

Environmental Assessment - Appendices

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



Environmental Assessment - Appendices

Young to 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 - Appendices

Ref 60189491

Date 27 June 2012

Prepared by See individual reports

Reviewed by See individual reports

Revision History

Revision	Revision Date	Details	Authorised	
			Name/Position	Signature
Rev 2.0	14-Oct-2011	For Adequacy Review	Guillaume Prudent-Richard Principal Environmental Scientist	Original Signed.
3-0	27-June-2012	For Public Exhibition	Guillaume Prudent-Richard Senior Environmental Scientist	

Appendix A

DGRs

Director-General's Requirements Checklist

Director-General's Requirements	Section Addressing Requirement
General Requirements	
- an executive summary .	Refer to page iii.
- a detailed description of the project including: construction and operation details that clearly define the proposal corridor.	Refer to Chapter 4.
- consideration of any relevant statutory provisions including the consistency of the project with the objects of the <i>Environmental Planning and Assessment Act 1979</i> .	Refer to Chapter 6.
- an assessment of the key issues outlined below, during construction, operation and decommissioning (as relevant).	Chapter 8-16 for detailed assessment of key issues.
- a draft statement of Commitments detailing measures for environmental mitigation, management and monitoring for the project.	Refer to Chapter 17.
- a conclusion justifying the project taking into consideration the environmental social and economic impacts of the project; the suitability of the site; and the public interest.	Refer to Chapter 18.
- certification by the author of the EA that the information contained in the Assessment is neither false nor misleading.	Refer to Statement of Validity inside the cover.
Key Assessment Requirements	
The EA must include assessment of the following key issues:	
- Strategic Planning and Project Justification – the Environment Assessment must provide a strategic assessment of the project, including justification of the need, scale, scope, and location for the project, with particular reference to the existing Australian pipeline network, the location of gas reserves and areas of gas demand and expected demand growth. The Environmental Assessment must include an analysis of the required capacity of the project, having regards to existing gas supplies and the potential for additional known reserves to be connected into the project.	Refer to Chapter 2.
- Land Use Planning Impacts – the Environmental Assessment must assess the potential for the project to generate land use conflicts, particularly with respect to Crown land, mineral reserves, conservation areas, land of high agricultural value (the agricultural land classes should be clearly shown) and areas of significant scenic or visual value.	Refer to Chapter 12.
- Ecological Impacts – the Environmental Assessment must include a justified and tiered assessment approach for impacts of the project on native vegetation, threatened species, populations, ecological communities and their habitats for each bioregion (including both terrestrial and aquatic ecology).	Refer to Chapter 8 and Appendix B.

Director-General's Requirements	Section Addressing Requirement
- Heritage Impacts – the Environmental Assessment must include sufficient information to demonstrate the likely impacts on Aboriginal heritage values/items and outline proposed mitigation measures in accordance with the <i>Draft Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation (DEC,2005)</i>. The Environmental Assessment must demonstrate effective consultation with aboriginal communities has been undertaken in determining and assessing impacts, developing options and selecting options and mitigation measures.	Refer to Chapter 9 and Appendix C.
- Human Amenity Impacts – the Environmental Assessment must include a justified and tiered assessment approach for impacts on human amenity, including noise and vibration, air quality (dust and odour) and traffic impacts during construction and operation of the project.	Refer to Chapter 10.
- Socio-Economic Implications – the Environmental Assessment must assess the potential for the project to influence the socio-economic profile of major centres and regions along the project route. The Environmental Assessment, where relevant, must also reflect a design philosophy to support the potential for domestic, commercial and industrial connection to gas supplies in major centres where feasible and appropriate in future.	Refer to Chapter 11.
- Hazard and Risk Impacts – the Environmental Assessment must include an assessment of the risks impacts of the project, prepared generally consistent with the approach outlined in the <i>Hazardous Industry Planning Advisory Paper No. 6 (DoP,1992)</i> and <i>Multi –level Risk Assessment (DUAP, 1997)</i>, and with specific reference to applicable Australian Standards (including AS2885 Pipelines – Gas and Liquid Petroleum – Operation and Maintenance). The Environmental Assessment shall specifically consider on-going maintenance and safety management of the project, including potential impacts on and from bushfires and floods.	An Environmental Risk Review is contained in Chapter 7. Refer to Chapter 13 for hazard identification and risk assessment based on Australian Standard 2885 (<i>Pipelines – Gas and Liquid Petroleum – Operation and Maintenance</i>).
- Surface and Groundwater Impacts – the Environmental Assessment must include a justified and tiered assessment approach for impacts on surface water and groundwater along the length of the project, including any stream crossings. In particular, the sources of water and disposal of water (from Hydro testing) must be detailed.	Refer to Chapter 14.
- Infrastructure Impacts – the Environmental Assessment must include a justified and tiered assessment approach for impacts on infrastructure, including roads, rail, electricity, gas and water supply infrastructure. Mitigation measures to counter these impacts shall be described.	Refer to Chapter 15.
- General Environmental Risk Analysis – notwithstanding the above key assessment requirements, the Environmental Assessment must include an environmental risk analysis to identify potential environmental impacts associated with the project (construction and operation), an outline of the proposed mitigation measures and potentially significant residual environmental impacts after the application of proposed mitigation measures. Where additional key environmental impacts are identified through this environmental impact (s) must be included in the Environmental Assessment.	Refer to Chapter 7 for environmental risk assessment.

Director-General's Requirements	Section Addressing Requirement
Consultation Requirements	
- You must undertake an appropriate and justified level of consultation with the following parties during the preparation of the Environmental Assessment: • NSW Department of Environment Climate Change and Water; • NSW Office of Water; • Industry and Investment NSW; • Relevant Catchment Management Authorities; • NSW Roads and Traffic Authority; • Australian Rail Track Authority; • relevant service providers; • Land and Property Management Authority; • relevant Rural lands Protection Boards; • relevant local aboriginal communities and Local Aboriginal Land Councils; • local councils of Young, Harden, Cootamundra, Junee; and • the local community of affected landholders. The Environmental Assessment must clearly indicate issues raised by stakeholders during consultation, and how those matters have been addressed in the Environmental Assessment.	Chapter 5 outlines the consultation process undertaken for the Environmental Assessment. The Chapter includes matters raised by stakeholders during the consultation process. Further consultation conducted with Indigenous stakeholders is outlined in Chapter 8 and Appendix C.

Director-General's Requirements

Section 75F of the *Environmental Planning and Assessment Act 1979*

Project	Construction and operation of a gas pipeline and associated infrastructure that loops 70 kilometres (from just north of Bethungra to Young) of the existing 131 kilometre gas pipeline between Young to Wagga Wagga. This comprises the second stage of the planned duplication (or looping) of the entire existing 131 kilometre pipeline between Young to Wagga Wagga.
Site	70 kilometres from north of Bethungra to Young
Proponent	East Australian Pipeline Pty Ltd (EAPL)
Date of Issue	21 September 2010
Date of Expiration	21 September 2010
General Requirements	The Environmental Assessment (EA) must include: • an executive summary; • a detailed description of the project including: construction and operation details that clearly define the proposal corridor; • consideration of any relevant statutory provisions including the consistency of the project with the objects of the <i>Environmental Planning and Assessment Act 1979</i>; • an assessment of the key issues outlined below, during construction, operation and decommissioning (as relevant); • a draft Statement of Commitments detailing measures for environmental mitigation, management and monitoring for the project; • a conclusion justifying the project taking into consideration the environmental, social and economic impacts of the project; the suitability of the site; and the public interest; and • certification by the author of the EA that the information contained in the Assessment is neither false nor misleading.
Key Assessment Requirements	The EA must include assessment of the following key issues: • Strategic Planning and Project Justification – the Environmental Assessment must provide a strategic assessment of the project, including justification of the need, scale, scope and location for the project, with particular reference to the existing Australian pipeline network, the location of gas reserves and areas of gas demand and expected demand growth. The Environmental Assessment must include an analysis of the required capacity of the project, having regard to existing gas supplies and the potential for additional known reserves to be connected into the project. • Land Use Planning Impacts – the Environmental Assessment must assess the potential for the project to generate land use conflicts, particularly with respect to Crown land, mineral reserves, conservation areas, land of high agricultural value (the agricultural land classes should be clearly shown) and areas of significant scenic or visual value; • Ecological Impacts – the Environmental Assessment must include a justified and tiered assessment approach for impacts of the project on native vegetation, threatened species, populations, ecological communities and their habitats for each bioregion (including both terrestrial and aquatic ecology). The Environmental Assessment must: ◦ identify bioregions that will be or may be impacted by the project; ◦ demonstrate a design philosophy of impact avoidance on ecological values, and in particular, ecological values of high significance; ◦ for each identified bioregion, include a screening of species, populations, ecological communities and habitats based on ecological significance and the potential for impact as a consequence of the project; ◦ for species, populations, ecological communities and habitats with high ecological significance and significant potential for impact, include sufficient information to demonstrate the likely impacts, consistent with <i>Guidelines for</i>

Threatened Species Assessment (DEC & DPI, July 2005);

- for other species, populations, ecological communities and habitats, a general bioregion-based assessment of ecological impacts associated with the project;
- consider region-based ecological outcomes, including habitat connectivity and distribution of species, and how these may be impacted by the project;
- detail measures to avoid or mitigate impacts, including any proposed compensatory habitat or off-set strategy, that describes the scale, scope and timing of implementation;
- **Heritage Impacts** – the Environmental Assessment must include sufficient information to demonstrate the likely impacts on Aboriginal heritage values/items and outline proposed mitigation measures in accordance with the *Draft Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation* (DEC, 2005). The Environmental Assessment must demonstrate effective consultation with Aboriginal communities has been undertaken in determining and assessing impacts, developing options and selecting options and mitigation measures.
- **Human Amenity Impacts** – the Environmental Assessment must include a justified and tiered assessment approach for impacts on human amenity, including noise and vibration, air quality (dust and odour) and traffic impacts during construction and operation of the project. The Environmental Assessment must:
 - identify human receptors that will be or may be impacted by the project;
 - characterise potentially impacted human receptors in terms of receptor type (e.g. isolated receptors, receptor areas (such as residential zones) and sensitive receptors (such as schools, hospitals etc))
 - identify those receptors and receptor types likely to be significantly impacted by the project;
 - include a framework for the mitigation, management and monitoring of noise and air quality impacts during construction of the project, particularly with respect to receptors and receptor types likely to be significantly impacted by the project and with specific reference to noise- and vibration-intensive construction works/ activities (drilling, blasting, bulk excavation, heavy vehicle movements etc) around receptors and major centres.
- **Socio-Economic Implications** – the Environmental Assessment must assess the potential for the project to influence the socio-economic profile of major centres and regions along the project route. The Environmental Assessment, where relevant, must also reflect a design philosophy to support the potential for domestic, commercial and industrial connection to gas supplies in major centres where feasible and appropriate in future.
- **Hazards and Risk Impacts** – the Environmental Assessment must include an assessment of the hazards and risk impacts of the project, prepared generally consistent with the approach outlined in *Hazardous Industry Planning Advisory Paper No. 6* (DoP, 1992) and *Multi-level Risk Assessment* (DUAP, 1997), and with specific reference to applicable Australian Standards (including AS2885 Pipelines - Gas and Liquid Petroleum – Operation and Maintenance). The Environmental Assessment shall specifically consider on-going maintenance and safety management of the project, including potential impacts on and from bushfires and floods.
- **Surface and Groundwater Impacts** – the Environmental Assessment must include a justified and tiered assessment approach for impacts on surface water and groundwater along the length of the project, including any stream crossings. In particular, the sources of water and disposal of water (from hydro testing) must be detailed.
- **Infrastructure Impacts** - the Environmental Assessment must include a justified and tiered assessment approach for impacts on infrastructure, including roads, rail, electricity, gas and water supply infrastructure. Mitigation measures to counter these impacts shall be described.
- **General Environmental Risk Analysis** – notwithstanding the above key assessment requirements, the Environmental Assessment must include an environmental risk analysis to identify potential environmental impacts associated with the project (construction and operation), an outline of the proposed mitigation measures and potentially significant residual environmental impacts after the

	application of proposed mitigation measures. Where additional key environmental impacts are identified through this environmental risk analysis, a framework for the consideration of the additional key environmental impact(s) must be included in the Environmental Assessment.
Consultation Requirements	You must undertake an appropriate and justified level of consultation with the following parties during the preparation of the Environmental Assessment: • NSW Department of Environment Climate Change and Water; • NSW Office of Water; • Industry and Investment NSW; • relevant Catchment Management Authorities; • NSW Roads and Traffic Authority; • Australian Rail Track Corporation; • relevant service providers; • Land and Property Management Authority; • relevant Rural Lands Protection Boards; • relevant local aboriginal communities and Local Aboriginal Land Councils; • local councils of Young, Harden, Cootamundra and Junee; and • the local community and affected landholders. The Environmental Assessment must clearly indicate issues raised by stakeholders during consultation, and how those matters have been addressed in the Environmental Assessment.
Deemed refusal period	60 days

Appendix B

Fauna and Flora Specialist Report

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

Fauna and Flora Assessment



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

Fauna and Flora Assessment

Prepared for

APA Group

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

17 Nov 2011

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

Ref 60189491

Date 17 Nov 2011

Prepared by Joel Garrigues and Jodi Wood

Reviewed by David James and Rochelle Lawson

Revision History

Revision	Revision Date	Details	Authorised	
			Name/Position	Signature
1	13-April-2011	Draft for Client Review	Guillaume Prudent-Richard Senior Environmental Scientist	
2	05-Aug-2011	Draft for Client Review	Guillaume Prudent-Richard Senior Environmental Scientist	
3	26-Aug-2011	For Issue	Guillaume Prudent-Richard Senior Environmental Scientist	
4	15-Nov-2011	For Issue	Guillaume Prudent-Richard Senior Environmental Scientist	

Table of Contents

1.0	Introduction	1
1.1	Background	1
1.2	Project Location	1
1.3	Objectives of the Flora and Fauna Assessment	1
2.0	Legislative Requirements	3
2.1	Commonwealth Legislation	3
2.1.1	Environment Protection and Biodiversity Conservation Act 1999	3
2.2	NSW Legislation	3
2.2.1	Environmental Planning and Assessment Act 1979	3
2.2.2	Threatened Species Conservation Act 1995	3
2.2.3	Native Vegetation Act 2003	4
2.2.4	National Parks and Wildlife Act 1974	4
2.2.5	Fisheries Management Act 1994	4
2.2.6	Noxious Weeds Act 1993	4
2.2.7	State Environmental Planning Policy No. 44 – Koala Habitat Protection	4
3.0	Assessment Methodology	6
3.1	Desktop Review	6
3.2	Field Survey	6
3.2.1	Flora Survey Locations	7
3.2.2	Flora Survey Methodology	8
3.2.3	Fauna Habitat and Fauna Survey Locations	8
3.2.4	Fauna Survey Methodology	8
3.3	Analysis of Results	10
3.4	Assumptions and Limitations	10
4.0	Existing Environment	11
4.1	Description of Study Area	11
4.2	Protected Areas	11
4.2.1	State Protected Areas	11
4.3	Critical Habitat	11
4.4	Flora	11
4.4.1	Vegetation Overview	11
4.4.2	Determination of Threatened Ecological Communities under EPBC Act and TSC Act	12
4.4.3	Endangered Ecological Communities under the EPBC Act	12
4.4.4	Endangered Ecological Communities under the TSC Act	14
4.4.5	Threatened Flora	15
4.4.6	Endangered Populations	16
4.4.7	Noxious and Environmental Weeds	16
4.5	Fauna	16
4.5.1	Fauna Recorded During Field Surveys	16
4.5.2	Endangered Populations of Fauna	17
4.5.3	Fauna Habitats	17
4.5.4	Threatened Fauna	17
4.5.5	Migratory Fauna Listed Under the EPBC Act	18
4.5.6	Introduced Species	18
4.6	Aquatic Ecology	18
5.0	Potential Impacts	19
5.1	Introduction	19
5.2	Loss of Native Vegetation	19
5.2.1	Threatened Ecological Communities	20
5.3	Loss of Hollow-bearing Trees	21
5.4	Removal of Dead and Fallen Timber	22
5.5	Removal of Rock	22
5.6	Creation of Edge Effects	22
5.7	Spread of Environmental Weeds	23

5.8	Easement Maintenance	23
5.9	Soil Excavation	23
5.10	Soil Compaction	24
5.11	Barrier Effects to Wildlife Movement	24
5.12	Alterations to Hydrology	24
5.13	Wild Fire	25
5.14	Construction Waste	25
5.15	Erosion, Sedimentation and Dust Emissions	25
6.0	Mitigation Measures	26
6.1	Pre-construction Phase	26
6.2	Construction Phase	26
6.3	Operational Phase	30
7.0	Conclusion	31
	References	32

Figures

Appendix A - Tables

Appendix B - TSC Act Section 5a Assessment (Seven Part Tests) for Threatened Ecological Communities and Species

Appendix C - EPBC Assessment of Significant Impact for Threatened Species

Appendix D - Noxious Weed Report

Appendix E - Fauna Habitat Figures

Appendix F - EPBC Migratory Species

Glossary of Acronyms

ASL	Above Sea Level
APA	Australian Pipeline Association Group
CMA	Catchment Management Authority
CRA	Comprehensive Regional Assessment
DECCW	Department of Environment, Climate Change and Water (formerly Department of Environment and Climate Change)
DEWHA	Department of the Environment, Water, Heritage and the Arts (now Department of Sustainability, Environment, Water, Population and Communities)
EALP	East Australian Pipeline Pty Ltd
EMP	Environmental Management Plan
EP&A Act	<i>Environmental Planning and Assessment Act 1979</i>
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
EPI	Environmental Planning Instrument
GIS	Geographic Information System
GPS	Global Positioning System
HDD	Horizontal Directional Drilling
KP	Kilometre Point
LEP	Local Environmental Plan
LGA	Local Government Area
NES	National Environmental Significance
NPW Act	<i>National Parks and Wildlife Act 1974</i>
NPWS	New South Wales National Parks and Wildlife Service
NV Act	<i>Native Vegetation Act 2003</i>
NW Act	<i>Noxious Weeds Act 1993</i>
REP	Regional Environmental Plan
ROW	Right of Way
SEPP	State Environmental Planning Policy
TSC Act	<i>Threatened Species Conservation Act 1995</i>
VCA	Voluntary Conservation Agreement
WONS	Weeds of National Significance

1.0 Introduction

1.1 Background

East Australian Pipeline Pty Ltd (EAPL) is proposing to loop (duplicate) the existing 131 km 12" Young to Wagga Wagga Pipeline with an 18" Pipeline. A Flora and Fauna Assessment Report was prepared to assess the construction and operation of Stage 1 of the duplicating of the 131 km natural gas pipeline from Young to Wagga Wagga (AECOM, 2009). The Stage 1 report assessed the 61 km section of pipeline between 7 km north of the Bethungra Line Valve and Bowen Meter Station in the Upper Slopes subregion of the NSW South-West Slopes Bioregion.

This Flora and Fauna Assessment Report has been prepared to assess the construction and operation of Stage 2 of the duplication of the 131 km natural gas pipeline from Young to Wagga Wagga, and has been prepared as a continuation of the Stage 1 Flora and Fauna Assessment Report (AECOM, 2009). This Stage 2 report assesses the 70 km section of pipeline between the EAPL Control Room (KP 0.78) and approximately 7 km north of the Bethungra Line Valve (KP 70.78) (Map 1). The new pipeline will be installed adjacent to the existing 12" pipeline to provide additional gas transmission capacity, and will be constructed within the existing 20 m wide gas pipeline easement. For construction purposes of the proposal only, a strip of land approximately 10 m wide is proposed to be acquired from the adjacent property owners to allow for the 30 m ROW.

On 4 July 2009, the Director-General's Environmental Assessment requirements were issued for the proposed project, pursuant to Section 75F (2) of the *Environmental Planning and Assessment Act 1979* (EP&A Act). The requirements reflect the project's „major project" classification and are based on the information provided to date, including the Planning Focus Meeting held on 11 April 2009 and through consultation with relevant government agencies. An ecological assessment is required by the Director General's requirements.

This Flora and Fauna Assessment Report has been prepared as part of an Environmental Assessment under Part 3A of the EP&A Act and meets the specific requirements relating to ecological assessment of the project as prescribed by the Director General's requirements.

