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TABLE OF CONTENTS

PART A	PROJECT ASSESSMENT
1	INTRODUCTION
2	PROJECT DESCRIPTION
3	ENVIRONMENTAL SETTING
4	LEGISLATIVE REVIEW
5	ASSESSMENT METHODOLOGY
6	ASSESSMENT OF IMPACTS
7	RECOMMENDATIONS
8	GLOSSARY & ABBREVIATIONS
9	STATEMENT OF LIMITATIONS
PART B	LONGWOOD to VIOLET TOWN (LOOPING 2)
1	REGIONAL BACKGROUND
2	FLORA ASSESSMENT
3	FAUNA ASSESSMENT
4	LEGISLATIVE IMPLICATIONS
5	RECOMMENDATIONS
PART C	MANGALORE TO LONGWOOD (LOOPING 3)
1	REGIONAL BACKGROUND
2	FLORA ASSESSMENT
3	FAUNA ASSESSMENT
4	LEGISLATIVE IMPLICATIONS
5	RECOMMENDATIONS
PART D	VIOLET TOWN to GLENROWAN (LOOPING 4)
1	REGIONAL BACKGROUND
2	FLORA ASSESSMENT
3	FAUNA ASSESSMENT
4	LEGISLATIVE IMPLICATIONS
5	RECOMMENDATIONS
PART E	WANDONG to BROADFORD (LOOPING 5)
1	REGIONAL BACKGROUND
2	FLORA ASSESSMENT
3	FAUNA ASSESSMENT
4	LEGISLATIVE IMPLICATIONS
5	RECOMMENDATIONS
PART F	REFERENCES

PART A - TABLE OF CONTENTS

1.	INTRODUCTION	1
1.1	Background	1
1.2	Preliminary Assessments	1
1.3	Scope of Flora and Fauna Assessments	3
1.4	Structure of this Report	3
1.5	Study Team Members	4
2.	PROJECT DESCRIPTION	5
2.1	Project Area	5
2.2	Proposed Works	5
3.	ENVIRONMENTAL SETTING	8
3.1	General	8
3.2	Land Use	9
3.3	Waterways	10
3.4	Previous Studies	11
4.	LEGISLATIVE REVIEW	12
4.1	Commonwealth Legislation	12
4.2	Victorian Legislation	12
4.2.1	<i>Catchment and Land Protection Act</i>	13
4.2.2	<i>Environment Effects Act</i>	13
4.2.3	<i>Flora and Fauna Guarantee Act</i>	14
4.2.4	<i>Pipelines Act</i>	14
4.2.5	<i>Planning and Environment Act</i>	14
4.2.6	<i>Water Act</i>	15
4.2.7	<i>Wildlife Management Act</i>	15
4.3	Permitted Clearing Regulations	15
5.	ASSESSMENT METHODOLOGY	16
5.1	Literature and Database Review	16
5.2	Database Review	17
5.3	Preliminary Assessment	17
5.4	Vegetation Assessment and Permitted Clearing Assessment	17
5.4.1	<i>Habitat Hectares Assessment</i>	18
5.4.2	<i>Indigenous Tree Assessment</i>	18
5.4.3	<i>Planted Vegetation</i>	19
5.4.4	<i>Weeds</i>	19
5.4.5	<i>Avoidance and Minimisation</i>	20
5.4.6	<i>Biodiversity Impact and Offset Requirements</i>	20
5.5	Threatened Species Assessment - Determining Significance	21
5.5.1	<i>Species Status</i>	21
5.5.2	<i>Likelihood of Occurrence</i>	21
5.6	Threatened Species Assessment - Flora	23
5.6.1	<i>Flora Species Profile</i>	23
5.6.2	<i>Survey Methodologies</i>	23
5.7	Threatened Vegetation Communities	24
5.7.1	<i>EPBC Act Listed Threatened Communities</i>	24
5.7.2	<i>FFG Act Listed Threatened Communities</i>	26
5.8	Threatened Species Assessment - Fauna	28
5.8.1	<i>Golden Sun Moth</i>	28
5.8.2	<i>Growling Grass Frog</i>	29
5.8.3	<i>Brown Toadlet</i>	30
5.8.4	<i>Birds and Reptiles</i>	30
5.8.5	<i>Nocturnal Surveys</i>	31
5.8.6	<i>Aquatic Surveys</i>	31

5.9	Survey Limitations.....	31
5.9.1	<i>Flora</i>	31
5.9.2	<i>Native Vegetation</i>	32
5.9.3	<i>Fauna</i>	32
6.	SUMMARY OF IMPACTS	34
6.1	Native Vegetation	34
6.1.1	<i>Remnant Vegetation</i>	34
6.1.2	<i>Tree Assessment</i>	36
6.2	Flora	37
6.3	Fauna	38
6.4	Ecological Communities	40
6.5	Impact Assessment	42
6.5.1	<i>Environment Protection and Biodiversity Conservation Act 1999</i>	42
6.5.2	<i>Flora and Fauna Guarantee Act 1988</i>	43
6.5.3	<i>Environment Effects Act 1978</i>	44
7.	RECOMMENDATIONS	46
7.1	General Mitigation Measures	46
7.1.1	<i>Flora and Fauna impacts</i>	46
7.1.2	<i>Weed Management</i>	48
7.2	Specific Mitigation Measures	48
8.	GLOSSARY & ABBREVIATIONS	53
9.	STATEMENT OF LIMITATIONS.....	56

List of Tables

Table 1:	Summary of Assessment Team	4
Table 2:	Characteristics that determine species significance	21
Table 3:	The likelihood of occurrence rankings for threatened flora species	22
Table 4:	The likelihood of occurrence rankings for threatened fauna species	22
Table 5:	Summary of Native Vegetation Proposed for Clearance	35
Table 6:	Summary of EVCs to be impacted	36
Table 7:	Summary of Threatened Flora Surveys	37
Table 8:	Summary of Threatened Fauna Surveys	38
Table 9:	Summary of Ecological Communities found within ROW	41
Table 10:	Summary of Impacts to Large Trees	37

List of Figures

- Figure 1: Overview of Proposed Loopings
- Figure 2: Typical layout of Construction ROW
- Figure 3: HDD Schematic Drawing

1. INTRODUCTION

1.1 Background

APA GasNet Australia (Operations) Pty Ltd (APA) is proposing to loop (duplicate) parts of the existing Wollert to Wodonga gas transmission pipeline (pipeline licence 101) between Wandong to Broadford and Mangalore to Glenrowan, Victoria.

The sections of the route to be looped (together with the distance in kilometres from the starting point of the existing pipeline at Wollert (where Summerhill Road, Wollert = Kilometre Point 0 or KP0) consists of the following:

- Looping 2: Longwood to Violet Town (KP107.6 to KP141.2) covering about 33.6km;
- Looping 3: Mangalore to Longwood (KP73.8 to KP107.6) covering about 33km;
- Looping 4: Violet Town to Glenrowan (KP141.2 to KP192) covering about 50.8km;
- Looping 5: Wandong to Broadford (KP27.8 to KP45.2) covering about 17.4km.

The total distance of all four loops is approximately 135km. An overview of the looping routes is provided in **Figure 1**.

Note that the naming conventions for the loopings take into consideration that APA is constructing Looping 1 from Wollert to Wandong (about 27.8km) in the first half of 2014. This is a separate project and flora and fauna issues for that section have been addressed in a separate report (refer Monarc, 2012).

Looping sections 2 to 5 are being undertaken to meet the specific demands of separate large commercial customers, each requiring gas demand to meet their growing retail gas needs throughout eastern Australia. The decision to construct each looping section is therefore driven by the specific gas demand of each customer and construction will be subject to long-term gas supply agreements currently being negotiated with APA.

Monarc Environmental Pty Ltd (Monarc) was engaged by APA to undertake a flora and fauna assessment of the APA easement from Wandong (KP27.8) to Broadford (KP45.2) and Mangalore (KP73.8) to Glenrowan (KP192). The purpose of the assessment is to identify any risks to significant flora and fauna values within the project area and provide the necessary information to enable management recommendations for flora and fauna affected by the proposed project.

1.2 Preliminary Assessments

A preliminary walk through field survey of the existing pipeline easement from the KP27.8 to KP192 has been undertaken in two stages. The results of these surveys have formed the basis of the current assessments in order to:

- Determine native vegetation cover and general ecological status of the area;
- Identify areas of remnant vegetation and scattered trees within the construction ROW that would require a Habitat Hectares assessment under the native vegetation *permitted clearing regulations* should they require removal;
- Identify key ecological values and habitats within the ROW and potential impacts of proposed construction activities;
- Identify potential field surveys targeting those threatened flora and fauna species that may potentially be found along or near the construction right of way (ROW) within habitat types identified during the preliminary survey.

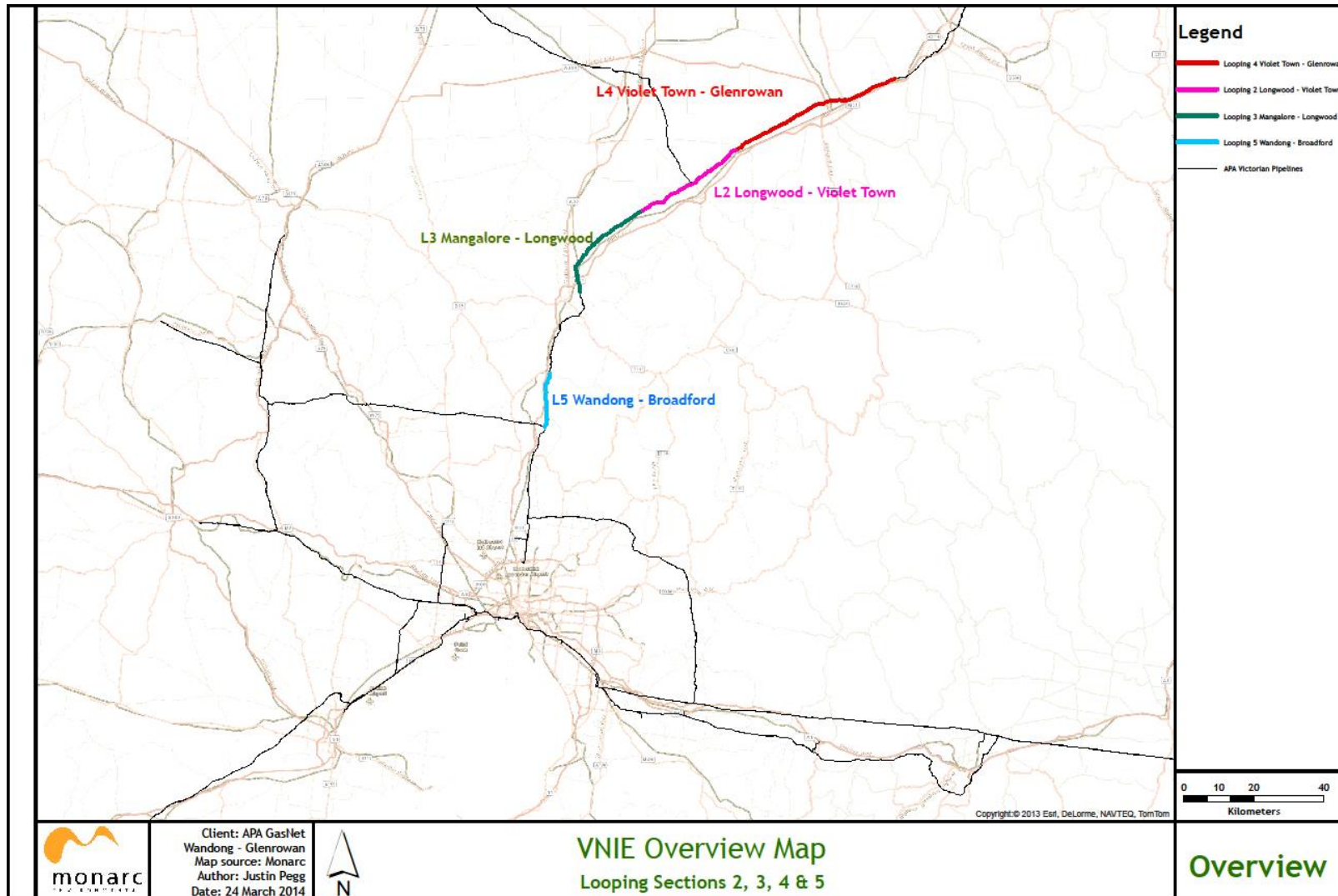


Figure 1: Overview of Proposed Loopings

1.3 Scope of Flora and Fauna Assessments

The following tasks were undertaken by Monarc for the project area:

- Review of publicly available information relevant to an evaluation of flora and fauna issues including:
 - Planning Zones, Land Use, Overlays and topographic features along the proposed route;
 - Public databases such as those maintained by the Commonwealth Department of the Environment (DoE) and Victorian Department of Environment and Primary Industries (DEPI) to determine potential significant flora and fauna and vegetation communities in the area;
 - Public reports relating to environmental studies of the area;
 - Discussion with local council officers or other relevant authorities to determine potential environmental sensitivities of the area such as significant species or land parcels; and
 - Results of the preliminary walk through field surveys
- A Habitat Hectares Assessment of the project area in accordance with the Vegetation Quality Assessment manual (DSE, 2004).
- Targeted surveys for those threatened flora and fauna species that may potentially be found along or near the proposed construction ROW within habitat types identified during the preliminary survey and habitat hectares assessment.
- Preparation of a report to document the findings of surveys which includes:
 - Targeted Flora and Fauna Survey Results including conservation significance of extant species;
 - Vegetation assessment results including extent, type and condition of native vegetation;
 - A Habitat Hectares Assessment of native vegetation proposed for removal;
 - Potential impacts of proposed works on ecological values;
 - Options to avoid and/or mitigate any impacts;
 - Implications for the project arising from Commonwealth and State legislation and policy including whether an EPBC referral and EES statement are required.

1.4 Structure of this Report

This flora and fauna assessment report has been structured as follows:

Part A: (this part) provides background information to the project including a description of the proposed project, the legislative obligations that apply to the management of biodiversity issues associated with the project and information on methodologies used on all looping sections to identify and assess any vegetation, flora or fauna matters of potential state or federal significance.

It concludes with a summary and assessment of the overall impact of the project and recommendations to mitigate impacts.

