresses the requirements as outlined by the Director General’s Requirements (DGRs), issued on the 21st September 2010.

The Proposal consists of approximately 70 km of looping pipeline from Bethungra to Young as part of 131 km stretch of pipeline from Young to Wagga Wagga. The Proposal would connect to the Moomba to Sydney Pipeline System (MSP) mainline at its north east end in Young.

Why build it?

According to modeling of energy generation scenarios by the Owen Inquiry Secretariat (2007), gas demands are expected to grow into the future. Furthermore, the modeling identified there is substantial potential to increase the level of base load gas-fired generation in New South Wales. The required gas supply to meet this forecast demand would be predominantly from Victoria and Queensland and would require expansion of existing gas transmission networks and investment in new pipelines to access additional reserves.

Given these projected demands in gas, the key objectives of the Proposal are to:

- Enhance the security of gas supply by strengthening the gas supply link between Victoria and NSW.
- Facilitate the increased use of a cleaner burning fuel source for power generation in NSW by increasing the maximum available storage of gas.
- Increase and improve the supply of alternative energies to regional NSW.

This increase would allow the Uranquinty Power Station to operate at full capacity continuously for 8 hours. The Proposal is a step towards increasing the capability of the gas supply link between the NSW pipeline system and the Victorian system. At this stage, the Proposal would provide minimal flow benefit. However once system augmentation works in Victoria are completed, both supply systems would be significantly strengthened, providing greater security of supply to both Sydney and Melbourne.

Where would it go?

Stage 1 covered 61 km of the pipeline route between the townships of Wagga Wagga and Bethungra, and was constructed in 2010-2011. The Proposal connects to the end of the Stage 1 looping gas pipeline in Bethungra and continues to Young, a distance of approximately 70 km. Following the route already outlined by an existing 12-inch pipeline, the Proposal aims to minimise unnecessary disturbance to surrounding landscapes, and would be located entirely within the existing 20 m wide easement. Whilst the proposed pipeline route avoids built up areas, it passes near the regional towns of Young, Wombat, Wallendbeen and Cootamundra. The study area considered for the EA is 30 m wide, consisting of the existing 20 m wide Pipeline easement and an additional 10 m which is proposed to be acquired from the property owners for construction purposes. This study area is referred to as a right of way (ROW). At completion, the entire Proposal would be buried with the exception of some occasional above ground line of sight safety markers, currently in place identifying the existing gas pipeline.

How would it be built?

Construction of the Proposal would involve clearing and grading the entire pipeline easement, except in limited areas, such as major roads and watercourse crossings, where alternative pipe trenching techniques such as directional drilling would be used. The pipeline trench would be constructed by mechanical trenching plant which excavates a trench (1.5 m deep x 0.65 m wide), moving the soil to one side. The pipeline, made of carbon steel, would be installed approximately 7 m from the existing pipeline. The site would then be back filled, levelled and revegetated upon completion.

The Approval Process

The Proposal is subject to the Commonwealth's *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). A precautionary Referral for the Proposal was submitted under the EPBC Act on the 5th September 2011 to the Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC). It was lodged on the basis that construction of the pipeline would likely impact 1.66 ha of the critically endangered Box Gum Woodland ecological community. Through careful implementation of the Proposal and the application of proposed mitigation measures, no significant impacts to any Commonwealth Matters of National Environmental Significance (NES) are expected. Advice from DSEWPaC received on 28 September 2011 confirmed this, and the Proposal therefore does not require approval under the EPBC Act.

The EP & A Act outlines the assessment and approval process for the Proposal. Central to this process is the preparation of an EA that identifies the environmental impacts that may occur as a result of the Proposal during pre construction, construction and operation phases. In addition the EA needs to provide a statement of commitments the proponent is willing to undertake as part of environmental management and mitigation measures.

The majority of potential environmental impacts are expected to occur during construction of the pipeline. The EA includes a review of environmental issues to identify two categories: key issues and other issues. The review is based on information available to date, including previous studies, consultation and correspondence with relevant stakeholders and desktop research. The key issues have been summarised in the following section and are outlined in further detail within the assessment.

Key Environmental Issues

Land Use Planning Impacts

Within the four shires, Cootamundra, Young, Harden and Junee, the land use is dominated by agricultural and rural land practices. The EA considers impacts to land uses with particular emphasis on existing and potential constraints created by the Proposal. The impacts upon these land use practices are expected to be of a transient nature during the construction phase.

Ecological Impacts

The Proposal is expected to disturb approximately 210 ha of land, most of which is already in a degraded state, with about 96 % of the ROW already cleared of native vegetation. Although the proposed route has already been subjected to similar construction during the existing pipeline installation, the Proposal would require some additional land clearing in sensitive areas which would affect both flora and fauna. However, once the pipeline is operational, the areas would be rehabilitated in order to mitigate any long term ecological impacts.

Heritage Impacts

A detailed heritage assessment was conducted to consider the impacts from the Proposal to both Aboriginal and historical heritage. Thirteen Aboriginal heritage sites and one historical heritage site were identified to be potentially impacted by the Proposal. Mitigation and management measures to minimise the potential impact on these sites include the collection of surface artefacts, fencing of larger items such as scarred trees and where necessary, salvage excavations.

Human Amenity Impacts

Impacts to human amenity are generally considered to include changes to noise and vibration levels, reductions in air quality and increases in traffic. The density of receptors is important in determining the overall impact to noise and air quality. Given the broadly rural and agricultural nature of the study area, receptors are widely dispersed around the proposed pipeline route. Air quality impacts depend upon the location of receptors as well as the construction activities being undertaken. Air quality impacts are also dependant on the climate and soil types. Mitigation measures to minimise these impacts include reduced construction zone speeds, use of water trucks and replanting of completed sections of pipeline easement.

Socio-economic Implications

The Proposal is estimated to cost approximately \$80 - \$90 million over the course of construction. The issue of employment (both direct and indirect) associated with the construction phase and the overall economic impact of the construction activities is assessed in the EA. The potential adverse impacts during the construction phase are expected to be minimal. Furthermore it is expected that there would be a number of positive (although minor) impacts, especially for retail and services in town and village centres located near the pipeline. There would be negligible socio-economic impacts during operation reflecting the already present maintenance schedule for the existing pipeline.

Surface and Groundwater

The majority of watercourse crossings are through ephemeral watercourse features (intermittent flow) with either poor or moderate riparian vegetation. The proposed pipeline would intercept 25 watercourses including 12 of moderate sensitivity, 13 of low sensitivity and no watercourse crossings of high sensitivity. Methods employed, such as trenching, are considered a suitable crossing method for drainage lines of low sensitivity. Groundwater levels in bores in the vicinity of, or within the study area, are identified as being below the proposed trench excavation level.

Infrastructure Impacts

Crossing methods have been developed with the aim of minimising potential infrastructure impacts. Infrastructure potentially impacted by the Proposal includes roads, railways, electricity transmission lines and other pipelines. These impacts will be managed through standardised mitigation measures.

Hazards and Risk Impacts

The Proposal is located adjacent to an existing pipeline, and as such has been positioned to generally avoid populated areas. A preliminary risk assessment, completed in line with relevant standards, concluded there were no extreme or high risk level incidents. The main hazard of concern is the potential for a gas leak and fire. To manage this risk, a range of safeguards and additional risk reduction measures have been incorporated into the design of the Proposal.

Other Issues

Other relevant issues considered in the EA include:

- Resource (energy and water) and waste management
- Contaminated land
- Geology and soils
- Visual amenity
- Greenhouse gases, emissions and climate change
- Cumulative impacts with other major developments

These issues were identified in the environmental risk analysis and undergo a general assessment of impacts in the EA.

Community and Stakeholder Consultation

During the EA preparation process, relevant authorities and identified key stakeholders were consulted. Initial meetings provided an overview of the Proposal and sought input into matters they would like to see addressed in the EA. Subsequently, stakeholders were informed of the proposed works and further feedback requested regarding their concerns. The consultation component of the EA has been and remains as an integral part of the Proposal development process, and would continue through construction and operation.

Part I – Introduction



1.0 Introduction

1.1 Proposal Overview

APA Group (APA) is proposing to loop (duplicate) the existing 12-inch (305 mm) Young to Wagga Wagga Pipeline with an 18-inch (450 mm) Pipeline. The new pipeline would be approximately 131 km in length. The first stage of this project, from Wagga Wagga to Bethungra, was previously approved under Part 3A of the *Environmental Planning and Assessment Act 1979* (EP&A Act) and has been constructed. The subject of this current Environmental Assessment is the second stage of project, from Bethungra to Young, an approximate 70 km length of looping pipeline (the Proposal). The existing pipeline is licensed by the Department of Trade and Investment (formerly the Department of Water and Energy) as Licence 19 and resides within an easement of 20 m in width. The Proposal is estimated to cost approximately \$80 - \$90 million and is intended to be laid entirely within the easement of the existing pipeline.

1.2 The proponent

APA is comprised of the Australian Pipeline Trust and APT Investment Trust. An ASX-listed gas transportation business with interests in gas infrastructure across Australia, including 12 700 km of natural gas pipelines, over 2,800 km of gas distribution networks and gas storage facilities. APA is Australia's largest transporter of natural gas, delivering more than half of Australia's annual gas use through its infrastructure.

APA has an internalised management structure with direct operational control over its assets. APA employs over 1100 people, who perform commercial, regulatory, government and stakeholder-related functions, as well as the day-to-day operations and maintenance.

1.3 Environmental assessment overview

The project is declared to be a major project under State Environmental Planning Policy (Major Development) 2005 (Major Projects SEPP) (Schedule 1, clause 26(a)) because it is development for the purpose of a pipeline in respect of which a licence has been granted under the *Pipelines Act 1967*. The project is therefore subject to Part 3A of the EP&A Act and the Minister for Planning is the determination authority.

Part 3A of the EP&A Act consolidates the assessment and approval process for all major development requiring approval of the Minister for Planning. Part 3A provides for an integrated and streamlined assessment and approval process for major infrastructure projects. Of the range of approval types and process under Part 3A, project approval is being sought for this Proposal.

The Director-General's environmental assessment requirements (DGRs), issued on 21 September 2010, identified the need to complete an environmental risk analysis – the purpose of which is to identify and rank environmental issues associated with the Proposal for consideration. The review of environmental issues identifies two categories of environmental issues: key issues and other issues. The review is based on information available to date, including previous studies, consultation and correspondence with relevant stakeholders and desktop research. A combination of the environmental risk analysis, and the DGRs identified the following key issues for detailed consideration and assessment:

- Land use planning impacts.
- Ecological impacts.
- Heritage impacts (Aboriginal and historical).
- Human amenity impacts (relating to noise, vibration, air quality and traffic).
- Socio-economic implications.
- Hazards and risk impacts.
- Surface and groundwater impacts.
- Infrastructure impacts.

Key issues form the bulk of the environmental assessment documents, and are the subject of detailed investigations, and the development of site-specific mitigation and management measures.

The issues identified as other environmental issues undergo a general assessment of impacts. The objective of the general assessment is to focus on the development of overarching environmental management frameworks for mitigation, management and monitoring.

1.4 Structure of this Report

The Environmental Assessment (EA) is structured in the following way:

Chapter 1 Introduction – Introduces the proponent and provides an overview of the proposal in general, and the approach of the environmental assessment.

Chapter 2 Strategic context and need for the proposal – This chapter addresses the current demand for gas, and the increasing role gas can play in electricity generation. The need for the Proposal is presented.

Chapter 3 Description of the study area – The pipeline route passes through a variety of environments and intersects numerous linear infrastructure features. This chapter provides a brief description of the study area along the entire pipeline route. The description includes the identification of key natural and human features.

Chapter 4 Project description – Specific detail in regards to pipeline design and activities related to construction and operational processes are described within this chapter. This information provides an understanding of all activities that may result in potential impacts as a result of the Proposal.

Chapter 5 Consultation Process – This chapter details the objectives, methods, extent and outcomes of consultation undertaken during the course of developing this Proposal.

Chapter 6 Planning and legislative requirements – The Commonwealth and NSW statutory requirements that are potentially relevant to the proposal are identified within this chapter. It provides a detailed account of the legislative framework within which the proposal is being assessed.

Chapter 7 Environmental assessment process – Identifies the process the environmental assessment has taken in relation to the Director-General's assessment requirements. It outlines the environmental risk review and provides a description of the assessment methodology for key and other issues.

Chapter 8 Ecological – A key issue recognised in the DGRs. This chapter outlines the significance of impacts on biodiversity features in relation to the construction and operational phases of the Proposal. It outlines the methodology chosen to determine relevant impacts and standard mitigation and management measures.

Chapter 9 Heritage – Aboriginal heritage is a key issue recognised in the DGRs. The potential impacts relating to both Aboriginal and historical heritage have been assessed. This chapter summarises the key issues within a specialist report relating to potential impacts that may occur in both the construction and operational phases of the Proposal and outlines management measures.

Chapter 10 Human amenity impacts – A key issue recognised in the DGRs. This chapter provides an assessment of the potential impacts and mitigation measures relating to human amenity features associated with the proposal. It identifies potentially adverse impacts in line with relevant regulatory requirements and industry guidelines, addressing noise and vibration, air quality and traffic issues.

Chapter 11 Socio-economic Impacts – A key issue recognised in the DGRs. This chapter addresses the socio-economic impacts of the development and operation of the project. The issue of employment (both direct and indirect) associated with the construction phase and the overall economic impact of the construction activities is assessed.

Chapter 12 Land use – A key issue recognised in the DGRs. This chapter addresses planning and land use with particular emphasis on potential and actual land use constraints created by the proposal additional to those from the existing pipeline within the same easement. Consideration is given to the potential for the proposal to adversely impact on agricultural production, or other land uses either during construction or operation.

Chapter 13 Hazards and risk impacts – A key issue recognised in the DGRs. This chapter provides a summary of the preliminary risk assessment report, which is appended to the EA. In accordance with the Director-General's requirements, the report includes a hazard identification and risk assessment based on Australian Standard 2885 (*Pipelines - Gas and liquid petroleum - General requirements*) and a quantitative risk assessment based on Hazardous Industry Planning Advisory Paper No 6.