1.2 Project Location

The proposed works (proposal) consist of a linear corridor 70 km in length, which begins approximately 10 km north of Young and traverses in a south westerly direction, ending near Bethungra (Map 1).

The following definitions are used throughout this report to refer to locations in the project area:

- The „proposal site" is the development footprint, including the pipeline right of way (ROW), and all other areas that would be directly impacted by the works, including access tracks, stockpile areas, compound sites and locations of infrastructure upgrades (e.g. temporary creek crossings);
- The „study area" includes the proposal site and the areas adjacent to the proposal site that might be indirectly impacted by the proposal; and
- The „search area" (for the purposes of the desktop surveys) refers to the surrounding area within 10 km of the proposal site.

1.3 Objectives of the Flora and Fauna Assessment

The objectives of the Flora and Fauna Assessment are to:

- Identify the flora and fauna species and vegetation communities present or potentially present within the study area;
- Determine if any critical habitat, species, populations, ecological communities, or their habitats protected under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), State *Threatened Species Conservation Act 1995* (TSC Act) or the *Fisheries Management Act 1994* (FM Act) would be significantly affected by the project;
- Recommend measures to minimise impacts on flora and fauna during construction and operation of the pipeline;

- Assess residual impacts on threatened flora and fauna;
- Recommend measures to compensate for residual impacts on threatened flora and fauna; and
- Recommend any additional assessment that may be required.

2.0 Legislative Requirements

Relevant legislation that applies to the project is described in the following sections.

2.1 Commonwealth Legislation

2.1.1 Environment Protection and Biodiversity Conservation Act 1999

The EPBC Act governs the Commonwealth Environmental Assessment process and provides protection for matters of National Environmental Significance (NES), which include:

- Listed threatened species and ecological communities;
- Migratory species protected under international agreements;
- Ramsar wetlands of international importance;
- The Commonwealth marine environment;
- World Heritage properties;
- National Heritage places;
- Great Barrier Reef Marine Park; and
- Nuclear actions.

The EPBC Act is separate from other approvals (such as those under the TSC Act).

2.2 NSW Legislation

2.2.1 Environmental Planning and Assessment Act 1979

The EP&A Act and EP&A Regulation 2000 provide the statutory context for assessment of the proposal. The proposal is to be assessed under the provisions of Part 3A of the EP&A Act with the APA Group the proponent and the Department of Planning, the consent authority.

The EP&A Act is supplemented by a number of Environmental Planning Instrument's (EPIs) including:

- State Environmental Planning Policies (SEPPs);
- Regional Environmental Plans (REPs);
- Local Environmental Plans (LEPs); and
- Other planning policies and guidance statements.

On 4 April 2011 the State Cabinet announced the suspension of Part 3A of the EP&A Act. Alternative provisions for the assessment of major projects under the EPA Act have not yet been announced.

2.2.2 Threatened Species Conservation Act 1995

The TSC Act outlines the protection of threatened species, populations, communities and critical habitat in NSW. The Act is administered by the Department of Environment, Climate Change and Water (DECCW).

The main objectives of the TSC Act are to:

- Conserve biological diversity and promote sustainable development;
- Prevent the extinction of native plants and animals;
- Protect habitat that is critical to the survival of endangered species;
- Eliminate or manage threats to biodiversity;
- Properly assess the impact of development on threatened species; and
- Encourage co-operative management in the conservation of threatened species.

Under section 5A of the EP&A Act, an assessment of significance (7-part test) may be required to determine the likely significance of impacts on threatened species, populations or ecological communities.

2.2.3 Native Vegetation Act 2003

The Native Vegetation Act 2003 (NV Act) regulates the clearing of all native vegetation on land in NSW except land listed under Schedule 1 of the Act.

The objects of this NV Act are:

- To provide for, encourage and promote the management of native vegetation on a regional basis in the social, economic and environmental interests of the State;
- To prevent broadscale clearing unless it improves or maintains environmental outcomes;
- To protect native vegetation of high conservation value having regard to its contribution to such matters as water quality, biodiversity, or the prevention of salinity or land degradation;
- To improve the condition of existing native vegetation, particularly where it has high conservation value; and
- To encourage the revegetation of land, and the rehabilitation of land, with appropriate native vegetation, in accordance with the principles of ecologically sustainable development.

2.2.4 National Parks and Wildlife Act 1974

The *National Parks and Wildlife Act 1974* (NPW Act) provides a framework to conserve native terrestrial flora and fauna species and manage areas of conservation value such as nature reserves and national parks.

Under this Act, it is an offence to harm, trade, possess or damage critical habitat or the habitat of any threatened species without obtaining a Section 120 licence.

2.2.5 Fisheries Management Act 1994

The FM Act provides for the conservation, protection and management of fisheries, aquatic systems and habitats in NSW. The Department of Investment and Industry NSW (I&I NSW) manages the majority of the FM Act, although DECCW has some responsibilities relating to endangered species and habitats. The FM Act applies in relation to all waters that are within the limits of the State, and regulates certain activities that have the potential to impact on aquatic habitats.

The objects of the FM Act are:

- To conserve fish stocks and key fish habitats;
- To conserve threatened species, populations and ecological communities of fish and marine vegetation; and
- To promote ecologically sustainable development, including the conservation of biological diversity.

Under the FM Act, development proponents are required to provide notification of proposal to I&I NSW. Permits issued under the Act are required for:

- Works that would block the passage of fish in a bay, inlet, river or creek;
- Dredging or reclamation works;
- The construction of structures within aquatic habitats (e.g. bridges, roads, causeways, pipelines); and
- Works that would cause harm to marine vegetation.

2.2.6 Noxious Weeds Act 1993

The *Noxious Weeds Act 1993* (NW Act) establishes a system for the identification and control of noxious weeds in NSW. The Act divides noxious weeds into five categories which determine the level of control required. Responsibility for the control of noxious weeds lies with the owner and/or occupier of private land and Crown land, local councils and other public authorities on land they occupy. Under the NW Act, the Minister for Primary Industries may declare a plant to be a noxious weed. Control notices can be issued by the Minister and local control authorities to ensure obligations are met.

2.2.7 State Environmental Planning Policy No. 44 – Koala Habitat Protection

State Environmental Planning Policy No. 44 (SEPP 44) encourages the conservation and management of natural vegetation areas that provide habitat for koalas to ensure permanent free-living populations will be maintained over their present range. The policy applies to 107 local government areas. Local councils cannot approve development in an area affected by the policy without an investigation of core koala habitat. The policy provides

the state-wide approach needed to enable appropriate development to continue, while ensuring there is ongoing protection of koalas and their habitat.

The aim of SEPP 44 is to “encourage the proper conservation and management of areas of natural vegetation that provide habitat for koalas to ensure a permanent free-living population over their present range and reverse the current trend of koala population decline”. SEPP 44 applies to local government areas (LGAs) listed in Schedule 1. The LGAs in which the proposed project occurs are not listed in Schedule 1, and hence the provisions of SEPP 44 do not apply to the project.

3.0 Assessment Methodology

3.1 Desktop Review

In order to identify all potential impacts of the project on flora and fauna, a review of existing information was conducted. This review included:

- Searches of relevant biodiversity databases (DECCW threatened species website, online Atlas of NSW Wildlife, DECCW Critical Habitat Protection and EPBC Act Protected Matters Search Tool);
- Examination of recent aerial photography;
- Mapping of threatened species records for the study area; and
- Research of literature of relevance to the key potential impacts.

Desktop searches for significant flora and fauna species and ecological communities were conducted for the wider study area, which comprised of a linear search area with a 10 km buffer. The linear search area is the approximate start and end points for the study area and is described as:

- -34.239, 148.323
- -34.711, 147.904

The EPBC Act identifies significant flora and fauna species and ecological communities and other matters of national significance. A Protected Matters Report was generated on 25 January 2011 that identified all EPBC Act listed species and ecological communities potentially occurring within the search area.

The Atlas of NSW Wildlife Database contains recorded sightings of flora and fauna species within New South Wales and identifies their current status under the TSC Act. A report from the Atlas of NSW Wildlife was generated on 25 January 2011 that identified all flora and fauna species known to occur within the search area.

The DECCW threatened species profile of each locally recorded species was reviewed in order to determine which of these species have the potential to occur on the site based on habitat attributes present. Through this process a list of key threatened flora and fauna species and ecological communities have been identified for more detailed study.

Critical Habitats are areas that are considered to be critical to the survival of threatened species, populations or ecological communities and are protected under the TSC Act. A search of the DECCW Critical Habitat Protection website was undertaken to identify the occurrence of any known Critical Habitats within the search area.

As well as searching the above database, vegetation and landscape patterns across the site were assessed using recent aerial imagery. Broad scale mapping of vegetation communities was not utilised during the desktop assessment, as it was not available at the time.

The results of this examination were used to categorise the different forms of habitat that appear to be present within the study area according to a number of variables including vegetation communities, vegetation condition, patch size, topography, and the presence of specific habitat features. Preliminary desktop assessment of habitat features, vegetation and species records was used to select 20 flora and fauna survey sites, and guide the survey efforts necessary to inform the assessment of impacts on flora and fauna to comply with the Director General's requirements for the Environmental Assessment.

3.2 Field Survey

Initial field surveys were carried out from 8 February to 11 February 2011. The field surveys were conducted by AECOM ecologists Jodi Wood and Joël Garrigues. The objective of the field surveys were to confirm the presence and / or potential presence of the threatened species and ecological communities identified in the desktop assessment or the presence of their preferred habitat(s) within the proposal site.

A follow up field survey was carried out from 11 July to 20 July 2011 (excluding 16 and 17 July). This follow up field survey was carried out to add further clarification to the vegetation data, specifically the location of any threatened ecological communities within the proposal site. Also surveyed at this time was the occurrence of fauna habitat features and noxious weed species within the proposal site.

3.2.1 Flora Survey Locations

Detailed flora surveys were conducted at 28 sites within the proposal site, mostly within timbered areas (Table 1). Given the limited extent of native vegetation apparent within the study area and the limited extent of the proposed activities, a detailed field survey of flora species was considered necessary only in the select locations identified during the desktop assessment and during field survey. The locations chosen were those in which native vegetation appeared to be retained in near-natural structure and composition such that a functioning vegetation community may be present and able to support a moderate to high diversity of native plant species. Within the study area such habitat is largely found within rarely grazed road reserves and along creeks. Some native vegetation also remains in grazed land, of steeper terrain where the landform and rocky soils have discouraged vegetation clearing, cropping and pasture improvement.

Table 1 – Location of Detailed Survey within the Proposal Site.

Survey Site Number	KP	Location Description	Type of vegetation present (from aerial imagery)	Type of Survey Conducted
1	0.8	APA compressor station	Narrow band of vegetation	Flora and Fauna
2	4.2	Agricultural land	Small patch of isolated trees	Flora and Fauna
3	6.1	McHenry Creek crossing	Riparian vegetation	Flora and Fauna
4	7.2	Henry Lawson Way road crossing	Small section of road reserve vegetation	Flora and Fauna
5	7.7	Burrangong Creek crossing	Riparian vegetation	Flora and Fauna
6	10.5	Agricultural land	Isolated patch of vegetation	Flora and Fauna
7	11.3	Milly Milly Lane road crossing	Road reserve vegetation	Flora and Fauna
8	20.4	Tumbleton Lane road crossing	Road reserve vegetation	Flora and Fauna
9	23.0	Unnamed tributary	Riparian vegetation	Flora and Fauna
10	27.9	Agricultural land	Narrow band of vegetation along fence line	Flora and Fauna
11	27.6	Agricultural land	Narrow band of vegetation along fence line	Flora and Fauna
12	31.1	Agricultural land	Narrow band of vegetation along fence line	Flora only
13	32.5	Agricultural land	Narrow band of vegetation	Flora and Fauna
14	32.9	Adjacent to large waterhole	Cleared agricultural land	Flora and Fauna
15	33.3	Fontenoy Lane road crossing (near large waterhole)	Large patch of vegetation	Flora and Fauna
16	33.9	Agricultural land	Isolated patch of vegetation	Flora and Fauna
17	34.8	Agricultural land	Narrow band of vegetation along fence line	Flora only
18	35.3	Agricultural land	Narrow band of vegetation	Flora and Fauna
19	46.5	Near Jindalee State Forest	Small patch of vegetation	Flora and Fauna
20	53.1	Floodplain (adjacent to Berthonga Road)	Narrow band of vegetation along floodplain	Flora and Fauna
21	53.6	Agricultural land	Narrow band of vegetation along fence line	Flora only
22	54.7	Crown Land (adjacent to Temora Road)	Small patch of vegetation	Flora and Fauna
23	55.5	Agricultural land	Large patch of vegetation	Flora only

Survey Site Number	KP	Location Description	Type of vegetation present (from aerial imagery)	Type of Survey Conducted
24	57.5	Suttons Rd crossing	Road reserve vegetation	Flora and Fauna
25	58.7	Unnamed lane crossing	Narrow band of vegetation along lane	Flora only
26	64.6	Agricultural land	Scattered remnant vegetation	Flora only
27	65.6	Agricultural land	Small patch of vegetation	Flora only
28	68.4	Agricultural land	Scattered remnant vegetation	Flora only

3.2.2 Flora Survey Methodology

Flora survey included observational survey, and where appropriate (i.e. where vegetation was of a good quality) detailed flora surveys. Detailed survey included identification of plant species located within 50 m x 20 m survey plots intersecting the proposed 30 m pipeline easement (i.e. 20 m wider than the proposed ROW) as well as targeted search for threatened plant species in the surrounding vegetation. It is noted that this survey plot size includes vegetation which will not be disturbed by the proposed activities, however it was chosen to provide a representative of the vegetation. This survey plot size also meets the requirements of the minimum „patch“ size according to EPBC Act Policy Statement 3.5 Guidelines for White Box-Yellow Box-Blakely's Red Gum and Derived Native Grasslands (DEH, 2006), enabling assessment for this community.

Plant species were identified with reference to Harden (1990-2000) and Botanic Gardens Trust (2009).

3.2.3 Fauna Habitat and Fauna Survey Locations

Fauna habitat surveys were conducted at 20 sites, mostly within timbered areas. Given the limited extent of habitat available within the proposal site and the extent of the proposed activities, a detailed field survey of fauna habitat was considered necessary only in select locations. The detailed fauna assessments were based upon an analysis of habitat quality and recorded features such as the extent of habitat fragmentation and the presence of key habitat features like hollow-bearing trees, fallen logs and water bodies. Detailed sites were established where the characteristics of the site indicated the greatest chance of detecting significant species and other values. The location for these 20 sites is shown in Table 1 (Section 3.2.1).

3.2.4 Fauna Survey Methodology

Detailed fauna habitat surveys involved the assessment of potential habitat for fauna through observation and recording of key habitat features and characteristics with a 100 m x 100 m area. The detailed fauna assessments assessed:

- Preferred food plants;
- Vegetation structure;
- Mature, potentially hollow-bearing trees;
- Fallen trees;
- Stags (dead standing trees)
- Rock outcrops;
- Termite mounds;
- Water bodies; and
- Incidental sightings of fauna species.

Observational fauna habitat and fauna surveys include the assessment of dominant fauna habitat characteristics and incidental sightings of fauna species.

Incidental fauna observations were recorded at all 20 fauna sites, and these were supplemented by spotlighting, ultrasonic bat detecting and call-playback activities (for threatened species) at sites specifically chosen for their habitat attributes. No trapping was undertaken during the survey.

During the field assessment, the proposal site was also assessed for potential habitat for threatened fauna. Specialised survey techniques were employed to conduct targeted searches of threatened fauna species in habitat identified as containing key habitat features and characteristics.

A conservative approach was taken in the assessment of the potential of habitat for threatened fauna species and the results were used to determine which fauna survey techniques to utilise at specific locations within the proposal site. An overview of the fauna survey techniques conducted is shown in Table 2.

Table 2 – Fauna Survey Techniques Utilised at Specific Locations Within the Proposal Site.

Types of threatened fauna targeted	Survey techniques employed	Total survey effort
Woodland birds	Visual observation and call identification.	All detailed and observational survey sites.
Nocturnal birds	Call playback	Sites containing feeding and roosting vegetation with connectivity to larger tracts of vegetation. Call playback survey techniques were conducted at five sites during day surveys and four sites during evening surveys.
	Spotlighting	Sites containing feeding and roosting vegetation with connectivity to larger tracts of vegetation. Spotlighting survey technique was conducted at four sites during evening surveys.
Terrestrial and arboreal mammals	Call playback	Sites containing feeding and roosting vegetation with connectivity to larger tracts of vegetation. This survey technique was conducted at four sites during evening surveys and five sites during day surveys.
	Spotlighting	Sites containing feeding and roosting vegetation with connectivity to larger tracts of vegetation. This survey technique was conducted at four sites during evening surveys.
Reptiles	Habitat searches for reptiles – lifting rocks, leaf litter and woody debris, inspection of fallen hollow logs	All detailed and observational survey sites.
Bats	Anabat (bat call recording and analysis)	Sites containing feeding and roosting vegetation with connectivity to larger tracts of vegetation and in close proximity to water bodies. This survey technique was conducted at two sites over night.
Frogs	Opportunistic call identification	Site containing water bodies or swampy area supporting native vegetation. This survey technique was conducted at five sites during day surveys and three sites during evening surveys.
	Call playback	Site containing water bodies or swampy area supporting native vegetation. This survey technique was conducted at five sites during day surveys and five sites during evening surveys.

Types of threatened fauna targeted	Survey techniques employed	Total survey effort
	Spotlighting	Site containing water bodies or swampy area supporting native vegetation. This survey technique was conducted at three sites during evening surveys.
All species	Habitat assessment - search for feeding signs, scats, den sites, roosts etc.	All detailed and observational survey sites.

Spotlighting was undertaken at four sites over two evenings for approximately 1 hour at each site (9 and 10 February 2011). Bat echolocation call detection (using ANABAT equipment) was undertaken at two sites for 12 hours each, from dusk until sunrise on the 9 and 10 February 2011. Analysis of bat detector data was conducted by Greg Ford of Balance Environmental, Toowoomba QLD.

Call-playback surveys of approximately 20 minutes were undertaken for several species in appropriate habitats within the proposal site. Species surveyed at least once by this method were: Barking Owl (*Ninox connivens*), Yellow-bellied Glider (*Petaurus australis*), Squirrel Glider (*Petaurus norfolcensis*), Koala (*Phascolarctos cinereus*), Sloane's Froglet (*Crinia sloanei*), Booroolong Frog (*Litoria booroolongensis*) and Southern Bell Frog (*Litoria raniformis*).

Scats, bones, feathers and other signs (e.g. scratching, diggings, etc.) were specifically searched for during the detailed fauna assessments, and on an incidental basis elsewhere.

GPS coordinates were taken using hand held GPS with an accuracy of +/- 10 m.

3.3 Analysis of Results

Threatened flora and fauna species, populations and ecological communities that may potentially be impacted by the project were identified from the desktop study, the site habitat assessments and an analysis of the ecology of the species. These assessments drew heavily on information on the threatened species pages of the DECCW website, and also included a review of existing Recovery Plans, where these exist, for those threatened species, populations and ecological communities considered to be potentially present. Potential impacts were then identified and categorised. Risk assessments were undertaken for each species (or group of species) that might potentially be impacted by the proposed actions, using the TSC Act Section 5a Assessment (also known as the Seven Part Test). Where possible, mitigation measures to avoid or minimise potential impacts were recommended.

3.4 Assumptions and Limitations

The presence or otherwise of a particular flora or fauna species within the proposal site can only be confirmed by detailed targeted field surveys. Where field sampling effort was not adequate for detecting particular threatened flora or fauna species, the precautionary principle has been applied to their potential presence within the proposal site (i.e. they are assumed to be potentially present).

Whilst a significant proportion of the proposal site is cleared and is likely to be suitable for locating infrastructure which would be required for the construction and operation of the pipeline, the specific locations for wellhead pumps, gas pipelines, secondary access roads, and other support infrastructure had not been precisely identified at the time of the assessment.

Heavy rainfall before the present survey may have hindered the detection of fauna and signs of fauna such as diggings and scats.