Parts B to E provide a breakdown of the results of the assessment for each looping section and consist of:

Part B: presentation of results of all vegetation and flora/fauna assessments for the Longwood to Violet Town section (Looping 2: KP107.6 to KP141.2) as well as any legislative implications for this part of the project and recommended mitigation measures

Part C: presentation of results of all vegetation and flora/fauna assessments for the Mangalore to Longwood section (Looping 3: KP73.83 to KP107.6) as well as any legislative implications for this part of the project and recommended mitigation measures

Part D: presentation of results of all vegetation and flora/fauna assessments for the Violet Town to Glenrowan section (Looping 4: KP141.2 to KP192) as well as any legislative implications for this part of the project and recommended mitigation measures

Part E: presentation of results of all vegetation and flora/fauna assessments for the Wandong to Broadford section (Looping 5: KP27.8 to KP45.2) as well as any legislative implications for this part of the project and recommended mitigation measures.

1.5 Study Team Members

The assessment has been undertaken by a team of environmental specialists from a range of disciplines - refer **Table 1**. The contribution of all team members is gratefully acknowledged.

Table 1: Summary of Assessment Team

ORGANISATION	ROLE	PERSONNEL
Monarc Environmental Pty Ltd	Specialist environmental studies including: Flora and fauna assessment Habitat Hectares assessment Targeted surveys for threatened flora and terrestrial fauna	David Coleman Colin Clay John Harris Liza James Justin Pegg Ben Roberts Kathy Himbeck James Garden Sean Lithgow Katherine O'Connor Fred Bohner Hayley Davis Knud Hansen Brad Jenner
	Support Services and Project Management	Jim Nikolareas Toby Montgomery Simon Meich Michael Baines Vanessa Wong
Land Access & Management Services (LAMS)	Liaison with land owners/land access	Ian Gordon Joe Price Peter Harken Darryl Jones
	Fish surveys	To be undertaken
Tree Logic Pty Ltd	Arborist Assessments	Bruce Callander James Martens-Mullaly

2. PROJECT DESCRIPTION

2.1 Project Area

The existing Wollert to Wodonga gas transmission pipeline runs in an approximate north easterly direction from the Wollert Compressor Station on the northern outskirts of Melbourne through to Wodonga on the southern outskirts of Albury; a total distance of approximately 269km. The sections of the route to be looped (together with the distance in kilometres from the starting point of the existing pipeline at Wollert where the WCS = Kilometre Point 0 or KP0) consists of the following:

- Looping 2: Longwood to Violet Town (KP107.6 to KP141.2) covering approximately 33.6km
- Looping 3: Mangalore to Longwood (KP73.8 to KP107.6) covering approximately 33km
- Looping 4: Violet Town to Glenrowan (KP141.2 to KP192) covering approximately 50.8km
- Looping 5: Wandong to Broadford (KP27.8 to KP45.2) covering approximately 17.4km

The total distance of all four loops is approximately 135km. Detailed maps of the project area are contained in Parts B to E.

2.2 Proposed Works

The proposed pipeline is to be installed below the ground surface within the existing 35 metre wide easement occupied by the Wollert to Wodonga gas transmission pipeline (PL 101).

The construction ROW for the project will be a temporary cleared working area that will accommodate construction equipment, allow vehicle travel along the construction route and storage of trench spoil and topsoil. The width of the construction ROW will ensure that construction activities can be safely performed with minimum risk of accident or injury to construction personnel.

The existing pipeline is located approximately 7.5m from the western edge of, and within, the existing easement with the proposed pipeline to be located approximately 7m east of the existing pipeline. The construction ROW along most of the project area will be confined to the portion of the easement that lies east of the existing Wodonga pipeline except at certain points where additional space may be required adjacent to the easement to accommodate equipment required for crossing special features, such as Horizontal Directional Drilling (HDD), or where space may be required as a temporary storage or equipment lay-down area. The ROW will therefore generally be 28m in width. In sensitive areas, however, the construction ROW will be reduced to 20m.

Pipe is to be laid below the ground surface with a minimum depth of cover of 1200mm for its entire length and construction works will generally involve a clear and grade process that will remove the top 100mm of vegetation and topsoil from the construction ROW, the excavation of a trench of approximately 700mm width, welding and laying of 400mm diameter pipe, backfilling of the trench and reinstatement of the land surface. If feasible, thrust boring, micro tunnelling or Horizontal Directional Drilling methods may be used for sections where minimal disturbance to significant features is required.

The typical layout of a construction ROW for a pipeline is provided in **Figure 2** (note that this layout may be adjusted at certain locations depending on site conditions or construction method).

Temporary construction site depots will be required for each stage of the project as well as laydown areas for pipes, laying out the HDD pipestring and other working areas. These will be restored to their original form once construction is complete.

The topography of the construction ROW will be restored as much as possible to its original form and the land returned to its prior use once the pipeline has been installed and restoration work has been completed. Few indications of the presence of the pipeline will be visible apart from:

- Three above ground line valves to be installed as parts of loopings 3, 4 and 5. The enclosures for these facilities will be placed next to the line valve enclosures of the existing pipeline and will encompass an area of no more than approximately 10m x10m
- Pipeline marker posts and cathodic protection test boxes required by the pipeline licence and Australian Standard.

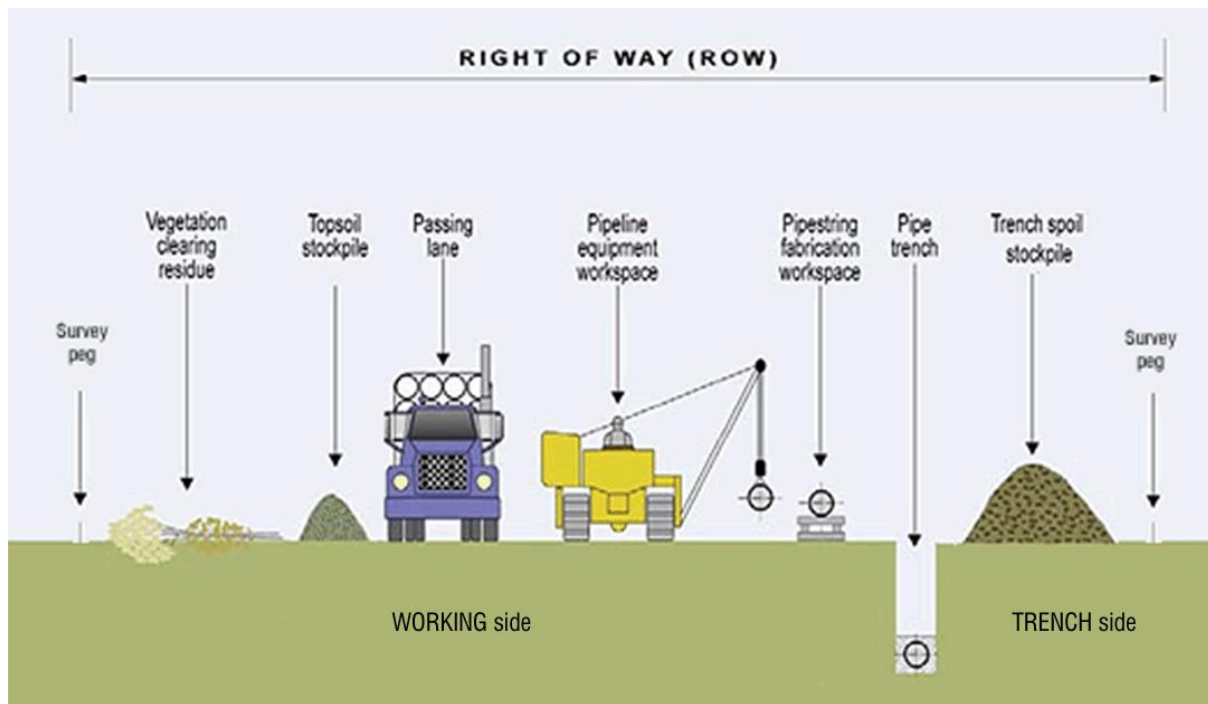


Figure 2: Typical layout of construction ROW

Key construction activities will involve civil works associated with pipeline construction and significant structural works at creek crossings, road crossings and rail crossings. Other activities will include clearing of vegetation, removal and/or relocation of above-ground structures (e.g. fencing), earthworks (including clear and grade, excavation, backfilling, topsoil spreading) and reinstatement of the land to its previous condition.

Several major roads are crossed by the pipeline including the Hume Freeway (within Looping 3 at KP76.9) and a number of major arterials between townships such as the Goulburn Valley Highway, the Midland Highway, the Murray Valley Highway and the Riverina Highway. Numerous minor roads are also crossed including a number of unsurfaced local access roads as well as a number of undeveloped road reserves. Many of these contain remnants of the local vegetation types. The easement also crosses the following rail transport corridors:

- Melbourne-Wodonga railway within Looping 3 at KP79
- Two smaller rail lines from Melbourne to Shepparton (within Looping 3 at KP82.77) and Benalla to Oaklands NSW (within Looping 4 at KP172.12).

In general, bitumen roads will be bored to minimise disturbance to traffic movements and avoid any impact on road-surface integrity. Unsurfaced roads will be open cut. Each rail crossing is also to be drilled using HDD.

Major waterways will be crossed with the use of HDD construction methods to pass under the river or creek. Riparian vegetation occurring between the entry and exit holes will not be disturbed.

HDD will involve drilling beneath the waterway utilising trenchless technology. It will require the excavation of an exit pit approximately 3m x 3m x 3m on the opposite side to where the drilling rig is set up to contain drilling fluids used to assist the drilling process. A smaller entry pit approximately half the size of the exit pit is excavated on the drilling rig side for the same reason as described above. A bore hole is then drilled more than several metres beneath the invert of the river from one side to the other and the pipe pulled back through the bore hole. The drilling fluids that are used to assist the process are monitored through the logging of fluid inputs and returns.

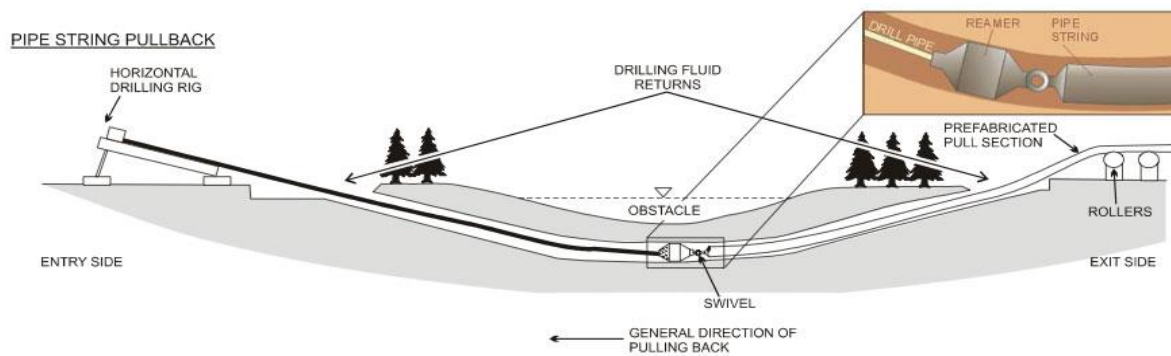


Figure 3: HDD Schematic Drawing

All other waterway crossings will be open cut. This involves the excavation of a trench across the watercourse. Construction is generally scheduled for periods of low/zero flow and sediment control measures (such as silt curtains) are used where appropriate to minimise impacts to stream quality. In some cases, temporary dams may be constructed and flumes or pumps used to carry water from one side of the construction area to the other in order to maintain stream flow. Restoration of these crossings following construction will use a range of methods to reinstate the areas and ensure they are stabilised after construction is complete.

Construction of the pipeline is scheduled to commence in September 2014 and be completed by May 2015. The timing of construction of each looping stage will be negotiated with the successful construction tenderer(s) when they are appointed to the project.

3. ENVIRONMENTAL SETTING

3.1 General

The Victorian Government has prepared a Biodiversity Strategy that has divided Victoria into a number of bioregions based on a combination of biological and geographical criteria (landform, climate etc). Bioregions are promoted for regional-scale biodiversity planning because they are based on patterns of ecological characteristics and the underlying environmental features. They are intended to reflect natural boundaries and relationships between biodiversity assets and natural resource based activities and the concept has therefore been adopted in Victoria's Biodiversity Strategy as well as in the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*.

While bioregion boundaries cannot be considered as rigid, based on current mapping, the easement intersects up to four bioregions:

- | | | |
|--|------------------|--|
| • Wandong to Broadford (Looping 5) | KP27.8 to 30.2 | <i>Highlands Northern Fall (HNF)</i> |
| | KP30.2 to 45.2 | <i>Central Victorian Uplands (CVU)</i> |
| • Mangalore to Longwood (Looping 3) | KP73.83 to 79.5 | <i>Central Victorian Uplands</i> |
| | KP79.5 to 107.6 | <i>Victorian Riverina (VRiv)</i> |
| • Longwood to Violet Town (Looping 2) | KP107.6 to 141.2 | <i>Victorian Riverina</i> |
| • Violet Town to Glenrowan (Looping 4) | KP141.2 to 160 | <i>Victorian Riverina</i> |
| | KP160 to 163 | <i>Northern Inland Slopes (NIS)</i> |
| | KP163 to 184.5 | <i>Victorian Riverina</i> |
| | KP184.5 to 189.5 | <i>Central Victorian Uplands</i> |
| | KP189.5 to 191.5 | <i>Victorian Riverina</i> |
| | KP191.5 to 191.8 | <i>Central Victorian Uplands</i> |
| | KP191.8 to 192 | <i>Northern Inland Slopes</i> |

The project area commences in the foothills of the north-western slopes of the Great Dividing Range within the *Highlands Northern Fall* and *Central Victorian Uplands Bioregions*. The topography of the southern portion of the area (Looping 5) consists of low rolling hills commencing at about 330m AHD before dropping gradually to about 230m at Strath Creek Road east of Broadford. The topography remains relatively level from Mangalore through to Glenrowan (Looping 2-4) lying at about 170m AHD as it skirts the north-western edge of the Strathbogie Ranges which lie to the south of the Hume Freeway.

Notable ecological features of the bioregions are summarised below:

- Around Wandong, the project area falls within the *Highlands Northern Fall Bioregion*. The original vegetation type largely consisted of Herb-rich Foothill Forest on the slopes interspersed with Valley Heathy Forest and Grassy Dry Forest towards the ridge lines¹. The base of the creek valleys were lined with Riparian Forest with occasional Swampy Riparian Complex lining the flatter areas away from the creek and occasional Valley Grassy Forest on the low rises between the valley floor and hill slopes. Vegetation types in these areas have been significantly affected by agricultural development, particularly in the lower lying areas, although extensive areas of relatively intact forest still remain within the ranges to the east of Wandong.
- The *Central Victorian Uplands* which borders the northern edge of the Highlands is part of a larger region known as the Victorian Midlands which stretches east-west across central Victoria. This region has undulating terrain and was formerly dominated by foothill forest, some of which is still found on the upper slopes. The flatter and more fertile areas are largely cleared for agriculture. Dry Foothill Forest Complexes dominated the *Central Victorian Uplands*, but large areas of Moist Foothill Forest Complexes and Valley Grassy Woodland Complexes also occurred.