Chapter 14 Surface and groundwater – A key issue recognised in the DGRs. This chapter provides an impact assessment on potential water features that may be affected by the proposal. Potential impacts and mitigation measures have been identified for both the construction and operational phases.

Chapter 15 Infrastructure – A key issue recognised in the DGRs. Infrastructure potentially impacted by the proposed pipeline includes roads, railway, electricity transmission lines and other pipelines. This chapter details relevant potential impacts in the construction and operational phases and outlines key mitigation and management measures.

Chapter 16 Environmental assessment (other issues) – Assesses all other environmental issues that have not been explicitly recognised in the DGRs, but are considered relevant to the proposal. It covers waste management, geology and soils, visual amenity, greenhouse gas and climate change.

Chapter 17 Draft statement of commitments – Outlines the proponent's commitment to the objectives and actions that must be taken for managing the environmental impacts of the Proposal to minimise or avoid adverse outcomes.

Chapter 18 Proposal justification and conclusion – Provides a justification for implementing the proposal.

2.0 Strategic Context and need for the Proposal

2.1 Current and expected energy and gas demand

2.1.1 Current demand for gas

The eastern Australian gas market has been historically characterised by discrete demand regions connected to individual sources by a direct transmission pipeline. The gas market has become increasingly interconnected, through the construction of additional gas delivery infrastructure. Therefore, the availability of gas supply to meet the requirements of potential future gas-fired base load generation in NSW must be assessed in the context of the total eastern Australian gas demand and supply.

The total number of gas delivery points in the NSW and Australian Capital Territory retail gas markets grew to almost 1.2 million in 2006/07, with an additional 30 325 new delivery points being created (Gas Market Company: Market Report 2007).

The eastern Australian market benefits from sufficient gas supply to mostly meet domestic consumption, however, it has not supported an export industry. The market is therefore self contained, and not subject to international competition. This has resulted in eastern Australia historically having gas prices that are significantly lower than the international gas price. However, as demand increases prices are expected to rise. Proposals such as the various Liquefied Natural Gas (LNG) export terminals in Gladstone in Queensland will open the eastern Australian market to an export market and have the potential to add further inflationary pressure to the price of delivered gas in the NSW market.

Wood McKenzie (Owen Inquiry into Electricity Supply in NSW: Availability and Cost of Gas for NSW Baseload Generation, July 2007) undertook a series of demand modelling scenarios for the Owen Inquiry. This analysis looked at the implications for gas demand in NSW flowing from the scenarios of increased gas-fired electricity generation in the state. The consideration of these demand scenarios in relation to the Proposal is important given proposals to expand existing generation in NSW generally. The scenarios modelled by Wood McKenzie included:

- A business as usual case.
- 1000 MW of additional gas-fired base load power generation in NSW.
- 2000 MW of additional gas-fired base load power generation in NSW.
- 2500 MW of additional gas-fired base load power generation in the national energy market.

Assuming the implementation of the high demand case, scenario four, whereby all new generation coming on stream in NSW and Victoria is gas-fired, then gas demand in NSW is expected to grow to around 250 PJ per annum by 2015, reaching around 350 PJ by 2030.

2.1.2 Increased demand for electricity generation

The Owen Inquiry (2007) identified that NSW currently uses more electrical energy (79 030 GWh in 2005–6) than any other state with consumption growing by about 1700 GWh per year for around the past 30 years. TransGrid forecasts reviewed as part of the Owen Inquiry anticipate a slightly slower average growth rate of around 1600 GWh per year over the next ten years, in part due to the impact of demand management and energy efficiency measures being implemented as part of broader government initiatives and policy.

The Owen Inquiry found that forecast growth in electricity use implies a need to provide around 91 000 GWh of electrical energy in NSW by 2013–14. This is around 10 500 GWh above current annual consumption.

NSW has traditionally had access to surplus generation capacity (including electricity imports from interstate) for the last 15 years, which has been more than sufficient to meet the growth in energy consumption. However, this surplus has reduced significantly as energy consumption has continued to grow at a faster rate than generation capacity. The Owen Inquiry found that it is likely that new generation capacity will be required in the state within the period 2013 to 2017.

The NSW Government has recently announced that it will be moving to partially privatise electricity retail businesses in the state and will be moving to lease generation and transmission networks with a view to ensuring that new investment can be made in the electricity generation industry. The form of this investment is most likely to be the expansion of new generation capacity either through upgrades to existing generation assets or via a new base load power station.

The impact of such expansion on the NSW gas markets should not be understated. In an increasingly carbon constrained environment, the benefits associated with the efficiencies of gas fired peaking and base load power plants become more apparent when considering the expected future pricing of carbon on a national exchange.

The Owen Inquiry found that current delivered gas prices equate to around \$25/MWh of electricity generated. Whilst this is more expensive on a per MWh basis than coal (at around \$10/MWh), the much higher capital cost of coal plants means that gas-fired generators have a lower total average cost than coal fired generators at lower utilisation rates. When potential future carbon prices are factored into the cost of electricity generation, it is expected that gas-fired generation will become increasingly competitive to that of coal-fired generation.

2.1.3 Increased demand for gas

Under the generation scenarios provided by the Owen Inquiry Secretariat, the potential to increase the level of base load gas-fired generation in the state up to 2016, is substantial. The required gas supply to meet this forecast demand would be predominantly from Victoria and Queensland and would require expansion of existing gas transmission networks and investment in new pipelines to access additional reserves.

2.2 Need for the proposal

The Young to Wagga Wagga Pipeline provides gas supply to the towns in the central south of NSW including Griffith, Cootamundra, Young and Wagga Wagga. The Pipeline connects to the Moomba to Sydney Pipeline System (MSP) mainline at its north east end at Young NSW. The MSP mainline currently carries gas from the Moomba plant in South Australia, and will in future carry natural gas from Queensland. Similarly the Gasnet system in Victoria carries Bass Strait gas from Longford to Culcairn where the Culcairn to Wagga Pipeline connects at the southern end of the Pipeline near Wagga Wagga.

The Pipeline operates bi-directionally with a capacity in the region of 72 Tera Joules (TJ) / day to suit the requirements of the NSW and Victorian Shippers, but more recently has also operated as a high pressure storage facility. With a useable capacity in the region of 50 TJ the pipeline enables the supply of natural gas at high peak flow rates as a base fuel to a power station at Uranquinty. To achieve this level of service, the Pipeline is pressurised to 8500 kilopascal (kPa) to hold the necessary linepack and is drawn down to around 4500 kPa during the operating day.

The Uranquinty Power Station at full power can currently operate for 5 hours with a contract allowing 43 TJ linepack consumption. The Proposal would increase the available capacity by approximately 30 TJ, which would enable the power station to operate continuously for approximately 8 hours. The Proposal is also a step to increase the capability of the gas supply link between the NSW pipeline system and the Victorian system. At this stage the Proposal would provide minimal flow benefit, however, once system augmentation works in Victoria are completed the supply systems would both be significantly strengthened, providing greater security of supply to both Sydney and Melbourne. The new (looping) pipeline would utilise the same gas reserves as the existing pipeline. The Proposal would not draw on any new gas resources. The key objectives of this proposal are therefore to:

- Facilitate the increased use of a cleaner burning fuel source for power generation in NSW by increasing the maximum available linepack by approximately 30 TJ.
- Enhancing the security of gas supply by strengthening the gas supply link between Victoria and NSW.

3.0 Description of the Study Area

The Proposal will involve the installation of a new 18-inch (450 mm) natural gas transmission 'looping pipeline' between the townships of Young and Bethungra (see Figure 1). The new pipeline will be installed adjacent to an existing 12-inch (305 mm) pipeline over a distance of approximately 70 km, and will be constructed within the existing 20 m wide gas pipeline easement. For construction purposes only, a strip of land approximately 10 m wide is proposed to be acquired from the property owners. The study area is defined as the proposed pipeline route contained within the existing easement, and the construction foot print approximately 30 m wide.

The study area also includes surrounding areas which may be indirectly affected by the proposal.

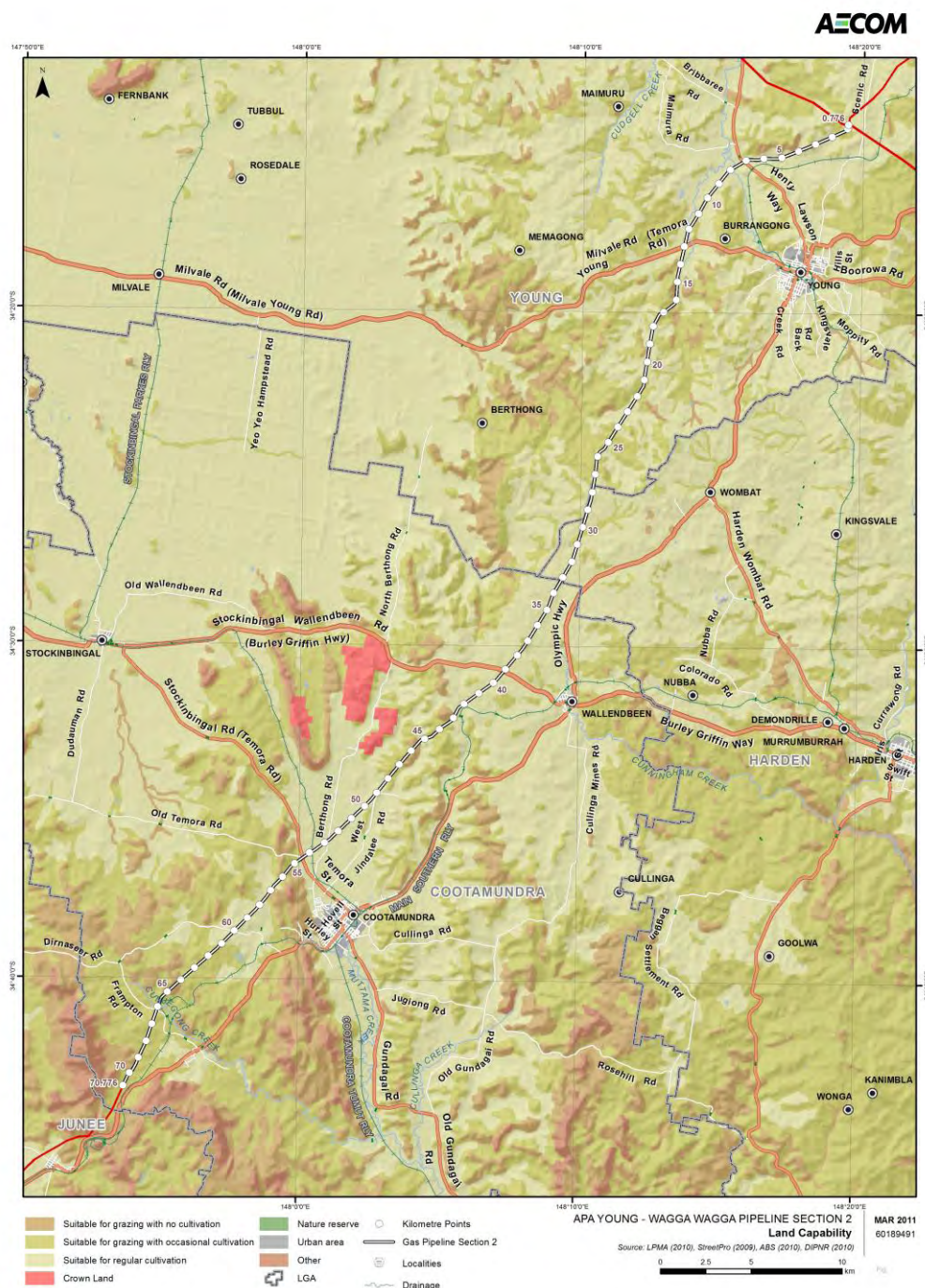


Figure 1 – Land use map of the Proposal, demonstrating land capability

3.1 Natural environment

The study area is encompassed by the South Western Slopes Bioregion. This bioregion is divided into two subregions, and the study area lies within the eastern side of the Upper Slopes subregion. Within the Upper Slopes the vegetation is dominated by open forests and woodlands. The tree species characteristic of the subregion are Black Cypress Pine (*Callitris endlicheri*), Kurrajong (*Brachychiton populneum*), Red Ironbark (*Eucalyptus sideroxylon*), White Gum (*E. rossi*), Yellow Box (*E. melliodora*) and Blakely's Red Gum (*E. blakelyi*) occupying the lower slopes. This merges west to Yellow Box, Grey Box (*E. microcarpa*) and White Cypress Pine (*Callitris glaucophylla*). Valley flats are dominated by Rough-Barked Apple (*Angophora floribunda*), with River Oak (*Casuarina cunninghamia*) found along eastern streams and River Red Gum (*E. camaldulensis*) lining the larger central and western streams.

This bioregion has been subject to extensive clearing for agricultural activity which has left very little of the original woodland vegetation intact. Over 80 % of the native vegetation in the region has been cleared making it the most cleared and fragmented bioregion in NSW (Benson, 2008).

The proposed pipeline route has undergone almost complete clearance of native timber for agricultural and/or pastoral purposes, with the landscape being generally characterised by native and introduced grasses and weeds. Remnant vegetation is for the most part restricted and comprised largely of modified stands of river red gum, yellow box and grey box. The river red gums along the study area occur primarily along creeks and within floodplains and also occur in some roadside and fence line vegetation. The yellow box and grey box occur primarily along fence lines, road reserves and isolated in pastures.

The landforms of the area are characterised by undulating hills, open plains, alluvial flats and incised ephemeral waterways. Few rocky outcrops exist along the study area. The study area intersects a number of minor drainage lines and watercourses and also traverses near to a number of irrigation dams used for agriculture. There is one apparent floodplain to the north west of Cootamundra which is intersected by the study area.