4.0 Existing Environment

4.1 Description of Study Area

The study area is within the South Western Slopes Bioregion. This bioregion is divided into two subregions, and the study area lies within the Upper Slopes subregion, to the east of the subregion border. Generally, 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 populneus*), Red Ironbark (*Eucalyptus sideroxylon* also known as Mugga Ironbark), White Gum (*Eucalyptus rossi*), Yellow Box (*Eucalyptus melliodora*) and Blakely's Red Gum (*Eucalyptus blakelyi*) occupying the lower slopes. This merges west to Yellow Box, Grey Box (*Eucalyptus 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 (*Eucalyptus 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 characteristic landforms of the area are characterised by undulating hills, open plains, alluvial flats and incised ephemeral waterways. Few rocky outcrops exist along the proposal site. The proposal site traverses through the Lachlan and Murrumbidgee Catchment Management Authority (CMA) regions. These CMAs are divided into smaller subregions, of which the northern section of the proposal site lies within the Upper Slopes subregion of the Lachlan CMA and the southern section of the proposal site lies within the Upper Slopes subregion of the Murrumbidgee CMA.

The proposal site traverses through four local government areas (LGA). These include Young Shire, Harden Shire, Cootamundra Shire and Junee Shire.

4.2 Protected Areas

4.2.1 State Protected Areas

No protected tenures were identified within the proposal site. The Jindalee State Forest is located approximately 1.2 km to the west of the proposal site in the vicinity of KP 46 (Map 1). Yeo Yeo State Forest Park is located approximately 4.6 km to the west of the proposal site at KP 49.

4.3 Critical Habitat

No areas or habitats within the study area have been declared as critical habitat for threatened species under either the EPBC or TSC Acts.

4.4 Flora

4.4.1 Vegetation Overview

Flora assessments were conducted at 28 sites (Table 1). A total of 55 plant species were recorded during the flora studies, including 31 native species and 24 introduced species (Table 5 in Appendix A).

Broad scale mapping was available for the proposed study area:

- Landscape scale vegetation mapping for Lachlan Catchment Management Authority (CMA) (DECC, 2006) - 1: 250,000 map sheets which covers the northern section of the line from KP 0.78 to 29.66;
- Landscape scale vegetation mapping for Murrumbidgee Catchment Management Authority (CMA) (DECC, 2007) - 1:250,000 map sheets which covers a small section of the line from KP 29.66 to 38.55; and
- NSW Vegetation Classification and Assessment (VCA) mapping for Cootamundra and Junee (DECCW, 2009) - 1:100,000 map sheets which covers the southern section of the line from KP 38.55 to 70.78.

Where possible, vegetation was assigned to existing regional and state vegetation communities, including:

- NSW native vegetation mapping (Keith, 2002) - CMA mapping for Murrumbidgee and Lachlan CMA; and

- NSW vegetation classification and assessment (Benson, 2006) - Cootamundra and Junee regional mapping.

Using this available mapping, aerial imagery and field survey results, vegetation present along the study area was assessed.

A breakdown of all remnant vegetation and cleared areas based VCA and CMA mapping along the proposed pipeline with lengths and start / end KPs is given in Table 6 in Appendix A. The majority of the study area is cleared, with a dense ground cover of exotic pasture grasses. Most cleared areas have very few trees, but regrowth of native tree species was observed in some areas. Based on field and desktop information, approximately 67.7 km (96.7%) of the proposed pipeline ROW is cleared.

Most remnant vegetation in plain and hillslope landforms is modified open forest where eucalypts such as Blakely's Red Gum, Yellow Box and White Box occur. These Eucalypt species primarily occur along fence lines, road reserves and as isolated paddock trees. Most sites have a relatively sparse midstorey of shrubs and sapling eucalypts, while the groundstorey is dense, with a variety native and exotic grasses, herbs and rushes.

Most streams within the study area support a narrow band of riparian vegetation, with cleared pasture on either side. The riparian canopy contains River Red Gum, Blakely's Red Gum, Yellow Box and White Box, whilst the groundstorey is predominantly weeds, such as Phalaris (*Phalaris aquatica*), Spear Thistle (*Cirsium vulgare*) and Patterson's Curse (*Echium plantagineum*). The proposal site intersects a number of minor drainage lines and watercourses and also traverses near to a number of irrigation dams used for agriculture. The minor waterways intersected by the proposal site include Mc Henry Creek (KP 6.1), Burrangong Creek (KP 7.7) and Tumbleton Creek (KP 23). There is one apparent floodplain to the north west of Cootamundra that is intersected by the proposal site (KP 53.1).

4.4.2 Determination of Threatened Ecological Communities under EPBC Act and TSC Act

Threatened vegetation communities in NSW are protected under the EPBC Act and the TSC Act. Each Act has a specific criterion in determining if vegetation constitutes any threatened ecological communities (EPBC Act) or endangered ecological communities (TSC Act). There are some vegetation communities that are protected under both Commonwealth and State legislation. There are some vegetation communities that are protected under the TSC Act, but are considered common in Australia and are not listed under the EPBC Act, and vice versa.

Similar vegetation communities may be defined differently under the EPBC Act and the TSC Act. As such, the same patch of vegetation may be listed as an endangered ecological community under both pieces of legislation, or under the TSC Act, but not under the EPBC Act.

4.4.3 Endangered Ecological Communities under the EPBC Act

The EPBC Act Protected Matters Report identified one Critically Endangered Ecological Community (CEEC) and two Endangered Ecological Communities (EEC) that may potentially occur within the proposal site:

- Weeping Myall Woodlands (endangered);
- Grey Box (*Eucalyptus macrocarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia (endangered); and
- White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland (EPBC Box-Gum Woodland) (critically endangered).

An analysis of whether the vegetation identified within the proposal site meets the definition of the endangered ecological communities under the EPBC Act is shown below.

Weeping Myall Woodlands

One individual Weeping Myall was recorded within the proposal site (KP 0.8). This specimen was located within a narrow strip of vegetation that has been planted, and comprises of planted Sugar Gum (*Eucalyptus cladocalyx*), River Red Gum, Silver-leaf Wattle (*Acacia delbata*) and Black She-oak (*Allocasuarina littoralis*). EPBC Act Policy Statement 3.17 Guidelines for Weeping Myall Woodlands (DEWHA, 2009) specify that the endangered community is characterised by:

- A patch of woodland with Weeping Myall as the dominant tree canopy species (at least 50% of trees present);
- The presence of native understorey;
- At least 5 % tree canopy cover or at least 25 Weeping Myall trees per hectare; and

- The patch must be greater than 0.5 ha in size.

As one Weeping Myall individual within a small patch of planted vegetation is not consistent with the above criteria, the vegetation community does not constitute the endangered Weeping Myall Woodland. Furthermore, it is unlikely that the proposed pipeline contains any Weeping Myall Woodland as there was no other Weeping Myall recorded within the proposal site.

Grey Box Grassy Woodlands and Derived Native Grasslands

No Grey Box was recorded within the proposal site.

The EPBC Act Guidelines for Grey Box Grassy Woodlands and Derived Native Grasslands (DEWHA, 2010) specifies that the endangered community is characterised by:

- Presence of Grey Box as the dominant or co-dominant tree species, and
- Either:
 - The patch is greater than 0.5 ha in area and 50% (or more) of the vegetative cover is perennial native species at any time of the year, or
 - The patch is greater than 2 ha and 10% or more of the vegetative ground cover is perennial native grasses at any time of the year, and
 - There are eight (or more) hollow-bearing trees per ha, or
 - Trees have a diameter breast eight of 60 cm (or more).

Therefore the proposal site does not contain any Grey Box Grassy Woodlands and Derived Native Grasslands endangered ecological community.

White Box-Yellow Box-Blakely's Red Gum Woodland and Derived Native Grassland

Eight areas along the proposal site contain White Box (*Eucalyptus albens*), Yellow Box (*Eucalyptus melliodora*) and/or Blakely's Red Gum (*Eucalyptus blakelyi*) and were surveyed to determine whether they meet the definition of the threatened ecological community.

EPBC Act Policy Statement 3.5 Guidelines for White Box-Yellow Box-Blakely's Red Gum and Derived Native Grasslands (DEH, 2006) specifies that the critically endangered community is characterised by:

- White Box, Yellow Box or Blakely's Red Gum is or was previously one of the most common overstorey species, and
- The presence of a predominantly native understorey, and
- Size of patch is greater than 0.1 ha, and
- The presence of 12 (or more) native understorey species (excluding grasses) including at least one important species.

If there is not 12 (or more) understorey species present within the patch of vegetation, to be classified as the White Box-Yellow Box-Blakely's Red Gum and Derived Native Grasslands the patch must:

- Be greater than 2 ha, or
- Possess an average of 20 (or more) mature trees per hectare or natural regeneration of the dominant overstorey species be evident.

Determination based on these criteria was undertaken on the vegetation surveyed at the eight sites where overstorey species included Yellow Box, Blakely's Red Gum or White Box. Three sites were found to have a predominantly native understorey over a scale of 0.1 ha. The three sites are dominated by native grass species such as *Austrodanthonia* spp., Red-leg Grass (*Bothriochloa macra*), Lovegrass (*Eragrostis* spp.), Hairy Panic (*Panicum effusum*), *Austrostipa* spp., and *Poa* spp. Other native understorey species (excluding grasses) were not detected often, most likely due to the disturbance due to frequent grazing. Therefore, there were not 12 or more native species excluding grasses detected in the understorey at the three sites, and this criterion was not met. However, the three sites were part of patches greater than 2 ha in size according to CMA and VCA mapping (Benson 2006, Keith 2002). The site at KP 34 is part of a patch of community that is approximately 18.5 ha. The site at KP 55.2 is part of a patch that is approximately 13 ha. The site at KP 65.55 is part of a patch that is approximately 2.7 ha.

Therefore, three sites along the proposal site meet the definition of White Box-Yellow Box-Blakely's Red Gum and Derived Native Grasslands (Figure 1A to 1H). The total area of endangered ecological community within the disturbance area is 1.66 ha, comprised of approximately 12 mature trees, 151 immature trees and a native dominated understory (Table 3).

Table 3 - Location of critically endangered ecological community White Box Yellow Box Blakely's Red Gum Woodland under the EPBC Act within the Proposal Site.

KP Start	KP End	Length (km)	Clearing Area Required (ha)	Overstorey to be Removed	Understorey to be Removed
33.85	34.03	0.18	0.36	5 immature Blakely's Red Gum	Native grasses and non-native plants
55.2	55.7	0.5	1	6 mature Blakely's Red Gum and 109 immature Blakely's Red Gum	Native grasses
65.55	65.7	0.15	0.3	6 mature Blakely's Red Gum and 37 immature Blakely's Red Gum	Native grasses
Total		0.83	1.66	12 mature Blakely's Red Gum, 151 immature Blakely's Red Gum and native grasses	

4.4.4 Endangered Ecological Communities under the TSC Act

The Atlas of NSW Wildlife data identified that four ecological communities listed as endangered under the TSC Act may potentially occur within the proposal site:

- Fuzzy Box Woodland on Alluvial Soils of the South Western Slopes, Darling Riverine Plains and Brigalow Belt South Bioregions
- Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions
- Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions
- White Box-Yellow Box-Blakely's Red Gum Woodland (TSC Box-Gum Woodland).

Based on desktop and field investigations, only Inland Grey Box Woodland and White Box-Yellow Box-Blakely's Red Gum Woodland were noted to be present within the proposal site, as discussed below.

Fuzzy Box Woodland

The tree species that are recognised as characteristic of the Fuzzy Box Woodland ecological community were not recorded within the areas inspected. As such, it is considered highly unlikely that this ecological community occurs within the proposal site.

Myall Woodland

One individual Weeping Myall was recorded within the proposal site (KP 0.8). This specimen was located within a narrow strip of vegetation that has been planted, and comprises of planted Sugar Gum, River Red Gum, Silver-leaved Wattle and Black She-oak. The scientific determination for Myall Woodland (DECCW, 2011a) stipulates that the endangered ecological community is characterised by an open to sparse tree canopy dominated by Weeping Myall. As only one individual plant was recorded, the individual does not constitute the endangered community Weeping Myall Woodland.

Inland Grey Box Woodland

The tree species that are recognised as characteristic of the Inland Grey Box Woodland ecological community were not recorded within the areas inspected. As such, it is considered highly unlikely that this ecological community occurs within the proposal site.

White Box-Yellow Box-Blakely's Red Gum Woodland

Identification Guidelines for White Box- Yellow Box -Blakely's Gum Woodland (NPWS, undated) stipulate that the endangered ecological community is characterised by:

- Occurring in the South Western Slopes Bioregion (among others);
- The presence of listed characteristic native species in the understorey or soils seed bank and likely to respond to assisted natural regeneration;
- The presence or prior occurrence of White Box, Yellow Box or Blakely's Red Gum; and
- The site is mainly grassy (i.e. not shrubby).

Eight sites along the proposal site meet the criteria for White Box- Yellow Box -Blakely's Gum Woodland (Figure 1A to 1H). The overstorey species present at the eight sites comprise either one or a combination of the required tree species. All of the eight sites contain at least one native species in the understorey, and all sites are predominantly grassy.

The total area of the endangered ecological community within the disturbance area is 2.46 ha, requiring the removal of approximately 296 mature and immature trees (Table 4).

Table 4 - Location and Characteristics of Threatened Ecological Community White Box-Yellow Box-Blakely's Red Gum Woodland Under the TSC Act Within the Proposal Site.

KP Start	KP End	Length (km)	Clearing Area Required (ha)	Overstorey to be Removed	Understorey to be Removed
20.4	20.4	0.025	0.07	4 trees	Pasture grasses
33.2	33.3	0.1	0.2	20 trees	Native grasses and non-native plants
34	34.1	0.1	0.2	5 trees	Native grasses and non-native plants
53.1	53.3	0.2	0.6	35 trees	Native grasses and non-native plants
55.2	55.7	0.5	1	115 trees	Native grasses
57.5		0.02	0.06	67 trees	Native grasses
58.7		0.01	0.03	7 trees	Native grasses and non-native plants
65.55	65.7	0.15	0.3	43 trees	Native grasses
Total		1.105	2.46	White Box Yellow Box Blakely's Red Gum Woodland under the TSC Act within the proposal site.	

4.4.5 Threatened Flora

Review of the Atlas of NSW Wildlife and EPBC Act Protected Matters database for areas within the study area recorded 14 threatened plant species listed under the TSC Act or EPBC Act that have been recorded as occurring or potentially occurring within the wider study area. Ten species are listed under the EPBC Act (six endangered and four vulnerable) and 13 species are listed under the TSC Act (eight endangered and five vulnerable).

An assessment of the likelihood of occurrence of these species based on previous records and habitat attributes is included in **Table 7** in Appendix A. Of the 14 threatened species identified as potentially occurring within the greater area, eight have preferred habitat which was identified as likely to occur within the study area to varying extents.

During the field surveys, targeted searches were conducted in habitat suitable for the identified threatened flora species. However no threatened flora species were recorded within the proposal site. Three of the threatened flora species potentially present are relatively large and conspicuous. As none of these species were recorded during the field survey, it is considered highly unlikely that any of these species occurs within the sites investigated.

Eleven of the identified species are smaller and less conspicuous, so are more difficult to detect during a single survey. For example, the Crimson Spider Orchid (*Caladenia concolor*) is a small terrestrial deciduous orchid,

which emerges annually and displays a single leaf which coincides with the emergent single flower. Although none of these species were observed within the sites investigated during the field survey, because of their inconspicuous nature it is not possible to discount the occurrence of these species within the investigated sites.

TSC Act Section 5a assessments (seven-part tests) were undertaken for two species listed as threatened under the TSC Act that may have potential habitat (possible or likely) in the proposal site (Appendix B). Assessments of significant impact are provided for two EPBC-listed threatened species in Appendix C.

4.4.6 Endangered Populations

The Atlas of NSW Wildlife data did not identify any endangered flora populations listed under the TSC Act that may potentially occur within the proposal site and adjacent regions.

4.4.7 Noxious and Environmental Weeds

Five weed species that are declared under the *Noxious Weeds Act 1993* (NW Act) were recorded within or immediately adjacent to the proposal site. Under the NW Act, weed species are classified into 5 categories:

- Classes 1 and 2: The plant must be eradicated from the land and the land kept free of the plant.
- Class 3: The plant must be fully and continuously suppressed and destroyed.
- Class 4: The growth and spread of the plant must be controlled according to the measures specified in a management plan published by the local authority.
- Class 5: The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with.

The five weed species identified are listed as Class 4 (St John's Wort, Scotch Thistle, Sweet Briar, Bathurst Burr and Paterson's Curse). These noxious weed species combined with other weeds (Spear Thistle, Variegated Thistle and Saffron Thistle) were identified during field survey to occur over 16.75 km (23.9 %) of the pipeline. The Noxious Weed Report and associated maps of noxious weeds within the study area are located in Appendix D.

Some weed species are also recognised by the Commonwealth Government as Weeds of National Significance (WONS) based on their:

- Invasiveness and impact characteristics;
- Potential and current area of spread; and
- Current primary industry, environment and socioeconomic impacts.

There were no WONS recorded in the proposed pipeline during the field survey.

4.5 Fauna

4.5.1 Fauna Recorded During Field Surveys

Fauna species recorded during the field survey include 23 bird, three terrestrial and arboreal mammal, two reptile, two amphibian and five microbat species.

Birds constituted the vast majority of the species recorded. The majority of the birds recorded were common woodland and open habitat species. Native bird species that were recorded include Noisy Minor (*Manorina melanocephala*), Eastern Rosella (*Platycercus eximius*), Australian Magpie (*Gymnorhina tibicen*) and Galah (*Eolophus roseicapillus*) (Table 8 in Appendix A).

Two native terrestrial mammal species, Brush-tailed Possum (*Trichosurus vulpecular*) and a glider (*Petaurus sp.*) were recorded during the field survey. Two glider species, Sugar Glider (*Petaurus breviceps*) and Squirrel Glider (*Petaurus norfolcensis*), could potentially occur in the proposal site. These species are difficult to tell apart at a distance and as a result the species could not be identified in the field.

Two reptile species, Eastern Long-necked Turtle (*Chelodina longicollis*) and a skink (*Ctenotus sp.*), were observed. Two frog species, Spotted Marsh Frog (*Limnodynastes tasmaniensis*) and Peron's Tree Frog (*Litoria peroni*), were observed at a creek crossing along the proposal site (Table 8 in Appendix A).

Five microchiropteran bat species (microbats) were recorded using ANABAT recorders at KP 6.05. These were:

- Gould's Wattled Bat (*Chalinolobus gouldii*);
- Chocolate Wattled Bat (*Chalinolobus morio*);

- Western Broad-nosed Bat (*Scotorepens balstoni*);
- White-striped Freetail Bat (*Austronomus australis*); and
- Southern Free-tailed Bat (*Mormopterus* 'species 4').

None of the species positively identified during the field surveys are listed as threatened under the TSC Act.

4.5.2 Endangered Populations of Fauna

The NSW threatened species search identified one endangered population of fauna species, *Squirrel glider in the Wagga Wagga Local Government Area*, listed under the TSC Act. This population occurs in an adjacent region to the proposal site approximately 60 km to the south west of the proposal.

The species in this endangered population has preferred habitat which occurs within the proposal site in the form of modified stands of river red gum, Yellow Box and grey box which may be used for denning and foraging. However, due to the distance from the proposal to the endangered population, it is not expected that the proposal would adversely impact this population. A seven-part test was undertaken as a precaution to determine if the proposed pipeline would have a significant impact on this species or the endangered population (Appendix B).

4.5.3 Fauna Habitats

Potential habitat for threatened fauna within the proposal site is generally characterised by isolated fragments of vegetation and habitat features within a landscape that has been subject to varying degrees of historical disturbance for the purposes of agriculture, grazing and other land uses. The majority of the proposal site is cleared, with a dense ground cover of exotic pasture grasses. Most cleared areas have very few trees, but regrowth of native tree species was observed in some areas. Potential habitat in the form of remnant vegetation, rocky outcrops, riparian areas, grassland and pasture would potentially be impacted by the proposal.

Field survey identified 36 mature hollow-bearing trees within the proposal site. An average of six hollows was found within each hollow-bearing tree identified. The hollows ranged in size with a total of 138 small (<20 cm) hollows and 66 large (>20 cm) hollows found within the proposal site. Figures of hollow bearing trees within the study area are located in Appendix E. These hollow-bearing trees are located within remnant vegetation within the proposal site and are likely to represent important roosting, breeding and nesting resources for a number of fauna species, including hollow-dependent birds, arboreal mammals and reptiles.