¹ Based on Ecological Vegetation Class (EVC) benchmarks published by DEPI

Note that all three LGAs have prepared roadside management plans that identify and categorise roadside vegetation considered to have conservation significance.

In general, the plans cover all rural road reserves in each LGA excluding any road reserves under the management of VicRoads (e.g. arterial roads or highways) or unused roads under the management of DEPI. While there is some variation in definition, roadsides have been generally assigned to one of three rankings:

- Low - predominately non-native vegetation with low natural regenerative capacity and few habitat features
- Medium - native vegetation in patches with only moderate disturbance and weed levels and with potential to improve conservation values by changes to management and or revegetation
- High - good representation of native vegetation layers with relatively lower level of disturbance and weed levels; area may form a wildlife corridor and is linked to other native vegetation

A number of roads intersected by the each of the loopings have been assigned a ranking of High Conservation value. Many of the roads considered to have special value (such as providing habitat for significant species like the Grey-crowned Babbler) have been identified by on-site signage to identify areas as Significant Roadside Area.

Each LGA has also been consulted for any planning controls applied to non-native vegetation such as Heritage Overlays or significant tree status. No such controls apply to the area intersected by the construction ROW.

3.3 Waterways

Natural assets that have been identified along the construction ROW include several perennial waterways as well as some ephemeral waterways and irrigation channels. In general, natural waterways and drainage lines (designated waterways under the Victorian *Water Act 1989*) are the responsibility of the Goulburn Broken Catchment Management Authority (GBCMA) while Goulburn Murray Water is responsible for water storage and associated delivery and drainage systems along the project corridor e.g. irrigation channels. In summary:

- Wandong to Broadford (Looping 5) intersects 17 designated waterways of which 6 are named. This includes Sunday Creek near Clonbinane;
- Mangalore to Longwood (Looping 3) intersects 29 designated waterways of which 8 are named. This includes Hughes Creek near Avenel;
- Longwood to Violet Town (Looping 2) intersects 24 designated waterways of which 8 are named. This includes Seven Creeks near Euroa;
- Looping 4 (Violet Town to Glenrowan) intersects 29 designated waterways of which 15 are named. This includes the Broken River near Benalla.

While there are a number of perennial waterways intersected by the project (such as Seven Creeks and the Broken River), many of these waterways are ephemeral and generally flow only when rainfall conditions are sufficient. Water flow within these waterways may therefore vary from a few hours or days following a storm event (ephemeral) to a few weeks or months (intermittent). All designated waterways intersected by the project corridor drain to the Goulburn River (about 3km from the project corridor at its closest point, near Mangalore at the commencement of Looping 3).

All waterways will be crossed in accordance with relevant guidelines for creek and river crossings. Approval to traverse these assets will be sought through the submission of a Site Environment Management Plan to the GBCMA and will include construction plans and drawings along with appropriate methods of construction and rehabilitation. APA and GBCMA have undertaken inspections of critical waterways and have commenced the process for the protection and management of these assets during construction.

Most of the minor waterways intersected by the project fall within private freehold land, however a number also fall within Crown Land. Under the *Flora and Fauna Guarantee Act 1988*, a permit is required to remove threatened species from Crown Land as well as a number of additional species

identified as protected flora on Crown land (refer Section 4.2.3). A permit will therefore be required prior to vegetation clearing on Crown Land intersected by the construction ROW.

There are also a number of dams either on, adjacent to, or near the construction ROW including a number of dams that are downgradient of the ROW. These vary from stockwatering dams in the middle of paddocks with little vegetation of value, dams along drainage lines/waterways with minimal fringing vegetation to dams or pondage with significant amounts of emergent, fringing and/or terrestrial vegetation. As a result, their habitat value varies but all should be protected during construction from adverse effects of run-off during construction. Any dams within the ROW that will be directly impacted by construction works could be habitat for native species and may therefore require a licence under the Wildlife Act and/or Water Act should they be disturbed.

3.4 Previous Studies

A number of Conservation Management Plans have been prepared by GBCMA to identify priorities for native biodiversity conservation in the region managed by the CMA. These have been prepared in accordance with DSE Biodiversity Action Planning objectives as part of the Victorian State biodiversity strategy and have identified a number of priority sites likely to have conservation values.

Six landscape zones identified by GBCMA apply to the project area - South-west Goulburn, Hughes Creek, Longwood, Violet Town, Chesney and Samaria Landscape Zones. Key biodiversity assets identified in the plans include examples of Plains Grassy Woodland, waterways and their riparian margins, wetlands and roadside vegetation. While a number of examples of each of these assets are identified for management, roadsides in particular have been noted to be an important part of conservation planning as not only do they often contain elements of remnant vegetation that provide linkages across the landscape, they also often contain large old trees with hollows. One of the objectives of the management plan is therefore to enhance roadsides by encouraging adjacent landowners to widen vegetated areas along roadsides to at least 40 metres.

4. LEGISLATIVE REVIEW

Legislative obligations with respect to flora and fauna are identified and briefly reviewed below. Legislation implications for each looping project are discussed in **Parts B to E** of this report.

4.1 Commonwealth Legislation

The *Environment Protection and Biodiversity Conservation Act 1999* (*EPBC Act*) establishes a Commonwealth process for the assessment of proposed actions that are likely to have a significant impact on matters of national environmental significance (MNES) or on Commonwealth land. An action, unless otherwise exempt, requires approval from the Commonwealth Environment Minister if it is considered likely to have an impact on one or more of the nine MNES to which the *EPBC Act* applies. These include:

1. World heritage properties;
2. National heritage places;
3. Wetlands of international importance (eg. Ramsar wetlands);
4. Nationally threatened species and ecological communities;
5. Migratory species;
6. Commonwealth marine areas;
7. Great Barrier Reef Marine Park;
8. Nuclear actions (including uranium mining); and
9. A water resource, in relation to coal seam gas development and large coal mining development.

Items 1 and 2 and 6 to 9 do not apply to the proposed action or this report. However, a number of threatened species and ecological communities listed under the *EPBC Act* have been identified as potentially occurring in the project area. These are discussed within the sections of this report dedicated to each looping.

Note that referrals to the Minister are required to identify whether the project is a component of a larger action or whether the project is related to any actions or proposals in the region. While construction of each looping section is considered to be independent of other loopings, the project will require referral of all sections of the project as a whole in the event that one or more loopings are considered likely to have an impact on a MNES.

In addition, the Australian Government released an Environmental Offsets Policy in late 2012 (DSEWPac 2012a). These are defined as measures that compensate for the residual adverse impacts of an action on the environment after avoidance and mitigation measures have been implemented.

The offsets policy does not apply to actions that have been declared as 'Not a Controlled Action' and are only required if residual impacts of a project declared as a 'Controlled Action' are considered significant (that is, after all appropriate mitigation measures have been considered). They are not required for all approvals under the *EPBC Act* and do not mean that proposals with unacceptable impacts will be approved. When they are deemed to be required, they may be additional to that already required under state laws although the Policy does not preclude the recognition of state offsets that may be suitable as offsets under the *EPBC Act* for the same action.

4.2 Victorian Legislation

The main Victorian based legislation of potential relevance to the development that may impact on the management of environmental issues is:

- *Catchment and Land Protection Act 1994*;
- *Environment Effects Act 1978*
- *Flora and Fauna Guarantee Act 1988*
- *Pipelines Act 2005*
- *Planning and Environment Act 1987*
- *Water Act 1989*

- *Wildlife Management Act 1975*

4.2.1 *Catchment and Land Protection Act*

The *Catchment and Land Protection Act 1994 (CaLP Act)* contains provisions relating to catchment planning, land management, noxious weeds and pest animals. The Act also provides a legislative framework for the management of private and public land and sets out the responsibilities of land managers, stating that they must take all reasonable steps to:

- Avoid causing or contributing to land degradation which causes or may cause damage to land of another land owner;
- Protect water resources;
- Conserve soil;
- Eradicate regionally prohibited weeds;
- Prevent the growth and spread of regionally controlled weeds; and,
- Prevent the spread of, and as far as possible eradicate, established pest animals.

The construction ROW contains a number of noxious weeds listed as regionally controlled within the Goulburn Broken Catchment Management Authority (GBCMA) region. These are listed in the sections of this report relevant to each looping. Appropriate weed control and hygiene measures should be implemented when removing vegetation in the construction ROW to ensure noxious weeds are not spread within, from or to the area.

4.2.2 *Environment Effects Act*

The *Environment Effects Act 1978 (EE Act)* requires the preparation of an Environment Effects Statement (EES) where proposed works may potentially have a significant effect on the environment. An EES is typically required where it is considered that there is a likelihood of regionally or State significant adverse effects on the environment. These may include effects on the biological and physical environment but also include consideration of economic, social, health, cultural and landscape values.

A project with potential adverse environmental effects that individually or in combination could be significant in a regional or State context should generally be referred to the Minister administering the *EE Act* to determine whether an EES is required. Guidance on the criteria for referral covers both individual potential environmental effects (such as loss of a significant proportion of habitat of a threatened species) as well as a combination of potential environmental effects.

They include the following matters related to flora and fauna (DSE, 2006):

- Potential clearing of 10ha or more of native vegetation from an area that
 - is of an Ecological Vegetation Class identified as endangered by DEPI
 - is, or is likely to be, of very high conservation significance
 - is not authorised under an approved Forest Management Plan or Fire Protection Plan
- Matters listed under the *Flora and Fauna Guarantee Act 1988* such as:
 - potential loss of a significant area of a listed ecological community
 - potential loss of a genetically important population of an endangered or threatened species
 - potential loss of critical habitat
 - potential significant effects on habitat values of a wetland supporting migratory bird species
- Potential major effects on landscape values of regional importance, especially where recognised by a planning scheme overlay

The most significant issue for the project in terms of the criteria for an EES referral is likely to be the amount of native vegetation that will be required to be removed in order to allow construction to proceed.

Note that the triggers for a potential EES referral with respect to native vegetation are based on the Native Vegetation Management Framework (DNRE 2002) which was replaced by the *Biodiversity assessment guidelines* in December 2013 (refer Section 4.3). The new vegetation assessment guidelines do not require consideration of the bioregional conservation status of vegetation classes as described in the referral guidelines (refer Section 5.4.6). This report has therefore considered the requirements of both the NVMF and *Biodiversity assessment guidelines* when determining obligations that may be applicable to the project.

Note that referrals to the Minister are required to identify whether the project is an element or stage in a larger project or whether the project is related to any other past, current or future proposal in the region. While construction of each looping section is considered to be independent of other loopings, the project will therefore require referral of all sections of the project as a whole in the event that one or more loopings meets the criteria for referral.

4.2.3 Flora and Fauna Guarantee Act

The *Flora and Fauna Guarantee Act 1988 (FFG Act)* is the primary Act for the protection of threatened native flora and fauna within Victoria. The Act includes the following lists:

- Threatened native flora and fauna;
- Threatened communities of native flora and fauna;
- Protected flora;
- Potentially threatening processes.

The FFG Act applies to all crown land and permits are required under the FFG Act for the taking of listed species in these areas.

4.2.4 Pipelines Act

In Victoria, onshore natural gas pipelines with an operating pressure above 1,050 kPa require licensing under the *Pipelines Act 2005 (Pipelines Act)* which is administered by the Earth Resources Regulation Division of the Department of Strategic Development, Business and Innovation (DSDBI) together with Energy Safe Victoria (ESV).

Section 85 of the *Pipelines Act* provides that a pipeline issued with a licence under the Act is exempt from the requirements for a permit in a planning scheme under the *Planning and Environment Act 1987* (refer Section 4.2.5). This includes any permits that may be required for construction including those associated with vegetation removal.

However, it does not provide for exemptions under any other Act. Therefore any proposed works, including vegetation removal, would still need to take account of potential issues such as:

- Whether an action is likely to impact on a matter of national environmental significance under the *EPBC Act*;
- Whether fauna or flora species listed under the *FFG Act* are present.

In addition, agreements between the pipeline regulator and other government departments ensure that relevant government policies such as State Environment Protection Policies or those related to vegetation management still apply.

Approval to construct a pipeline is issued following acceptance of a Construction Safety Management Plan (CSMP) and a Construction Environment Management Plan (CEMP). Consent to construct is not issued until ESV and DSDBI are satisfied that all relevant issues are appropriately resolved.

4.2.5 Planning and Environment Act

The *Planning and Environment Act 1987 (P&E Act)* is the main State legislation governing the use (zoning), development and environmental protection of land in Victoria. The planning legislation provides a framework for integrating planning policies and environmental considerations (e.g. clearing of native vegetation) on local, regional and the State levels; for example the clearing of native vegetation, through instruments such as planning permits (refer Section 4.3 for further detail).

While the *Pipelines Act* provides an exemption from the requirements for permits under the *P&E Act*, all such projects are still required to conform to the requirements of government policy (refer Section 4.3 Permitted Clearing Regulations).

4.2.6 Water Act

The purposes of the *Water Act 1989* are diverse. In part it relates to the orderly, efficient and sustainable use of water resources. This includes the integrated management of all elements of the terrestrial phase of the water cycle, formal means for the protection and enhancement of the environmental qualities of waterways and their in-stream uses and to make sure that water resources are conserved and properly managed for sustainable use for the benefit of present and future Victorians.

A permit to construct ('Works on Waterways License') will be required from the GBCMA for the crossing of all designated waterways along the construction ROW.

4.2.7 Wildlife Management Act

The main legislation for protecting and managing fauna in Victoria is the *Wildlife Act 1975*. This covers indigenous vertebrate species (except declared pest species), invertebrate species listed under the *FFG Act* and some introduced game species but does not apply to fish defined under the *Fisheries Act 1995*.

A Management Authorization permit will be required under the Act if salvage and relocation of fauna are to be undertaken as part of any mitigation measures for the project.

4.3 Permitted Clearing Regulations

In Victoria, a permit is required to remove, destroy or lop native vegetation. These regulations are known as the native vegetation permitted clearing regulations.

Responsibilities for the clearance of native vegetation are referenced under the *P&E Act* and are generally enacted under the municipal planning scheme via Clause 52.17 of the Victorian Planning Provisions (VPP). While the *Pipelines Act* provides an exemption from the requirements for permits under the *P&E Act*, an agreement between the regulators of the *Pipelines Act* and the department responsible for protection of the environment requires that the principles of the Native Vegetation Management Framework (DNRE 2002) regarding the removal of native vegetation be met.