The study area traverses through the Lachlan and Murrumbidgee Catchment Management Authority (CMA) regions. These CMAs are divided into smaller sub regions, of which the northern section of the study area lies within the Upper Slopes sub region of the Lachlan CMA and the southern section of the study area lies within the Upper Slopes sub region of the Murrumbidgee CMA.

3.2 Human environment

Whilst proposed pipeline route avoids built up areas, it passes near the regional towns of Young, Wombat, Wallendbeen and Cootamundra (see Figure 1). The study area is located within the Local Government Areas (LGAs) of Young, Junee, Harden and Cootamundra Shire. Major industries within these LGA's include a varied mix of agriculture with the major agribusinesses including cattle, pig and poultry production, wheat and grains, canola, oats, wine, stone fruits, fat lambs and wool. Other areas of industry within these LGA's include horticulture, construction, engineering and steel fabrication, retail and service industries, mining, tourism and the transport (light and heavy freight) sector.

The study area is entirely within the Young local Aboriginal land council area. A search of the Aboriginal Heritage Information Management System (AHIMS) database identified a total of seven AHIMS registered Aboriginal sites within the 1 km AHIMS search buffer for the proposed pipeline route.

The study area intersects a total of eight sealed roads, including Henry Lawson and Burley Griffin Way, and numerous small unpaved lanes and tracks. The pipeline crosses one railway north west of Cootamundra, Lake Cargelligo railway.

The study area predominantly traverses through agricultural properties, used for dry land agricultural industries of livestock, grazing and cropping. The proposed pipeline also traverses a number of landholdings owned and/or managed as Crown Land by the NSW Land and Property Management Authority (LPMA). There is one state forest located near the study area, the Jindalee State Forest, which covers an area of around 1400 ha near the town of Cootamundra. There will be no likely adverse direct impact to this state forest as the proposed pipeline will not intersect this state forest. It is noted that a number of threatened fauna exist within this state forest, which have the possibility of utilising habitat within the study area.

3.3 Proposal description

AECOM has been commissioned by Eastern Australian Pipeline Pty Ltd, a wholly owned subsidiary of the APA to prepare an EA for Stage 2 of the Young to Wagga Wagga Looping Gas Pipeline Project (the Proposal).

Stage 2 of the Proposal will involve the installation of a new 18-inch (450 mm) natural gas transmission 'looping pipeline' between the townships of Young and Bethungra (see Figure 1). The new pipeline will be installed adjacent to an existing 12-inch (305mm) pipeline over a distance of approximately 70 km to provide additional gas transmission capacity, and will be constructed within the existing 20 m wide gas pipeline easement. For construction purposes only, a strip of land approximately 10 m wide is proposed to be acquired from the property owners. Stage 1 of this project covered a total distance of 61 km of the pipeline route between the townships of Wagga Wagga and Bethungra, and was constructed in 2010-2011.

Construction of the proposed pipeline will involve clearing and grading the entire pipeline easement, except in limited areas where alternative pipe trenching techniques, such as directional drilling will be used. Such clearing would result in total surface disturbance over the areas where it is employed, which will likely consist of the majority of the route. It is worth noting that the study area has already been subject to such an impact in 1980 when the original pipeline was constructed, and subsequently in 2006 when an optical fibre cable was constructed in part of the study area. Since 1980, the area has also been subject to ongoing maintenance activities, including vegetation clearing and maintenance in accordance with safety requirements for gas pipelines of this specification.

The pipeline trench is constructed by mechanical trenching plant which excavates a trench (1.5 m deep x 0.65 m wide), moving the spoil to one side. This method is used everywhere except for major road and watercourse crossings where directional drilling would normally be employed.

Following the placement of the pipe in the trench, the site will be backfilled, levelled and revegetated.

4.0 Project Description

This section provides a description of the design, construction, commissioning and operational activities associated with the proposed pipeline from Young to Bethungra. The proposed pipeline forms Stage 2 of the Young to Wagga Wagga Pipeline Project.

4.1 Proposal Specification

The proposed pipeline would be a new 18-inch natural gas transmission 'looping pipeline' between the townships of Young and Bethungra in Central NSW. The new pipeline would be installed adjacent to an existing pipeline (separated by approximately 7 m) over a distance of approximately 70 km. The new pipeline would be within the existing 20 m wide gas pipeline easement.

The proposed pipeline would be a buried, class 600 (10.2 MPa) gas transmission pipeline which would initially be operated at 8.5 MPa. The pipeline would be designed, constructed and operated in accordance with AS 2885.

4.1.1 Pipeline Design

Table 1 details the pipeline design specifications.

Table 1 – Design Specifications

Pipeline Component	Design Specification
Length	Approximately 70 km
Diameter	18-inch (450 mm)
Wall Thickness	Generally 6.8 mm
Material	Carbon Steel
Coating	Fusion bonded epoxy
Depth Cover	Generally 900 mm
Maximum Allowable Operating Pressure (MAOP)	10.2 MPa
Construction Right of Way (ROW)	30 m
Pipeline Easement	20 m
Separation Distance from Existing Pipeline	Approximately 7 m
Corrosion Protection	Coated with fusion bonded epoxy and cathodically protected
Non Destructive Testing (NDT)	100% radiographic inspection of welded joints
Supervisory Control and Data Acquisition (SCADA)	Pipeline monitoring back to existing control centre at Young

4.2 Pipeline Construction Activities

The construction of the pipeline would require a number of activities to be undertaken sequentially along the length of the proposed route. These activities are described in more detail below. It is anticipated that the construction period would be approximately four months assuming there are no delays due to adverse weather.

Typically a 30 m wide construction ROW is required to facilitate construction. This ROW would provide the necessary space for vehicle movements, working areas, stringing out of the pipeline, stockpiles of excavated spoil and storage of equipment. Figure 2 below shows a typical cross-section of a ROW.

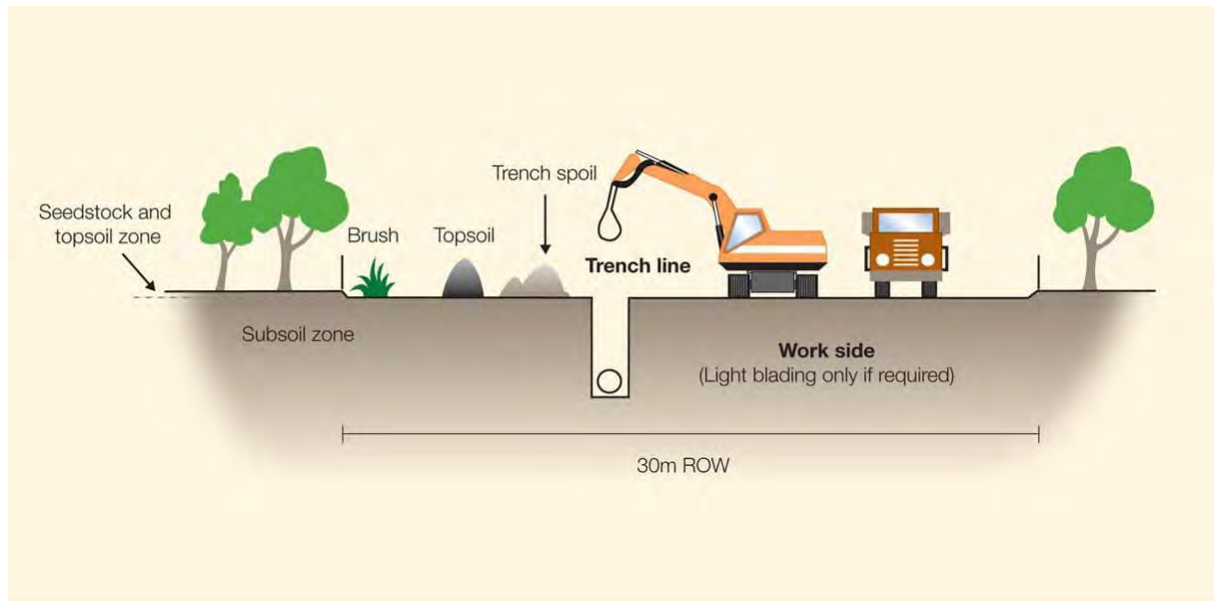


Figure 2 – Typical ROW Layout

4.2.1 Hours of Works

It is proposed to undertake construction works as per the standard pipeline industry work cycle of 28 days on / 9 days off. Construction works would generally be undertaken during the daylight hours, except in the following circumstances where extended hours may be required:

- Horizontal Directional Drilling (HDD) – once the drill rig is in operation, it is required to complete the HDD bore. This may result in extended work hours beyond daylight hours including 24 hour operations. Section 4.2.13 identifies area where HDD may be required.
- Boring – similar to HDD, boring must continue until completion to ensure the integrity of the bore. If drilling were to cease midway through boring, there would be potential subsidence issues. Section 4.2.13 identifies area where boring may be required.
- Hydro-testing – testing cannot cease midway as it is imperative that pipeline is maintained at pressure during the testing procedures. Section 4.4.1 provides details on the hydro-testing procedure.
- Works that do not exceed Rating Background Levels (RBL) plus 5 dB(A) at any residence. This is further discussed in Section 10.2.
- The transportation of plant, equipment and pipe by oversized trucks as required by authorities for safety reasons.
- Where it is required in an emergency to prevent the loss of life, damage to property and/or environmental harm.
- Where an agreement is reached with the local residents in order to reduce the duration of construction activities and/or manage other disturbances.

4.2.2 Equipment

Typical equipment required for pipeline construction includes: bulldozers, loaders, graders, side-boom tractors, trucks, padding machines, excavators, wheel ditching machines, welding units and light vehicles.

4.2.3 Survey and Fencing

At the start of the construction phase surveyors would mark the pipe centreline and the width of the ROW.

Fencing crews would be also mobilised to set up temporary gates and fences along the route to allow for construction crew movement and protection of livestock. Gates would be installed where fence lines are required to be breached.

4.2.4 Temporary Facilities

A range of temporary facilities will be required during pipeline construction. These include work areas for equipment, site compound locations, a dam to store water for hydrostatic testing and borrow pits to source additional fill material (if required). The location of the temporary facilities will be based upon logistical requirements, negotiations with land owners and environmental factors.

The final location of the temporary facilities would be based on logistical requirements, the Australian Pipeline Industry Association (APIA) *Code of Environmental Practice* (APIA, 2009) and negotiations with potentially affected landholders.

A dam would be required approximately at the midpoint of the proposed gas pipeline to facilitate the hydrostatic testing of the pipeline. The dam would be required to be capable of retaining approximately 7 – 8 ML of water. The pipeline would be tested in 2 events, each doing approximately half of the pipeline length. Water would be sourced locally and is most likely to be taken from a local groundwater licence on arrangement with a landholder, and in accordance with the relevant provisions of the *Water Management Act 2000* (as amended), and any relevant Water Sharing Plan(s). The dam would be located outside of the easement, in an area previously cleared for agriculture. Equipment used during construction would be stored within the construction work zones when not in use. Following completion of the testing process and prior to discharge, hydrostatic test water would be treated to an appropriate standard, as required by the receiving environment.

4.2.5 Access

During construction, access tracks would be required to areas such as the pipeline easement and work areas. Existing roads, access tracks and disturbed areas would be utilised as far as practicable to minimise disturbance to the surrounding areas. The selection of access track routes would be based on the *APIA Code of Environmental Practice* and negotiations with potentially affected landholders.

4.2.6 Utilities

Gas

No gas would be required during construction. Some gas may be used to purge the pipeline after it is constructed.

Electricity

Construction power would be supplied by on site generators.

Water

Raw water would be required for dust control and maintenance of the construction ROW and access tracks (quantity dependent on conditions), as well as for hydrostatic testing of the pipeline during construction. Potable water for domestic use would also be required during the construction phase.

Sewerage

Portaloos or pump out sewerage systems would be utilised during the construction period. Sewerage pump out would be undertaken by a suitably licensed liquid waste contractor.

4.2.7 Clear and Grade

Clear and grade is carried out to provide a safe construction ROW for vehicular movement, trenching and other construction activities. An impact width of approximately 30 m is generally required to enable construction operations to be safely and efficiently carried out, as well as to ensure adequate soil segregation. This width is typically increased adjacent to watercourses to provide additional room for stockpiling brush and soil outside of the watercourse.

The ROW would be cleared of heavy vegetation; however, root stock would be left in the ground where practicable to stabilise the area and reduce erosion. Large mature trees would be preserved where practicable. In scrubby areas, the vegetation would be stockpiled for respreading as part of the restoration process. Breaks would be left in stockpiled vegetation to allow continued access to stock, fence lines, tracks and drainage lines.

The ROW would be levelled to the required gradient using graders, backhoes and bulldozers. Topsoil would be removed and stockpiled separately for re-use during reinstatement works.

4.2.8 Trenching

A wheel trencher, rock saw or excavator would be used to dig the trench in which the pipe would lie. The distance covered per day by trenching would be dependent on terrain, equipment availability and weather conditions but would typically be approximately 2 km/day. The minimal practicable distance of trench would be left open at any time. Figure 3 shows a typical trenching operation, albeit within a larger disturbance footprint than proposed between Bethungra to Young.



Figure 3 – Typical trenching methods would be used for the majority of the route

Breaks in the trench would be left to facilitate stock and wildlife crossing and agricultural vehicle movements. In addition, methods to prevent fauna entrapment (e.g. trench breakers, ramped ends of trench, fauna ladders) would be implemented.

These methods ensure that fauna egress points in the trench are no more than 500 m apart. Potential impacts upon fauna and proposed management measures are discussed in Section 8.3.

4.2.9 Stringing and Bending

Stringing is the term used to describe the laying out of the pipe in preparation for welding. Pipe would generally be transported to site on trucks in 18 m lengths. The pipe would be laid out adjacent to the trench and held off the ground on skids that protect the pipe coating from damage. Prior to welding the pipes would be bent to match the required vertical and/or horizontal profile.

4.2.10 Welding, Inspection and Coating

Once the pipe is strung, the pipe would be positioned using side-boom tractors and internal line-up clamps. Specialised construction crews would undertake the welding phase of the project. Pipes would be welded in several segments, typically into one kilometre lengths called pipe strings.