Dead wood and dead trees provide essential habitat for a wide variety of native animals and are important to the functioning of many ecosystems. Fallen logs were observed at 13 sites within the proposal site, and ranged in size from individual branches to felled trees. These logs were often located within Eucalypt woodlands, however they also were found within paddocks surrounded by agricultural land. Figures containing the locations of logs found within the study area are located in Appendix E.

Other habitat features identified found to occur within the proposal site include stags (standing dead trees), bird nests and rocky outcrops. Nineteen stags and three bird nests were identified within the proposal site. Additionally, 11 rocky outcrop areas were identified within the proposal site, largely composed of large granite boulders. Figures containing the location of the stags, nests and rocky outcrops identified within the study area are located in Appendix E.

Where the proposal passes through a potential wildlife movement corridor, construction impacts may result in disruptions to dispersal along corridors, which are often the only means of dispersal through fragmented landscapes.

4.5.4 Threatened Fauna

A total of 44 species threatened under the EPBC Act and / or the TSC Act have been recorded or could potentially occur within the proposed proposal site (Table 9 in Appendix A). Of these 44 species there are 26 birds, three amphibians, one insect, 11 mammals and three reptiles. Twelve of these species are listed under the EPBC Act (one critically endangered, four endangered and seven vulnerable). All 44 species are listed under the TSC Act (one critically endangered, seven endangered, 36 vulnerable).

An assessment of potential habitat suggests that 29 threatened species may possibly have potential habitat within the proposal site, and five of these species were identified as likely to occur within the proposal site following assessment of species distribution and suitable habitat within the proposal site (Table 9 in Appendix A). These species are the Regent Honeyeater, Bush Stone-curlew, Little Lorikeet, Painted Honeyeater and Superb Parrot. TSC Act Section 5a assessments (seven-part tests) were undertaken for all 34 species listed as threatened under

the TSC Act that may have potential habitat (possible or likely) in the proposal site (Appendix B). Assessments of significant impact are provided for seven EPBC-listed threatened species in Appendix C.

4.5.5 Migratory Fauna Listed Under the EPBC Act

A total of ten bird species listed as Migratory were identified as potentially occurring within the proposal site from the EPBC Protected Matters Search Tool. While nine of these species have potential habitat within or adjacent to the proposal site, none of these species were observed during the field surveys (Table 10 in Appendix A). Potential impacts on EPBC-listed Migratory fauna species were assessed according to the EPBC Act Policy Statement *Significant Impact Guidelines 1.1 - Matters of National Environmental Significance* (EPBC Act 1999) (Appendix F).

4.5.6 Introduced Species

Introduced species identified within the proposal site include European Red Fox (*Vulpes vulpes*), Brown Hare (*Lepus capensis*), House Mouse (*Mus musculus*), Cattle (*Bos taurus*) and European Rabbit (*Oryctolagus cuniculus*). Predation by the European red fox was listed as a Key Threatening Process under the TSC Act in 1998.

Other introduced species which are likely to be present in the proposed corridor include:

- Black Rat (*Rattus rattus*);
- Wild Dog (*Canis familiaris*);
- European Blackbird (*Turdus merula*);
- Common Starling (*Sturnus vulgaris*); and
- House Sparrow (*Passer domesticus*).

4.6 Aquatic Ecology

The proposal site intersected and ran adjacent to a number of aquatic features. This included crossing two creeks, one ephemeral creek crossing and one potential floodplain. Also, a number of artificial dams were near the proposal site, including one dam within 50 m of the proposal site (KP 33.3).

The first creek crossing is of poor vegetation condition, containing large Eucalypts on the banks and an abundance of non native Sharp Rush (*Juncus acutus*) in the creek bed. Spotted at this location during nocturnal surveys were the two frog species Peron's Tree Frog (*Litoria peroni*) and Spotted Marsh Frog (*Limnodynastes tasmaniensis*). This crossing was identified as possibly containing suitable habitat for the Booroolong Frog (*Litoria booroolongensis*), which lives along permanent streams with some fringing vegetation cover. However no individuals were observed or heard.

The other creek crossing (KP 7.7) was highly degraded with no woody vegetation in the proposal site and was dominated by Spear Thistle (*Cirium vulgare*) and Wallaby Grass (*Austrodanthonia* sp.).

The ephemeral creek which was crossed KP 23 contained the native Common Reed (*Phragmites australis*) and also a number of non-native plants such as Phalaris (*Phalaris aquatic*) and Couch (*Cynodon dactylon*). Frog call playback for three threatened frog species was conducted at this site, but no frogs responded.

No aquatic species flora or fauna species were noted at the potential floodplain crossing (KP 53.1).

The artificial dam adjacent to the proposal site (KP 32.9) contained numerous water birds species nesting on submerged stags (Australian White Ibis, Darter and Pied Cormorant). This dam also contained a number of eastern long-necked turtles along with two duck species (Pacific Black Duck and Australian Wood Duck) and some Australasian Grebes. This dam was identified as possibly containing suitable habitat for the Southern Bell Frog (*Litoria raniformis*), however given the amount of native birds that may prey on frogs and tadpoles, it was not surprising that no individuals were observed, or their calls identified.

5.0 Potential Impacts

5.1 Introduction

The potential impacts discussed below are based on desktop studies of the proposal site and field investigations of the sites within the proposal site that were considered most at risk of significant impacts from construction and maintenance activities (see Section 3.1 and 3.2). A matrix table of potential impacts and the environmental values (pursuant to the EPBC and TSC Acts) potentially affected is provided in Table 11 in Appendix A). Assessments of significant impact on environmental values (i.e. threatened species and ecological communities) are provided in Appendix B.

Potential impacts considered include:

- Loss of native vegetation;
- Loss of hollow-bearing trees;
- Removal of dead and fallen timber;
- Removal of rock;
- Creation of edge effects;
- Spread of environmental weeds;
- Easement maintenance;
- Soil excavation;
- Soil compaction;
- Barrier effects to wildlife movement;
- Alterations to hydrology;
- Wild fire;
- Construction waste; and
- Erosion, sedimentation and dust emissions.

Potential impacts arising from the proposed development can be classed as those that are reversible and those that are non-reversible. The most wide-spread impact likely to arise from the proposal is the loss of native vegetation (Section 5.2). However, this is largely a reversible impact. Notwithstanding the easement maintenance requirements required for threat mitigation (as detailed within AS 2885.3, Section 6), once the proposed pipeline has been constructed, tree, shrub and understorey vegetation will naturally re-establish the area adjacent to the pipeline and shallow-rooted vegetation will establish directly over the pipeline itself. Keeping a 3 m strip on either side of the proposed pipeline free of trees and shrubs may be all that is necessary to protect the pipe from potential root damage and facilitate ongoing pipeline inspection and necessary maintenance. As such, subject to landholder property management practices, it is expected that over the medium term (10 to 50 years) significant portions of the proposed pipeline construction footprint would naturally regenerate.

5.2 Loss of Native Vegetation

Native vegetation is made up of plant communities that comprise primarily indigenous species and have a structure resembling that of the undisturbed community. It includes canopy trees (where present), understorey, ground cover and below-ground biomass (roots, bulbs and the seed bank). Removal of native vegetation not only affects the plant species removed but also reduces habitat (feeding, breeding, roosting and sheltering resources) for native fauna species. Numerous impacts can result from clearing native vegetation (DECCW, 2010), including:

- Destruction of habitat causing a loss of biological diversity, which may result in total extinction of species or loss of local genotypes;
- Fragmentation of populations resulting in limited gene flow between small isolated populations, reduced potential to adapt to environmental change and loss or severe modification of the interactions between species;

- Riparian zone degradation, such as bank erosion leading to sedimentation that affects aquatic communities;
- Disturbed habitat which may permit the establishment and spread of exotic species that may displace native species; and
- Loss of leaf litter, removing habitat for a wide variety of vertebrates and invertebrates.

There are numerous threatened species, populations and ecological communities adversely affected by the clearing of native vegetation. "*Clearing of native vegetation*" is listed as a key threatening process in Schedule 3 of the TSC Act and "*Land Clearing*" is listed as a key threatening process under the EPBC Act.

Impacts potentially arising from removal of native vegetation have particular relevance in this proposal for threatened ecological communities, threatened flora species and threatened fauna species that have been recorded in the proposal site or wider locality (Table 11 in Appendix A). More specific details for each environmental value potentially impacted are provided in Appendix B.

The total disturbance footprint is a maximum of 210 ha, based on a pipeline route 70 km in length and a 30 m ROW. Much of that area is pastoral land. Based on available VCA and CMA mapping, approximately 2.3 km of remnant native vegetation is transected by the proposed pipeline route. The proposed pipeline route would require clearing of up to 6.9 ha of remnant vegetation, assuming clearance of a 30 m ROW for the proposed pipeline construction. Of that amount, 2.46 ha have been identified as Box-Gum Woodland with a grassy understorey.

The actual area of clearing is likely to be lower than this estimate, as:

- The ROW would be able to largely utilise existing cleared infrastructure corridors through remnant vegetation;
- Pipeline construction will be reduced to 20 m ROW width within certain sections of remnant vegetation to ensure minimal impact;
- Disturbance of remnant vegetation beside major watercourses and major roads may be avoided by the use of Horizontal Directional Drilling (HDD); and
- Disturbance of remnant vegetation may be avoided within some vegetated areas via careful avoidance wherever practicable.

Clearing may also be required for other construction requirements (e.g. access tracks, stockpile and storage areas etc.). Storage areas for materials (such as pipe sections) will be minimal as materials will be brought directly to construction sites in so far as is possible. While exact locations for these requirements were unknown at the time of reporting, it is anticipated that these would be located in existing cleared areas as far as possible to reduce the total area of vegetation loss.

Table 6 (Appendix A) shows the maximum estimated clearing area for each vegetated section of the proposed pipeline ROW (based on VCA and CMA mapping) when utilising a 30 m ROW.

The removal of remnant vegetation could potentially impact 34 species listed as threatened under the EPBC Act and / or TSC Act and 9 species listed as Migratory under the EPBC Act. The potential impacts on TSC-listed species are assessed pursuant to Section 5a of the TSC Act (7 part tests) in Appendix B. An assessment of the potential impacts to EPBC listed threatened species is shown in Appendix C. An assessment of the potential impacts to listed Migratory species is shown in Appendix F.

The potential impacts on each vegetation community are considered further in the following sections.

5.2.1 Threatened Ecological Communities

Eight sections of the proposal site contain White Box-Yellow Box-Blakely's Red Gum Woodland meeting the criteria of the TSC Act EEC and three sections contain woodland meeting the criteria of the EPBC Act CEEC, White Box-Yellow Box-Blakely's Red Gum Woodland and Derived Native Grassland.

White Box-Yellow Box-Blakely's Red Gum Woodland and Derived Native Grassland - EPBC Act

Three sections of the proposal site meet the definition of White Box-Yellow Box-Blakely's Red Gum Woodland and Derived Native Grassland. The construction ROW within these areas will be reduced to 20 m to reduce the disturbance. The total length of this CEEC transected by the proposal site is 0.83 km, assuming the entire 20 m ROW meets the definition for the CEEC and is cleared, a maximum of 1.66 ha of EPBC Act listed CEEC White Box-Yellow Box-Blakely's Red Gum Woodland and Derived Native Grassland will be disturbed. The proposed

pipeline will follow the existing pipeline and share the existing ROW. This minimises the amount of mature remnant vegetation required to be cleared, but it also limits alternative options for avoiding and minimising potential impacts. An Assessment of Impact Significance of the proposal on the CEEC (Appendix D) indicates that an EPBC Act Referral of Proposed Action should be made to DSEWPC specifically regarding the proposed removal of three sections of EPBC Box-Gum Woodland. Any residual loss of the CEEC potentially will require compensation in the form of biodiversity offsets, subject to the requirements of DSEWPC.

Table 11 in Appendix A lists environmental values that could be affected by these potential impacts. The potential impacts to these environmental values are assessed in Appendix B, and they would be considered significant if they were not mitigated. Therefore, Recommendations 1, 2 and 3 in Section 6.0 outline measures designed to avoid, minimise and / or mitigate these potential impacts.

White Box-Yellow Box-Blakely's Red Gum Woodland - TSC Act

Eight sections of the proposal site meet the TSC Act definition of the White Box-Yellow Box-Blakely's Red Gum Woodland. If the full 30 m ROW is cleared, a maximum of 2.46 ha of White Box-Yellow Box-Blakely's Red Gum Woodland would be removed. This represents about 0.09% of this endangered community within the total extent of the 5 km buffer based on VCA and CMA mapping. The proposed pipeline will follow the existing pipeline and share the existing ROW. This will minimise the amount of clearing required in sections of remnant vegetation to a maximum width of 10 m, but it will also limit options for avoiding and minimising potential impacts. A TSC Act Section 5a assessment (seven-part test) was undertaken to assess the potential impact of the proposed pipeline on TSC Box-Gum Woodland (Appendix B). Any residual loss of TSC Box-Gum Woodland potentially will require compensation in the form of a biodiversity offset, subject to the requirements of DECCW. Table 11 in Appendix A lists environmental values that could be affected by these potential impacts. The potential impacts to these environmental values are assessed in Appendix B, and they would be considered significant if they were not mitigated. Therefore, Recommendations 1, 2 and 3 in Section 6.0 outline measures designed to avoid, minimise and / or mitigate these potential impacts.

5.3 Loss of Hollow-bearing Trees

Tree hollows are cavities formed in the trunk or branches of a living or dead tree. Hollows are usually more characteristic of older, mature to over-mature trees. Hollows may develop in the trunk and branches of trees as a result of wind breakage, lightning strikes, fire and / or following the consumption and decay of internal heartwood by fungi and invertebrates, primarily termites. Hollow entrances are more common in larger trunks and branches because damage is less likely to be covered by growth of external sapwood (DECCW, 2010).

Hollows occur primarily in old eucalypt trees, and are uncommon in many other native and introduced species such as wattle (*Acacia* sp.), Cypress Pine (*Callitris* sp.), She-oak (*Allocasuarina* sp.) and Pine (*Pinus* sp.). The presence, abundance and size of hollows are positively correlated with tree trunk diameter, which is an index of age. Hollows with large internal dimensions are the rarest and occur predominantly in large old trees, which are rarely less than 220 years old. Larger, older trees also provide a greater density of hollows per tree. As such, large old hollow-bearing trees are relatively more valuable to hollow-using fauna than younger hollow-bearing trees. The latter are important as a future resource (DECCW, 2010).

Mature and old hollow-bearing trees offer other valuable resources. Mature trees provide more flowers, nectar, fruit and seeds than younger trees, and a complex substrate that supplies diverse habitats for invertebrate populations. When hollow-bearing trees collapse or shed limbs, they also provide hollow logs that serve as important foraging substrates and shelter sites (DECCW, 2010). Hollow-bearing trees can be considered a finite resource in the study area, given the long time periods required for hollow development (Wormington and Lamb, 1999) and that the repercussions of the removal of hollow-bearing trees from an area may persist for several hundred years (Gibbons and Lindenmayer, 2002).

Some hollow-bearing trees may be removed by the proposal (Section 4.5.3). "*Loss of hollow bearing trees*" is listed as a key threatening process under Schedule 3 of the TSC Act. Impacts potentially arising from a loss of hollow-bearing trees have particular relevance in this proposal for up to one fauna population and 19 threatened fauna species listed under the TSC and EPBC Acts that are dependent on hollows and definitely or potentially occur in the study area or locality (Table 11 in Appendix A). An assessment of potential impacts that could occur is provided for each of these species in Appendix B. These potential impacts would be considered significant if they were not mitigated. Therefore, Recommendation 4 in Section 6.0 outlines measures designed to avoid, minimise and / or mitigate these potential impacts.

5.4 Removal of Dead and Fallen Timber

Dead wood and dead trees provide essential habitat for a wide variety of native animals and are important to the functioning of many ecosystems. The removal of dead wood can have a range of environmental consequences, including the loss of habitat (as they often contain hollows used for shelter by animals), disruption of ecosystem processes and soil erosion (DECCW, 2010).

Removal of dead old trees (either standing or on the ground) results in the loss of important habitat such as hollows and decaying wood (Gibbons and Lindenmayer, 2002) for a wide variety of vertebrates, invertebrates and microbial species and may adversely affect numerous threatened species. The proposal has the potential to remove dead and fallen timber wherever it occurs within the proposed pipeline footprint. "*Removal of dead wood and dead trees*" is listed as a Key Threatening Process under Schedule 3 of the TSC Act.

Fallen logs were observed within the proposal site at a number of sites, and are assumed to occur elsewhere in the study area (Section 4.5.3). Impacts potentially arising from the removal of ground debris have particular relevance in this proposal for a number of threatened fauna species, in particular a large suite of woodland birds that are reliant on fallen timber and have been recorded or have the potential to occur in the study area.

This potentially could have direct and indirect impacts up to three ecological communities and up to 15 fauna species listed as threatened under the EPBC Act and / or the TSC Act that potentially occur in the proposal site or locality (Table 11 in Appendix A). The potential impacts to these environmental values are assessed in Appendix B, and they would be considered significant if they were not mitigated. Therefore, Recommendation 5 in Section 6.0 outlines measures designed to avoid, minimise and / or mitigate these potential impacts.

5.5 Removal of Rock

Rocks serve many purposes in the natural environment. They provide habitat for many plants and animals, some of which are threatened. Many animals use rocks and rocky environments for shelter, to hide from predators, find food, avoid extreme weather conditions and escape bushfires. Bushrock is also known to provide egg-laying sites for reptiles (DECCW, 2010). A number of reptile species are highly dependent on rocks for both protection and the thermal characteristics of rock shelters, and may become locally extinct in areas from which loose rocks and rock outcrops have been removed or destroyed (Shine et al., 1998; Webb and Shine, 2000; Shah et al., 2004).

"*Bushrock removal*" is listed as a Key Threatening Process under Schedule 3 of the TSC Act.

Areas containing rock outcrops and rocky escarpments within the proposed pipeline were limited but were found on occasion. Impacts potentially arising from the removal of rock could have direct and indirect impacts on up to six fauna species threatened under the EPBC Act and / or TSC Act that potentially occur in the proposal site or locality (Table 11 in Appendix A). Recommendation 6 in Section 6.0 outlines measures designed to avoid, minimise and / or mitigate potential impacts that might arise in the event that areas of bush rock are encountered in the proposed construction footprint.

5.6 Creation of Edge Effects

Indirect impacts of the proposed development would include the increase or extension of edge effects where the proposed pipeline would run adjacent to previously undisturbed vegetation. Edge effects are caused by changed environmental conditions and may include alterations to light, wind, temperature and runoff along the edges of vegetated areas. Increased light exposure may lead to a reduction in the amount of water available due to increased evaporation and / or evapo-transpiration. Other potential edge effects resulting from the proposed development include further establishment of weeds and modification of habitat to the disadvantage of forest fauna assemblages and advantage of edge-specialist assemblages. This may result in changes to species composition in these areas. Bali (2000) concluded that effects from a new edge would extend at least 50 m towards the interior of the habitat.

Impacts potentially arising from edge effects have little relevance in this proposal because the proposal site does not run through or immediately adjacent to sizable intact tracts of timbered habitats. The proposal site does transect and run immediately adjacent to previously cleared and disturbed tracts of timbered habitat, which could potentially have direct and indirect impacts on up to two ecological communities and up to one fauna population and 13 fauna species listed as threatened under the EPBC Act and / or the TSC Act that potentially occur in the proposal site or locality (Table 11 in Appendix A). The potential impacts to these environmental values are assessed in Appendix B. Since the majority of the proposed route has been cleared previously and the landscape

is highly fragmented, the potential impacts are not considered to be significant. Nevertheless, a suite of recommendations in Section 6.0 such as Recommendation 8 and 11 outlines measures designed to avoid, minimise and / or mitigate these potential impacts.

5.7 Spread of Environmental Weeds

Noxious weeds and environmental weeds were identified during field survey to occur over 16.75 km (23.9 %) of the pipeline. The Noxious Weed Report and associated maps of noxious weeds within the study area are located in Appendix D.