The Victorian State government, through DEPI, recently released a set of reforms to guide the clearing of native vegetation in Victoria. This new approach, which replaced the Native Vegetation Management Framework in late December 2013, uses risk-based pathways, based on the extent of vegetation removed and the location risk, to regulate the approval and conditions association with vegetation clearing.

The 'Permitted clearing of native vegetation - Biodiversity assessment guidelines' (the Guidelines) outline how impacts on Victoria's biodiversity are assessed when an application to remove native vegetation is lodged (DEPI 2013b). The Guidelines are an incorporated document in all Victorian planning schemes.

The Guidelines are applied alongside other requirements of the planning scheme when an application for a permit to remove native vegetation is considered by the responsible authority.

The objective of the new guidelines is to ensure 'no net loss in the contribution made by native vegetation to Victoria's biodiversity'. Native vegetation permitted to be cleared may therefore be required to be offset by the planting, protection and management of other native vegetation. Under the new guidelines, these offsets are required to be secured before clearing is approved either:

- Via a security agreement for the offset site that includes an onsite management plan
- Evidence of a secured third party offset, such as an allocated credit register extract from the native vegetation credit register.

Note that a permit to remove native vegetation does not replace any requirements under the *FFG Act* and the Commonwealth *EPBC Act*.

5. ASSESSMENT METHODOLOGY

Each looping project has been assessed to:

- Determine native vegetation and general ecological status of the area;
- Identify areas of remnant vegetation and scattered trees within the construction ROW that would require a Habitat Hectares assessment under the native vegetation *permitted clearing regulations* should they require removal;
- Identify key ecological values and habitats within the pipeline easement and potential impacts of proposed construction activities;
- Identify potential field surveys targeting those threatened flora and fauna species that may potentially be found along or near the construction ROW within habitat types identified during the preliminary survey.

The following section discusses methodologies utilised in all loopings to:

1. Assess native vegetation intersected by the construction ROW;
2. Determine species of significance that may be expected to occur within the vicinity of each looping;
3. Determine species of significance that may potentially utilise habitat found within the construction ROW and therefore require survey to determine the potential impact of construction;
4. Determine locations within the construction ROW requiring survey for the significant species identified for survey.

It concludes with a discussion of methodologies utilised in all loopings to survey for the targeted species and any limitations of the assessment.

Note that property numbers utilised by Monarc to describe properties intersected by the ROW are based on mapping provided by APA which had each property identified with a Site number between S1-62 and S4-47. Property numbers are included in all detailed route maps included within Parts B to E of this report.

5.1 Literature and Database Review

In order to provide context for the project area, records for flora and fauna within 5km of the project area were obtained from relevant public databases. Information sources used for the flora and fauna assessment include:

- The Victorian Biodiversity Atlas (VBA), the database maintained by DEPI of records of flora and fauna sightings across Victoria (DEPI, 2014b);
- The Protected Matters Search Tool (PMST) maintained by the Commonwealth Department of the Environment (DoE), a predictive database that identifies nationally listed species and communities that may occur in a given search area;
- Biodiversity Interactive Maps maintained by DEPI that identify historic and extant Ecological Vegetation Classes, Bioregions and key ecological values across Victoria (known as the Biodiversity Information Management System or BIMS);
- Local Government Authority Planning Schemes along with any associated environmental studies to ascertain current zoning and environmental overlays;
- Geospatial databases maintained by GBCMA as part of their Biodiversity Action Planning process to identify priority sites for management with regard to native species;
- Literature reviews for targeted species and communities including:
 - Species Profile and Threats database (SPRAT) maintained by DoE for *EPBC Act* listed species including relevant species impact guidelines, policy statements and recovery plans
 - Actions Statements and Listing Advice prepared by/for DEPI on state listed threatened species and/or communities

- Regional management plans prepared by GBCMA to identify priorities for native biodiversity conservation in the region
- Discussions with local councils and DEPI officers and the GBCMA regarding local species records;
- Results of Monarc preliminary walk through field surveys.

5.2 Database Review

A search was undertaken in relation to species listed under the *EPBC Act* with a buffer of 5km for listed species and vegetation communities that may occur in the area of each looping. The results of the searches are provided in Parts B to E.

A search of the VBA was also conducted for each looping over a linear search area along the existing pipeline easement with a buffer of 5km to obtain a species profile for the area from records maintained by DEPI.

The database records sightings of all species reported to DEPI (including the locality and date of sighting) and indicates whether species are listed under the *EPBC Act*, the State *FFG Act* or DEPI Advisory List (DSE 2013; 2005a). Results of the searches are provided in Parts B to E.

Information from both databases was then compiled to obtain a preliminary listing of species that may be expected within the vicinity of each of the loopings. Where indicated, additional species were added to the listing following discussions with DEPI officers or other credible sources.

5.3 Preliminary Assessment

A preliminary inspection of the easement was undertaken by qualified and experienced ecologists from Monarc over two separate occasions:

- KP0 to KP172.3 was inspected from 4 to 22 June 2012
- KP172.3 to KP192 was inspected from 30 Jan to 14 February 2013

Both surveys used three teams of two people with at least one person per team qualified under the DSE Vegetation Quality Assessment scheme for assessment of remnant native vegetation in accordance with the NVMF (DNRE 20002).

The purpose of the preliminary assessment was to gain an understanding of the type and variability of vegetation and habitats within the construction ROW and the potential for the vegetation to provide habitat for any threatened flora or fauna. Any significant areas of vegetation (areas requiring a habitat hectare assessment, location of scattered trees and vegetation communities or other potential habitat for threatened species) were recorded and mapped by a hand held geographical positioning system unit (GPS). This was used to help determine and guide the development of the detailed surveys (i.e. areas requiring assessment for Net Gain or for targeted surveys for threatened flora and fauna) which were implemented at a season/time appropriate to the maximum chance of detecting the species (if present).

5.4 Vegetation Assessment and Permitted Clearing Assessment

Targeted vegetation assessments were undertaken across all looping sections in Spring 2013. The assessments to determine the implications for clearance of native vegetation within the construction ROW are based on the '*Permitted clearing of native vegetation - Biodiversity assessment guidelines*' prepared by DEPI (DEPI 2013b).

These guidelines replaced the former Native Vegetation Management Framework (NVMF) in late December 2013 and use risk-based pathways, based on the extent of vegetation removed and the location of the works, to regulate the approval and conditions (offsets) associated with vegetation permitted for clearing.

Based on the location of the project and amount of native vegetation to be impacted by the project, each looping falls under the 'Moderate' or 'High' risk based pathway under the new guidelines. This requires applications to remove native vegetation to include the following:

- A habitat hectare assessment of the native vegetation to be removed

- A statement outlining what steps have been taken to ensure that impacts on biodiversity from the removal of native vegetation have been minimised
- An assessment of whether the removal of native vegetation will have a significant impact on biodiversity with regard to the impact on habitat for rare or threatened species
- An offset strategy that details how an offset will be secured to offset the impacts of native vegetation removal

At the time of the surveys (mid-May to mid-July and mid-October to mid-November 2013), the NVMF was still applicable. All surveys were therefore undertaken in accordance with the Framework (DNRE 2002). This required an in-field habitat hectare and scattered tree assessment of the ROW which was mapped using GIS tools to clearly identify the extent of remnant native vegetation and the number of scattered trees proposed for removal.

All assessments have subsequently been adapted to the method described in the Guidelines released by DEPI. To facilitate transfer from the previous process to the new guidelines, DEPI have established transition arrangements where applicants have already undertaken an assessment of vegetation clearing requirements prior to the approval of the new Guidelines (DEPI 2014a). Under these arrangements the applicant may submit the assessment data to DEPI who will provide the requisite offset requirements under the new Guidelines and produce a Biodiversity impact and offset requirements report. This DEPI report provides biodiversity information for applications that fall within a moderate and high risk-based pathway, for the approval to remove native vegetation under clause 52.16 or 52.17 of the planning schemes in Victoria.

5.4.1 Habitat Hectares Assessment

A habitat hectare assessment of the construction ROW was undertaken between June and November 2013. All patches of remnant native vegetation were compared to historic and current mapping of Ecological Vegetation Classes (EVC) prepared by DEPI and the relevant benchmark for the EVC. The overall condition of the vegetation was scored and mapped onto a Nomad Trimble Personal Digital Assistant (PDA) with ArcPad 8.0 software.

All vegetation within the construction ROW was assessed according to the habitat hectare methodology described in the Vegetation Quality Assessment Manual prepared by the State government (DSE 2004a). A habitat hectare is a unit of measurement, which combines both quality (relative to an EVC Benchmark) and quantity (EVC type) for a habitat zone. Vegetation community names follow DEPI's Ecological Vegetation Class benchmarks relevant to each bioregion intersected by the project (DEPI 2014c).

Note that the assessment of vegetation quality only applies to the area intersected by the construction ROW. Any judgment about the quality of vegetation outside these areas (for instance when assessing the impact of proposed works on patches of remnant vegetation that extend beyond the construction ROW) is based on modeling of vegetation types by DEPI (refer to the Biodiversity Information Management System).

5.4.2 Indigenous Tree Assessment

All trees within remnant patches were assessed according to the Framework, based on the Diameter at Breast Height (DBH), to determine their size class and mapped onto a Nomad Trimble Personal Digital Assistant (PDA) with ArcPad 8.0 software.

Scattered indigenous trees (i.e. those not located within a remnant patch of vegetation) were also mapped and the species, size class (compared with the relevant EVC benchmark) and the conservation significance of each tree was determined (DSE 2007). Trees were assigned to one of the following categories:

- Very Large Old Tree (VLOT) is a tree with a diameter at breast height (DBH) equal to or greater than 1.5 times the large tree diameter in the relevant EVC benchmark;
- Large Old Tree (LOT) is a tree with a DBH equal to or greater than the large tree diameter specified in the relevant EVC benchmark;

- Medium Old Tree (MOT) is a tree with a DBH equal to or greater than 0.75 of the large tree diameter specified in the relevant EVC benchmark but less than the DBH for LOT;
- Small Tree (ST) is a tree with a DBH equal to or greater than 0.25 of the large tree diameter specified in the relevant EVC benchmark but less than the DBH for a MOT.

Scattered trees were assessed in accordance with the Framework and data for any trees identified for removal was provided to DEPI for translation into the offset requirements under the new *Biodiversity assessment guidelines* (DEPI 2013b). Confirmation that this approach was in accordance with the transitional arrangements was received from DEPI (Chisholm 2014²).

5.4.3 Planted Vegetation

The construction ROW intersects a number of areas with planted vegetation. This may consist of:

- Planted native vegetation indigenous to the area
- Planted native vegetation that is not indigenous to the area
- Planted exotic vegetation

Examples of planted vegetation intersected by the construction ROW include:

- Paddocks sown with exotic pasture grasses
- Timber plantations
- Plantings along driveways or other access routes
- Planted shelter belts

The latter have generally been placed along property boundaries to provide wind breaks or shelter for stock and may consist of non-indigenous native tree species, indigenous native tree species or exotic species.

Planted vegetation, unless it has been publicly funded as part of a revegetation project, falls outside the definition of native vegetation and does not require assessment under the permitted clearing regulations.

In addition, non-native vegetation is generally considered of limited value for most significant native fauna species. While such areas may provide habitat for some of the more common native species (including nesting sites), in general, non-native vegetation is considered to provide limited habitat opportunities for threatened native species.

Planted vegetation, unless it falls under the permitted clearing regulations, does not form part of the native vegetation assessment and has not been mapped as part of this project. APA and/or the pipeline contractor will discuss any removal of planted vegetation directly with the landholders.

5.4.4 Weeds

Under the *CaLP Act*, landholders have a duty to prevent the growth and spread of regionally controlled weeds on their property and on adjoining roadsides and to eradicate regionally prohibited weeds. Declaration and management of weed issues within this catchment is undertaken by the GBCMA.

The field surveys noted the prevalence of opportunistic weed infestations throughout the easement and surrounding areas, particularly in agricultural properties. These vary from common and widely distributed weed species like Plantain (*Plantago* spp), sheep sorrel or Blackberry (particularly near some drainage lines such as Castle Creek) that occupy multiple habitat types to those more commonly found in fields, grasslands and woodland. Other species may be used as pasture but considered a weed species outside of these areas. Examples include *Phalaris* and *Avena* spp which have invaded many roadside areas with remnant native vegetation. The success of invasive weed species is expected to persist with current land use.

Weeds can impact on both agricultural productivity and biodiversity. Appropriate measures to manage the potential spread or introduction of weeds during construction will be required and included in the

² Email from Mark Chisholm Project Officer, Land Fire and Environment DEPI 28/3/2014

Construction Environment Management Plan to be prepared for the project. These include the adoption of appropriate hygiene practices for personnel and equipment in order to avoid contributing to the spread of weeds.

5.4.5 Avoidance and Minimisation

Following the detailed vegetation assessments for each looping section, the construction ROW was inspected by the APA Project Manager together with a qualified and experienced ecologist from Monarc to identify where clearance of native vegetation (vegetation that qualifies as a remnant patch or scattered tree under the guidelines) could be avoided or minimised. Measures applied to each looping to minimize impacts to vegetation or habitat are provided in the relevant section for each looping.

The aim was to reduce, where possible, impacts to native vegetation, scattered trees, Large Old Trees in patches and any other sensitive areas that were identified during the detailed vegetation assessments. Where threatened species and or communities were identified, avoidance and minimisation measures were also considered.

Each inspection was undertaken with reference to maps and GIS tools which clearly identified the extent of mapped remnant native vegetation, scattered trees and any threatened flora and fauna species recorded that could be potentially be impacted by the proposed works.

Any additional construction space required to accommodate turning space for vehicles or equipment storage was also identified at this time and placed, as much as possible, in areas where native vegetation or habitat would not be impacted.

The area of native vegetation identified for removal was then recalculated on the basis of the advice from APA in terms of their ability to avoid impacts on native vegetation during construction. The initial assessment was therefore revised on the basis of this advice to provide the final assessment of impacts of the construction ROW on native vegetation.

An arborist has also been contracted to undertake an arboricultural assessment to determine the impact of construction on large trees (trees >40cm DBH) identified for retention within or close to the ROW and the appropriate means to protect these trees during construction. Recommendations regarding the future management of trees identified for retention and details of tree protection distances and construction controls required to minimise impacts to trees during the works will also be provided. This included an evaluation of Tree Protection Zones as described in *Australian Standard 4970 Protection of trees on development sites* (Standards Australia 2009). Protection measures will be included in the Construction Environment Management Plan (CEMP) to be prepared for the project.