Each weld would be subjected to a 100% Non-Destructive Testing (NDT) inspection to check for compliance to specification, thus ensuring the integrity of each weld. This would be typically carried out immediately after welding so that any defects in the weld can be repaired whilst the welding crews are still in the general vicinity.

Following welding and inspection, the pipe would be cleaned by grit blasting and an external coating applied.

4.2.11 Lowering In

The trench would be prepared as necessary to protect the pipe. This may include placing padding or supports (e.g. sandbags or Styrofoam blocks) in the bottom of the trench.

The pipe would be lifted off the skids and then inspected and tested for defects. The pipe would then be lowered into the trench using side-boom tractors.

Blocks, known as trench breakers, may be installed in the trench prior to backfilling to control water movement along the trench. Trench breakers are commonly installed in areas such as adjacent to watercourses, on steep slopes or where drainage patterns change.



Figure 4 – Typical lowering activity methods would be used for the majority of the route

4.2.12 Backfilling

The trench would then be backfilled with screened trench spoil, which would sift around the pipe providing a stone free covering. The remaining subsoil would then be placed in the trench in layers (typically two layers) with compaction between each layer.

4.2.13 Infrastructure Crossings

The proposed pipeline would cross various infrastructure including major roadways, minor roadways and rail lines. Impacts to and management of infrastructure is further detailed in Section 15.0.

Horizontal boring or would likely be utilised where the pipeline crosses the following major infrastructure:

- Henry Lawson Way.
- Boorowa Street, outside of Young.
- Burley Griffin Way.
- Cootamundra Stokinbingal Road.
- Southern Railway Line.

Crossings of other roadways would typically be done by trench excavation. This would involve either partial road closures or a full road closure with local diversions.

4.2.14 Waterway Crossings

Several methods can be used at watercourse crossings depending upon the size and nature of the watercourse flow regime and the quality of the riparian vegetation. In addition to pipe laying, temporary vehicle crossings may also be constructed to facilitate the movement of construction vehicles over watercourses.

Section 14.0 provides a detailed description of each watercourse and the sensitivity of the watercourse. All watercourses are determined to be ephemeral creeks of low to medium sensitivity. As such, open trenching with flow diversions (if flow diversion is necessary at the time of construction) is deemed to be appropriate at all crossings. Watercourse crossing methods are described in detail in the following sections.

Standard open cut

As detailed above, all watercourse crossings are expected to be constructed using standard open cut (trenching) construction. This technique is most suited to dry or low flow conditions. The standard open cut method would involve establishing a stable working platform either side of the watercourse and creating a trench using excavators. Tie-in points would be located on high ground well away from any water flow.

Watercourse bed and bank material and trench spoil would be stockpiled separately. The pipe may be concrete coated or have river weights attached (refer Figure 5) at watercourse crossings to protect the external coating and to prevent the pipe from 'floating' once in place. Pipe string welding and concrete coating would generally occur prior to placement of the pipe in the trench.



Figure 5 – Adding concrete weights at a watercourse crossing

Flow diversion

Flow diversion is a modification to the standard open cut method and is employed where higher water volumes and flows are present (typically up to 1000 L per second). Flow diversions may be required depending on the site specific conditions at the time of construction. The technique involves damming the watercourse and transferring the water from upstream to downstream around the work site.

Conditions that may influence the decision to employ flow diversion techniques include:

- Technical constraints limiting the ability to construct a suitable trench.
- Site safety and working conditions.

- Potential adverse impacts to water quality (principally as a result of increased sediment load), which may affect downstream users or ecosystems.

The key steps for a typical flow diversion crossing would be:

- Construction of a dam wall using plastic lined sandbags (or similar) to prevent the flow of water into the work area.
- Installation of a method of transferring the water from upstream to downstream (e.g. pump or flume).
- Installation of a pump to dewater the trench. Water from the trench is likely to be highly turbid and would not be discharged directly into the watercourse. It would be discharged through a filter system into the watercourse or discharged to stable ground away from the watercourse.
- Digging the trench and stockpiling the trench spoil above the bank in a bunded area ensuring that bed and bank materials are stockpiled separately.
- Installation of pre-welded pipe in the trench and return spoil material to the trench. Rock protection may be installed over the trench line in the stream bed to prevent potential scouring during flood conditions.
- Reinstatement of the banks to as near as practicable to their original profile. Where required geofabric (e.g. jute matting) may be used to hold soil in place. Such materials aid in bank stabilisation whilst being permeable to water and permitting plant growth.
- Reinstatement of vegetation as required. This usually involves seeding initially with sterile grasses (e.g. millet or rye corn) to facilitate revegetation and stabilisation of watercourse banks and permitting local vegetation to re-establish across the area.

Methods of transferring the water from upstream to downstream may include pumping the flow around work areas or installing a flume.

Dam and pump

The dam and pump method would generally be utilised for minor to intermediate sized water bodies. A dam would be installed upstream of the crossing and the water would be pumped around the crossing location. Once the excavation and backfill is complete, the dam would be removed and flow would resume as normal. Figure 6 depicts the dam and pump process.

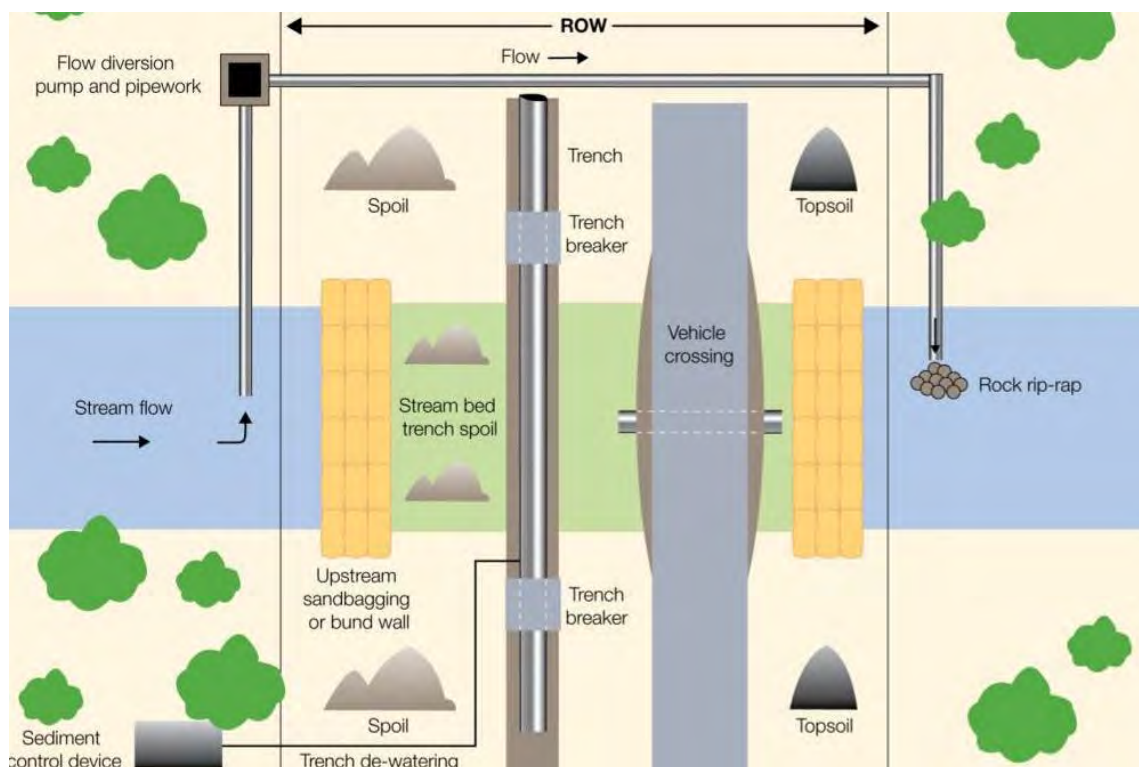


Figure 6 – Dam and pump process

Flume

This method is similar to the dam and pump method but does not require a pump. Instead, the crossing would be sealed off on both the upstream and downstream sides, and the water flow diverted around the crossing location through a flume, or pipe. Figure 7 depicts the flume process.

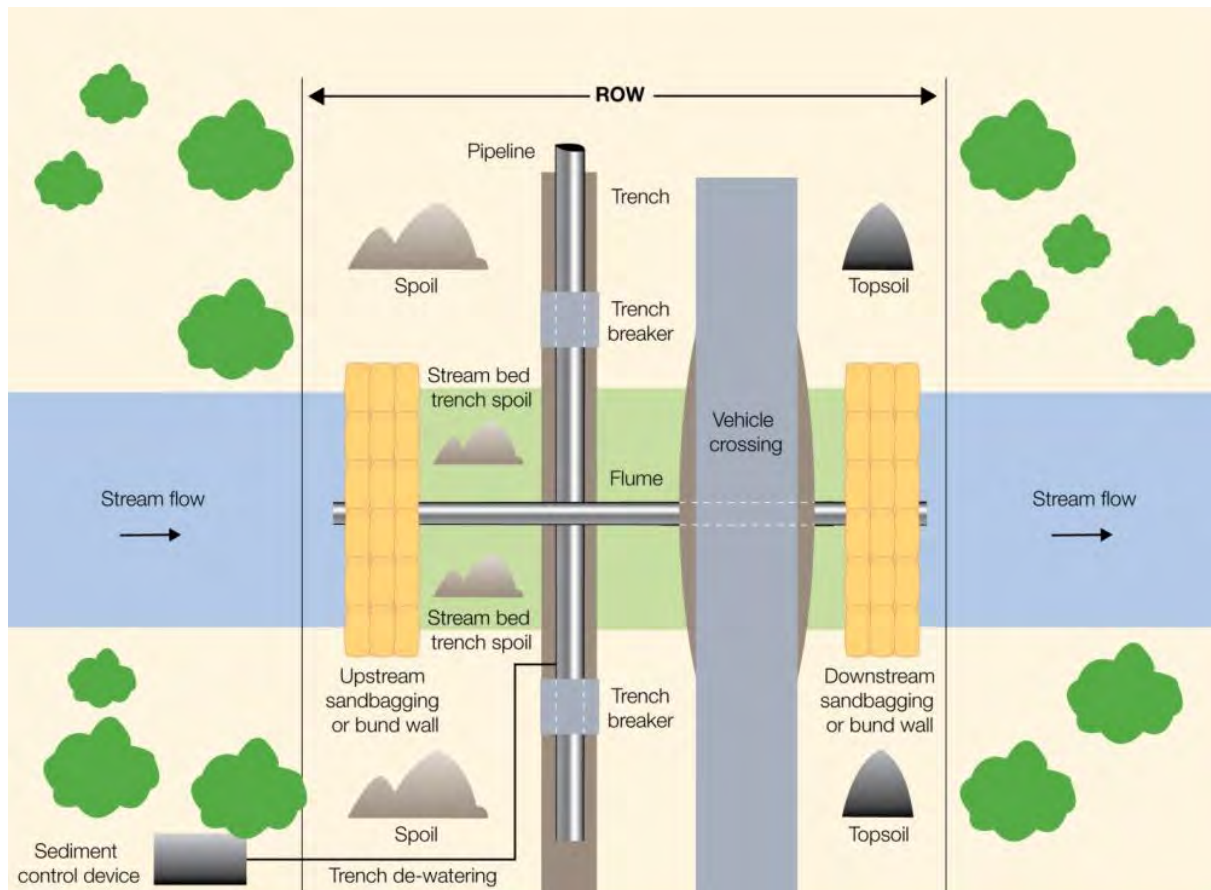


Figure 7 – Flume process

4.2.15 Traffic Management

The key transport issues for the proposal are associated with the construction phase when plant, equipment, materials (including pipe), camp facilities and personnel are required to be moved to and from the work sites.

Pipeline construction typically involves initial delivery of construction plant and equipment (e.g. graders, excavators, bulldozers and welding units) and compound facilities and then daily movements associated with construction workers and pipe deliveries. Construction plant and equipment would then be demobilised from site at the completion of construction works.

Pipes would be transported by truck directly to the ROW. Pipes would be transported on a needs basis and would only be stockpiled for HDD or special crossings. Pipe would typically be supplied in 18 m lengths transported on extended semi-trailers with a capacity to carry around 0.5 km of pipe per truck. Therefore 70 km of pipeline would involve approximately 140 loaded truck movements. Due to the linear nature of the development these truck movements would be spread across the 70 km pipeline route.

Traffic issues, mitigation and management are further addressed in 10.4.

4.3 Construction Workforce and Accommodation

The construction phase is likely to create a minor short-term positive impact on local employment and at the peak of the project it is expected that there will be a workforce of approximately 50 personnel. Most of the roles in the construction stage are for the pipeline specialists who need specialist skills such as high-pressure pipeline welding brought in by companies from outside the area. There are some opportunities for more generalist local and Indigenous labour to work on aspects of the pipeline such as clearing and grading of the land. Local communities in the area of the proposal are generally employed in a range of industries, such as manufacturing and construction with skilled tradespeople in high demand and may be available for some of the more general work. Accommodation of construction crews varies depending upon the size and location of the project. It is anticipated, due to the proximity to populated areas, that the construction crew for this Project would be able to be accommodated in existing local accommodation.

4.4 Commissioning Activities

4.4.1 Hydrostatic Testing

Once the pipeline has been installed in the trench it would be subjected to a hydrostatic test to prove the integrity of the pipeline. Hydrostatic testing of the pipeline requires large single volumes of water to be pumped into the pipe in sections and pressurised to a minimum of 125% of the maximum allowable operating pressure. The pipe is divided into sections which are capped with test manifolds, filled with water and pressurised to the specified test pressure and held for the required period.

The methodology for hydrostatic testing depends upon the quality and quantity of the water available. It is proposed to undertake hydro-testing in two stages, with approximately half the pipe tested in each stage. In order to conserve the amount of water used, the test water would be recycled and re-used. Water loss for each test would be in the order of five per cent.