Environmental weeds have many severe impacts on Australian environments, including smothering of native vegetation, competition with native vegetation, prevention of seedling recruitment and alteration of fire regimes. There is potential to spread weeds and increase their areas of infestation during the construction phase of the proposed development, during ongoing maintenance activities, and through modified drainage patterns. Schedule 3 of the TSC Act lists four Key Threatening Processes related to weed invasion:

- Invasion and establishment of exotic vines and scramblers
- Invasion of native plant communities by bitou bush and boneseed
- Invasion of native plant communities by exotic perennial grasses
- Invasion, establishment and spread of lantana.

The proposed pipeline potentially could have direct and indirect impacts on up to two ecological communities, up to nine flora species and up to 22 fauna species listed as threatened under the EPBC Act and / or the TSC Act that potentially occur in the proposal site or locality (Table 11 in Appendix A). The potential impacts to these environmental values are assessed in Appendix B, and they would be considered significant if they were not mitigated. Therefore, Recommendation 11 in Section 6.0 outlines measures designed to avoid, minimise and / or mitigate these potential impacts.

5.8 Easement Maintenance

The actions associated with easement maintenance are recognised as threats to some listed flora species in NSW. Activities which can cause negative impacts include slashing, clearing of regrowth, spraying of weeds, fire, and trampling by vehicles and machinery. Priority action statements to address these potential impacts generally require that where threatened species or their potential habitats occur, planning and maintenance staff are made aware of threatened species before easement maintenance activities commence and that processes are in place to avoid impacts.

Activities associated with maintenance of the easement (such as those required under AS 2885.3, Section 6.4.4, threat mitigation in relation to vegetation on and near the pipeline) potentially could have direct and indirect impacts on up to two ecological communities, up to nine flora species and up to nine fauna species listed as threatened under the EPBC Act and / or the TSC Act that potentially occur in the proposal site or locality (Table 11 in Appendix A). The potential impacts to these environmental values are assessed in Appendix B, and they would be considered significant if they were not mitigated. Therefore, Recommendation 13 in Section 6.0 outlines measures designed to avoid, minimise and / or mitigate these potential impacts.

5.9 Soil Excavation

Many fauna species burrow or shelter in deep cracks in soil. There is potential for significant, direct impact on some fauna species from being unearthed during construction of the proposed pipeline trench. While many larger and more mobile fauna such as birds, macropods and larger reptiles are likely to move away from the disturbance resulting from construction, smaller burrowing fauna (especially nocturnal species) are likely to remain under the surface and therefore risk being dug up and injured or killed. A broad range of burrowing and crack-dwelling fauna including frogs, lizards, snakes and small mammals are potentially present along the entire length of the proposed pipeline route.

To facilitate the laying of the pipeline, an open trench would be required. The trenching would be progressive and therefore the full length of the proposed pipeline would not be open at any given time. The open trench provides a temporary barrier to movement of ground-dwelling fauna. Ground-dwelling species, particularly smaller species such as reptiles and amphibian are also at risk of falling into open trenches, becoming trapped by the steep banks

and being exposed to overheating, dehydration, predation and / or drowning. Fauna entrapment within proposed pipeline trenches has been recognised as a key environmental issue by the Australian Pipeline Industry Association Code of Environmental Practice (APIA, 2005).

Some flora species rely on underground rhizomes for regeneration following fire. Excavation of the trench has the potential to inadvertently remove and destroy these rhizomes, potentially causing damage and / or death to plant individuals.

Published information from other Australian pipeline projects has demonstrated that pipeline trenches can entrap high numbers of a wide diversity of terrestrial animals (including threatened species), particularly reptiles, frogs and small mammals, with the potential for very high levels of mortality (Ayers and Wallace, 1997; Woinarski et al., 2000; Doody et al. 2003, Wilson and Swan, 2004; Wilson, 2005).

This potentially could have direct and indirect impacts on up to two ecological communities, up to six flora species and up to 11 fauna species listed as threatened under the EPBC Act and / or the TSC Act that potentially occur in the proposal site or locality (Table 11 in Appendix A). The potential impacts to these environmental values are assessed in Appendix B, and they would be considered significant if they were not mitigated. Therefore, Recommendations 9 and 10 in Section 6.0 outline measures designed to avoid, minimise and / or mitigate these potential impacts.

5.10 Soil Compaction

Some flora species rely on underground rhizomes for regeneration following fire. Soil compaction from construction machinery and easement maintenance vehicles has the potential to inadvertently destroy these rhizomes. Soil compaction may also impair regeneration of vegetation following construction and result in increased erosion and sediment loss.

This potentially could have direct and indirect impacts on up to two ecological communities, up to six flora species and up to nine fauna species listed as threatened under the EPBC Act and / or the TSC Act that potentially occur in the proposal site or locality (Table 11 in Appendix A). The potential impacts to these environmental values are assessed in Appendix B, and they would be considered significant if they were not mitigated. Therefore, Recommendation 10 in Section 6.0 outlines measures designed to avoid, minimise and / or mitigate these potential impacts.

5.11 Barrier Effects to Wildlife Movement

In some circumstances, linear infrastructure projects can create significant barriers to wildlife movements, in particular terrestrial and arboreal fauna species. At their most extreme, these barriers can reduce gene flow in populations. This is mostly seen in major arterial roads with dual carriageways and fauna-proof fencing. In buried pipelines such as the current proposal, only the most sedentary species would be affected and the impacts would be largely short-term, resulting from disturbance and temporary loss of vegetation cover. The impacts are largely reversible with restoration of vegetation cover.

This is considered unlikely to have significant or long-term impacts (Table 11 in Appendix A). Nevertheless, Recommendation 8 in Section 6.0 outlines measures designed to avoid, minimise and / or mitigate these potential impacts.

5.12 Alterations to Hydrology

Alteration to natural flow regimes refers to reducing or increasing flows, altering seasonality of flows, changing the frequency, duration, magnitude, timing, predictability and variability of flow events, altering surface and subsurface water levels and changing the rate of rise or fall of water levels. The three primary human processes that have altered flows in streams, rivers and their floodplains, and wetlands in NSW are:

- Building of dams;
- Diversion of flows by structures or extraction; and
- Alteration of flows on floodplains with levees and structures (DECCW, 2010).

Alteration to the natural flow regimes of rivers and streams and their floodplains and wetlands is recognised as a major factor contributing to loss of biological diversity and ecological function in aquatic ecosystems, including floodplains. Alteration to the natural flow regimes of rivers and streams and their floodplains and wetlands has

been identified as a threat to a number of threatened species and communities. “*Alteration to the natural flow regimes of rivers, streams, floodplains and wetlands*” is listed on Schedule 3 of the TSC Act as a Key Threatening Process.

Impacts potentially arising from alteration to the natural flow regimes potentially could have direct and indirect impacts on up to five fauna species listed as threatened under the EPBC Act and / or the TSC Act that potentially occur in the proposal site or locality (Table 11 in Appendix A). Impacts on hydrology from the proposal will be dependent on the method of crossing that is chosen for each site where the proposed pipeline intersects an aquatic feature (see Section 4.6). The decisions for individual crossings have not yet been made and will depend on assessment made on site immediately prior to construction works. The potential impacts to these environmental values are assessed in Appendix B, and they would be considered significant if they were not mitigated. Therefore, Recommendations 7 in Section 6.0 outline measures designed to avoid, minimise and / or mitigate these potential impacts particularly through the use of HDD techniques..

5.13 Wild Fire

Construction activities could create unintended wild fires in the project area. Fires have the potential to spread rapidly and well beyond the intended project footprint. Wild fires could also be started by vegetation maintenance activities in the proposed pipeline easement throughout the operational phase of the proposed project. Conversely, the pipeline easement may act as a fire break and retard wild fire in some areas. It is expected that construction and maintenance teams involved in the proposal would have basic fire fighting equipment at hand which would be utilised to suppress accidental fires.

Impacts potentially arising from changes to the local regime of wild fire potentially could have direct and indirect impacts on a up to two ecological communities, up to one fauna population, nine flora species and up to 15 fauna species listed as threatened under the EPBC Act and / or the TSC Act that potentially occur in the proposal site or locality (Table 11 in Appendix A). The potential impacts to these environmental values are assessed in Appendix B, and they would be considered significant if they were not mitigated. Therefore, Recommendations 2 and 13 in Section 6.0 outline measures designed to avoid, minimise and / or mitigate these potential impacts.

5.14 Construction Waste

Construction activities can generate large amounts of waste (e.g. wrapping and packaging from construction materials, domestic waste from crew members, etc). Linear infrastructure projects provide the potential to strew this waste extensively across a landscape.

Impacts potentially arising from construction waste potentially could have direct and indirect impacts up to two ecological communities and up to six fauna species listed as threatened under the EPBC Act and / or the TSC Act that potentially occur in the proposal site or locality (Table 11 in Appendix A). The potential impacts to these environmental values are assessed in Appendix B and they would be considered significant if they were not mitigated. Therefore, Recommendation 12 in Section 6.0 outlines measures designed to avoid, minimise and / or mitigate these potential impacts.

5.15 Erosion, Sedimentation and Dust Emissions

Earthworks, vegetation clearing, vehicle movements on unformed tracks and other machinery operations have the potential to cause erosion and dust emissions. Erosion is of particular concern in waterways and steep areas. Erosion and dust can cause sedimentation of waterways, including streams and freshwater wetlands.

Potential impacts arising from dust emissions would likely be short-term and reversible, but could affect vegetation communities and flora species through smothering. Erosion and sedimentation could continue after construction is completed and the impacts of sedimentation could persist after erosion has ceased.

Impacts potentially arising from erosion, sedimentation and dust emissions potentially could have direct and indirect impacts on up to two ecological communities, nine flora species and up to nine fauna species listed as threatened under the EPBC Act and / or the TSC Act that potentially occur in the proposal site or locality (Table 11 in Appendix A). The potential impacts to these environmental values are assessed in Appendix B, and they would be considered significant if they were not mitigated. Therefore, Recommendation 12 in Section 6.0 outline measures designed to avoid, minimise and / or mitigate these potential impacts.

6.0 Mitigation Measures

6.1 Pre-construction Phase

Recommendation 1: Develop and Implement best-practice site management measures within an Construction Environmental Management Plan (CEMP) framework.

Incorporate impact mitigation and environmental management measures into a CEMP for the proposed development and include provisions for the preconstruction, construction and operational stages of the development. In the CEMP detail specific management strategies to be implemented during the construction phase of the proposed development, including strategies and protocols relating to soil and water management, protection of vegetation to be retained, fauna protection, rehabilitation strategies, containment of waste, and an emergency response program for accidental spills and other emergencies. Include a number of detailed management strategies in the CEMP sufficient to facilitate the implementation and auditing of all the mitigation measures recommended in this Section.

Develop an induction program for the CEMP and induct all site workers involved in construction activities (whether directly or indirectly) into the CEMP program prior to their commencement of duties.

6.2 Construction Phase

Recommendation 2: Minimise clearing of native vegetation during construction works.

The following general measures are recommended to minimise impacts on native vegetation:

- Locate site compounds and parking areas, site-offices, stockpiles and other ancillary works areas in existing cleared areas, away from waterways or other sensitive areas;
- Install highly visible barriers (e.g. barrier webbing) between the construction area and adjacent native vegetation;
- Restrict access from the construction area into adjacent areas of native vegetation and waterways;
- Provide clear instructions regarding the limits of vegetation clearing to all workers and contractors;
- Minimise the amount of native vegetation (timber) to be cleared by employing the minimum construction footprint in timbered habitats;
- Avoid removal of large paddock trees wherever feasible;
- Fit spark arresters on diesel engines used in construction;
- Ensure fire extinguishers and personnel trained in fire fighting are on-hand during welding operations to minimise damage caused by accidental fires; and
- Retain and protect hollow-bearing trees wherever possible in accordance with Recommendation 5 below.

Recommendation 3: Minimise clearing of native vegetation along the pipeline route.

Minimise clearing of native riparian vegetation at watercourses (such as KP 6.1) by utilising existing clearings (where present) and reducing the width of the ROW.

Minimise clearing of native vegetation within road reserves (KP 7.2, 11.3, 20.4, 33.3 and 57.5) when crossing roads by utilising clearings (where present) and reducing the width of the ROW.

When transecting native vegetation, utilise existing cleared areas and reduce the width of the ROW wherever feasible.

Conduct pre-clearing surveys just prior to construction to identify minor route refinements that reduce clearing of native vegetation.

Recommendation 4: Minimise the impacts arising from removal of large hollow-bearing trees.

Avoid the removal of large-hollow-bearing trees wherever possible. Figures of the hollow bearing trees identified within the proposal site are located in Appendix E.

Where removal cannot be avoided conduct wildlife clearance surveys (Recommendation 9) and recycle hollows that are felled in timbered areas by strapping them to trees adjacent to the project footprint, in consultation with DECCW.

Recommendation 5: Minimise the impact of removing dead trees and fallen timber wherever possible.

Avoid felling standing dead trees (stags) wherever possible. Figures of the stags identified within the proposal site are located in Appendix E.

Avoid disturbing, removing or breaking up fallen timber (especially larger logs) wherever possible. Figures of the fallen timber identified within the proposal site are located in Appendix E.

Wherever it is unavoidable to disturb fallen timber, either relocate it to adjacent areas of native vegetation or stockpile it and return to the ROW following completion of earthworks.

Where possible, recycle timber cleared from the ROW by placing logs on the ground in the ROW following construction.

Recommendation 6: Minimise the potential impact from the removal of surface rock.

If an area of outcropping rock is encountered, adjust the local alignment of the proposed pipeline if feasible to avoid it. Figures of the rocky outcrops identified within the proposal site are located in Appendix E.

Wherever it is unavoidable to disturb surface rock, stockpile it and return to the ROW following completion of earthworks.

Recommendation 7: Minimise potential impacts to permanent streams.

Wherever the proposed pipeline crosses permanent streams, use appropriate techniques for the given conditions to avoid disturbance to hydrology, riparian vegetation and threatened species as far as possible.

Avoid the development footprint encroaching or impacting on streams, including indirect impacts such as erosion, down-stream sedimentation, pollution and eutrophication.

Recommendation 8: Develop a detailed landscaping and rehabilitation plan for incorporation into project Environmental Management Plans.

Detail landscaping and rehabilitation strategies in an EMP for the proposed development.

Include a maintenance program in the landscaping and rehabilitation strategies, involving in-planting and weed control, for at least 2 years after completion of construction activities. It is recommended that landscaping and rehabilitation works involve:

- Obtain local provenance native seeds, either from commercial seed suppliers or collection by qualified bush regenerators prior to clearing, for use in the revegetation of disturbed areas;
- Stockpile topsoil that is excavated from areas of native vegetation for application to rehabilitation areas in the ROW, to retain the natural seed bank from the site and assist in the regeneration of local flora;
- Revegetate progressively as construction proceeds, to reduce exposure of unstabilised surfaces and minimise opportunities for weed establishment;
- Revegetate with site-specific species compositions to match the characteristics of the local endemic communities;
- Wherever further fragmentation of existing native vegetation cannot be avoided, revegetate (using local native species) as soon as possible, in order to minimise edge effects;
- The landscaping and rehabilitation plan should aim to reconnect any patches of native vegetation isolated or fragmented by the proposed development, to improve connectivity for wildlife and reduce edge effects; and
- Monitor vegetation re-establishment during and post-construction. Desirable species may include native groundcover species in native vegetation areas or pasture grasses in agricultural landscapes (as requested by landholders).

Recommendation 9: Undertake wildlife-clearance surveys immediately before the vegetation clearing and / or trench excavation fronts.

Have wildlife-clearance surveys undertaken by appropriately qualified people immediately ahead of vegetation clearing operations to avoid disturbance to the following threatened fauna species, including:

- Conduct surveys for nests of the bush stone-curlew, which nests on the ground amongst fallen timber and undergrowth in open woodland (figures of the fallen timber identified within the proposal site are located in Appendix E). If a nest is found in the clearing path then clearing operations should be rerouted where possible or locally suspended and the below clearance protocols employed;
- Conduct surveys for nests of the superb parrot, which nests in tree hollows particularly in River and Blakely's Red Gums. If a nest is found in the clearing path then clearing operations should be rerouted where possible or locally suspended and the below clearance protocols employed;
- Conduct surveys for nests of the little lorikeet, which nests in small tree hollows. If a nest is found in the clearing path then clearing operations should be rerouted where possible or locally suspended and the below clearance protocols employed;
- Conduct surveys for nests of woodland birds, such as regent and painted honeyeaters, which nest in tree branches and mistletoes within mature Eucalypts. If a nest is found in the clearing path then clearing operations should be rerouted where possible or locally suspended and the below clearance protocols employed;
- Conduct surveys for dens for small mammals, such as gliders and bats, which nests in hollows in large hollow-bearing trees in tall forests. If a nest is found in the clearing path then clearing operations should be rerouted where possible or locally suspended and the below clearance protocols employed; and
- Conduct surveys for the presence of koalas, which rest in trees by day. If a koala is found in the clearing path then clearing operations should be suspended locally until the koala moves out of the impact zone.

Wherever it is not possible to avoid the removal of large, old-growth, hollow-bearing trees then the following clearance protocols should to be employed:

- Clear the vegetation surrounding large, old-growth, hollow-bearing trees but leave the tree standing in order to give fauna an opportunity to move;
- Large, old-growth, hollow-bearing trees should be felled no less than two days after the removal of the surrounding vegetation; and
- Large, old-growth, hollow-bearing trees should be felled carefully and left intact on the ground overnight to give fauna the opportunity to escape.

Authorised wildlife rescuers should be on hand to rescue and relocate fauna disaffected, disoriented or displaced by vegetation clearing and excavation of the trench.

- Whenever possible, release nocturnally active animals that are captured for relocation at dusk.

Recommendation 10: Manage earthworks to minimise impacts on threatened fauna species.

Use temporary fencing to exclude access to the trench by livestock and larger native wildlife (APIA, 2005).

Trench progressively to minimise the period of time the trench is open and the length of open trench. The length of open trench at any one time should be the minimum practicable.

Construct ramps and trench plugs with slopes of no greater than 50% (APIA, 2005) and located at least every 500 m to assist escape for larger fauna species. Where possible, locate trench plugs to coincide with stock and wildlife trails.

Place branches, ramped gangplanks or similar to create „ladders“ at regular intervals to assist small fauna to exit the trench (APIA, 2005).

Supply some form of cool insulated cover in the trench to allow smaller fauna species to shelter in shade and / or climb above accumulated water. Following the method employed during construction of the North Queensland Gas Pipeline (Wilson and Swan, 2004), sawdust-filled hessian sacks used to support pipes prior to laying-in should be soaked in water and placed in pairs at approximately 250 m intervals.

Employ qualified fauna spotters and handlers to survey the open trench and remove any trapped fauna species. Such surveillance should occur along the entire length of the trench and not merely those areas described as fauna habitats or sensitive areas. Fauna spotters and handlers should be qualified or appropriately trained to assess and handle any injuries to native fauna that may occur due to trenchfall.

Have qualified veterinarian staff available on call to assess and treat or euthanase (as necessary) any large native vertebrates that are seriously injured.

Recommendation 11: Develop and implement a detailed weed management strategy.

Develop and implement a detailed weed management strategy as part of the EMP. Include measures to control the spread of weeds into adjacent native vegetation (i.e. weed hygiene). Weed control measures would be particularly important where the proposed development traverses large, intact stands of vegetation, in riparian areas, and around freshwater wetlands. Following ROW clearing weed management measures are likely to be able to be scaled back, provided following works remain within the cleared ROW. It is noted that management of areas containing existing weed infestations outside of the ROW are not the responsibility of APA, who are responsible only for the management of weeds within the easement, but rather the responsibility of the relevant land owners.

Include in the plan, as a minimum, the following measures:

- Remove existing noxious weeds within the project footprint;
- Destroy weed material removed from construction sites;
- Develop weed quarantine zones along the proposed pipeline route based on weed distribution and sub-catchments, for application of weed hygiene activities;
- Wash down vehicles, machinery and equipment moving between weed quarantine zones, especially after clearing activities and earthworks in weed infested areas;
- Implement a certification process to ensure that all vehicles and plant are weed-free whenever entering or leaving the site and whenever moving between weed quarantine zones within the site;
- Minimise the potential for the transport of weeds in soil, by not transporting excavated soil further than the nearest stockpile locations;
- Use shredded native plant material (uncontaminated by weeds) removed from the site as a mulch and groundcover on disturbed soil surfaces to reduce the potential for weed establishment;
- Use sediment control fencing to prevent soil contaminated with weed seeds from washing into waterways and wetlands; and
- Conduct weed management works and monitor for at least two years following construction.