5.4.6 Biodiversity Impact and Offset Requirements

Vegetation quality assessment data compiled by Monarc for each looping section will be provided to DEPI following finalisation and confirmation of all avoidance and minimisation measures. DEPI will then generate a '*Biodiversity impact and offset requirements report*' for each looping which will provide the following information:

- Confirmation of the risk-based pathway that applies to the native vegetation identified for removal. The risk-based pathway is determined by combining the extent risk and the location risk of the native vegetation proposed to be removed in accordance with Section 6 of the '*Permitted clearing of native vegetation - Biodiversity assessment guidelines*' (DEPI 2013b);
- The strategic biodiversity score of the native vegetation to be removed. This is a measure of the site's importance to Victoria's biodiversity relative to other locations across the landscape;
- Information to inform the assessment of whether the proposed removal of native vegetation will have a significant impact on Victoria's biodiversity with specific regard to the proportional impact on habitat for any rare or threatened species. This is known as the specific-general offset test. The test determines if the proposed removal of native vegetation has a proportional impact on any rare or threatened species habitats above the specific offset threshold. According to DEPI the threshold is set at 0.005 per cent of the total habitat for a species. When the proportional impact is above the specific offset threshold a specific offset for that species' habitat is required;

- The offset requirements applicable to the native vegetation proposed for removal. These are expressed in terms of ‘Biodiversity equivalence units’ which are based on:
 - The habitat hectare score for each patch
 - An assessment of the importance of the patch to Victoria’s overall biodiversity (the strategic biodiversity score) or
 in the event that the patch is considered to provide habitat for a threatened species (as mapped by DEPI), an assessment of the contribution of that patch to the habitat of the species (the habitat importance score)

This report will provide the final offset obligations including the attributes that a proposed offset site must have to meet the requisite obligations for clearance (such as the minimum strategic biodiversity score or provision of habitat for a particular species).

Note that under the guidelines, an offset must be secured before native vegetation is removed. This could be either:

- A security agreement for the offset site that includes an onsite management plan
- Evidence of a secured third party offset such as an allocated credit register extract from the native vegetation credit register.

5.5 Threatened Species Assessment - Determining Significance

5.5.1 Species Status

All flora and fauna species records for the assessment area obtained during the literature and database review (refer Section 5.1) were evaluated to determine those species of significance that may occur within habitat intersected by the ROW.

The significance of a species or community was determined by reference to its listing under Commonwealth and/or State legislation. The sources used to categorise significance of species and communities in this report are summarised in **Table 2**.

Table 2: Characteristics that Determine Species Significance

Legislation	Species / Community Significance
Commonwealth	Listed as critically endangered, endangered, vulnerable or conservation dependant under the <i>EPBC Act 1999</i>
State	Listed as threatened or nominated under the <i>FFG Act 1988</i> Fauna listed as critically endangered, endangered or vulnerable on the DEPI Advisory Lists (DSE 2009, 2013) Flora listed as endangered, vulnerable or rare on the DEPI Advisory List (DSE 2005)

Species found to fit the criteria provided in Table 2 were subsequently assessed for their potential to occur within habitat contained in the construction ROW.

5.5.2 Likelihood of Occurrence

Habitat requirements of significant flora and fauna species previously recorded within five kilometres of the construction ROW, or that may potentially occur within the construction ROW, were assessed to determine their likelihood of occurrence with the construction ROW. The likelihood of a species occurring within the ROW was then ranked as Negligible, Low, Moderate or High.

Descriptions of criteria utilised by Monarc to rank the likelihood of occurrence of flora and fauna within the construction ROW are summarised in **Table 3** and **Table 4**.

Table 3: The Likelihood of occurrence rankings for threatened flora species

Likelihood of Occurrence	Criteria
High	Recent reputable records of the species in the local vicinity (i.e. within the last 10 years) eg VBA
	Known resident in the area based on site observations, database records or expert advice and/or the construction ROW contains high quality habitat
Moderate	Previous reputable records of the species in the local vicinity (eg VBA); and/or the construction ROW contains moderate quality habitat
Low	Limited previous records of the species in the local vicinity; and/or, the construction ROW contains poor or limited habitat. May also be considered low if other environmental factors, such as the fragmented or isolated nature of the habitat, are present
Negligible	No suitable habitat and/or outside species range

Species with a moderate or high likelihood of occurrence were subject to targeted surveys over the appropriate season. Species identified for survey within each looping are discussed in the relevant section of this report.

Table 4: The Likelihood of Occurrence Rankings for Threatened Fauna Species

Likelihood of Occurrence	Code	Criteria
High	H1	Known resident in the area based on site observations, database records or expert advice
	H2	Recent reputable records (i.e. within five years) of the species in the local area e.g. VBA
	H3	The construction ROW contains the species' preferred habitat
Moderate	M1	The species is likely to visit the area regularly (i.e. at least seasonally)
	M2	Previous reputable records of the species in the local area e.g. VBA
	M3	The construction ROW contains some characteristics of the species' preferred habitat
Low	L1	The species is likely to visit the area occasionally or opportunistically whilst en route to more suitable sites
	L2	There are only limited or historical records of the species in the local area (i.e. more than 20 years old)
	L3	The construction ROW contains few or no characteristics of the species' preferred habitat
Negligible	N1	No previous records of the species in the local area; or
	N2	Previous records of the species in the local area (eg VBA) but > 30 years old
	N3	The species may fly over the area when moving between areas of more suitable habitat
	N4	Out of the species' range
	N5	No suitable habitat present
	N6	Species regionally extinct

* Disclaimer: Due to ongoing modification of the region and/or the surrounding landscape, species that have no records after 1984 have been excluded from this table unless otherwise advised by Government and local

authorities that the species may be present. Some additional species with no VBA records in the area, however, have also been considered by Monarc where potentially suitable habitat was considered to exist.

5.6 Threatened Species Assessment - Flora

5.6.1 Flora Species Profile

Threatened flora species targeted for survey were determined by reviewing the following:

- Habitat quality and types identified during the preliminary assessments;
- A review of the VBA data base for species recorded in the area;
- A review of the PMST for Matters of National Environment Significance listed under the *EPBC Act*;
- Undertaking an assessment of the species identified for their likelihood to occur in the area traversed by each looping (refer Section 5.5).

A breakdown of all flora species targeted (with the exception of species listed as poorly known as per the DEPI Advisory List (DSE 2005)), species description, habitat preference and flowering time are provided in Parts B to E. This includes an assessment of the likelihood of occurrence of each species, potential habitat, KP location and dates of surveys.

As a result, the following flora species, or groups of flora species were identified for survey:

- Winter flowering species (*Pimelea spinescens spinescens*) within Looping 5;
- Spring flowering species within Loopings 2 to 5;
- Early summer flowering species within Loopings 3 and 5.

Methodologies adopted to complete the required surveys are discussed below.

5.6.2 Survey Methodologies

Experienced field ecologists from Monarc conducted transects through all areas of vegetation considered to provide habitat for threatened flora species.

Targeted surveys focused on likely habitat within all areas which were systematically traversed in search of all threatened species identified. Where a listed species was located, the following information was recorded:

- The name, location and population size (or extent);
- Counts of the entire population if possible, or estimates of this from samples of the population;
- Age structure of the population if possible including any evidence of a viable reproducing population;
- Condition of the population if possible and any potential threats;
- Any distinguishing or unusual features of the population including differentiation or evidence of hybridisation and introgression.

The methodology applied was in accordance with significant impact guidelines and recommendations, where available, and in accordance with any of the survey guidelines contained within the Species Profile and Threats (SPRAT) Database maintained by DoE.

All surveys of the construction ROW were undertaken during the optimal flowering period for all targeted species. Due to differing flowering times of the targeted species, and species expected within each looping, surveys were undertaken over the following periods:

- Surveys for Loopings 2 and 4 covered the period between September and early December 2013
- Surveys for Looping 3 and 5 were undertaken in August 2013 and between mid-September and December 2013.

Survey locations for spring/summer surveys were selected based on the following:

- All Remnant patches which were assessed as having an understory Vegetation Quality Score of 15 and above via the Habitat Hectare methodology.

- All remnant patches wherein a part of the patch was permanently or ephemerally wet, incorporating a water-course, billabong or wetland etc.

All flora identified during the surveys was recorded irrespective of status. Results of the surveys are included in Parts B to E.

Note that the construction ROW forms a slim linear study area that may intersect only small portions of much larger areas of habitat. The focus of the study was on the ecological value of the construction ROW but in some cases (where potential habitat exists) the area examined was widened to assist in assessing the potential for the presence of certain species within habitat intersected by the construction ROW.

Common and scientific names used for flora within this report follow those used within the VBA maintained by DEPI.

5.7 Threatened Vegetation Communities

The majority of the pipeline is to be installed via trenching which requires clearance of vegetation over the construction ROW prior to construction. In addition to regulatory obligations (such as vegetation offsets) that may apply to the proposed works should approval for clearance of native vegetation be obtained, there is potential for the easement to be occupied by vegetation communities that are listed under Commonwealth or State legislation. The PMST and the VBA was reviewed to determine if any threatened communities occur or are likely to occur within the study area for each looping section.

All vegetation was assessed against either the condition thresholds or the listing advice that is provided for each community and was assessed concurrently with the habitat hectare assessments. Brief descriptions of the communities that are likely and/or may occur within the area intersected by the project are listed and described below. The likelihood of occurrence of each community within each looping section is summarised in Parts B to E.

5.7.1 EPBC Act Listed Threatened Communities

A number of EPBC listed communities have potential to occur along the construction ROW:

- **Buloke Woodlands of the Riverina and Murray-Darling Depression Bioregions**

'Buloke Woodlands of the Riverina and Murray Darling Depression Bioregion' encompasses a number of closely-related woodland communities in which Buloke (*Allocasuarina luehmannii*) is usually the dominant or co-dominant tree. Other trees that may be prominent in the community are Slender Pine (*Callitris gracilis*), White/Murray Pine (*Callitris glaucophylla*), Black Box (*Eucalyptus largiflorens*), Yellow/Blue Gum (*Eucalyptus leucoxylon* subsp. *pruinosa*) and Grey Box (*Eucalyptus microcarpa*).

The ground layer is usually grassy but can also include many subshrubs and herbs. While the composition of the ground stratum varies considerably, native grasses often include wallaby grasses (*Rytidosperma* spp.) and Spear Grasses (*Stipa* spp). Native subshrubs and herbs may include Nodding Saltbush (*Einadia nutans*), Variable Groundsel (*Senecio pinnatifolius*), Variable Sida (*Sida corrugata*), New Holland daisies (*Vittadinia* spp.), Grassy Bindweed (*Convolvulus remotus*) and Wingless Bluebush (*Maireana enchylaenioides*).

The community once occurred in a mosaic pattern across the northern parts of the Riverina interspersed amongst grasslands and eucalypt woodlands (although not in areas immediately adjacent to major rivers). Distribution appears to be influenced by a number of factors including rainfall, soil type and frequency of fire events. In Victoria, the community largely occurs in north-western Victoria but may be found in parts of northern central Victoria. Modelling of the community by DoE indicates that Looping 5 lies well south of where the community is likely to occur while Loopings 2-4 are likely to lie just outside the south-western limit of where the community is likely to occur (although the northern part of Looping 4 may intrude). While such mapping is indicative only, in general, the community tends to be located in semi-arid areas to the north and west of project area and it is therefore not expected that the project will impact on this community.

- **Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia**

Grey Box Grassy Woodlands generally occur in landscapes of low-relief such as flat to undulating plains, low slopes and rises and, to a lesser extent, drainage depressions and flats. It occurs both in a grassy woodland form with a tree canopy that is dominated or co-dominated by Grey Box (*Eucalyptus microcarpa*) and as a derived native grassland where the tree canopy and mid layer has been almost entirely removed but the native ground layer remains largely intact (DSEWPaC 2012b). In the woodland form, the understorey contains a moderately dense to sparse shrub layer and a ground layer of perennial and annual native forbs and graminoids.

The community predominantly occurs on the drier edge of the temperate grassy eucalypt woodland belt that covered the lower slopes and plains of mainland eastern Australia, inland of the Great Dividing Range, and which ranges from central New South Wales through northern and central Victoria into South Australia. An indicative map of where the community is likely to occur (refer DSEWPaC 2012) indicates that all loopings lie on the southern or south-western edge of its likely range. All loopings therefore have the potential to intersect remnants of the community although it is more likely to be present in areas around Loopings 2 to 4.

- **'Natural Grasslands of the Murray Valley Plains'**

'Natural Grasslands of the Murray Valley Plains' is a type of natural temperate grassland that has semi-arid characteristics, due to the lower rainfall where it occurs.

Modelling of the distribution of the community by DSEWPaC suggests that Loopings 2 to 4 lie at the southern extremity of the area in which the community may occur (between ~KP79 to KP172). In Victoria, a substantial part of the ecological community is recognised as 'Northern Plains Grasslands', which is listed as threatened under the Victorian *FFG Act*. This generally occurs within semi-arid area to the west and north-west of the project area and it is not expected that this community will be impacted by the project.

- **Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains**

The listing under the *EPBC Act* refers to temporary freshwater, generally treeless, wetlands that are inundated on a seasonal basis during winter-spring rains but then dry out during the warmer months (TSSC 2012). The listed community is dominated by a herbaceous ground layer of native plant species that are characteristic of wetter sites but adapted to seasonal inundation. It provides habitat for a range of animals that require water during at least part of the year including aquatic invertebrates, frogs, reptiles and waterbirds.

The community is most extensive in Victoria where it occurs primarily on the lowland plains of southern Victoria and the *Victorian Riverina* at elevations below 500 metres above sea level (asl). Much of the ecological community occurs within a mean annual rainfall zone of between 400 to 800 mm/year.

The listing is intended to focus protection on those remnants of the community that are still functional, relatively natural and in relatively good condition. The listing advice therefore includes a number of key characteristics to assist in identifying whether a wetland qualifies as the listed community including the Victorian wetland communities that most likely correspond with the community. These include Plains Grassy Wetland (EVC 125), Gilgai Wetland (EVC778) and Herb-rich Gilgai Wetland (EVC956) as well as associated mosaics and complexes. Some of these EVCs could be expected in the project area, particularly within Loopings 2 to 4.

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

The listed community can occur either as woodland or grassland from which the trees have been removed. It has a ground layer dominated by native tussock grasses and herbs (that is, greater than 50%) and a sparse, scattered shrub layer (less than 30%). White Box (*Eucalyptus albens*), Yellow Box (*E. melliodora*) or Blakely's Red Gum (*E. blakelyi*) dominate the community where a tree layer still occurs (DEH 2006).