Hydrostatic testing procedures, including water sourcing and disposal, would be confirmed during the detailed design and construction phase. APA is in ongoing discussions with NOW regarding potential sources of water, and relevant licensing requirements. If NOW confirms that a licence would be required under the Water Act 1912, APA would work with NOW to either apply for the licence or seek an exemption as appropriate. Water resources for hydrostatic testing are discussed in Section 4.2.4 above. Goldenfields Water County Council (located in Temora and servicing the northern Riverina region) indicated that they would be able to provide water to the APA for the hydrostatic testing. Detailed arrangements would be finalised prior to construction.

Hydrostatic test water would not be discharged directly to natural water bodies. If appropriate and practicable, the discarded water would be supplied for beneficial re-use in consultation with landowners. Where water is not suitable, or it is not practicable, for beneficial re-use, it would be disposed of to land typically through a settling and filtration structure, with erosion and scour controls in place.

4.4.2 Clean-up and Restoration

Clean up and restoration measures would be applied to the ROW, work areas and access tracks in consultation with the relevant landholder/owner. Generally clean up and restoration would involve removal of foreign material (construction material and waste), surface contouring, respreading topsoil, respreading vegetation and reseedling/revegetating (typically with native grass or other approved species).

Restoration would be undertaken in accordance with the APIA *Code of Environmental Practice* to ensure that:

- Topsoil cover is re-established and all land and waterways disturbed by proposal activities are returned to a stable condition as soon as possible after construction.
- Land is returned as close as possible to its previous productivity.
- Stable landforms are re-established close to original topographic contours.
- Natural drainage patterns are reinstated.
- Erosion control measures (e.g. contour banks, filter strips) are installed in erosion prone areas.
- The environment is reinstated as near as possible to the condition of the surrounding area.

Restoration management measures have been further discussed in Section 8.4.

Installation of marker signs

Pipeline marker signs in accordance with AS 2885 would be installed during restoration activities to indicate the presence of the pipeline and to reduce the risk of inadvertent damage by third parties. Marker signs would be installed at:

- Both sides of road and rail crossings.
- Both sides of significant watercourse crossings.
- All fence lines.
- All utility crossings, except in the middle of cultivated areas.
- Significant bends, except in the middle of cultivated areas.
- As otherwise required to be visible.

4.5 Commissioning

Instrumentation calibration

All instrumentation would be calibrated in accordance with appropriate Australian standards, industry guidelines and manufactures instructions.

Performance testing

All systems (e.g. shut down and start up) and all valves and equipment would be tested in accordance with Australian standards and industry guidelines to ensure that they are operating to the design specifications. Where any tests fall outside of the agreed acceptance criteria repair work or modifications would be carried out and the items would be retested.

Baseline intelligent Pipeline Inspection Gauge (PIG) run

An intelligent PIG run, utilising either magnetic flux loss or ultrasonic methods, would be undertaken to:

- Confirm that there are no gouges, dents or other defects from the construction process; and
- Provide a baseline for future pipeline integrity studies to be carried out.

Pipeline drying

The pipeline would be dried to an acceptable dew point standard so that initial gas is maintained to standard. This is done by running many scraper pigs and then foam pigs to push out and soak up remaining hydrostatic test water. These pigs are propelled using dry air to assist in the drying process.

Alternatively once the pipeline has been pigged so that free liquid water is removed a large vacuum unit may be attached to the pipe to remove any remaining liquid water and water vapour. This prevents the need for the purging step, as there is no other gas in the pipeline.

Pipeline purging

The pipeline may be purged of air prior to the introduction of gas to ensure safe entry of the gas. Typically this is done by introducing a slug of inert gas immediately prior to introducing the natural gas directly into the pipeline to create an inert interface between the air and the gas. This allows the arrival of the gas/air interface at the downstream vent point to be readily detected.

Alternatively, the gas can be introduced directly into the pipeline under strictly controlled conditions. The volume of gas that would be vented to the atmosphere would be limited to that necessary to ensure the gas/air interface has passed the vent points.

The purging method would be selected as part of the detailed planning for the commissioning program and would be subjected to safety and risk analysis as required.

4.6 Operational Activities

Given that the pipeline would be buried in part of an existing easement, next to an existing pipeline, land users would be encouraged to resume previous land use activities on top of the pipeline, provided that the use does not

include excavation activities. Whilst deep-rooted vegetation cannot be re-established directly across the pipeline (due to the potential to damage the pipeline) shallow root cropping and grassland re-establishment is encouraged and no long-term impacts would be expected to such areas.

4.6.1 Operating Conditions and Practices

General operating conditions and practices associated with the original pipeline would be expanded to include the new proposed looping pipeline. General operations encompass routine operation and maintenance programs including ground and aerial patrols, repair of equipment, cleaning of the pipeline (pigging), monitoring for corrosion, and remediation and tenure area maintenance including access roads. Aerial and/or ground inspections would be undertaken in order to detect erosion, monitor success of reinstatement, and detect and control weed species. The pipeline would have a cathodic protection system (a system used to control the corrosion of the pipeline by connecting it with another more easily corroded or "sacrificial metal") which would also be regularly monitored.

All gas flows would be metered with high accuracy metering. This information is continually checked against the volume of gas within the pipeline and any major imbalance would be immediately checked to confirm the integrity of the pipeline.

The likelihood of uncontrolled gas leakage or venting is extremely low due to both design and procedural controls associated with the pipeline. These measures are in place to greatly reduce the likelihood of third party interference causing rupture to the pipeline.

During normal operations, occasional venting of small quantities of gas may occur under controlled conditions at valve and/or scraper stations, in accordance with established operating procedures. The risk to public safety in these operations is very low, primarily because:

- The stations are typically located in isolated areas, away from the general public.
- The venting would be conducted under controlled conditions and can be stopped if conditions become unfavourable (e.g. strong winds or storms).
- The nature of the gas, with a very high CH₄ content is extremely buoyant in air and would disperse very quickly. This essentially eliminates the likelihood of a flammable atmosphere forming.
- Electrical equipment inside the compound, for areas where gas can escape, would be rated for use in explosive atmospheres and therefore potential ignition sources are kept to a minimum.

If a leak were to occur, the following systems would be in place to minimise any risk to public safety:

- Balanced metering to detect discrepancies that may indicate a leak.
- Leaking sections would be remotely isolated as soon as possible after the leak is detected.
- Pipeline personnel would be deployed to control the leak and isolate the area.
- The pipeline can be depressurised safely through cold vents at pipeline facilities.
- If required, local landowners and emergency services would be notified.

Hazards and risks associated with the pipeline are discussed further in Section 13.0.

4.6.2 Maintenance of Pipeline

APA currently operates the existing Licence 19 gas pipeline, and therefore already has an established maintenance regime which includes regular monitoring of the pipeline, ongoing vegetation management and dedicated real time telemetry monitoring. All maintenance of the existing pipeline is undertaken in accordance with AS 2885. The Proposal would be operated and maintained looped pipeline in conjunction with this existing pipeline. It is anticipated that the increase in operational duties would equate to less than 1 person/year. This would most likely be absorbed by the existing staff or by an additional employee at the Young Base.

Prevention of damage due to third party activity would be achieved through appropriate depth of cover, signposting of the pipeline, "Dig Before You Dig" programs, regular inspection of the pipeline ROW to spot any construction or earthmoving activities in the area, and third party education on the potential dangers of carrying out activities in proximity to the pipeline. In some areas such as crossings, marker tape or concrete slabs may be buried above the pipeline to reduce risk of third party interference.

Corrosion would be prevented by the protective external coating and cathodic protection systems. The cathodic protection system would be checked regularly to ensure that the protection voltages are within limits and to monitor any likely areas of corrosion activity. The cathodic protection system and external coating system work independently to protect the pipeline from corrosion. If corrosion is detected the relevant section of pipe may have additional cathodic protection applied or need to be excavated and remediation measures implemented.

A maintenance schedule would be created for the orderly undertaking of valve lubrication and maintenance, sign and sign post maintenance and other necessary activities. In addition, monitoring of gas pressures within lines would be undertaken from the 24 hour operated control room at Young.

4.6.3 Maintenance of Easement

Maintenance of the pipeline easement would be carried out through a process of regular inspections and repairs.

Inspection

During the operational phase of the pipeline the permanent easement would be patrolled on a regular basis. This would be done as a part of the regular operation of the pipeline, as part of planned maintenance trips or as a dedicated route inspection trip. In addition to the regular inspection trips, specific inspections would be carried out after heavy rainfall or flash flooding. Experienced personnel using ground vehicles or aircraft, as appropriate, would do all inspections.

Inspection of the pipeline easement would target:

- Erosion.
- Encroachment.
- Potential injurious construction or other activity.
- Digging activities, such as:
 - Land levelling.
 - Table drain clearing.
 - Trenching/ploughing for utility installation.
- Drilling for fencing, foundations and soil testing.
- Water impoundment.
- Unauthorised access.
- Dumping of rubbish.
- Rate of revegetation (in early years).
- Vegetation dead spots (potential leakage).
- Missing or vandalised signage.
- Facility vandalism.
- Noxious and other weeds.
- Trench subsidence in early years of operation.
- Vegetation that would block emergency access.

Repairs

Potential conditions that would require repairs and, when evident, the appropriate remedial actions that would be taken are set out in Table 2 below.

Table 2 – Likely Repairs and Remedial Actions

Potential Repair Requirement	Remedial Action Summary
Erosion	After discussion and coordination with the landholder, the land would be regraded close to the original contour. Additional erosion control measures such as seeding for regrowth, run off control structures or rip rap at stream banks may be utilised if required.
Encroachment	The landholder would be contacted to stop the encroaching activity, remove any structures that have been built over the pipeline and restore the land to the original contour.
Potentially injurious construction or other activity (e.g. road construction over the pipeline)	The landholder or constructor would be told to immediately cease activity until measures have been taken to properly protect the pipeline.
Digging activities	The activity would be immediately stopped. The pipeline and easement would be marked. All digging within 500 mm of the pipe must be done by hand. Any damage to the pipe must be repaired and would be at the expense of the damaging party.
Rate of revegetation	Ecologists would be used to assess the rate of regrowth over the pipeline ROW for the first 18 months after the installation of the pipeline. Where the area is not revegetating at the same rate as the surrounding area measures such as reseeding and/or fertilisation would be implemented. The 20 m ROW would need to be maintained free of trees to ensure no damage to the pipeline through root systems and to provide access for both regular inspections and emergency situations.
Vegetation dead spots (potential leakage)	Dead spots would be assessed using a gas detector to determine if gas is present. If vapour is present the area would be excavated to locate any potential leak. If a leak is located then the area would be repaired in accordance with APA procedures and AS 2885. The pipe would be recoated for corrosion protection, backfilled and the surface restored to the original contours. If there is no leakage the area would be backfilled and restored to the original contours.
Missing/vandalised signage	The sign and post (if required) would be replaced. The damaged sign and/or post would be removed and disposed of. If this is a persistent problem in certain locations more robust signage would be installed. If the problem still persists the issue would be referred to the local police authorities.
Facility vandalism	All above ground facilities would be inside a security fence. Where vandalism occurs, repairs would be carried out and, if necessary, additional security measures would be considered and installed. All acts of vandalism that could pose a threat to the overall security of the pipeline would be reported to the police.
Noxious weeds	Noxious weeds, if present along the easement as a result of construction or operations/maintenance activities, would be eliminated by cutting, spraying or removal as appropriate to the type of weed, the season, the size of the infestation and in consultation with the landholder.
Trench subsidence	In the first two years after construction, there may be subsidence along the trench in certain soil types due to compaction of the backfill. Where trench subsidence occurs and the subsidence affects the local drainage pattern, the land use or causes erosion, then the area would be backfilled and regraded to the surrounding contours. Such measures (if required) would be once off to redress the soil profile.

4.6.4 Supervisory Control and Data Acquisition (SCADA)

The pipeline would be connected to the existing Young Base SCADA system which would continually monitor pipeline conditions such as pressure, temperature, linepack, valve status, and cathodic protection.

The SCADA system enables the Pipeline Controller to remotely open or close valves, alter operating pressures and start or stop equipment as required.

4.7 Decommissioning

The pipeline loop would remain in operation for its design life and future extension. It is anticipated that 70 years would be achievable. When decommissioning is required, the pipeline would be abandoned in accordance with AS 2885 requirements and the APIA *Code of Environmental Practice*. This may involve abandonment in situ or total removal depending upon the prevailing conditions at the time. In either case, all above ground pipe work would be removed. Where possible recycling of materials and disturbance to vegetation would be minimised and the implementation of land rehabilitation would occur as soon as practicable.

Part II – Environmental Assessment Process



5.0 Consultation Process

5.1 Consultation with stakeholders and other relevant authorities

5.1.1 Planning Focus Meeting

The DoP advised that a Planning Focus Meeting (PFM) would be required in order for the Proponent to formally seek the views of relevant statutory authorities in respect of potential impacts of the proposal and issues to be addressed during preparation of the EA. A PFM was held on 7 April 2009. The PFM provided an opportunity for statutory authorities to establish the requirements for the form and content of the EA. The PFM covered both Stage 1 (Wagga Wagga to Bethungra) and Stage 2 (Bethungra to Young) of the proposed development. Therefore some of the stakeholders (and their comments) are only relevant for Stage 1 or Stage 2 of the proposed development.

5.1.2 Statutory and Other Relevant Authorities

The Director General has undertaken consultation with key local and State Government agencies. The purpose of this consultation was to provide an overview of the Project and to seek input into matters they would like to see addressed in the EA. In this regard written comments were sought from those parties identified in the Director-General's environmental assessment requirements to assist with the preparation of the EA. Table 3 below summarises the responses received together. Copies of the written comments to the Director-General's for this Project are provided in Appendix A.