Recommendation 12: Develop and implement a detailed soil, water and waste management strategy.

Develop and implement a detailed soil, water and waste management strategy to control sediment and pollutant discharge from the construction area into adjoining vegetation, streams and wetlands. The following measures are recommended, as a minimum:

- Develop strategies and facilities to contain contaminants such as gross pollutants, weed seeds, fuels and oils, chemicals, etc.;
- Stabilise exposed soil surfaces (e.g. through sterile grass seeding, erosion control meshing, progressive stabilisation and re-vegetation of finished soil surfaces and / or mulching using vegetative material removed from the project area;
- Vegetation and soil stockpiles should be separated where possible to maximise use of vegetation for sediment erosion control;
- Use erosion and sediment control fencing to prevent sedimentation of waterways;
- Implement a best practice self-auditing program for site stabilisation and erosion control;
- Dispose of waste materials and / or contaminants appropriately and away from adjacent native vegetation and waterways;
- Develop strategies to minimise erosion and related impacts on steep slopes and in riparian areas;

- Develop a strategy and facilities for the suppression of dust (e.g. dust trigger levels, air quality monitoring and water trucks);
- Rehabilitate access tracks not required after construction, to minimise the potential for erosion and inappropriate vehicular access; and
- If contaminated land (such as visually impacted or odorous soil) is encountered during the construction phase, conduct a risk assessment immediately.

Measures to prevent the spread of weed seeds should be included in the strategy and integrated with the weed management strategy outlined in Recommendation 11.

6.3 Operational Phase

Recommendation 13: Develop and implement detailed strategies to minimise the impacts of operations.

Develop and implement best-practice site management measures within an Operational Environmental Management Plan (OEMP) framework. A specific OEMP should be developed for operation and maintenance the transmission gas pipeline.

The OEMP should include strategies and protocols relating to soil and water management, protection of retained vegetation and rehabilitation areas, fauna protection, site closure and rehabilitation strategies, containment of waste, an emergency response program for accidental spills and other emergencies, and monitoring / auditing protocols. Integrate strategies with activities conducted by other users of the sites and surrounding land managers (e.g. electrical supplier, graziers, NPWS).

Develop induction programs for the OEMP and induct all site workers involved in operation and maintenance activities (whether directly or indirectly) into the appropriate OEMP prior to their commencement of duties.

Specific strategies should include, but not necessarily be limited to:

- Access protocols for operations and maintenance personnel;
- Fire management (e.g. ignition suppression devices such as spark arrestors on equipment, fire-fighting equipment, fuel load control around assets, planned burns);
- Installation, monitoring, maintenance and repair of sediment and erosion control devices including matting to minimise the compaction and / or erosion of soft or erodible soils in sensitive areas such as watercourses and wetlands;
- Track and firebreak maintenance and repair procedures and schedules;
- Vegetation control protocols within easements and around assets (e.g. slashing, herbicide application, tree lopping and trimming);
- Weed management and hygiene;
- Maintenance of any rehabilitation areas created during construction;
- Monitoring areas of natural vegetation with high ecological values and / or sensitivity within or adjacent to the development (e.g. Endangered Ecological Communities, wetlands, riparian areas, important habitats for protected wildlife);
- Containment of contaminants such as gross pollutants, acid leachates, weed seeds, fuels and oils, chemicals, etc.; and
- Contact details for qualified veterinarian staff to assess and treat or euthanase (as necessary) any large native vertebrates that are seriously injured.

7.0 Conclusion

The proposed pipeline will involve the installation of a new 18 inch natural gas transmission „looping pipeline“ between the townships of Young and Bethungra. The new pipeline will be installed adjacent to an existing 12 inch 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 majority of the proposed pipeline is cleared, with a dense ground cover of exotic pasture grasses. Most cleared areas have very few trees, but regrowth of native tree species was observed in some areas. Based on field and desktop information, approximately 67.7 km (96.7%) of the proposed pipeline ROW is cleared. Assuming a 30 m right of way (ROW) would be cleared along the proposal site; the total disturbance area would be approximately 210 ha.

Based on available CMA and VCA mapping approximately 2.3 km of remnant native vegetation is transected by the proposed 70 km pipeline route. The proposed pipeline route would require clearing of up to 6.9 ha of remnant vegetation, assuming clearance of a 30 m ROW for the proposed pipeline construction. However the actual area of clearing is likely to be lower than this estimate. This clearing of vegetation would potentially impact 2.46 ha of one Endangered Ecological Community listed under the TSC Act. The proposed removal of this EEC potentially will require compensation in the form of a biodiversity offset, subject to the requirements of DECCW.

The clearing of vegetation would also impact one Critically Endangered Ecological Community listed under the EPBC Act with the proposed removal of 1.66 ha of EPBC Box-Gum Woodland and Derived Native Grassland in three sections (KP 34, 55.2 and 65.55). This issue will require specific address in a Referral of Proposed Action to DSEWPC.

No threatened fauna species listed under the EPBC Act or the TSC Act were found within the proposal site. However, an assessment of potential habitat suggests that 34 threatened fauna species could have potential habitat within the proposal site, and five of these species were identified as likely to occur within the proposal site following assessment of species distribution and suitable habitat within the proposal site.

The proposed pipeline construction and operation may have significant impacts on threatened flora and fauna, and other important natural values of the proposal site. Mitigation measures proposed during the pre-construction, construction and operational phases are designed to avoid, minimise and / or mitigate these potential impacts.

On 4 July 2009, the Director-General's Environmental Assessment requirements were issued for the proposed project, pursuant to Section 75F (2) of the *Environmental Planning and Assessment Act 1979* (EP&A Act). The requirements reflect the project's „major project“ classification and are based on the information provided to date, including the Planning Focus Meeting held on 11 April 2009 and through consultation with relevant Government agencies. An ecological assessment is required by the Director General's requirements.

This Flora and Fauna Assessment Report has been prepared as part of an Environmental Assessment under Part 3A of the EP&A Act and meets the specific requirements relating to ecological assessment of the project as prescribed by the Director General's requirements.

References

AECOM (2009) Flora and Fauna Assessment Report Stage 1 Duplication of 131 km natural gas pipeline from Young to Wagga Wagga.

APIA (2005) *Code of Environmental Practice – Onshore Pipelines*. Australian Pipeline Industry Association, Kingston, ACT.

Ayers, D. and Wallace, G (1997) Pipeline trenches: an under-utilised resource for finding fauna. Pp. 349-357 in: Hale, P. and Lamb, D. (eds) *Conservation Outside Nature Reserves*. Centre for Conservation Biology, The University of Queensland, Brisbane.

Bali R (2000). *Discussion Paper: Compensating for Edge Effects*. Biosis Research Pty Ltd, Sydney. Report to NSW Roads & Traffic Authority.

Benson, J.S. (2008) New South Wales Vegetation Classification and Assessment: Part 2 Plant communities in the NSW South-western Slopes Bioregion and update of NSW Western Plains plant communities. Version 2 of the NSW VCA database. *Cunninghamia* 10(4): 599-673.

DECC (2006) Reconstructed and extant distribution of native vegetation in the Lachlan Catchment. NSW Department of Environment and Conservation, Dubbo.

DECC (2007) The Native Vegetation of the Southern Wheat-Sheep Belt" Reconstructed and extant distribution of native vegetation in the Murray and Murrumbidgee catchments, NSW Department of Environment and Conservation

DECCW (2010). *Threatened Species Profiles*: Department of Environment and Climate Change, Sydney, viewed March, 2011, <http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/home_species.aspx>

DECCW (2009) Interpretation of High Resolution Digital Aerial Photography in a Digital 3D Environment to Map NSW VCA Plant Community Types in the Lower South-West Slopes of NSW. Technical Report. NSW Department of Environment, Climate Change and Water. Unpublished.

DECCW (2010) Key threatening processes, Department of Environment and Climate Change, Sydney. Accessed at URL: http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/pas_ktp.aspx. Accessed in March, 2011

DECCW (2011a) Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions - Endangered Ecological Community Listing. Viewed March 2011 - March, 2011, <<http://www.environment.nsw.gov.au/determinations/MyallWoodlandWesternEndSpListing.htm>>

DECCW (2011b) Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions - Endangered Ecological Community Listing. Viewed March 2011 - March, 2011, < <http://www.environment.nsw.gov.au/determinations/EucalyptusMicrocarpaEndCom.htm>>

DEH (2006) EPBC Act Policy Statement 3.5 Guidelines for White Box – Yellow Box – Blakely's Red Gum Grassy Woodlands and Derived Native Grasslands, Department of the Environment and Heritage, Commonwealth of Australia

DEWHA (2009) EPBC Act Policy Statement 3.17 Guidelines for Weeping Myall Woodlands, Department of the Environment, Water, Heritage and Arts, Commonwealth of Australia.

DEWHA (2010) Farming and the Nationally Protected Grey Box Woodlands and Grasslands, Department of the Environment, Water, Heritage and Arts, Commonwealth of Australia.

Doody, J.S., West, P., Stapley, J., Welsh, M., Tucker, A., Guarino, E., Pauza, M., Bishop, N., Head, M., Dennis, S., West, G., Pepper, A. and Jones, A (2003) Fauna by-catch in pipeline trenches: conservation, animal ethics, and current practices in Australia. *Australian Zoologist* 32:410-419.

Gibbons P. and Lindenmayer D.B (2002) *Tree Hollows and Wildlife Conservation in Australia*. CSIRO Publishing, Melbourne.

Keith, D. (2002) A Compilation Map of Native Vegetation for New South Wales. New South Wales Government, Sydney.

NPWS (undated) Identification Guidelines for Endangered Ecological Communities: White Box Yellow Box Blakely's Red Gum Woodland (Box-Gum Woodland). NSW National Parks and Wildlife Service. Viewed March 2011, <<http://www.environment.nsw.gov.au/resources/nature/box-gumldGuidelines.pdf>>

Shah B., Shine R., Hudson S. and Kearney M (2004) An experimental study of retreat-site selection by thick-tailed geckos, *Nephurus milii*. *Austral Ecology*, 29: 547-552.

Shine R., Webb J.K., Fitzgerald M., Sumner J (1998) The impact of bush-rock removal on an endangered snake species, *Hoplocephalus bungaroides*. *Wildlife Research*, 25: 285-295.

Webb J.K. and Shine R (2000) Paving the way for habitat restoration: can artificial rocks restore degraded habitats for endangered reptiles? *Biological Conservation*, 92: 93-99.

Wilson S. and Swan G (2004) Life in the trenches: a happy mix of pipeline construction and wildlife conservation. P. 20 in D. Hogarth.(ed.). *North Queensland Gas Pipeline – An Alliance Perspective*. <http://www.enertrade.com.au/PDFS/NQGP%20-%20An%20Alliance%20Perspective.pdf>

Wilson, S (2005) Wildlife patrol on Australia's longest pit trap. *Australian Geographic* 79:26-27.

Woinarski, J.C.Z., Armstrong, M., Brennan, K., Connors, G.T., Milne, D., McKenzie, G. and Edwards, K (2000) A different fauna? Captures of vertebrates in a pipeline trench, compared with conventional survey techniques; and a consideration of mortality patterns in a pipeline trench. *Australian Zoologist* 31:421-431.

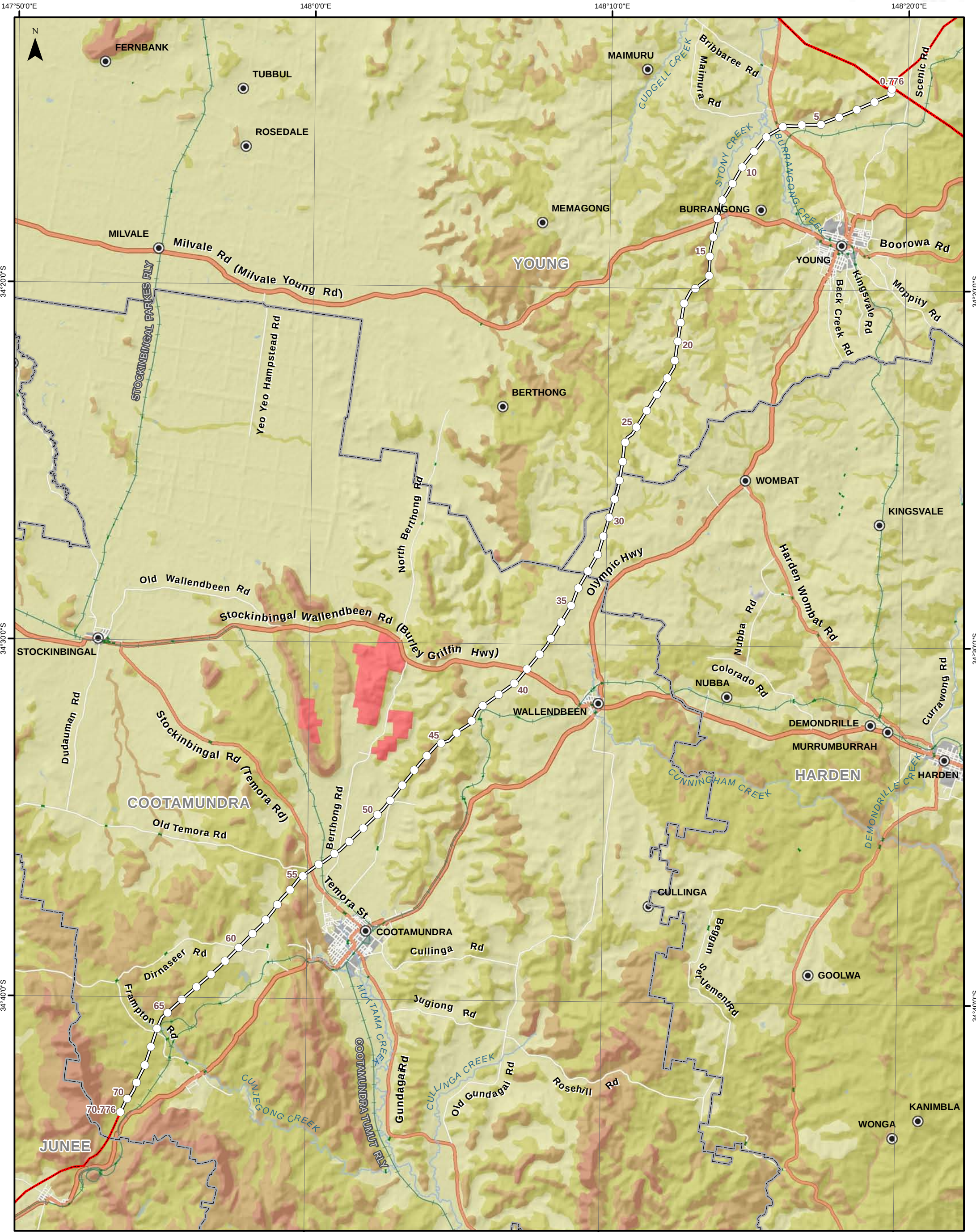
Wormington K. & Lamb D (1999) Tree hollow development in wet and dry sclerophyll eucalypt forest in south-east Queensland, Australia. *Australian Forestry*, 62: 336-345.

Figures

Figures

Map 1: Alignment Map

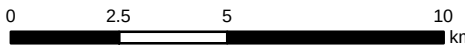
Figures 1A to 1H: TSC and EPBC Box Gum



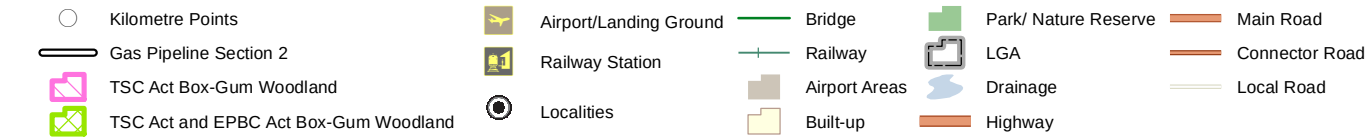
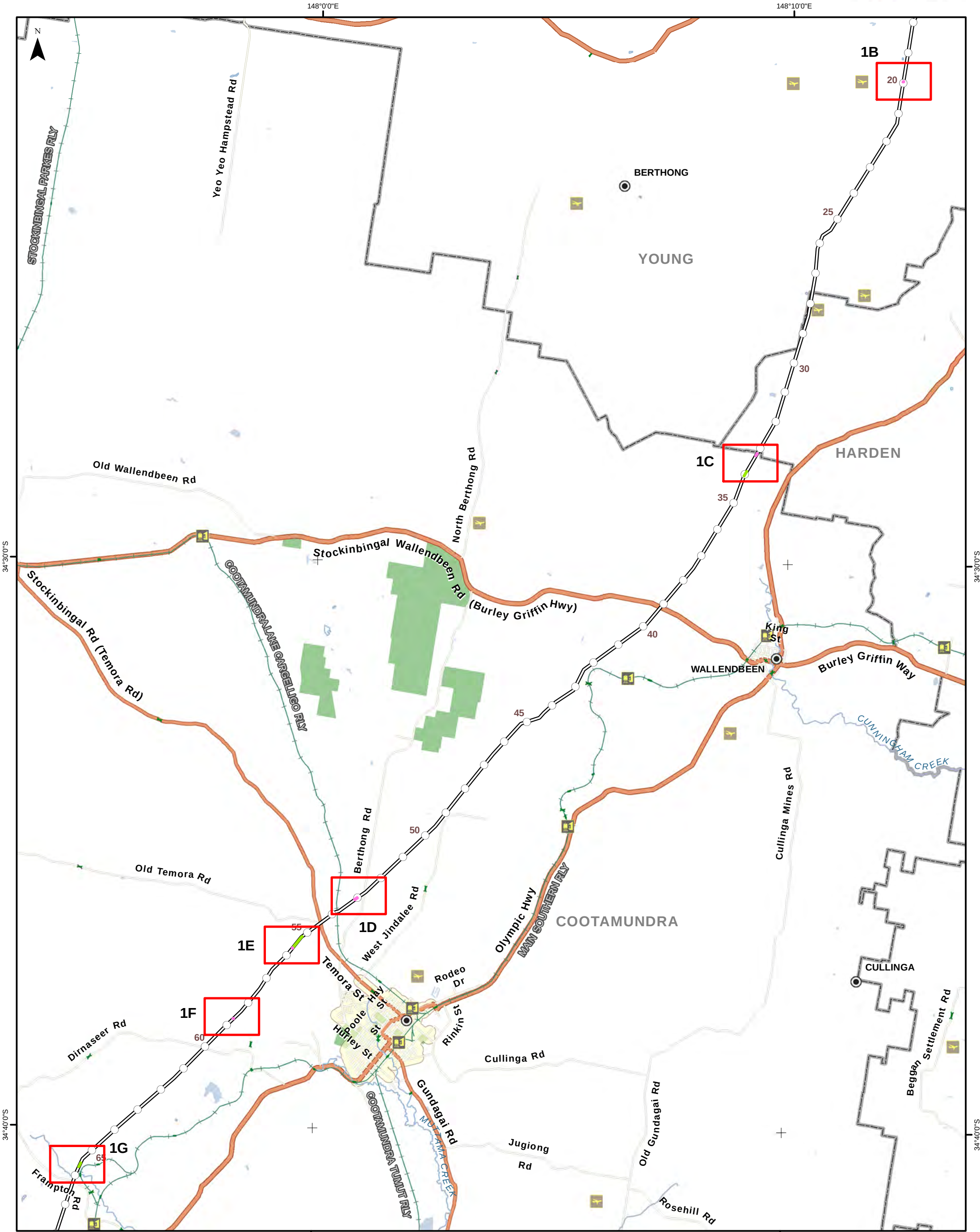
- | | | |
|--|----------------|------------------------|
| Suitable for grazing with no cultivation | Nature reserve | Kilometre Points |
| Suitable for grazing with occasional cultivation | Urban area | Gas Pipeline Section 2 |
| Suitable for regular cultivation | Other | Localities |
| State forest | LGA | Drainage |

APA YOUNG - WAGGA WAGGA PIPELINE SECTION 2
Land Capability

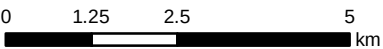
Source: LPMA (2010), StreetPro (2009), ABS (2010), DIPNR (2010)