In Victoria, the community tends to occur on the slopes and tablelands on the northern side of the Great Dividing Range. The EVCs that may correspond to this community include Valley Grassy

Forest (EVC47) and Grassy Woodland (EVC175) and, while some remnants may exist towards the northern end of Looping 5, the community is more likely to occur (if present) in the area traversed by Loopings 2-4.

The potential EPBC listed communities identified for assessment within the construction ROW were therefore:

- *Grey Box (Eucalyptus microcarpa) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia*
- *Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains*
- *White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland*

The ROW was assessed according to the thresholds provided in the relevant Policy document. Where vegetation within the ROW was determined to correspond to the listed community, the area of impact within the ROW was assessed by comparison with the extent of the whole patch contiguous with the ROW but lying outside the ROW.

5.7.2 FFG Act Listed Threatened Communities

Four FFG listed communities were identified with the potential to occur along the construction ROW:

- ***Creeklime Grassy Woodland (Goldfields) Community***

The *Creeklime Grassy Woodland (Goldfields) Community* occurs along shallow or ephemeral drainage lines as small remnants within the box-ironbark ecosystems of Victoria (DEPI 2013a). It is distinct from the riparian vegetation found along permanently flowing streams on the alluvial plains.

The overstorey tends to be dominated by River Red Gum (*Eucalyptus camaldulensis*), but may occasionally include Yellow Box (*E. melliodora*) and Grey Box (*E. microcarpa*), with a dense understorey of native grasses and sedges.

Modelling of listed communities across Victoria by DEPI indicates that Loopings 2 to 4 pass through areas where scattered patches of the community are potentially present (DEPI 2014b). In the area of the easement, DEPI modelling of the potential occurrence of the community has been largely linked to the modelling of EVC 68 Creeklime Grassy Woodland. This suggests that all remnant patches that qualify as EVC 68 could potentially correspond to the community. However, the FFG listed community is described as containing a dense understorey of native grasses and sedges and therefore only those woodland areas adjoining ephemeral drainage lines with a dominant native understorey have been categorised as the FFG community.

- ***Grey Box - Buloke Grassy Woodland Community***

The *Grey Box - Buloke Grassy Woodland Community* is a mainly grassy woodland found on flat or very gently undulating plains in northern Victoria and a few places in central Victoria (DEPI 2013a). It tends to develop in the absence of fire on sites with relatively fertile, fine-grained soils.

The tree layer is usually dominated by Grey Box (*Eucalyptus microcarpa*) over a lower stratum of Buloke (*Allocasuarina luehmannii*) although Buloke may become the dominant species when fire is absent over a long period. The ground layer is generally dominated by grasses such as Bristly Wallaby-grass (*Rytidosperma setaceum*), Windmill-grass (*Chloris truncata*), Common Wheat-grass (*Elymus scaber*) and occasionally Kangaroo Grass (*Themeda triandra*). While shrubs are generally absent, wattles such as Deane's Wattle (*Acacia deanei*), Gold-dust Wattle (*A. acinacea*) and Golden Wattle (*A. pycnantha*) maybe present at some sites together with a few other shrubs such as Drooping Cassinia (*Cassinia arcuata*).

The FFG listed community is closely related to the EPBC listed 'Grey Box Grassy Woodland' discussed above. Modelling of listed communities across Victoria by DEPI indicates that Loopings 2 to 4 pass through areas where scattered patches of the community are potentially present (DEPI 2014b).

In the area of the easement, DEPI modelling of the potential occurrence of the community has been largely linked to the modelling of EVC 55. This suggests that all remnant patches that qualify as EVC-55_61 and EVC-55_62 Plains Grassy Woodland could potentially correspond to the community. However, the FFG listed community is described as containing a lower stratum of Buloke with a ground layer containing predominantly native grasses and, occasionally, a scattering of acacia and a few other shrubs (DEPI 2013). Therefore, in absence of threshold criteria, when determining the occurrence of this community within the ROW, only those remnant patches with Buloke and a mainly native ground layer have been categorised as the FFG community. As the ROW is relatively narrow (and may not therefore contain a Buloke), this included consideration of whether the vegetation in the immediate vicinity of the ROW (that is of the same vegetation type) could be reasonably considered to contain these characteristics eg Bulokes were observed adjacent to the ROW.

- **Northern Plains Grassland**

The Northern Plains Grassland Community is restricted to the naturally treeless plains of northern Victoria, and is dominated by largely perennial tussocky grasses and an occasional, sparse occurrence of trees or large shrubs (DEPI 2013a). The community is readily distinguished from other grasslands and grassy woodlands in Victoria by the absence of *Themeda triandra*.

Modelling of listed communities across Victoria by DEPI indicates that this community occurs in similar locales to the Grey Box Buloke Grassy Woodland Community. This appears largely to be a result of the matching of the community to one or more EVCS (in this case EVC55). A description of the community provided by the FFG Scientific Advisory Committee, however, indicates that the community extends from Echuca in the east to the Patho Plains near the Loddon River in the west (DEPI 2013a), an area which lies about 100km north-west of Looping 2. The community is therefore not expected to be impacted by the project.

- **Victorian temperate-woodland bird community**

The *Victorian temperate woodland bird community* is a group of bird species commonly found within box-ironbark, yellow box, cypress pine and other woodlands along the slopes and plains to the north of the Great Dividing Range.

The description of the community identifies twenty-four key indicator species that are characteristic of the listed community, a number of which are listed on the FFG Act (SAC 2001). Some of the key indicator species listed as part of the community that are known to occur in the project area (that is, with records on the VBA) include Bush Stone-curlew (*Burhinus grallarius*), Brown Treecreeper (*Climacteris picumnus victoriae*), Swift Parrot (*Lathamus discolor*), Jacky Winter (*Microeca fascians*), Barking Owl (*Ninox connivens*), Grey-crowned Babbler (*Pomatostomus temporalis temporalis*) and Diamond Firetail (*Stagonopleura guttata*).

The community therefore has the potential to occur within woodland intersected by Loopings 2 to 4. The community may also correlate with the national ecological communities known as 'Grey Box Grassy Woodland' and 'White Box-Yellow Box-Blakely's Red Gum Grassy Woodland' as well as the State-listed 'Grey Box - Buloke Grassy Woodland Community'. Where such communities are found within the ROW, there is therefore the potential for the temperate woodland bird community to also occur.

Many of the remnant patches of native vegetation intersected by the ROW within Loopings 2 to 4 are likely to support some, or many, of the bird species that are listed under this community.

The potential FFG listed communities identified for assessment within the ROW were therefore:

- *Creepline Grassy Woodland (Goldfields) Community*
- *Grey Box - Buloke Grassy Woodland Community*
- *Victorian temperate-woodland bird community*

5.8 Threatened Species Assessment - Fauna

Threatened fauna species targeted for survey were determined by reviewing the following:

- Habitat quality and types identified during the preliminary assessments;
- A review of the VBA data base for species recorded in the area;
- A review of the PMST for Matters of National Environment Significance listed under the *EPBC Act*;
- Undertaking an assessment of the species identified for their likelihood to occur in the area traversed by each looping (refer Section 5.5).

In forming conclusions on the likelihood of a species occurrence in the area and the potential impact from construction, the following general considerations were taken into account (other species specific considerations may apply): areas devoid of remnant native vegetation, such as agricultural paddocks, are generally considered to have few if any ecological values and are usually of negligible significance for threatened native fauna. Species richness or diversity is relatively limited within these areas.

A breakdown of all fauna species targeted, species description and habitat preference is provided in Parts B to E. This includes an assessment of the likelihood of occurrence of each species, potential habitat, KP location and dates of surveys.

As a result, the following fauna species were identified for survey³:

- Golden Sun Moth within Looping 3 and 5;
- Amphibian species being Growling Grass Frog (Loopings 2 to 5), Southern Toadlet (Looping 5) and Brown Toadlet (Loopings 2 to 5);
- State significant bird species such as Grey-crowned Babbler (Loopings 2 to 5);
- State significant mammal species such as Brush-tailed Phascogale and Squirrel Glider (Loopings 2 to 5);
- Aquatic vertebrate species occupying perennial waterways intersected by the ROW (Loopings 2 to 5).

Surveys for threatened fauna species were undertaken at various times across the year depending on the fauna species being surveyed:

- Toadlet species (*Pseudophryne spp*) were surveyed in Loopings 2 to 4 during Autumn 2013;
- Surveys for birds, mammals, reptiles and the Growling Grass Frog (*Litoria raniformis*) were conducted across the project area from November 2013 to January 2014.

All surveys were undertaken in accordance with Commonwealth or State guidelines, where available, and included consideration of survey timing and survey effort (e.g. number and length of surveys required for each targeted species). Survey effort was also discussed with regulatory authorities and other professionals where available records were limited.

All fauna identified during the surveys were recorded irrespective of their status. Methodologies applicable to each survey type are discussed below. The results of surveys are discussed in Parts B to E.

5.8.1 Golden Sun Moth

Targeted surveys for Golden Sun Moths (GSM) were undertaken by experienced field ecologists from Monarc between 31 December 2013 and 30 January 2014.

A total of five locations across Loopings 5 and 3 (four and one, respectively) were identified for survey due to their vegetation composition and proximity to known GSM populations at Mt Piper Nature Conservation Reserve, west of Broadford and Whiteheads Creek, east of Seymour. Whilst Loopings 2 and 4 fall within the modelled EBPC habitat for GSM, there are no records of GSM on the VBA within 25km of the project alignment in these areas. Surveys of the area for GSM were therefore discussed

³ Note that while the construction ROW lies within the EPBC modelled area for occurrence of Striped Legless Lizard (SLL), no occurrences of SLL have been recorded on the VBA within at least 5km of the construction ROW. Little in the way of suitable habitat was located during the assessments of the construction ROW. Discussions with DEPI confirmed the lack of records for the area who recommended that a contingency plan be prepared in the event of discovery of any specimens during construction.

with officers from the Hume Region of DEPI who confirmed the lack of records and concurred with the assessment strategy to restrict surveys to Loopings 5 and 3. A summary of fauna survey effort and locations is provided in Parts C and E.

Surveys were undertaken on warm and relatively cloudless days over 20 degrees Celsius (by 1000hrs) with little to no wind and at least two days after rain as per the recommendations contained in Commonwealth and State guidelines (refer DEWHA 2009c). Each survey site was assessed over four suitable days, at approximately weekly intervals, depending on suitable weather conditions. Due to the later start of the 2013 flying season for GSM, the Port Phillip Region of DEPI extended the survey season until the end of February 2014 (Winfield, 2013⁴). After discussions with Hume Region of DEPI, this extension was also approved for the sites surveyed as part of this project.

Surveys were limited to the existing 35m wide pipeline easement and were undertaken by two people walking in transect lines spaced approximately five metres apart. The surveys included traversal of the pipeline easement multiple times between 1000 hrs and 1600 hrs on all survey days. Surveyors were searching for flying males, laying females and/or signs of eggs or pupal cases to confirm signs of reproduction.

Habitat features of each survey location, such as vegetation composition and structure and presence of bare ground and inter-tussock spaces, were noted. For any Golden Sun Moth sightings, GPS location was recorded and photos taken where possible.

In accordance with survey guidelines for the species, reference sites were surveyed on the same day as all project surveys to confirm the species was flying during the survey period. Mt Piper Nature Conservation Reserve, near Broadford, was recommended as the primary reference site due to its proximity to the easement (approximately six km west) and confirmed GSM population (Smith 2013, *pers comm*). However, no GSM were recorded from the Mt Piper reference site during any of the four surveys. Suitable secondary sites were therefore also sourced from the 'GSM Network' administered by Biosis for the days that surveys were conducted.

5.8.2 Growling Grass Frog

Targeted surveys for Growling Grass Frogs were undertaken by experienced field ecologists from Monarc between late November 2013 and the end of January 2014. A summary of fauna survey effort is provided in Parts B to E.

Surveys were conducted in accordance with federal guidelines (DEWHA 2009d) and included the following:

- Survey nights were selected on the basis of projected weather conditions which included fine conditions (day-time temperatures above 15 degrees Celsius and minimum night-time temperatures above 12 degrees Celsius) and little or no wind;
- Surveys were conducted between 2100hrs and 0300 hrs on the days indicated using a combination of active searching with spotlights in appropriate habitat, call recording and call playback (using the advertising call of the male) and a search of banks and emergent vegetation where appropriate.

Surveys commenced with a period of listening at each survey point to determine if any frogs were active in the area (minimum 10 minutes). Males are likely to respond to playback during the breeding season and therefore calls were broadcast at a number of locations along the targeted waterways (maximum of 50m spacing) and at least two locations within each of the smaller water bodies. After playback ten minutes was spent listening for any evidence of Growling Grass Frog response. All frogs audible during the survey were recorded for later confirmation against reference recordings of frog calls and all species detected during the surveys were noted.

Habitat features such as vegetation composition and structure, presence of refuge or shelter sites and suitable dispersal sites were also noted. Features noted about each of the survey sites included

⁴Email from Mark Winfield Environment and Water Regional Manager, Port Phillip Region DEPI to GSM Network 23/12/2013 with follow up email on 30/1/2014

availability of breeding habitat (e.g. suitable vegetation) and location in the landscape (e.g. proximity to other possible Growling Grass Frog sites).

A total of fifteen locations across all loopings were identified for survey. Due to varying weather conditions all fifteen sites were surveyed at least once before the end of December 2013 with ten of these sites surveyed twice. The five remaining sites were surveyed an additional two times in January 2014 to achieve a 95% probability of occupancy in accordance with Heard et al 2010. Refer to Parts B and E for further details.

Whilst no reference sites were identified in the immediate area during the survey, GGF activity has been recorded within 5km of the construction ROW as identified during the desktop assessment. The level of survey is therefore considered sufficient to maximise the probability of detecting adult GGF within the study area during this period. However, the number of surveys represents only a snap-shot of site occupancy. An assessment of the spatial and temporal use of habitats by the species within the study area over time would require repeated surveys to be undertaken over a prolonged period of time which is beyond the scope of this project.

5.8.3 Brown Toadlet

Targeted surveys for Brown Toadlet were undertaken across Loopings 2-4.

Breeding for the species generally occurs over autumn with male calling starting as early as February and continuing through to June. Surveys were therefore conducted by experienced field ecologists from Monarc in May 2013 and included a combination of active searching with spotlights in appropriate habitat, call recording and call playback. Active searching included a search of banks and emergent vegetation where appropriate.

A total of six locations across loopings 2 to 4 were identified for survey. All sites were surveyed at least twice within the recommended seasonal period during moderate climatic conditions.

Howard et al (2010) states that “When conditions are suitable for calling, there is a greater than 90% chance of detecting calling within two minutes, and greater than 99% chance within four minutes”. The level of survey undertaken is therefore considered sufficient to maximise the probability of detecting adult Brown Toadlets within the survey area during this period. Further details are provided in Parts B to D.