Table 3 – Responses to the DG enquiries

Institution	Matters for Consideration
NSW Department of Environment and Climate Change (DECC ¹)	Based on the information provided, the proposed activity is not a scheduled activity under the <i>Protection of the Environment Operations Act 1997</i> .
	- Impacts on fauna and flora;
	- Impacts on threatened species, occurring in and around the pipeline easement and any associated track construction;
	- Proposed rehabilitation of areas temporarily disturbed;
	- Assessment of any impacts the project may have on Aboriginal cultural heritage; and
	- Actions that will be taken to avoid or mitigate impacts or compensate to prevent unavoidable impacts identified above.
	- Environmental impacts need to be identified, quantified and reported on air quality.
	- Environmental impacts need to be identified, quantified and reported on water quality.
	- Environmental impacts need to be identified, quantified and reported on noise.
	- Environmental impacts need to be identified, quantified and reported in terms of waste.
	Consideration of the relevant guidelines in assessing impacts in terms of air quality, noise and vibration, water quality, groundwater, stormwater, waste water, waste, threatened species and aboriginal cultural heritage.
NSW Department of Primary Industries (DPI)	DPI has no additional key issues to raise.
NSW Department of Water and Energy (DWE ²)	- Impacts on waterway crossing; - Impacts on water supply; and - Potential for groundwater interception.

¹ DECC has since changed and is now the Office of the Environment and Heritage (OEH)

² DWE is now Department of Trade and Investments (DTI)

Institution	Matters for Consideration
Cootamundra Shire	- Impacts of construction workers and vehicles on Shire roads; - Preparation of traffic control plans for the gas line crossing roads; and - Preparation of traffic management plans for activity such as delivery of pipes and materials as well as parking of workers along the roads. - Preparation of rehabilitation plans for the all work on road reserves or other Councils owned land. - Preparation of waste management plan for disposal of all waste.
Harden Shire	- Protection of Council's infrastructure during construction, in particular under boring of roads, disturbance to reticulated water services and access to site from Councils' roads; - Impacts on areas of historic gold diggings, mine working and mine workers camps. This should include actual disturbance, visual impacts and security fencing. - Description of camp sites offices and stockpiles. - Description of waste disposal measures, including any on site effluent. - Areas where water for testing and dust suppression will be drawn, disposal location and potential impacts particularly in relation to soil disturbance and agricultural reuse. - Community notification procedures. - Impacts of increased traffic. - Details of revegetation and landscaping activities.
Junee Shire	- Bushfire prevention measures. - Erosion control measures. - Rehabilitation to damage and work outside the easement. - Water sourcing and possible re-use of water. - Impacts on existing wildlife. - Location of a central material depot to allow for better traffic distribution.
Wagga Wagga Shire	- Activities outside the easement - Impacts on council's infrastructures including road pavement and drainage infrastructure. - Impacts on remnant vegetation. - Progressive rehabilitation of all disturbed areas including: • Temporary access roadways; • Profile of creeks and drainage lines; • Natural profile of the landscape; and • Vegetation profile. - Minimise the number of required access locations to public roads - Minimise the potential for entrapment and injury to wildlife while trenches are open.
Young Shire	- Location of the easement, old and new pipeline - Location of any dwelling or sensitive land use close to the pipeline and subsequent risk assessment - Impacts on vegetation especially on road reserves - Details on road re-instatement where road crossings occur - Details on temporary vehicle access - Details of permanent vehicle access - Noise impact assessment during the construction phase - Sedimentation and erosion control measures
Livestock Health and Pest Authority	- The pipeline does not run through any of the travelling stock reserves – it is expected that there will be no impacts from the project.

5.1.3 Stakeholder consultation at EA Stage

In September 2009, all stakeholder groups were contacted and a brief overview of the gas pipeline proposal was forwarded to the contact persons identified. Invitations for either face to face meetings or teleconferencing were extended in order to discuss the proposed works and ascertain any concerns.

Table 4 – Responses to stakeholder consultation

Institution	Matter for consideration	Addressed in
DECC	Flora and fauna impacts and indigenous heritage are main concern	Section 8.0 and Section 9.0
	Indigenous heritage – DECC not aware of/if any records of sites destroyed by original pipeline works	Section 9.0
	After pressure testing the system, undertake sampling of the water for disposal to ensure no contaminants present	Section 4.4 and Section 14.0
	Greenhouse gas emissions – will there be any new pump stations or components?	Section 4.1
	Part 3A developments are exempt from requiring licenses/approvals at water crossings, however: Trees around a riparian zone should not be removed as is a key threatening process for threatened species Ensure assessment of impact includes vehicle tracks and camps A Surface Water Management Plan may be required by DoP Open trenching of ephemeral creeks is allowed, however rehabilitation works should be documented	Section 8.0 and Section 14.0
DPI	No comment received	N/A
DWE	Ascertain water supply as a license may be required depending on source and volume	Section 4.4.1
	Water supply for workers camps	Section 4.3
	Have a surface water management plan that identifies potential issue of intercepting a shallow groundwater source or spring (in the event, stop work and contact the Office of Water (formerly DWE)	Section 14.0
NSW Road Traffic Authority (RTA)	Prefer face to face meeting once materials depot decided There may be some issues that are relevant to site specific circumstances and roadway pavement standards on the various classified roads - Burley Griffin Way (MR84), MR235, MR239, MR241. No further comment received	Section 10.4 and Section 15.0
NSW Department of Lands (DoL)	Requested information regarding Crown Lands	Section 12.1.3
Australian Rail Track Corporation (ARTC)	Ensure the EA covers works in the ARTC corridor Acknowledgement of ARTC's EPL An application will need to be made to ARTC. Design will have to comply with relevant ARTC Standards and guidelines	Section 15.0
Country Energy	No comment received	N/A
Transgrid	No comment received	N/A

Institution	Matter for consideration	Addressed in
Young Shire Council	Referred to response to DGRs, no additional comments to be made Consultation will occur closer to Stage Two works	N/A
Harden Shire Council	Consultation will occur closer to Stage Two works	N/A
Cootamundra Shire Council	Consultation will occur closer to Stage Two works	N/A
Junee Shire Council	Construction preferable in summer Consider possible road closure and traffic management	Section 10.4
	Address bushfire prevention in EA – community is sensitive to this issue	Section 8.3.12
	Include erosion control measures in EA Information on web page re high risk areas and rural heritage items are on LEP	Section 8.3.14
	Re-use the pressure-testing water – possibly discharge to a farm dam	Section 4.4.1 and Section 14.0
	Fauna concerns are more applicable at Bethungra and Wagga areas	Section 8.0
	Junee is an ideal central location for first stage of works; facilities/amenities include potential storage depot, accommodation and road and rail access	N/A
Wagga Wagga Shire Council	No comment received	N/A
Lachlan CMA	Consultation will occur closer to Stage Two works	N/A
Murrumbidgee CMA	The REF should: Consider land zoning in reference to the relevant LEP Include a site plan indicating location of native vegetation for removal, rehabilitation works and proposed mitigation/offset measures Include likely impacts to native vegetation, biodiversity and threatened species/communities Details on purpose of the pipeline, community impact and benefit	Section 12.0 and Section 8.0
	Any clearing should be consistent with the Murrumbidgee CMA's Catchment Action Plan Avoid clearing previously over cleared vegetation communities – consider alternate route Consider rehabilitation through revegetation activities that will minimise impact on soil erosion and water quality	Section 8.0
	Consideration should be given to threatened communities and threatened species habitat. Avoid EECs such as Yellow Box – White Box – Blakelys Red Gum Woodland Threatened species habitat should be assessed and avoid unnecessary clearing, particularly those listed under Threatened Species Conservation Act (1997) (threatened populations, endangered communities, and threatened species habitat should be assessed using the eight part test (<i>now seven part test</i>) under Section 5A of the EP&A Act)	Section 8.0

Institution	Matter for consideration	Addressed in
	Land identified as 'State Forest', 'Reserve' or 'Crown' may require written consent from Department of Lands or other authorities	Section 12.0
	Undertake an assessment to determine any impact to culturally significant sites	Section 9.0
	Impact of clearing on land degradation requires an assessment of land and soil capability and potential for erosion	Section 8.3.14
	Assessment should be undertaken to determine if clearing will impact on salinity of the site	Section 8.3.14
Landcare Groups	Young and Harden: Consultation will occur closer to Stage Two works Otherwise, Landcare Groups will be represented under the CMA umbrella	N/A
Young Livestock Health and Pest Authority (LHPA)	Pipeline doesn't traverse any stock routes so no impact expected	N/A
Gundagai LHPA	Stock route at Bethungra, inform LHPA in the event of passing through a reserve, they will keep stock away Otherwise no impact expected	N/A
Wagga Wagga LHPA	No comment received	N/A
Goldenfields Water County Council	Currently does not have specifications for this type of activities. Proposed to work with the APA closer to construction stage to better understand requirements and implications. Would be happy to provide water for hydrostatic testing.	Section 4.4.1

Note: Consultation regarding indigenous matters of concern are covered in Chapter 9.0.

5.1.4 Landowner Consultation

Extensive consultation has been undertaken with landowners affected by the preferred corridor for the pipeline. Several letters have been issued to inform all landowners that are to be affected about the development of the proposal (in August 2009, November 2009, February 2010 and June 2011). In addition, APA has met with each of the land owners to explain the proposal and will seek approval by way of an Easement Construction Deed in due course. APA continues to give priority to this consultation activity.

6.0 Planning and Legislative Requirements

This section sets out the planning and legislative framework applicable to the Proposal and considers both the EP&A Act and the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The Proposal may also require approvals under additional State and Commonwealth Acts. These are discussed in more detail below, as relevant to the Proposal.

6.1 Changes to Part 3A of the EP&A Act

When the Environmental Planning and Assessment Amendment (Part 3A Repeal) Act 2011 (Part 3A Repeal) commenced Part 3A of the EP&A Act was repealed. At that time, the Proposal became a “*transitional Part 3A project*” under the new regime as it is a Proposal for which environmental assessment requirements were notified before the repeal of Part 3A.

As a transitional Part 3A project, the Proposal is regulated by the provisions of the Schedule of the EP&A Act (this is the relevant effect of the Part 3A Repeal). Under Schedule 6A, the provisions of Part 3A of the EP&A Act will continue to apply to transitional Part 3A projects, irrespective of its repeal (subject to any amendments made from time to time under later legislation or regulations). Similarly, all State Environmental Planning Policies (SEPPs), declarations, orders and determinations relevant to the project will continue to apply after the repeal of Part 3A. The regulations relevant to Part 3A of the EP&A Act, being part 1A of the *Environmental Planning and Assessment Regulation 2000* will also continue to apply to the Proposal. Section 6.2 describes the process applied to the Proposal under the provisions of the EP&A Act.

6.2 EP&A Act

The EP&A Act provides a framework for environmental planning and assessment in NSW. The objects of the EP&A 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.

The Proposal facilitates the transport of natural gas, responding to increased industry and community demand for the energy source. Specifically, the Proposal represents an orderly and economic development of land utilising an existing and generally disturbed, gas pipeline easement. During the development of the Proposal, consultation has been conducted with relevant utility services, and measures have been proposed to enable the protection of the environment. Further details around the commitments by the proponent around the protection of the natural environment, ongoing consultation with the community and relevant utility stakeholders is included in Chapter 17.

Part 3A of the EP&A Act provides an assessment and approval process for major projects. The project is declared to be a major project under State Environmental Planning Policy (Major Development) 2005 (Major Projects SEPP) (Schedule 1, clause 26(a)) because it is development for the purpose of a pipeline in respect of which a license has been granted under the *Pipelines Act 1967*. The project is therefore subject to Part 3A of the EP&A Act and the Minister for Planning is the determination authority.

The existing pipeline licence requires a variation to address the increase in capacity of the pipeline. Section 6.4.1 provides a discussion on licensing requirements under the *Pipelines Act 1967* and details the outcome of initial consultation with the Department of Trade and Investment (previously Department of Water and Energy), in relation to licensing and the approval process under Part 3A of the EP&A Act.

On 16 April 2009, pursuant to Clause 6 of the Major Projects SEPP, the Minister for Planning declared the Proposal to be development of a kind that is described in Group 8, Clause 26A of Schedule 1. Following this declaration, the following steps apply in respect of the assessment and determination of the Proposal, and are summarised in Figure 8.

6.2.1 Environmental Assessment Requirements

The Director-General of the Department of Planning, in consultation with relevant public authorities, prepares and issues environmental assessment requirements for the Concept Plan under Sections 75F and 75N of the EP&A Act. The Director-General may require the proponent to include in the environmental assessment a statement of commitments the proponent is prepared to make for environmental management and mitigation measures.

The Director-General issued DGRs for the Proposal on 21 September 2010. These, together with a table cross-referencing where in the EA the DGRs are addressed, are reproduced in Appendix A.

6.2.2 Preparation of Environmental Assessment

APA prepares an Environmental Assessment for the Proposal which addresses the environmental assessment requirements and submits it to the Director-General in accordance with Section 75H of the EP&A Act. This document is the environmental assessment for the Proposal.

6.2.3 Public Exhibition

If the Director-General accepts the environmental assessment, the environmental assessment is placed on public exhibition for a period of not less than 30 days. During this period, any person (including a public authority) may make a written submission to the Director-General.

6.2.4 Consideration of Public Submissions

The Director-General provides copies of submissions received to the proponent or alternatively may prepare and issue to the proponent a report on the issues raised. The Director-General considers the submissions on the proposal and may require the proponent to:

- Submit to the Director-General a response to the issues raised in the submissions.
- Prepare a preferred project report that outlines any proposed changes to the project to minimise its environmental impact.
- Prepare a revised statement of commitments.

If any significant changes are proposed following public exhibition, the Director-General may require APA to make the preferred project report available to the public.

6.2.5 Preparation of Director-General's Report

The Director-General of the DoP then prepares a report under Section 75I and 75N of the EP&A Act and gives a copy of that report to the Minister for the purposes of the Minister's consideration of the application for approval of the concept plan.

6.2.6 Minister's Decision

The Minister decides whether or not to approve the proposal under Section 75J of the EP&A Act (see Figure 8).