MAR 2011
60189491



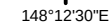
YOUNG - WAGGA WAGGA PIPELINE SECTION 2
Threatened Ecological Communities
Source: AECOM (2011), LPMA (2010), StreetPro (2009), ABS (2006)



GDA94 - MGA Zone 55

JUL 2011
60189491

Fig. **1A**



- Fig. 1B**

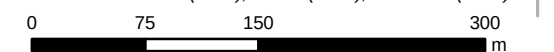


- | | | | | | |
|---------------------------------------|------------------------|----------------|----------------------|----------------|-----------------|
| ○ 200m Interval Point | Airport/Landing Ground | Bridge | Airport Area | Highway | Path |
| Gas Pipeline Section 2 | Railway Station | Railway | Built-up | Main Road | Private Road |
| TSC Act Box-Gum Woodland | ⊙ Locality | Major Drainage | Park/ Nature Reserve | Connector Road | Unsealed Road |
| TSC Act and EPBC Act Box-Gum Woodland | ● Facility | Minor Drainage | Suburb | Local Road | Vehicular Track |

YOUNG - WAGGA WAGGA PIPELINE SECTION 2

Threatened Ecological Communities

Source: AECOM (2011), LPMA (2010), StreetPro (2009)



JULY 2011

60189491

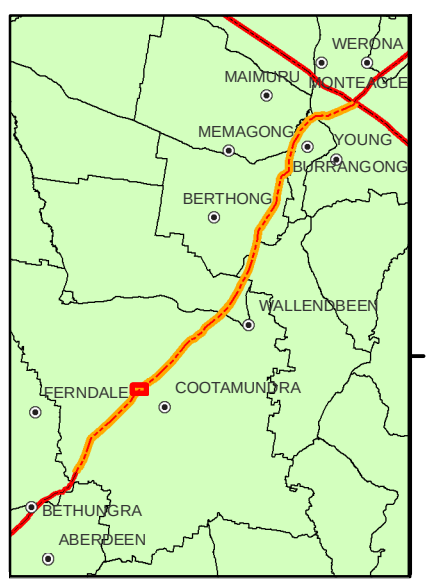
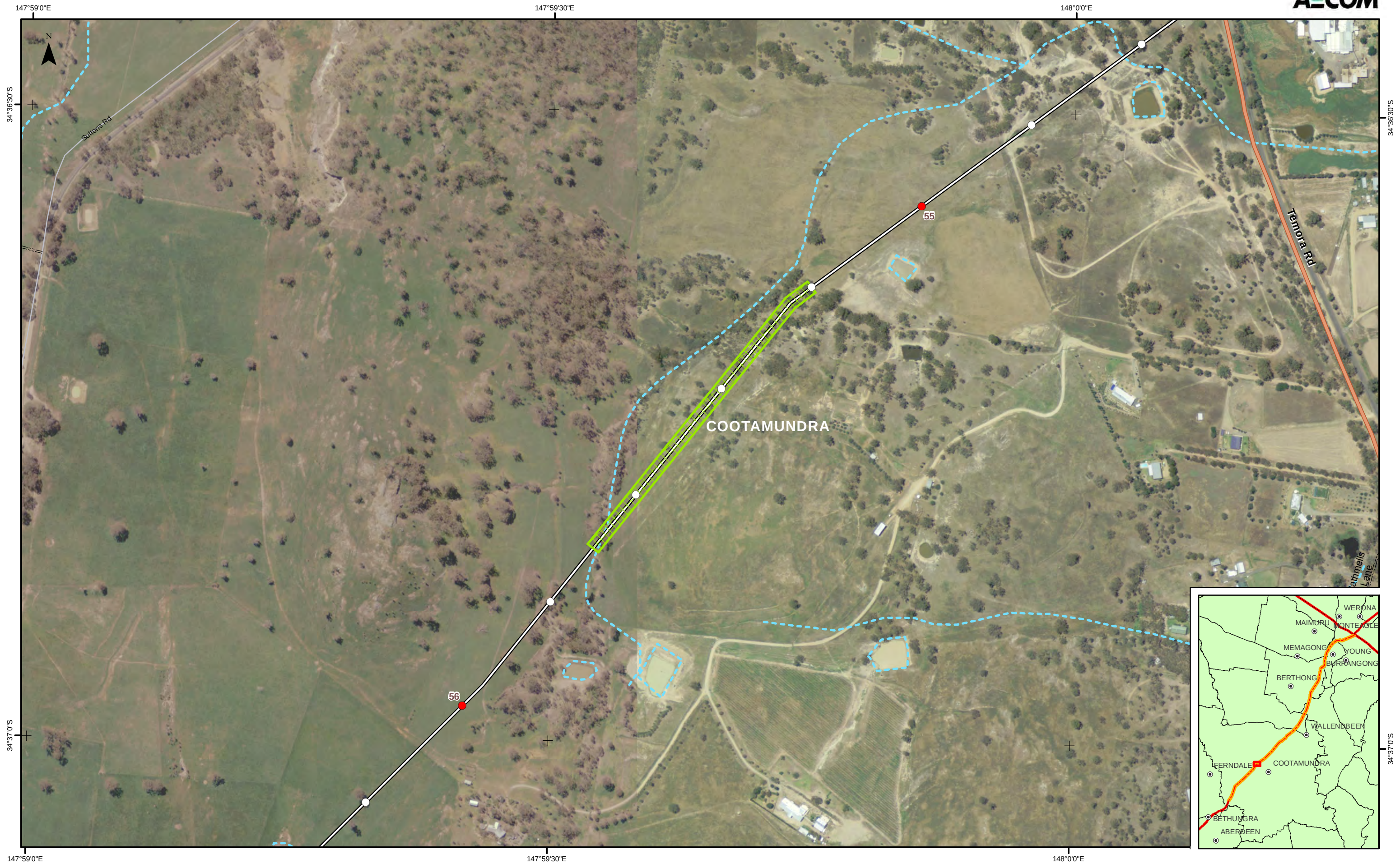
Fig. **1C**



- | | | | | | |
|---|--------------------------|------------------|------------------------|------------------|----------------------|
| ○ 200m Interval Point | ✈ Airport/Landing Ground | — Bridge | ✈ Airport Area | — Highway | — Path |
| — Gas Pipeline Section 2 | 🚂 Railway Station | — Railway | 📁 Built-up | — Main Road | — Private Road |
| 🟡 TSC Act Box-Gum Woodland | 📍 Locality | 🌊 Major Drainage | 🌳 Park/ Nature Reserve | — Connector Road | — Unsealed Road |
| 🟢 TSC Act and EPBC Act Box-Gum Woodland | ● Facility | 🌊 Minor Drainage | 🏘 Suburb | — Local Road | ==== Vehicular Track |

YOUNG - WAGGA WAGGA PIPELINE SECTION 2
Threatened Ecological Communities
Source: AECOM (2011), LPMA (2010), StreetPro (2009)

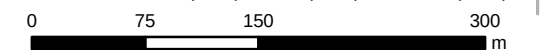
0 75 150 300 m
GDA94 - MGA Zone 55



- | | | | | | |
|---------------------------------------|------------------------|----------------|----------------------|----------------|-----------------|
| ○ 200m Interval Point | Airport/Landing Ground | Bridge | Airport Area | Highway | Path |
| Gas Pipeline Section 2 | Railway Station | Railway | Built-up | Main Road | Private Road |
| TSC Act Box-Gum Woodland | ⊙ Locality | Major Drainage | Park/ Nature Reserve | Connector Road | Unsealed Road |
| TSC Act and EPBC Act Box-Gum Woodland | ● Facility | Minor Drainage | Suburb | Local Road | Vehicular Track |

YOUNG - WAGGA WAGGA PIPELINE SECTION 2
Threatened Ecological Communities

Source: AECOM (2011), LPMA (2010), StreetPro (2009)



GDA94 - MGA Zone 55

JULY 2011
60189491

Fig. 1E

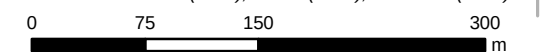


- | | | | | | |
|---------------------------------------|------------------------|----------------|----------------------|----------------|-----------------|
| ○ 200m Interval Point | Airport/Landing Ground | Bridge | Airport Area | Highway | Path |
| Gas Pipeline Section 2 | Railway Station | Railway | Built-up | Main Road | Private Road |
| TSC Act Box-Gum Woodland | ⊙ Locality | Major Drainage | Park/ Nature Reserve | Connector Road | Unsealed Road |
| TSC Act and EPBC Act Box-Gum Woodland | ● Facility | Minor Drainage | Suburb | Local Road | Vehicular Track |

YOUNG - WAGGA WAGGA PIPELINE SECTION 2

Threatened Ecological Communities

Source: AECOM (2011), LPMA (2010), StreetPro (2009)



GDA94 - MGA Zone 55

JULY 2011

60189491

Fig. **1F**

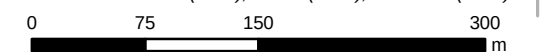


- | | | | | | |
|---------------------------------------|------------------------|----------------|----------------------|----------------|-----------------|
| ○ 200m Interval Point | Airport/Landing Ground | Bridge | Airport Area | Highway | Path |
| Gas Pipeline Section 2 | Railway Station | Railway | Built-up | Main Road | Private Road |
| TSC Act Box-Gum Woodland | ⊙ Locality | Major Drainage | Park/ Nature Reserve | Connector Road | Unsealed Road |
| TSC Act and EPBC Act Box-Gum Woodland | ● Facility | Minor Drainage | Suburb | Local Road | Vehicular Track |

YOUNG - WAGGA WAGGA PIPELINE SECTION 2

Threatened Ecological Communities

Source: AECOM (2011), LPMA (2010), StreetPro (2009)



JULY 2011

60189491

Fig. **1G**

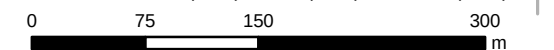


- | | | | | | |
|---------------------------------------|------------------------|----------------|----------------------|----------------|-----------------|
| ○ 200m Interval Point | Airport/Landing Ground | Bridge | Airport Area | Highway | Path |
| Gas Pipeline Section 2 | Railway Station | Railway | Built-up | Main Road | Private Road |
| TSC Act Box-Gum Woodland | ⊙ Locality | Major Drainage | Park/ Nature Reserve | Connector Road | Unsealed Road |
| TSC Act and EPBC Act Box-Gum Woodland | ● Facility | Minor Drainage | Suburb | Local Road | Vehicular Track |

YOUNG - WAGGA WAGGA PIPELINE SECTION 2

Threatened Ecological Communities

Source: AECOM (2011), LPMA (2010), StreetPro (2009)



GDA94 - MGA Zone 55

JULY 2011

60189491

Fig. **1H**

Appendix A-A

Tables

Appendix A-A Tables

Table 5 Flora Species Recorded During Field Surveys at 28 Sites

Common Name	Scientific Name	NSW Weed Status	Site Number																											
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
Native Species																														
Silver wattle	<i>Acacia dealbata</i>		x																											
Weeping myall	<i>Acacia pendula</i>		x																											
Black she-oak	<i>Allocasuarina littoralis</i>		x																											
Mistletoe	<i>Amyena sp.</i>			x																										
Wallaby grass	<i>Austrodanthonia sp.</i>				x		x			x							x					x			x	x	x		x	
Corkscrew speargrass	<i>Austrostipa scabra</i>			x																							x			x
Red-leg grass	<i>Bothriochloa macra</i>			x																										
Sweet bursaria	<i>Bursaria spinosa</i>		x																											
Small crumbweed	<i>Chenopodium pumilio</i>														x	x		x		x		x								

Common Name	Scientific Name	NSW Weed Status	Site Number																												
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	
Windmill Grass	<i>Chloris truncata</i>				x						x											x									
Couch	<i>Cynodon dactylon</i>		x	x							x																				
Purple love-grass	<i>Eragrostis lacunaria</i>										x														x				x		
White Box	<i>Eucalyptus albens</i>				x									x								x			x	x	x	x			
Blakely's Red Gum	<i>Eucalyptus blakelyi</i>		x		x	x			x	x	x			x	x		x	x	x	x		x		x	x	x	x	x		x	x
Monkey grey gum	<i>Eucalyptus cypellocarpa</i>				x																										
Red stringybark	<i>Eucalyptus macrorrhyncha</i>																				x										
Yellow Box	<i>Eucalyptus melliodora</i>			x				x	x			x	x	x	x			x				x									
Mugga ironbark	<i>Eucalyptus sideroxylon</i>								x	x											x										
	<i>Eucalyptus sp. (juvenile)</i>																	x							x						
Native geranium	<i>Geranium solanderi</i>				x																										
	<i>Goodenia pinnatifida</i>		x	x																											

Common Name	Scientific Name	NSW Weed Status	Site Number																											
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
Hyssop loosestrife	<i>Lythrum hyssopifolia</i>																					x								
Grassland wood sorrel	<i>Oxalis perennans</i>											x	x		x		x				x									
Hairy panic	<i>Panicum effusum</i>										x				x	x				x		x			x	x				x
Common reed	<i>Phragmites australis</i>										x																			
Jersey cudweed	<i>Pseudognaphalium luteoalbum</i>																			x										
Swamp dock	<i>Rumex brownii</i>												x																	
	<i>Schloena</i> sp.										x																			
	<i>Trifolium</i> sp.											x	x			x														
Tufted Bluebell	<i>Wahlenbergia communis</i>				x																									
Non-native Species																														
Capeweed	<i>Arctotheca calendula</i>																								x					
Great brome	<i>Bromus diandrus</i>																	x												
Saffron	<i>Carthamus</i>	# (4)			x							x	x					x												

Common Name	Scientific Name	NSW Weed Status	Site Number																											
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
thistle	<i>lanatus</i>																													
Skeleton weed	<i>Chondrilla juncea</i>										x						x													
Spear thistle	<i>Cirsium vulgare</i>		x	x	x		x	x	x		x	x	x	x			x	x												
Wild melon	<i>Citrullus lanatus</i>																			x	x	x								
Paterson's curse	<i>Echium plantagineum</i>	# (4)	x	x	x					x	x			x	x		x	x		x										
Stinkgrasses	<i>Eragrostis cilianensis</i>																x			x		x			x					
Sugar gum	<i>Eucalyptus cladocalyx</i>		x									x	x																	
St John's wort	<i>Hypericum perforatum</i>	# (4)															x													
Flatweed	<i>Hypochaeris radicata</i>				x							x	x																	
Sharp rush	<i>Juncus acutus</i>				x																									
	<i>Lepidium africanum</i>									x																				
Lucerne	<i>Medicago sativa</i>														x			x												
Vasey grass	<i>Paspalum urvillei</i>										x						x									x				
Phalaris	<i>Phalaris</i>		x						x	x	x	x	x		x	x	x					x			x					

Common Name	Scientific Name	NSW Weed Status	Site Number																											
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
	<i>aquatica</i>																													
Rice millet	<i>Piptatherum miliaceum</i>								x																					
Lamb's tongues	<i>Plantago lanceolata</i>				x												x								x					
Wireweed	<i>Polygonum aviculare</i>													x						x				x						
Salad burnet	<i>Sanguisorba minor</i>				x																									
Black-berry nightshade	<i>Solanum nigrum</i>																		x											
Narrow-leaved clover	<i>Trifolium angustifolium</i>				x																									
Yellow suckling clover	<i>Trifolium dubium</i>				x																									
Common wheat	<i>Triticum aestivum</i>																			x										

Class: Under the NSW Noxious Weeds Act 1993, weed species are classified into 5 categories:
Classes 1 and 2: *This plant must be eradicated from the land and the land kept free of the plant.*
Class 3: *The plant must be fully and continuously suppressed and destroyed.*
Class 4: *The growth and spread of the plant must be controlled according to the measures specified in a management plan published by the local authority.*
Class 5: *The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with.*

Table 6 Vegetation Transected by the Proposed Pipeline Based on vegetation mapping by Catchment Management Authority (CMA) as described by Benson, 2006 (NSW VCA Mapping for Cootamundra / Junee Region), and Vegetation Classification and Assessment (VCA) as described by Keith, 2002 (Murrumbidgee and Lachlan CMA Mapping)

Vegetation	KP start	KP end	Length (km)	Clearing Area Required (ha) *
Non-remnant modified agricultural land	0.78	4.21	3.43	
White Box Yellow Box Blakely's Red Gum Woodland	4.21	4.32	0.12	0.36
Non-remnant modified agricultural land	4.32	6.09	1.77	
Red Stringybark - Blakely's Red Gum - Yellow Box Woodland	6.09	6.17	0.08	0.24
Non-remnant modified agricultural land	6.17	7.12	0.94	
White Box Yellow Box Blakely's Red Gum Woodland	7.12	7.17	0.05	0.15
Non-remnant modified agricultural land	7.17	10.48	3.31	
White Box Yellow Box Blakely's Red Gum Woodland	10.48	10.57	0.09	0.27
Non-remnant modified agricultural land	10.57	11.25	0.67	
White Box Yellow Box Blakely's Red Gum Woodland	11.25	11.30	0.05	0.15
Non-remnant modified agricultural land	11.30	20.39	9.09	
River Red Gum riparian woodland/forest on floodplains	20.39	20.42	0.04	0.12
Non-remnant modified agricultural land	20.42	27.93	7.50	
White Box Yellow Box Blakely's Red Gum Woodland	27.93	27.94	0.02	0.06
Non-remnant modified agricultural land	27.94	31.25	3.30	
White Box Yellow Box Blakely's Red Gum Woodland	31.25	31.30	0.06	0.18
Non-remnant modified agricultural land	31.30	32.43	1.12	
Yellow Box Woodland	32.43	32.50	0.08	0.24
Non-remnant modified agricultural land	32.50	33.09	0.59	
River Red Gum riparian woodland/forest on floodplains	33.09	33.34	0.25	0.75
Non-remnant modified agricultural land	33.34	33.86	0.52	
Yellow Box Woodland	33.86	34.04	0.18	0.54
Non-remnant modified agricultural land	34.04	34.79	0.75	
River Red Gum riparian woodland/forest on floodplains	34.79	34.84	0.05	0.15
Non-remnant modified agricultural land	34.84	46.50	11.66	
White Box - White Cypress Pine - Inland Grey Box shrub/grass/forb woodland in the NSW South-western	46.50	46.57	0.07	0.21

Vegetation	KP start	KP end	Length (km)	Clearing Area Required (ha) *
Slopes Bioregion				
Non-remnant modified agricultural land	46.57	46.64	0.07	
White Box - White Cypress Pine - Inland Grey Box shrub/grass/forb woodland in the NSW South-western Slopes Bioregion	46.64	46.71	0.07	0.21
Non-remnant modified agricultural land	46.71	53.01	6.30	
Blakelys Red Gum - Yellow Box grassy tall woodland of the NSW South-western Slopes Bioregion	53.01	53.12	0.11	0.33
Non-remnant modified agricultural land	53.12	53.62	0.49	
Blakelys Red Gum - Yellow Box grassy tall woodland of the NSW South-western Slopes Bioregion	53.62	53.67	0.05	0.15
Non-remnant modified agricultural land	53.67	54.49	0.82	
Inland Grey Box tall grassy woodland on alluvial loam and clay soils in the NSW South Western Slopes and Riverina Bioregions	54.49	54.63	0.14	0.42
Non-remnant modified agricultural land	54.63	54.67	0.04	
Inland Grey Box tall grassy woodland on alluvial loam and clay soils in the NSW South Western Slopes and Riverina Bioregions	54.67	54.71	0.05	0.15
Non-remnant modified agricultural land	54.71	54.79	0.08	
Blakelys Red Gum - Yellow Box grassy tall woodland of the NSW South-western Slopes Bioregion	54.79	54.84	0.05	0.15
Non-remnant modified agricultural land	54.84	55.64	0.80	
Blakelys Red Gum - Yellow Box grassy tall woodland of the NSW South-western Slopes Bioregion	55.64	55.70	0.06	0.18
Non-remnant modified agricultural land	55.70	55.75	0.06	
Blakelys Red Gum - Yellow Box grassy tall woodland of the NSW South-western Slopes Bioregion	55.75	55.86	0.11	0.33
Non-remnant modified agricultural land	55.86	57.41	1.55	
Inland Grey Box tall grassy woodland on alluvial loam and clay soils in the NSW South Western Slopes and Riverina Bioregions	57.41	57.54	0.13	0.39
Non-remnant modified agricultural land	57.54	58.68	1.14	
Blakelys Red Gum - Yellow Box grassy tall woodland of the NSW South-western Slopes Bioregion	58.68	58.72	0.05	0.15
Non-remnant modified agricultural land	58.72	64.59	5.87	
White Box grassy woodland in the upper slopes sub-region of the NSW South-western Slopes Bioregion	64.59	64.65	0.06	0.18
Non-remnant modified agricultural land	64.65	65.56	0.90	

Vegetation	KP start	KP end	Length (km)	Clearing Area Required (ha) *
Blakelys Red Gum - Yellow Box grassy tall woodland of the NSW South-western Slopes Bioregion	65.56	65.75	0.19	0.57
Non-remnant modified agricultural land	65.75	68.41	2.66	
Blakelys Red Gum - Yellow Box grassy tall woodland of the NSW South-western Slopes Bioregion	68.41	68.52	0.11	0.33
Non-remnant modified agricultural land	68.52	70.78	2.26	
Total Clearing				6.96

*Maximum area of remnant vegetation that would be cleared assuming 30 m ROW is fully vegetated.