5.8.4 Birds and Reptiles

Bird surveys were undertaken by experienced ornithologists and field ecologists from Monarc between mid-October 2013 and mid-January 2014. The easement was also surveyed for any reptiles at this time. A summary of fauna survey effort is provided in Parts B to E.

Survey methods were in accordance with methods set out in the Biodiversity Precinct Structure Planning Kit (DSE, 2010b) and were conducted twice at each site over two different time periods on separate days (early morning and early evening). Early morning surveys were undertaken between 0700 and 1100hrs and early evening surveys between 1600 and 2000hrs).

Surveys were undertaken by two people walking along 100m transect lines for ten minutes either side or along the easement. This method is considered suitable for surveys on linear areas of Crown Land such as roadsides and waterways and was chosen following expert advice on methods appropriate to the habitat quality and extent intersected by the ROW (Loyn, 2013 *pers comm*). Note that where the easement passed through private property, surveys were only undertaken on the easement due to limited access outside this area. However, any birds or other fauna observed within the vicinity were also recorded.

A total of 73 locations across all loopings were identified for survey. Binoculars were used to scan the area for birds and other evidence of avifauna such as nests. All species seen and heard within the 100m transect were recorded. This included presence of birds, reptiles and mammals. The GPS location of any threatened species located was recorded and photos taken where possible. GPS locations of nests and hollows that are in use were also noted.

5.8.5 Nocturnal Surveys

Nocturnal surveys for threatened mammal and avian species were undertaken by experienced zoologists and field ecologists from Monarc between late-November 2013 and mid-January 2014. A summary of fauna survey effort is provided in Parts B to E.

Surveys were conducted over two nights at each site between 2100hrs and 0200hrs. Surveys were undertaken by two people walking along 100m transect lines for ten minutes either side or along the easement. This method was chosen following discussions on appropriate methods given the nature and time frame for the surveys (Loyn, 2013 *pers comm*). This method was suitable for surveys on Crown Land such as roadsides and waterways. However, due to limited access, on private property the surveys were limited to the easement. Any fauna observed or heard within the vicinity were also recorded.

Head torches and spot lights were used to scan the area for mammals and birds and observers searched trees for nests and hollows. Brief periods of call playback were also used to initiate a response from threatened nocturnal birds such as Barking Owl *Ninox connivens* or Bush Stone-curlew *Burhinus grallarius*. All species seen and heard within the 100m transect were recorded. This included presence of birds, mammals, amphibians and reptiles. The GPS location of any threatened species located was recorded and photos taken where possible.

5.8.6 Aquatic Surveys

Only a few occurrences of threatened aquatic species are recorded on the VBA. Surveys of waterways for threatened aquatic species were therefore discussed with officers from the Hume Region of DEPI who confirmed that all known populations of threatened fish species are located upstream of the project area. These are restricted to only a few of the perennial waterways intersected by the easement.

Perennial waterways intersected by the project that have potential to contain listed aquatic species have been identified for HDD. While impacts to such areas are therefore likely to be minimal, aquatic surveys will be undertaken in April and May 2014 as a contingency measure in the unlikely event that HDD methods are not successful. These will be undertaken by appropriately qualified ecologists using a combination of dip-netting, overnight bait trapping and electrofishing. The waterways currently identified for survey (subject to appropriate conditions at the time of survey) are:

- Looping 5 - Sunday Creek (KP34.05)
- Looping 3 - Hughes Creek (KP88.3)
- Looping 2 - Creightons Creek (KP114)
Seven Creeks (KP125.45)
Faithful Creek (KP130.1)
- Looping 4 - Broken River (KP169)
Mokoan Channel (KP176.3)

Results of the surveys will be presented in separate reports.

5.9 Survey Limitations

5.9.1 Flora

The methodology employed for this assessment (i.e. field survey combined with information available from other desktop information sources) is considered sufficient to determine if the project would have a significant impact on any threatened species, population or ecological community. No significant study limitations were identified. However, the following considerations apply:

- The surveys covered vascular flora only (ferns, conifers and flowering plants). Non-vascular flora (e.g. mosses, liverworts) were not considered.
- Surveys provide a sampling of flora at a given time only. Different seasonal conditions may provide more flora. While every effort has been taken to identify the significant species that may be expected to occur in the area and, subsequently, to examine parts of the construction ROW at times appropriate to the flowering of the significant species identified, some other flora species may not have been visible due to dormancy (e.g. orchids or certain herbaceous species which leaf

and flower during certain periods of the year but remain underground at other times) or their presence during the survey period as seeds only (e.g. annuals whose life cycle is completed within one season). Other plant species are perennial but are inconspicuous unless flowering. More plant species may have been recorded with additional surveys, however, the field surveys, which were undertaken at times when detection of most threatened species is high, combined with information available from other sources documented in this report is deemed appropriate to assess the ecological values of the construction ROW.

- Much of the construction ROW is subject either to intensive grazing by domestic stock animals or ploughing. This could lead to the removal of live plant material and/or fruiting materials and may restrict the ability to identify all the plants species that could be present within the construction ROW.

5.9.2 Native Vegetation

The construction ROW forms a slim linear project area that generally intersects only small portions of much larger areas of remnant vegetation. Much of the construction ROW passes through private land. The focus of the study was therefore on the ecological value of the easement or construction ROW being the area accessible to APA. The quality of vegetation when assessed on a broader scale across a property may differ when compared to an assessment of a small portion of that area such as that intersected by the construction ROW.

Note also that threshold criteria provided for some listed vegetation communities such as *White Box-Yellow Box-Blakely's Red Gum Grassy Woodland* require patches to be assessed at a scale of 0.1ha or greater (DEH 2006a). In many cases, the area of vegetation intersected by the ROW was less than this figure. Assessment for the presence of this community was based entirely on vegetation found within the easement.

Any judgment about the quality of vegetation outside the area of the easement (for instance when assessing the impact of proposed works on patches of listed communities) is based on modeling of vegetation types by DEPI documented within the Biodiversity Information Management System (DEPI 2014b).

Field equipment used to map vegetation included hand held GPS devices. Accuracy of such equipment varies but is not guaranteed beyond about $\pm 5\text{m}$. As a result, there may be some differences between patches represented on mapping produced for this report and on ground conditions. This may also impact on whether scattered trees have been designated to inside or outside the ROW.

5.9.3 Fauna

The methodology employed for this assessment (i.e. field survey combined with information available from desktop information sources) is considered sufficient to determine if the development will have a significant impact on any threatened species, population or ecological community. No significant study limitations were identified, however the following considerations apply:

- The construction ROW forms a slim linear project area that may intersect only small portions of much larger areas of habitat. Much of the construction ROW passes through private land. The focus of the study was therefore on the ecological value of the easement or construction ROW being the area accessible to APA. In some cases (where potential habitat exists or access was available), the area examined was widened to assist in assessing the potential for the presence of certain species within habitat intersected by the construction ROW.
- While the surveys are considered adequate for detecting active fauna typical of the area, such surveys provide a sampling of the fauna only at a given time. Factors such as time of year and day, weather conditions, species behaviour and habitat impact on the likelihood of locating many species. The surveys were therefore undertaken during times and conditions when the targeted threatened species were considered most likely to be active and the chance of locating uncommon or transient species was highest. More species may have been recorded with additional surveys, however, the survey effort is deemed appropriate to provide a reasonable assessment of the ecological values of the project area.
- It has been widely noted by several ecological consultancies across Melbourne that the 2013/14 flight season for Golden Sun Moths has been highly variable resulting in low Golden Sun Moth

numbers being recorded in known locations that normally yield high populations. It should also be noted that the stated Golden Sun Moth flight season as specified in the Biodiversity Precinct Structure Planning Kit (DSE, 2010b) was officially extended by one month to include January for the 2013/14 flight season. This was due to the unseasonal cool and wet weather condition prior to January (Winfield, 2013⁵).

⁵Email from Mark Winfield Environment and Water Regional Manager, Port Phillip Region DEPI to GSM Network 23/12/2013

6. SUMMARY OF IMPACTS

6.1 Native Vegetation

6.1.1 Remnant Vegetation

Guidelines for vegetation clearance recommend a three step approach be used in the assessment of applications for vegetation clearance (DEPI 2013b). This consists of the following:

- Avoidance of adverse impacts
- Minimisation of impacts through appropriate considerations implemented during planning processes and project design or management
- Identification of appropriate offset options.

After the initial VQA assessments were undertaken, the maximum area of native vegetation to be cleared (covering the 28m of the easement that lies east of the existing pipeline) was determined to be 54.33ha for the whole of the construction ROW between Wandong to Broadford (Looping 5) and Mangalore to Glenrowan (Loopings 2 to 4).

The design of the route is constrained by the use of the existing easement. All construction is proposed to be confined as much as possible to the existing easement created in 1975. Measures to avoid or minimise impacts can therefore only be confined to techniques to be implemented within the easement generally either through the narrowing of the ROW or, if practicable, other construction techniques such as drilling or boring.

Subsequent to the assessment of the original proposal for the construction ROW, Monarc and APA undertook an inspection of the proposed construction ROW to identify areas where vegetation removal could be avoided or minimised. During this inspection, APA identified a number of areas where measures could be taken to avoid or minimise impacts to native vegetation. These measures included the narrowing of the construction ROW to 20m at specific locations to avoid/minimise impacts to native vegetation and/or Large Old Trees (in general, the minimum width required to ensure that construction activities can be safely performed with minimum risk of accident or injury to construction personnel).

In all attempts to minimise impacts on native vegetation, particular effort has been made to minimise impacts on Large Old Trees whether within remnant patches or as trees scattered through the project area.

The following measures have been taken to minimise impacts to vegetation:

- Reduction of the construction ROW to 20m width where it intersects a remnant patch in order to minimise impacts to native vegetation
- Reduction of the construction ROW to the minimum width necessary in order to avoid impacts to scattered trees that do not lie over, or near, the alignment of the proposed pipeline. This is generally possible in most areas of the construction ROW due to the open nature of the country through which the construction ROW passes;
- Shifting of the narrowed construction ROW (20m), in some cases, westwards over the existing pipeline to avoid impacts on remnant vegetation in the 'eastern' area of the easement. In general, the construction process should avoid work or movement of heavy construction traffic over the existing pipeline. In some cases, however, in areas where a specialist crew is proposed, such as at waterway crossings, impacts can be reduced by shifting the narrowed construction ROW westwards over the existing pipeline. Note that this is only proposed in areas where a reduction in impacts can be demonstrated (in some properties, vegetation that has regrown west of the existing pipeline is of similar quality to vegetation located east of the proposed pipeline);
- HDD of selected locations, generally waterways, to pass under significant vegetation as well as the waterway where possible. However, some VLOTS that lie over or near the proposed pipeline have also been identified for HDD in recognition of their habitat and landscape value.

These measures have been applied to selected locations based on an on-site inspection of the construction ROW to determine the practicability of avoidance measures at each location while

considering the constraints of construction. Parts B to E of this report identify the specific locations within each looping where these measures have been applied.

After avoidance and minimisation measures have been factored in, the total area of native vegetation to be cleared across the four loopings is 36.74ha, a saving of about 32%. The distribution of this vegetation across each of the looping projects is provided in Table 5 below. This includes figures for the total area of vegetation that has been classified as Endangered under the Native Vegetation Management Framework (DNRE 2002) that will be impacted by the construction ROW (that is, after application of all avoidance and minimisation measures).

Table 5: Summary of Native Vegetation Proposed for Clearance

Looping Section	Native vegetation occupying 28m of easement east of existing pipeline (ha)	Native vegetation occupying 20m of the construction ROW (after avoidance and minimisation)		
		Total Area Endangered Vegetation (ha)	Total Area Other Vegetation (ha)	Combined Total Area (ha)
Wandong to Broadford (Looping 5)	11.01	2.16	5.34	7.50
Mangalore to Longwood (Looping 3)	16.46	7.74	3.33	11.07
Longwood to Violet Town (Looping 2)	11.63	7.23	0.65	7.88
Violet Town to Glenrowan (Looping 4)	15.08	10.13	0.16	10.29
Total (ha)	54.33	27.26	9.48	36.74

A breakdown of the native vegetation classes to be impacted within each looping, together with their conservation significance under the NVMF, is provided in Table 6.

Most of this vegetation, particularly within Loopings 2-4, occurs on roadsides with some patches of reasonable quality vegetation occurring along some of the more significant waterways. The area traversed by Looping 5 has probably been subject to less clearing than the area north of the Great Dividing Range and as a result includes some areas of remnant woodland that have survived on freehold land. This is reflected in the listing provided in Table 5 which indicates a greater prevalence of endangered EVCs located north of the Range in Loopings 2-4 than in Looping 5.

Most areas, however, have been subject to invasion by exotic species to varying extent. As a result, the quality of native vegetation within the ROW varies greatly and includes areas of native grasses with very little or no native canopy that have established over previously cleared land, patches of remnant woodland with very little native understorey and patches of remnant woodland with a good cover of native understorey species. In a number of cases, native vegetation has re-established over the existing pipeline.

Consequently, while about 27ha of the vegetation intersected by the ROW consist of vegetation types classified as Endangered within the relevant bioregion (across all loopings), only about 11ha of this vegetation is of sufficient quality to qualify as Very High Conservation Significance under the guidelines provided in the Native Vegetation Management Framework (DNRE 2002). This is distributed over about 71 individual patches with most patches, such as those along roadsides, covering less than 0.1ha. Refer to Section 7 for further discussion.

The *Biodiversity assessment guidelines* were approved for incorporation into Victorian Planning Provisions in late 2013. Application will be required to DEPI under the Transition Arrangements to determine the required offsets under the Guidelines for any permitted clearing of native vegetation (refer Section 4.3). This includes clearing of any patches of native vegetation and scattered trees identified for removal. Note that under the new Guidelines, vegetation offsets will have to be secured prior to clearance.