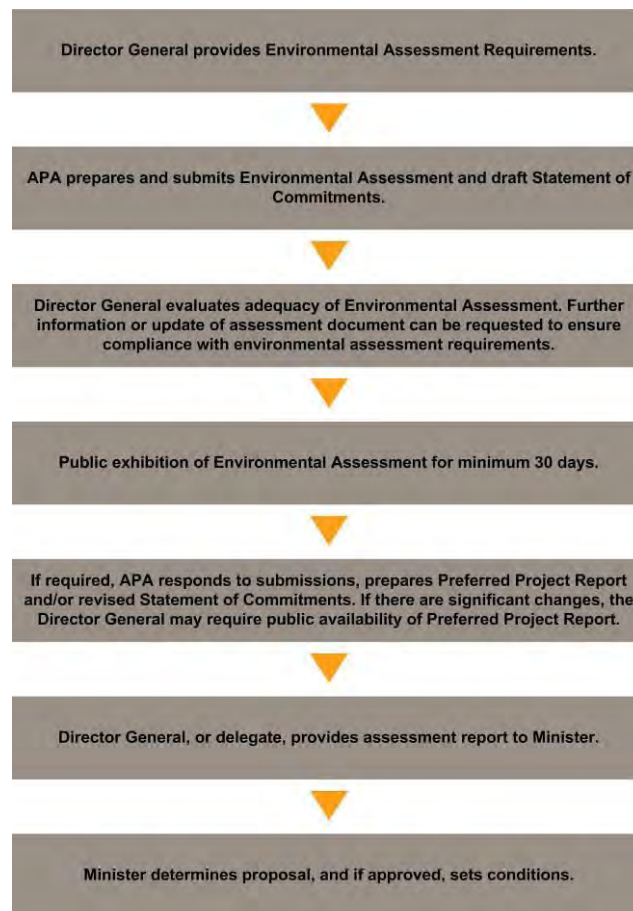


Figure 8 – Overview of Part 3A Environmental Assessment Process

6.3 Environmental Planning Instruments

The relevance of environmental planning instruments to the Part 3A assessment and approval process is dictated by 75J(3) of the EP&A Act.

Section 75J(3) states:

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.

In recognition of the Minister's discretion to consider the provisions of environmental planning instruments, a review has been undertaken to identify those that may be relevant. They are presented in the following sections.

6.3.1 State Environmental Planning Policies:

- State Environmental Planning Policy No. 44 Koala Habitat Protection
- State Environmental Planning Policy (Major Development) 2005
- State Environmental Planning Policy (Infrastructure) 2007
- State Environmental Planning Policy No. 55 – Remediation of Land.

6.3.2 Local Environmental Plans

A review of the local environment plans that pertain to the study area indicate that the Proposal is not prohibited in any of the land use zones within which it is located. Further details of each of the local environmental planning instruments are provided below.

Harden Shire statutory plans and zoning

Harden Shire has commenced the process of implementing a new comprehensive Local Environmental Plan (LEP) with the draft form of the 2011 LEP placed on exhibition in April 2010. The 1976 environmental planning instrument known as the Harden Interim Development Order No 1 (IDO) is currently guiding development in Harden Shire. This IDO includes the original LEP prepared over thirty years ago as well as its subsequent amendments. Under the NSW Standard Instrument (Local Environment Plans) Order in 2006 the new LEP will have to be developed according to standardised zones, definitions, clauses and format.

The Proposal passes through a small section of Harden Shire just north of the township of Wallendbeen (which is in Cootamundra Shire) which is in Zone area 1(a). In this zoning area the Proposal, as a utility installation, may be carried out with consent.

Junee Shire Statutory plans and zoning

The *Junee Local Environmental Plan 1992* and its subsequent amendments apply to the land within this section of the study area. The Proposal passes through a small section in the northern corner of the Junee Shire. It is identified as Zone No 1 (a) (General Rural Zone) and Zone No 2 (v) (Village or Urban Zone).

In Zone No 1 (a) all activity apart from agriculture and forestry (which are permitted without development consent) and motor showrooms, residential flat buildings and shops other than general stores (which are prohibited) may be permitted with consent. In Zone No 2 (v) apart from the following industries which are prohibited (extractive industries, horticulture, intensive livestock, keeping establishments, mines, offensive and hazardous industries) all activities are permissible with consent. In line with both these zoning regulations the Proposal is permissible with consent.

Cootamundra Shire statutory plans and zoning

Cootamundra Shire has commenced the process of implementing a new comprehensive Local Environmental Plan with plans to submit their proposal to the NSW Department of Planning in 2011. As a result, the Cootamundra Interim Development Order No 1 (1976) is the planning instrument that currently guides development in the Shire. While prepared over thirty years ago there have been a number of amendments which must be followed. Under the Standard Instrument (Local Environment Plans) Order in 2006 the new LEP will have to be developed according to standardised zones, definitions, clauses and format.

The proposed pipeline runs through zoning area 1(a) non-Urban A. In this zoning area the only development which may be carried out without consent is agriculture (other than feed lots, dog breeding and boarding, poultry farms, pig keeping) or forestry. Other than extractive industries, home industries, offensive or hazardous industries and rural industries or motor show rooms, residential flat buildings, and shops other than general stores all other development such as a utility installation may be carried out with consent.

Young Shire statutory plans and zoning

The *Young Local Environmental Plan 2010* currently applies to the land within this section of the study area and according to this plan the proposed pipeline runs through zoning area RU1 primary production in which there are a variety of activities which can be carried out with consent including utility installations under which category the Proposal falls.

6.4 Other NSW Legislation

If the Minister grants approval for the Proposal under Part 3A then Section 75U of the EP&A Act provides that the following approvals would not be required:

- Permit under Section 201, 205 or 219 of the *Fisheries Management Act 1994*.
- Approval under Part 4, or an excavation permit under Section 139, of the *Heritage Act 1977*.
- Permit under Section 87 or a consent under Section 90 of the *National Parks and Wildlife Act 1974*.
- Authorisation referred to in Section 12 of the *Native Vegetation Act 2003* to clear native vegetation or State protected land.
- Permit under Part 3A of the *Rivers and Foreshores Improvement Act 1948*.
- Bushfire safety authority under Section 100B of the *Rural Fires Act 1997*.

- Water use approval under Section 89, water management work approval under Section 90 or an activity approval under Section 91 of the *Water Management Act 2000*.

If the Minister grants an approval for the proposal under Part 3A, then Section 75V of the EP&A Act provides that the following relevant approvals under other legislation, if required, cannot be refused:

- An environment protection licence under Chapter 3 of the *Protection of the Environment Operations Act 1997* (for any of the purposes referred to in Section 43 of that Act).
- Consent under Section 138 of the *Roads Act 1993*.
- Approval under Section 15 of the *Mine Subsidence Compensation Act 1961*.
- A licence under the *Pipeline Act 1967*.

There are other statutory approvals that may be required, for example,

- A reserve use permit under Section 100 of the *Rural Lands Protection Act 1998*.
- A licence under Section 45 and the creation of an easement under Section 52 of the *Crown Lands Act 1989*.

6.4.1 Pipelines Act 1967

The *Pipelines Act 1967* regulates the high pressure gas transmission pipeline network in NSW. The types of pipelines covered by the Act typically transport large volumes of natural gas at high pressure and/or for long distances, either from a gas producer to the receipt point or to a distribution network. The *Pipelines Act 1967* provides licensing provisions and an approvals system to facilitate the construction of pipelines within NSW.

Under the *Pipelines Act 1967* authorisations or a License can be applied for by any person proposing to construct and operate a pipeline for the purpose of any substance. The Department of Trade and Investment are the responsible authority for administering the Act and the Minister for Energy is responsible for granting licenses under the Act.

APA sought advice from the Department of Trade and Investment in relation to the Proposal and the relevant approval process. In addition to progressing approvals under Part 3a of the EP&A Act, advice from Department of Trade and Investment indicated that Clause 8 of Schedule 1 of the *Pipelines Act 1967* relates to deemed EP&A Act approvals and assessment for pipelines for works in relation to a pipeline:

(1) *This clause applies to a development or an activity in respect of a pipeline that on the commencement of a provision of the amending Act (the commencement) becomes a development or an activity that requires EP&A Act approval (the affected activity).*

(2) *If:*

(a) *before the commencement, a permit is granted with respect to the affected activity, or*

(b) *at any time (including before the commencement), a licence is granted in respect of the affected activity and the licence relates to land in respect of which a permit has been granted,*

any EP&A Act approval required in respect of the affected activity is taken to have been granted, and all associated assessment is taken to have been carried out, in accordance with the EP&A Act.

(3) *The EP&A Act approval is taken to be subject to the same conditions as the licence or permit, as the case may be.*

(4) *The provisions of the EP&A Act apply, as appropriate, in respect of EP&A Act approvals that are taken, by subclause (2), to have been granted.*

(5) *This clause applies subject to the regulations.*

The *Pipelines Act 1967* has been amended since the original licence was granted for operation of the pipeline. In this regard, Section 8(1) applies to development in relation to a pipeline that upon commencement of the amended *Pipelines Act 1967* requires approval for the proposed works under the EP&A Act. Section 8(1) provides that due to the amendments of the *Pipelines Act 1967*, development for the purpose of a pipeline now requires approval under the EP&A Act.

As the works will be contained wholly within the existing licence area and no additional lands are required that would otherwise necessitate an application for variation under Section 18 of the Act, DII have indicated that an application for variation under Section 30(d) of the *Pipelines Act 1967* would be appropriate to cover the proposed

works. Section 30 '*Variation of, and exemption from, licence conditions etc*' provides that the licensee (APA Group) may apply to the Minister for a variation or suspension of, or exemption from compliance with, any of the conditions of the licence. An application under Section 30(d) of the Act is therefore required to be obtained by APA Group. The application is required to provide a description of the amendments to Licence (19), as well as a detailed project description.

6.4.2 Threatened Species Conservation Act 1995

The *Threatened Species Conservation Act 1995* (TSC Act) outlines the protection of threatened species, communities and critical habitat in NSW. The Act aims to ensure that the impact of any action affecting threatened species, populations and ecological communities is properly assessed, and is administered by the NSW Office of Environment and Heritage.

6.5 Commonwealth Legislation

6.5.1 Environment Protection and Biodiversity Conservation Act 1999

Under the EPBC Act, approval from the Commonwealth Minister for Sustainability, Environment, Water, Population and Communities is required for an action that is:

- Likely to have a significant impact on a matter of NES.
- Carried out on Commonwealth land and is likely to have a significant impact on the environment.
- Carried on outside of Commonwealth land but is likely to have a significant impact on the environment on Commonwealth land.

Matters of national environmental significance include:

- World heritage properties.
- National heritage places.
- Listed migratory species.
- Wetlands of International Importance.
- Commonwealth Marine Areas.
- Threatened ecological communities and threatened species.
- Nuclear actions.

The Proposal is not located on Commonwealth land nor would it be likely to have a significant impact on Commonwealth land.

The Proposal does not affect Commonwealth marine areas nor does it constitute a nuclear action. The Proposal avoids world heritage properties and national heritage places. Therefore NES matters that are potentially relevant to the Proposal relate to:

- Nationally threatened species and ecological communities: The pipeline passes through five bioregions that contain a variety of relevant flora and fauna.
- Listed migratory species.

Assessment of the potential impacts on these NES matters is referred to in Section 8.3. It is expected that through careful implementation of the Proposal, and the application of proposed mitigation measures (outlined in Chapter 8) no significant impacts to any NES matters is likely. Notwithstanding, a precautionary Referral under the EPBC Act was lodged with the Department of Sustainability, Environment, Water, Population and Communities (DSEWPac) on 30 August 2011. At the time of writing no response had been received from the Department.

6.5.2 Other Commonwealth legislation

The *Aboriginal and Torres Strait Islander Heritage Protection Act 1984* provides protection of places of significance to Aboriginal people. Aboriginal people who believe that a place or object is threatened and believe that state government processes offer inadequate protection can apply to the Commonwealth Minister for Sustainability, Environment, Water, Population and Communities to protect that place or object.

The *Native Title Act 1993* allows for recognition of native title through a claims and mediation process and also sets up a regime for obtaining interests in land or waters where native title exists through Indigenous Land Use Agreements. The National Native Title Tribunal administers the Act.

Native title is the communal, group or individual rights and interests of the indigenous people of Australia in relation to their traditional land and waters, as recognised by the common law of Australia and the *Native Title Act 1993*. Native title will only exist in relation to a particular area of land if the indigenous people in question have maintained a continuing connection to their traditional land or waters and their native title rights and interests have not been extinguished by a grant of tenure or use of land by the Crown or a third party.

7.0 Environmental Assessment Process

7.1 Environmental assessment requirements

The Director-General of the Department of Planning identified the following key issues for consideration and assessment:

- Land use planning impacts.
- Ecological impacts.
- Heritage impacts.
- Human amenity impacts.
- Socio-economic impacts.
- Hazards and risk impacts.
- Surface and groundwater impacts.
- Infrastructure impacts.

This chapter sets out the steps that have been undertaken in preparing this Environmental Assessment.

7.2 Overview and environmental risk assessment methodology

The environmental risk assessment is an important step in the process of assessment of environmental impacts and is required as part of the Final Scoping Document. In particular it is used to further guide the scoping of environmental investigations and assessments, to guide proposal design, to assist in identifying appropriate mitigation measures and management responses and to identify potentially significant residual impacts.

The environmental risk assessment has been performed in accordance with the principles of *ISO 31000:2009 Risk Management – Principles and Guidelines*. The risk of each identified potential impact has been ranked by identifying the consequences of the impact and the likelihood of it occurring. The probable effectiveness of the proposed mitigation measures is then considered to determine the residual risk of each impact.

The risks associated with the potential impacts are analysed as a function of the likelihood of the risk occurring, the consequences associated with this risk occurring and the effectiveness of the control systems in place to address the risk. The risks and impacts identified are assigned likelihood and consequence ratings from 1 to 5 (1 being low and 5 being high) to create a combined rating out of 10. Table 5 provides a generic overview of the consequence levels.