Table 7 Flora Species and Ecological Communities Listed under Commonwealth and / or State Legislation and Identified from Database Searches as Previously Recorded from the Wider Study Area, or with Geographical Ranges that Overlap the Wider Study Area with Preferred Habitat.

Scientific Name	Common name	Status		Preferred Habitat	Likelihood of Habitat Suitable for Species Within or Adjacent to Study Area	Recorded During Field Survey	Further Assessment Required
		EPBC*	TSC^				
<i>Ammobium craspedioides</i>	Yass daisy	V	V	Found from near Crookwell on the Southern Tablelands to near Wagga Wagga on the South Western Slopes. Most populations are in the Yass region. Found in dry forest, Box-Gum Woodland and secondary grassland derived from clearing of these communities. Grows in association with a large range of eucalypts (<i>Eucalyptus blakelyi</i> , <i>E. bridgesiana</i> , <i>E. dives</i> , <i>E. goniocalyx</i> , <i>E. macrorhyncha</i> , <i>E. mannifera</i> , <i>E. melliodora</i> , <i>E. polyanthemos</i> , <i>E. rubida</i>). Apparently unaffected by light grazing, as populations persist in some grazed sites.	Likely	No	Yes
<i>Caladenia arenaria</i>	Sand-hill spider-orchid	E	E	Occurs in woodland with sandy soil, especially that dominated by White Cypress Pine (<i>Callitris glaucophylla</i>).	Unlikely	No	No
<i>Caladenia concolor</i>	Crimson spider-orchid	V	V	Habitat is regrowth woodland on granite ridge country that has retained a high diversity of plant species, including other orchids. The dominant trees are Blakely's Red Gum (<i>Eucalyptus blakelyi</i>), Red Stringybark (<i>E. macrorhyncha</i>), Red Box (<i>E. polyanthemos</i>) and White Box (<i>E. albens</i>).	Unlikely	No	No
<i>Cullen parvum</i>	Small scurf-pea	-	E	Known populations in Victoria and NSW. Plants are found in grassland, River Red Gum (<i>Eucalyptus camaldulensis</i>) Woodland and even grazing country and table drains, in areas with rainfall of between 450 and 700 mm. Plants often occur near watercourses. Plants tend to die back over summer and resprout with rain in winter or spring; in dry years, plants apparently do not always produce shoots but survive below the ground.	Unlikely	No	No
<i>Diuris tricolor</i>	Pine donkey orchid	V	V	Sporadically distributed on the western slopes of NSW, extending from south of Narrandera all the way to the far north of NSW. This plant is associated with species including <i>Callitris glaucophylla</i> , <i>Eucalyptus populnea</i> , <i>Eucalyptus intertexta</i> , Ironbark and Acacia shrubland. The understorey is often grassy with herbaceous plants such as Bulbine species.	Unlikely	No	No

Scientific Name	Common name	Status		Preferred Habitat	Likelihood of Habitat Suitable for Species Within or Adjacent to Study Area	Recorded During Field Survey	Further Assessment Required
		EPBC*	TSC^				
<i>Euphrasia collina</i> subsp. <i>Muelleri</i>	Mueller's Eyebright	E	E	Recorded in NSW in the upper Murray and McIntyre Rivers and was last recorded in NSW near Dorrigo in 1904 and near Cootamundra in 1887. Little is known about the habitat this species preferred, although there is a reference to "damp places" in an early von Mueller collection. Extant populations in Victoria occur in healthy woodland. Flowering has generally been recorded in spring and early summer, although one flowering collection from Dorrigo in 1904 was made in July.	Unlikely	No	No
<i>Grevillea wilkinsonii</i>	Tumut grevillea	E	E	Found in two areas: one is a 4.5 km stretch of the Goobarragandra River, approximately 18 km south-east of Tumut; the other at a small site near Gundagai. The associated native vegetation includes remnant riverine shrub communities adjacent to open-forest, with the most common tree species being Blakely's Red Gum (<i>Eucalyptus blakelyi</i>), Apple Box (<i>E. bridgesiana</i>), Yellow Box (<i>E. melliodora</i>), and Red Stringybark (<i>E. macrorhyncha</i>) and with Kurrajongs (<i>Brachychiton populneus</i>) growing in nearby paddocks.	Unlikely	No	No
<i>Leucochrysum albicans</i> var. <i>tricolor</i>	Hoary sunray	E	-	Occurs in grasslands, grassy areas in woodlands and dry open forests, and modified habitats, on a variety of soil types including clays, clay loams, stony and gravely soil.	Likely	No	Yes
<i>Pilularia novae-hollandiae</i>	Austral pillwort	-	E	The population at Lake Cowal is the only known extant population in NSW. Austral Pillwort grows in shallow swamps and waterways, often among grasses and sedges. It is most often recorded in drying mud as this is when it is most conspicuous. Most of the records in the Albury-Urana area were from table drains on the sides of roads. This species is probably ephemeral (especially in the drier parts of its range), appearing when soils are moistened by rain.	Unlikely	No	No

Scientific Name	Common name	Status		Preferred Habitat	Likelihood of Habitat Suitable for Species Within or Adjacent to Study Area	Recorded During Field Survey	Further Assessment Required
		EPBC*	TSC^				
<i>Pomaderris cotoneaster</i>	Cotoneaster pomaderris	E	E	Has a very disjunct distribution, being known from the Nungatta area, northern Kosciuszko National Park (near Tumut), the Tantawangalo area in South-East Forests National Park and adjoining freehold land, Badgery's Lookout near Tallong, the Yerranderie area, the Canyonleigh area and Ettrema Gorge in Morton National Park. Cotoneaster Pomaderris has been recorded in a range of habitats in predominantly forested country. The habitats include forest with deep, friable soil, amongst rock beside a creek, on rocky forested slopes and in steep gullies between sandstone cliffs.	Unlikely	No	No
<i>Prasophyllum petilum</i>	Tarengo leek orchid	E	E	Known from two sites in the NSW Southern Tablelands; at Boorowa and Captains Flat. Also at Hall in the Australian Capital Territory. Grows in open sites within Natural Temperate Grassland at the Boorowa site. Also grows in grassy woodland in association with River Tussock (<i>Poa labillardieri</i>) Black Gum (<i>Eucalyptus aggregata</i>) and tea-trees (<i>Leptospermum</i> spp.) at Captains Flat and within the grassy groundlayer of Box-Gum Woodland at Hall. Flowers in October at Boorowa and December at Captains Flat.	Unlikely	No	No
<i>Pultenaea humilis</i>	Dwarf bush pea	-	V	Rare in New South Wales and Tasmania, but relatively common in Victoria. In NSW, <i>Pultenaea humilis</i> is currently known from three confirmed localities in the NSW South Western Slopes bioregion. Occurs on a variety of soils ranging from sandy loams to clays. <i>Pultenaea humilis</i> is found in isolated remnants of native woodland and forest communities that occur in extensively cleared agricultural landscapes.	Unlikely	No	No
<i>Senecio garlandii</i>	Woolly ragwort	V	V	Occurs on sheltered slopes of rocky outcrops. Flowering occurs in spring.	Unlikely	No	No
<i>Swainsona sericea</i>	Silky Swainson-pea	-	V	Recorded from the Northern Tablelands to the Southern Tablelands and further inland on the slopes and plains. Found in Box-Gum Woodland in the Southern Tablelands and South West Slopes.	Likely	No	Yes

* Status under the EPBC Act (CE- Critically Endangered, E- Endangered, V- Vulnerable); ^ Status under the TSC Act (E- Endangered, V- Vulnerable).

Table 8 Fauna Species Observed During the Field Surveys.

Scientific Name	Common Name	KP	Notes
BIRDS			
<i>Anas superciliosa</i>	Pacific black duck	11.3	
<i>Anhinga melanogaster</i>	Darter	32.9, 35.3	
<i>Cacatua galerita</i>	Sulphur crested cockatoo	11.3, 33.3	
<i>Chenonetta jubata</i>	Australian wood duck	32.9	
<i>Coracina novaehollandiae</i>	Black-faced cuckoo-shrike	54.7	
<i>Corcorax melanorhamphos</i>	White-winged chough	33.9, 53.1	
<i>Coturnix pectoralis</i>	Stubble quail	6.1	
<i>Dacelo novaeguineae</i>	Laughing kookaburra	33.3, 35.3, 53.1, 54.7	
<i>Eolophus roseicapillus</i>	Galah	35.3, 46.5	
<i>Gymnorhina tibicen</i>	Australian magpie	23, 27.9, 46.5, 54.7, 57.5	
<i>Lalage tricolor</i>	White Winged triller	53.1	
<i>Malurus splendens</i>	Splendid fairy wren	23	
<i>Manorina melanocephala</i>	Noisy minor	11.3, 33.3, 53.1	
<i>Milvus migrans</i>	Black kite	46.5	
<i>Phalacrocorax varius</i>	Pied cormorant	32.9	Breeding, juveniles in nest
<i>Platycercus elegans</i>	Crimson rosella	53.1	
<i>Platycercus eximius</i>	Eastern rosella	11.3, 20.4, 33.3, 35.3, 46.5, 54.7	
<i>Tachybaptus novaehollandiae</i>	Australasian grebe	11.3, 32.9	
<i>Threskiornis molucca</i>	Australian white ibis	11.3, 32.9	Breeding, juveniles in nest
<i>Threskiornis spinicollis</i>	Straw-necked ibis	35.3	
<i>Todairamphus pyrrhopygia</i>	Red-backed kingfisher	54.7	
<i>Rhipidura leucophrys</i>	Willie wagtail	6.1	
AMPHIBIANS			
<i>Limnodynastes tasmaniensis</i>	Spotted grass frog	6.1	
<i>Litoria peronii</i>	Peron's tree frog	6.1	
<i>Litoria tyleri</i>	Tyler's tree frog	6.1	
REPTILES			
<i>Chelodina longicollis</i>	Long-necked turtle	32.9	
<i>Ctenotus sp.</i>		23	
MAMMALS			
<i>Austronomus australis</i>	White-striped freetail bat	6.1	Detected by ANABAT
<i>Chalinolobus gouldii</i>	Gould's wattled bat	6.1	Detected by ANABAT
<i>Chalinolobus morio</i>	Chocolate wattled bat	6.1	Detected by ANABAT
<i>Mormopterus 'species 4'</i>	Southern free-tailed bat	6.1	Detected by ANABAT
<i>Petaurus sp.</i>	A glider	6.1	

Scientific Name	Common Name	KP	Notes
<i>Scotorepens balstoni</i>	Western broad-nosed bat	6.1	Detected by ANABAT
<i>Trichosurus vulpecula</i>	Brush-tailed possum	32.9	
<i>Vulpes vulpes</i> *	Red fox	6.1	

* Introduced species

Table 9 Fauna Species Listed under Commonwealth and / or State Legislation and Identified from Database Searches as Previously Recorded from the Wider Study Area, or with Geographical Ranges that Overlap the Wider Study Area with Preferred Habitat.

Scientific Name	Common name	Status		Preferred Habitat	Likelihood of Habitat Suitable for Species Within or Adjacent to Study Area	Recorded During Field Survey	Further Assessment Required
		EPBC*	TSC^				
BIRDS							
<i>Anthochaera phrygia</i> (<i>Xanthomya phrygia</i>)	Regent Honeyeater	E	CE	Dry box-ironbark eucalypt woodland and dry sclerophyll forest associations.	Likely	No	Yes
<i>Burhinus grallarius</i>	Bush Stone-curlew		E	Open forests and woodlands with a sparse grassy ground layer, leaf litter and fallen timber.	Likely	No	Yes
<i>Callocephalon fimbriatum</i>	Gang-gang Cockatoo		V	In summer, generally found in tall mountain forests and woodlands, particularly in heavily timbered and mature wet sclerophyll forests. In winter, may occur at lower altitudes in drier more open eucalypt forests and woodlands, and often found in urban areas.	Possible	No	Yes
<i>Calyptorhynchus lathami</i>	Glossy black-Cockatoo		V	Forests and woodland habitats from the central Queensland coast to East Gippsland in Victoria, and inland to the southern tablelands and central western plains of NSW.	Possible	No	Yes
<i>Circus assimilis</i>	Spotted Harrier		V	Grassy open woodland including acacia and mallee remnants, inland riparian woodland, grassland and shrub steppe (e.g. chenopods). Most commonly found in	Possible	No	Yes

Scientific Name	Common name	Status		Preferred Habitat	Likelihood of Habitat Suitable for Species Within or Adjacent to Study Area	Recorded During Field Survey	Further Assessment Required
		EPBC*	TSC^				
				native grassland, but also found in agricultural land, foraging over open habitats including edges of inland wetlands.			
<i>Climacteris picumnus victoriae</i>	Brown Treecreeper (eastern subspecies)		V	Eucalypt forests and woodlands dominated by stringybarks or other rough-barked eucalypts of inland plains and slopes of the Great Dividing Range. It is less commonly found on coastal plains and ranges. The western boundary of its range runs through Wagga Wagga, Temora, Forbes, Dubbo and Inverell.	Possible	No	Yes
<i>Epthianura albifrons</i>	White-fronted Chat		V	Damp open habitats, particularly wetlands containing saltmarsh areas that are bordered by open grasslands or lightly timbered lands.	Unlikely	No	No
<i>Glossopsitta pusilla</i>	Little Lorikeet		V	Old and new growth forests and woodlands from the coast to the western slopes of the Great Dividing Range, extending westwards to the vicinity of Albury, Parkes, Dubbo and Narrabri.	Likely	No	Yes
<i>Grantiella picta</i>	Painted Honeyeater		V	Boree, Brigalow and Box-Gum Woodlands and Box-Ironbark Forests. A specialist feeder on the fruits of mistletoes growing on woodland eucalypts and acacias.	Likely	No	Yes
<i>Grus rubicunda</i>	Brolga		V	Dry grassland, ploughed paddocks and desert claypans near shallow swamps.	Unlikely	No	No
<i>Lathamus</i>	Swift Parrot	E	E	On the mainland they	Possible	No	Yes

Scientific Name	Common name	Status		Preferred Habitat	Likelihood of Habitat Suitable for Species Within or Adjacent to Study Area	Recorded During Field Survey	Further Assessment Required
		EPBC*	TSC^				
<i>discolor</i>				occur in areas where eucalypts are flowering profusely or where there are abundant lerp (from sap-sucking bugs) infestations. Favours feed trees include winter flowering species such as Swamp Mahogany (<i>Eucalyptus robusta</i>), Spotted Gum (<i>Corymbia maculata</i>), Red Bloodwood (<i>C. gummifera</i>), Mugga Ironbark (<i>E. sideroxylon</i>), and White Box (<i>E. albens</i>).			
<i>Leipoa ocellata</i>	Malleefowl	V	E	Mallee communities and less frequently eucalypt woodlands, mulga woodlands or cypress pine woodland.	Unlikely	No	No
<i>Lophoictinia isura</i>	Square-tailed Kite		V	Timbered habitats including dry woodlands and open forests. Shows a particular preference for timbered watercourses.	Possible	No	Yes
<i>Melanodryas cucullata cucullata</i>	Hooded Robin (south-eastern form)		V	Lightly wooded country, usually open eucalypt woodland, acacia scrub and mallee, often in or near clearings or open areas. Requires structurally diverse habitats featuring mature eucalypts, saplings, some small shrubs and a ground layer of moderately tall native grasses.	Possible	No	Yes
<i>Melithreptus gularis gularis</i>	Black-chinned Honeyeater (eastern subspecies)		V	Rarely recorded east of the Great Dividing Range, although regularly observed from the Richmond River district. Inhabits upper levels of drier open forests or woodlands	Possible	No	Yes

Scientific Name	Common name	Status		Preferred Habitat	Likelihood of Habitat Suitable for Species Within or Adjacent to Study Area	Recorded During Field Survey	Further Assessment Required
		EPBC*	TSC^				
				dominated by box and ironbark eucalypts, especially <i>Eucalyptus sideroxylon</i> , <i>E. albens</i> , <i>E. microcarpa</i> , <i>E. melliodora</i> and <i>E. tereticornis</i> .			
<i>Neophema pulchella</i>	Turquoise Parrot		V	Eucalypt woodland adjoining clearings, timbered ridges and creeks in farmland	Possible	No	Yes
<i>Ninox connivens</i>	Barking Owl		V	Eucalypt woodland, open forest, swamp woodlands and, especially in inland areas, timber along watercourses.	Possible	No	Yes
<i>Oxyura australis</i>	Blue-billed Duck		V	Deep water in large permanent wetlands and swamps with dense aquatic vegetation.	Unlikely	No	No
<i>Pachycephala inornata</i>	Gilbert's Whistler		V	Mallee shrubland, box-ironbark woodlands, Cypress Pine and Belah woodlands and River Red Gum forests.	Possible	No	Yes
<i>Petroica phoenicea</i>	Flame Robin		V	Upland moist eucalypt forests and woodlands, often on ridges and slopes, in areas of open understorey. Migrates in winter to more open lowland habitats such as grassland with scattered trees and open woodland on the inland slopes and plains.	Possible	No	Yes
<i>Polytelis swainsonii</i>	Superb Parrot	V	V	Forests and woodlands dominated by eucalypts. Forages mostly on the ground.	Likely	No	Yes
<i>Pomatostomus temporalis temporalis</i>	Grey-crowned Babbler (eastern subspecies)		V	Open Box-Gum Woodlands on the slopes, and Box-Cypress-pine and open Box Woodlands on alluvial plains.	Possible	No	Yes

Scientific Name	Common name	Status		Preferred Habitat	Likelihood of Habitat Suitable for Species Within or Adjacent to Study Area	Recorded During Field Survey	Further Assessment Required
		EPBC*	TSC^				
<i>Pyrrholaemus sagittatus</i>	Speckled Warbler		V	Wide range of Eucalyptus dominated communities that have a grassy understorey, often on rocky ridges or in gullies	Possible	No	Yes
<i>Rostratula australis</i>	Australian Painted Snipe	V	E	Fringes of swamps, dams and nearby marshy areas where there is a cover of grasses, low scrub or open timber.	Unlikely	No	No
<i>Stagonopleura guttata</i>	Diamond Firetail		V	Grassy eucalypt woodlands, including Box-Gum woodlands and Snow Gum (<i>Eucalyptus pauciflora</i>) woodlands. Also occurs in open forest, mallee, Natural Temperate Grassland, and in secondary grassland derived from other communities.	Possible	No	Yes
<i>Stictonetta naevosa</i>	Freckled Duck		V	Large temporary swamps created by floods in the Bulloo and Lake Eyre basins and the Murray-Darling system, particularly along the Paroo and Lachlan Rivers, and other rivers within the Riverina.	Unlikely	No	No
AMPHIBIANS							
<i>Crinia sloanei</i>	Sloane's Froglet		V	Recorded from widely scattered sites in the floodplains of the Murray-Darling Basin, with the majority of records in the Darling Riverine Plains, NSW South Western Slopes and Riverina bioregions in New South Wales.	Unlikely	No	No
<i>Litoria booroolongensis</i>	Booroolong Frog	E	E	Permanent streams with some fringing vegetation cover such	Unlikely	No	No