Table 5 – Qualitative measures of Consequences

Level	Descriptor	Definition
5	Catastrophic	- Would result in a major prosecution under relevant environmental legislation. - Would cause long-term and irreversible impacts.
4	Major	- Would result in a fine or equivalent under relevant environmental legislation. - Would cause medium-term, potentially irreversible impacts.
3	Moderate	- Would result in a medium-term, reversible impacts.
2	Minor	- Would result in a short-term, reversible impacts.
1	Insignificant	- Would not result in any impacts.

By considering the frequency of activities that may cause the impact and the probability of the impact occurring during that activity, the likelihood of each identified impact occurring is also used in determining the risk rating. See Table 6 for the classification of the likelihood.

Table 6 – Qualitative measures of the likelihood

Level	Descriptor	Recurrent risks	Single events
5	Almost certain	Could occur several times per year	More likely than not / Probability greater than 50%
4	Likely	May arise about once per year	As likely as not / 50/50 chance
3	Possible	May arise once in 10 years	Less likely than not but still appreciable / Probability less than 50% but still quite high
2	Unlikely	May arise once in 10 years to 25 years	Unlikely but not negligible / Probability low but noticeably greater than zero
1	Rare	Unlikely during the next 25 years	Negligible / Probability very low, close to zero

The combination of the consequence and likelihood analysis result in a ranking of the different risks. Table 7 provides a generic overview of the risk ranking.

Table 7 – Risk rating categories

		Consequences				
		Insignificant 1	Minor 2	Moderate 3	Major 4	Catastrophic 5
Likelihood	Almost certain (5)	M (5)	M (10)	H (15)	E (20)	E (25)
	Likely (4)	L (4)	M (8)	H (12)	H (16)	E (20)
	Possible (3)	L (3)	M (6)	M (9)	H (12)	H (15)
	Unlikely (2)	L (2)	L (4)	M (6)	M (8)	M (10)
	Rare (1)	L (1)	L (2)	L (3)	L (4)	M (5)

E = >20 and H = >12: Detailed assessment and planning necessary to develop appropriate measures to mitigate and manage the potential impacts.

M = >5: Detailed assessment and planning necessary to develop appropriate measures to mitigate and manage the potential impacts.

L = <5: Potential impacts either require no specific management measures or are mitigated adequately through other working controls (such as detailed design requirements, normal working practice, quality and safety controls).

The potential effectiveness of the mitigation measures proposed in the following chapters was then assessed and the degree of effectiveness of mitigations classed as either:

- Very effective – decrease risk rating score by ten points or more (e.g. from 25 – extreme to 10 – medium).
- Effective – decrease risk rating score by up to ten points (e.g. from 25 – extreme to 15 – medium).
- Partly effective – decrease risk rating score by less than five points (e.g. from 3 – high to 4 – medium).
- Not effective – no change in risk rating.

7.3 Environmental risk assessment analysis

The risk assessment was based on information from the impact assessment, construction experience on similar projects and experience with linear infrastructure projects. A workshop to review the potential risks associated with the project was conducted with key members of the project team and the environmental assessment consultants. The assessment took specific regard to the mitigation and management measures developed and put forward in the *APIA Code of Environmental Practice* and to the principles for ecologically sustainable development. The results of the environmental risk workshop are summarised in Table 8.

Table 8 Environmental Risk Assessment Results

Environmental issues		Assessment of potential impacts			Assessment of proposed mitigations		
Aspects	Potential impacts	Overall consequence	Overall likelihood	Risk rating	Proposed mitigation measures	Effectiveness	Residual risk rating
During Construction							
Ecology (Biodiversity)	- Clearing of Endangered Ecological Communities (EECs). - Impacts threatened species or loss of their habitat. - Adverse impacts on plants and animals, including impacts on habitat. - Potential longer term impacts associated with increased habitat fragmentation.	Major (4)	Likely (4)	High (16)	Section 8.4	Effective	Medium (6)
Aboriginal heritage	- Disturbance of Aboriginal objects and places. - Potential destruction of these objects and places. - Disturbance of archaeological deposits and cultural values associated with the landscape.	Major (4)	Unlikely (2)	Medium (8)	Section 9.4	Effective	Low (1)
Historical heritage	- Adverse impacts on historical heritage sites. - Potential to destroy heritage items and places not listed on any statutory register.	Major (4)	Unlikely (2)	Medium (8)	Section 9.4	Effective	Low (1)

Environmental issues		Assessment of potential impacts			Assessment of proposed mitigations		
Aspects	Potential impacts	Overall consequence	Overall likelihood	Risk rating	Proposed mitigation measures	Effectiveness	Residual risk rating
Noise and vibration	- Noise levels adversely impact human amenity. - Vibration levels adversely impact human amenity. - Vibration levels cause damage to buildings. - Air blast causes damage to structures and injury to people.	Moderate (3)	Likely (4)	High (12)	Section 10.2.7	Effective	Low (2)
Traffic and transport	Disruption of traffic and transport services, both local and through traffic.	Minor (2)	Almost certain (5)	Medium (10)	Section 10.4.3	Effective	Low (3)
Air quality	- Dust and exhaust levels adversely impact human amenity. - Venting of gas during commissioning.	Minor (2)	Almost certain (5)	Medium (10)	Section 10.3.6	Partly Effective	Medium (6)
Socio economic	- Increased pressure on social services. - Disruption to local community during construction. - Impact of temporary modification to property access.	Minor (2)	Possible (3)	Medium (6)	Section 11.3	Effective	Low (1)
Land use planning	- Adverse impact on current and potential future uses of land. - Reduction in current available land uses.	Moderate (3)	Likely (4)	High (12)	Section 12.0	Effective	Low (2)

Environmental issues		Assessment of potential impacts			Assessment of proposed mitigations		
Aspects	Potential impacts	Overall consequence	Overall likelihood	Risk rating	Proposed mitigation measures	Effectiveness	Residual risk rating
Hazards and risks	- Damage to property or human health resulting from an emergency incident associated with the existing pipeline. - Bushfire from spark emitting construction activities.	Catastrophic (5)	Unlikely (2)	Medium (10)	Section 13.4	Very Effective	Low (1)
Surface and groundwater	- Adverse impacts on surface and groundwater quality. - Adverse impacts of waterway morphology.	Moderate (3)	Possible (3)	Medium (9)	Section 14.4	Effective	Low (2)
Infrastructure	- Disruption of key national and state infrastructure (highways, interstate rail network etc). - Disruption of other services (rail, road, electricity etc).	Major (4)	Unlikely (2)	Medium (8)	Section 15.4	Effective	Low (2)
Waste	- Adverse impacts on land resources due to excess waste sent to landfill. - Adverse impacts from discharge of hydrostatic test water.	Minor (2)	Unlikely (2)	Low (4)	Section 16.1.4	Partly effective	Low (1)
Contamination	- Disturbance of contaminated soils causing land or water pollution. - Contamination of land through spills of fuels or chemicals.	Moderate (3)	Unlikely (2)	Medium (6)	Section 16.2.2.2	Effective	Low (1)
Geology and soils	- Adverse impacts on the productivity of soils through changes in structure, erosion, landslip and subsidence.	Moderate (3)	Unlikely (2)	Medium (6)	Section 16.3.3	Effective	Low (1)

Environmental issues		Assessment of potential impacts			Assessment of proposed mitigations		
Aspects	Potential impacts	Overall consequence	Overall likelihood	Risk rating	Proposed mitigation measures	Effectiveness	Residual risk rating
Visual amenity	- Construction activities adversely impacting human amenity. - Removal of vegetation through forested areas in right of way.	Minor (2)	Likely (4)	Medium (8)	Section 16.4.4	Partly Effective	Medium (5)
Greenhouse gases and climate change	- Generation of greenhouse gases from operation of plant and equipment. - Loss of greenhouse sink as a result of vegetation clearance.	Insignificant (1)	Likely (4)	Low (4)	Section 16.5.4	Effective	Low (1)
During Operation							
Ecology (Biodiversity)	- Fragmentation of habitat. - Poor regeneration of native species. - Establishment and spread of weeds to environmentally sensitive areas. - Ongoing edge effects from maintenance of pipeline easement.	Moderate (3)	Possible (3)	Medium (9)	Section 8.4	Very Effective	Low (1)
Aboriginal heritage	- Adverse impacts on Aboriginal items and objects.	Major (4)	Unlikely (2)	Medium (8)	Section 9.4	Very Effective	Low (1)
Historical heritage	- Adverse impacts on historical heritage sites.	Moderate (3)	Unlikely (2)	Medium (6)	Section 9.4	Very Effective	Low (1)
Noise and vibration	- Occasional disturbance to local residents and other land users. - Occasional disturbance to stock and wildlife.	Minor (2)	Unlikely (2)	Low (4)	Section 10.2.7	Very Effective	Low (1)

Environmental issues		Assessment of potential impacts			Assessment of proposed mitigations		
Aspects	Potential impacts	Overall consequence	Overall likelihood	Risk rating	Proposed mitigation measures	Effectiveness	Residual risk rating
Traffic and transport	- Disruption of traffic and transport services through maintenance traffic.	Minor (2)	Rare (1)	Low (2)	Section 10.4.3	Very Effective	Low (1)
Air quality	- Release of gas. - Temporary reduction of amenity associated with dust.	Minor (2)	Rare (1)	Low (2)	Section 10.3.6	Very Effective	Low (1)
Socio economic	- Temporary disruption to residents and landholders.	Minor (2)	Rare (1)	Low (2)	Section 11.3	Very Effective	Low (1)
Land use planning	- Adverse impact on current and future land uses of land. - Damage to agricultural production or other land uses.	Minor (2)	Rare (1)	Low (2)	Section 12.0	Very Effective	Low (1)
Hazards and risks	- Damage to property or human health resulting from an emergency incident. - Seismic event resulting in damage to the pipeline.	Catastrophic (5)	Rare (1)	Medium (5)	Section 13.4	Very Effective	Low (1)
Surface and groundwater	- Adverse impacts on surface and groundwater quality. - Interruption to natural surface and groundwater flows. - Adverse impacts of waterway morphology.	Minor (2)	Unlikely (2)	Low (4)	Section 14.4	Effective	Low (1)
Infrastructure	- Disruption to services (rail, road, electricity) as a result of emergency maintenance activities.	Major (4)	Unlikely (2)	Medium (8)	Section 15.4	Very Effective	Low (1)

Environmental issues		Assessment of potential impacts			Assessment of proposed mitigations		
Aspects	Potential impacts	Overall consequence	Overall likelihood	Risk rating	Proposed mitigation measures	Effectiveness	Residual risk rating
Waste	- Adverse impacts on land resources due to excess waste sent to landfill.	Insignificant (1)	Rare (1)	Low (1)	Section 16.1.4	Very Effective	Low (1)
Contamination	- Contamination of land and water through spills of fuels or chemicals.	Minor (2)	Unlikely (2)	Low (4)	Section 16.2.4	Effective	Low (1)
Geology and soils	- Soil compaction, erosion and sediment releases to land and water. - Subsidence of pipeline trench.	Moderate (3)	Possible (3)	Medium (9)	Section 16.3.3	Effective	Low (2)
Visual amenity	- Emplacement of pipeline line of sight markers. - Cleared easements through forested areas.	Minor (2)	Likely (4)	Medium (8)	Section 16.4.4	Effective	Low (1)
Greenhouse gases and climate change	- Emission of greenhouse gases.	Minor (1)	Unlikely (2)	Low (2)	Section 16.5.4	Very Effective	Low (1)

7.4 Outcomes of the environmental risk assessment

7.4.1 Key issues

The environmental risk assessment did not identify any items of high residual risk and all operational activities were assessed as having a low level of residual risk. Eight items were considered to have a medium level of residual environmental risk. With the exception of historic heritage, these items were also identified in the DGRs as key assessment requirements. Following consideration of the issues raised in consultation with government agencies and relevant stakeholders as outlined in Chapter 5.0, and experience on the previous stage one project, historic heritage was added to the key issues for assessment. Therefore the key environmental issues identified for assessment based on a combination of the DGRs and the environmental risk assessment are:

- Ecology.
- Aboriginal heritage.
- Historical heritage.
- Noise vibration and blasting.
- Traffic and transport.
- Air quality.
- Socio economic.
- Land use planning.
- Hazards and risks.
- Surface and groundwater.
- Infrastructure.

Key issues are considered in Chapter 8.0 to Chapter 15.0 and the approach to their assessment is discussed further in Section 7.5.1.

7.4.2 Other issues

Other issues are considered to be those that are normally associated with the development and delivery of pipeline proposals. Following consideration of the issues raised in consultation with government agencies and relevant stakeholders as outlined in Chapter 6 and the environmental risk assessment, the other environmental issues for the proposal were considered to be:

- Waste and resource management.
- Existing contamination.
- Geology and soils.
- Visual amenity.
- Greenhouse gases and climate change.

These issues are addressed in Chapter 16.0 and the approach to their assessment of other issues is discussed in Section 7.5.2.

7.5 Assessment approach

7.5.1 Assessment of key issues

Key issues identified through the environmental risk analysis have been subjected to a tiered assessment of impacts. This provided for a more focussed and efficient environmental assessment. The overriding objective of the tiered assessment process was to utilise a standardised and consistent approach in evaluating potential impacts along the entire length of the proposal.

In order to assess potential impacts, the tiered methodology utilised a set of tailored significance criteria for each key issue. The significance criteria were derived based on the extent to which an environmental attribute deviates from the normal baseline situation. Residual impacts were then assessed according to the significance criteria to identify those areas where:

- Detailed assessment would be required – to enable a more informed understanding of environmental constraints and/or potential impacts.
- Standardised management approaches could be adopted (general impacts).

Chapter 8.0 to Chapter 15.0 detail the tiered assessment methodologies specific to each key issue and those areas that are of potentially significant impact specific to the key issue.

7.5.2 Assessment of other issues

Other environmental issues were considered to be those that can be routinely managed through detailed design and by the implementation of standard management and mitigation measures aimed at ensuring that all necessary environmental criteria and guidelines are achieved. The objective of the assessment of other issues was to focus on the development of overarching environmental management frameworks for mitigation, management and monitoring.