Table 6: Summary of EVCs to be impacted

Looping	Bioregion	Ecological Vegetation Class	Area (ha)	Conservation Status ¹
Wandong - Broadford (Looping 5)	<i>Central Victorian Uplands</i>	18 Riparian Forest	0.12	Vulnerable
		22 Grassy Dry Forest	0.14	Depleted
		23 Herb Rich Foothill Forest	0.57	Depleted
		47 Valley Grassy Forest	2.95	Vulnerable
		55 Plains Grassy Woodland	0.36	Endangered
		127 Valley Heathy Forest	1.57	Vulnerable
		175 Grassy Woodland	1.8	Endangered
Mangalore - Longwood (Looping 3)	<i>Central Victorian Uplands</i>	55 Plains Grassy Woodland	0.13	Endangered
		61 Box Ironbark Forest	3.33	Vulnerable
		68 Creekline Grassy Woodland	0.12	Endangered
	<i>Victorian Riverina</i>	55 Plains Grassy Woodland	6.1	Endangered
		68 Creekline Grassy Woodland	1.23	Endangered
		175_61 Low Rises Grassy Woodland	0.18	Endangered
Longwood - Violet Town (Looping 2)	<i>Victorian Riverina</i>	55 Plains Grassy Woodland	5.79	Endangered
		61 Box Ironbark Forest	0.65	Vulnerable
		68 Creekline Grassy Woodland	0.74	Endangered
		235 Plains Woodland/Herb-rich Gilgai Wetland Mosaic	0.7	Endangered
Violet Town - Glenrowan (Looping 4)	<i>Central Victorian Uplands</i>	235 Plains Woodland/Herb-rich Gilgai Wetland Mosaic	0.68	Endangered
	<i>Northern Inland Slopes</i>	61 Box Ironbark Forest	0.14	Endangered
		68 Creekline Grassy Woodland	0.39	Endangered
	<i>Victorian Riverina</i>	55 Plains Grassy Woodland	2.35	Endangered
		68 Creekline Grassy Woodland	1.04	Endangered
		175_61 Low Rises Grassy Woodland	0.71	Endangered
		235 Plains Woodland/Herb-rich Gilgai Wetland Mosaic	4.96	Endangered
		810 Floodway Pond Herbland	0.02	Vulnerable

Notes: Bioregional conservation status assigned to each EVC under the NVMF (DNRE 2002)

6.1.2 Tree Assessment

A total of 898 trees (medium sized trees and above), comprising 558 scattered indigenous trees and 340 trees in patches, were identified within the easement east of the existing pipeline.

Large trees were recognised as providing significant habitat and landscape value and mitigation measures have been put in place to retain as many of the LOTs and VLOTs as possible to ensure impacts to habitat are minimised. MOTs were also taken into consideration. As a result, only 15 scattered indigenous trees have been identified for removal. Refer to Table 7. Furthermore only 13 trees in patches have been identified for removal. Refer to Table 8.

Recommendations regarding the management of trees identified for retention and details of tree protection distances and construction controls required to minimise impacts to trees during the construction works are to be provided by an arborist. These will include:

- Treatments that reduce the level of impact within the TPZ (which could damage surface oriented roots) in order to retain trees subject to potential impact associated with clear and grade activities;
- Treatments that reduce the level of impact associated with trenching activities.

All requirements are to be included as part of the CEMP to be approved for the project.

Table 7: Summary of Impacts to Scattered Indigenous Trees

	VLOTs, LOTs, MOTs and STs	VLOTs, LOTs, MOTs and STs to be retained	VLOTs, LOTs, MOTs and STs to be removed
Longwood to Violet Town (L2)	101	97	4
Mangalore to Longwood (L3)	150	148	2
Violet Town to Glenrowan (L4)	215	211	4
Wandong to Broadford (L5)	92	87	5
TOTAL	558	543	15

Figures provided above are subject to the final assessment of impacts to retained trees being conducted by an arborist.

Table 8 Summary of Impacts to Indigenous Trees in patches

	VLOTs, LOTs and MOTs	VLOTs, LOTs and MOTs to be retained	VLOTs, LOTs and MOTs to be removed
Longwood to Violet Town (L2)	88	85	3
Mangalore to Longwood (L3)	111	105	6
Violet Town to Glenrowan (L4)	97	94	3
Wandong to Broadford (L5)	44	43	1
TOTAL	340	325	13

Figures provided above are subject to the final assessment of impacts to retained trees being conducted by an arborist.

6.2 Flora

Results of surveys for threatened flora species located within the construction ROW are summarised in Table 9.

Table 9: Summary of Threatened Flora Surveys

Scientific Name	Common Name	Source of Listing ¹	Looping No (# locations)			
			2	3	4	5
<i>Amyema linophylla orientale</i>	Buloke Mistletoe	DEPI (v)		1		
<i>Dianella amoena</i>	Matted Flax-lily	EPBC/DEPI (e)			1	
<i>Dianella tarda</i>	Late-flowering Flax Lily	DEPI (v)	2	2	3	
<i>Juncus psammophilus</i>	Sand Rush	DEPI (r)			3	

Notes: 1 DEPI refers to 'Advisory List of Rare or Threatened Plants in Victoria' (DSE 2005a) and conservation status in Victoria (where e=endangered, v=vulnerable, r=rare)

Specific locations are noted below:

Longwood - Violet Town (Looping 2)

Dianella tarda - recorded at Government Road (KP112.1) and Angle Road (KP119.2);

Mangalore - Longwood (Looping 3)

- *Amyema linophylla ssp orientale* - a number of plants found on Buloke, within the easement, at Ryan's Rd, Locksley (KP99.93);
- *Dianella tarda* - recorded from Martins Lane and Ryans Lane (KP93 and 99.9 respectively), Locksley.

Violet Town - Glenrowan (Looping 4)

- *Dianella amoena* - recorded in the vicinity of Lorimers Lane (KP151.5);
- *Dianella tarda* - recorded from Two Mile Creek, Lorimers Lane and Pagets Road (KP147.5, 151.5 and 155.2 respectively);
- *Juncus psammophilus* - recorded at Hoskins Lane/One Mile Creek (KP 145.5), Two Mile Creek (KP147.5) and Turnip Creek (KP152.5) both near Violet Town.

The ROW has been narrowed to 20m at all the above locations to minimise impacts to any listed species and associated vegetation.

It is further recommended that any specimens of *Dianella amoena*, *Dianella tarda* and *Juncus psammophilus* be salvaged prior to the preconstruction clearance of the ROW for relocation to suitable habitat in the same area.

Note that the *FFG Act*, in addition to listing species and communities considered to be threatened in Victoria, also identifies a number of other flora species that are not considered threatened but are nevertheless protected where they occur on Crown land. Many of these species have been recorded on parcels of Crown land intersected by the ROW such as road reserves and waterways. A permit under the *FFG Act* will therefore be required for clearance of any native vegetation within these areas.

6.3 Fauna

Results of surveys for threatened fauna species located within the construction ROW are summarised in Table 10.

Table 10: Summary of Threatened Fauna Surveys

Scientific Name	Common Name	Source of Listing	Looping No (# locations)			
			2	3	4	5
<i>Litoria raniformis</i>	Growling Grass Frog	FFG/EPBC		1		
<i>Pogona barbata</i>	Bearded Dragon	DEPI (v)		1		
<i>Varanus varius</i>	Lace Monitor	DEPI (e)				*
<i>Ardea modesta</i>	Eastern Great Egret	FFG			1	
<i>Aythya australis</i>	Hardhead	DEPI (v)				1
<i>Burhinus grallarius</i>	Bush Stone-curlew	FFG			2	
<i>Gallinago hardwickii</i>	Latham's Snipe	EPBC (mig)				1
<i>Merops ornatus</i>	Rainbow Bee-eater	EPBC (mig)		1		
<i>Pomatostomus temporalis temporalis</i>	Grey-crowned Babbler	FFG	2		5	
<i>Petaurus norfolcensis</i>	Squirrel Glider	FFG	6	4		
<i>Phascogale tapoatafa tapoatafa</i>	Brush-tailed Phascogale	FFG		2		

Notes: 1 DEPI refers to 'Advisory List of Threatened Vertebrate Fauna in Victoria' (DSE 2013) and conservation status in Victoria (where e=endangered, v=vulnerable)

* While no Lace Monitors were recorded during surveys, anecdotal evidence has been provided by a local landowner of a recent sighting on property S2-15, south of Tait's Road, Clonbinane (KP35)

The area traversed by the construction ROW is considered to currently support four broad habitat types: introduced grassland/pasture with occasional remnant native species, remnant patches of native woodland and/or derived grassland, scattered trees and aquatic/riparian habitats provided by waterways and dams.

Introduced grassland/pasture is generally considered of low habitat value for native fauna. However, some of the native vegetation intersected by the construction ROW has been found to provide habitat for species or communities of conservation significance. Hollow-nesting/roosting species like Squirrel Glider and Brush-tailed Phascogale may potentially be impacted if the trees they inhabit are to be cleared as part of this project. Mid-layer species such as Grey-crowned Babbler could be impacted by the clearance of shrubs and immature trees at some locations while ground-nesting species,

particularly Bush Stone Curlew, could be impacted by earthworks along the project corridor. Fallen logs, where they occur, may also provide refuge and nesting habitat for terrestrial native species such as reptiles, birds and mammals. Waterways, as well as dams, can also provide important refuge and breeding sites for amphibians and native fish.

Specific locations of FFG or EPBC listed species are noted below:

Wandong - Broadford (Looping 5)

- Latham's Snipe - recorded south of Stotts Road at KP29.8

Mangalore - Longwood (Looping 3)

- Growling Grass Frog - recorded at Wormangal Creek and nearby dam, Avenel (KP91.8 - 92.0);
- Bearded Dragon - recorded east of Babbler Lane at KP91.4;
- Rainbow Bee-eater - recorded at Burnt Creek (KP100.5);
- Squirrel Glider - recorded at seven sites being Charles and Reedy Creek (KP97.25 - 97.95) Monea, Ryans Lane and Nagambie-Locksley Rd, Locksley (KP99.9 and 100.29 respectively);
- Brush-tailed Phascogale - recorded at Hanley's Lane/Four Mile Creek (S2-119), Mangalore (KP77.3) and Muddy Waterhole Creek, Longwood (KP105.15).

Longwood - Violet Town (Looping 2)

- Grey-crowned Babbler - observed at Angle Road, Euroa (KP119.2) and Minahan Lane (KP140.15) near Euroa. Their distinctive nests were also found at Government Road (KP112.1) and Geodetic Road, Longwood (KP112.38);
- Squirrel Glider - observed at six locations being Kirwan's Bridge-Longwood Road (KP109.64), Government Road (KP112.1), Drysdale Road (KP117.32), Angle Road (KP119.2), Minahan Lane (KP140.15) and Alan McDiarmids Road, Violet Town (KP141).

Violet Town - Glenrowan (Looping 4)

- Bush Stone-curlew - two aural records only near Pagets Road (KP155.2) and Sloan Road (KP160.59). It was estimated that the calls were between 200 and 500m away from the ROW;
- Eastern Great Egret - one record at KP154.5;
- Grey-crowned Babbler - observed near the easement in Crilly (Boyle) Road (KP144.25), Waters Road (KP147.2), Lorimers Lane (KP151.5), Robinsons Road (KP154.1) and Four Mile Road (KP165.5);
Their distinctive nests were also found at Peck Road (KP149.5) and Harrison's Road (KP149.71), Violet Town and Sloan Road (KP161.4), Baddaginnie.

Most of this vegetation occurs as relatively thin corridors along roadsides or waterways and measures will be implemented to minimise impacts to vegetation in these locations. The nature of the project, with a construction footprint of between 20-28m, will therefore not require clearing of large swathes of native vegetation or habitat.

However, a number of trees have been identified for removal, whether within a patch or as scattered trees. As many of these contain hollows of some kind, they provide roosting or nesting sites for birds, marsupials such as gliders and phascogales, microbats and reptiles. Remnant patches with shrubs and saplings within the construction ROW, especially on the roadsides in Loopings 2 and 4, provide nesting sites for Grey-crowned Babbler.

Consideration should be given to the following measures to reduce the impact on local hollow-dependant fauna and Grey-crowned Babblers:

- Where hollow bearing trees are to be removed, nest boxes should be installed in adjacent non-impacted vegetation at least several days prior to tree removal;
- Tree collars to be installed on the hollow-bearing trees to be removed three days before scheduled removal to prevent fauna from re-entering hollows;
- An appropriately zoologist/wildlife handler to carefully inspect all hollows for fauna using an endoscope prior to felling of hollow-bearing trees;

- Hollow-bearing trees to be removed carefully by qualified arborists under the direction of an appropriately licenced zoologist/wildlife handler;
- An appropriately zoologist/wildlife handler to carefully inspect all hollows for fauna using an endoscope after felling of hollow-bearing trees;
- Where applicable and appropriate, restoration works should include the planting of shrubs, particularly *Acacia* species, within the ROW following construction;
- Lopping saplings and shrubs prior to the breeding season (June to October) in areas where babblers have been observed or nests recorded. In doing this it would eliminate the chance of nesting occurring in the construction ROW while breaking ground and construction activities are happening.

6.4 Ecological Communities

Results of surveys for threatened ecological communities located within the construction ROW are summarised in **Table 11**. EPBC communities intersected consist of:

- 'Grey Box (*E. microcarpa*) Grassy Woodlands and derived native grasslands of south-eastern Australia' within Loopings 2 to 4;
- 'White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and native grassland' within Looping 2;
- 'Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains' within Looping 4.

In addition, a number of patches intersected within Loopings 2 to 4 qualify for recognition as 'Grey Box - Buloke Grassy Woodland Community' under the Victorian *FFG Act*. Many of the species typical of the FFG listed Victorian temperate woodland bird community can also be found in many of the woodland patches intersected by the ROW.

No EPBC or FFG communities have been found to occur within Looping 5. However, several locations have been identified within Loopings 2 to 4 where an EPBC or FFG community occur. Note that implications in terms of the *FFG Act* will only apply to listed communities located on public land i.e. roadsides and some creeklines.

In each case, the area of the listed community intersected by the construction ROW is a portion only of much larger patches of the community and small portions only of each patch will be impacted by the construction ROW. In most cases, the communities intersected by the ROW occur as slim corridors inside road reserves and most of these areas are impacted to various degrees by exotic weeds or habitat modification such as log removal.

APA have indicated that a number of measures will be implemented to minimise impacts as much as possible. For the ecological communities impacted these include:

- Reduction of the width of the ROW to at least 20m (being the minimum width required in most situations to enable safe movement of construction traffic along the ROW) and, at one location, reduction of the ROW to less than 20m to avoid a number of Buloke considered to form an important part of the (applicable to Ryans Lane within Looping 3);
- Reduction of the width of the ROW to 20m and, where a reduction in impacts can be demonstrated (for instance, to avoid impact on a large tree), shifting of the ROW by 7m over the existing pipeline (applicable to Creighton's Siding Road and Lawrence Road within Looping 2);
- Retention of as many existing LOTs as possible recognising both their habitat and landscape value.

In particular, management measures have focused on the retention of as many mature trees as possible. As a result, no trees within the listed communities have been currently identified for removal. Grading of the topsoil prior to installation of the pipeline and its replacement following construction will also assist in maximising the retention of the existing seedbank and maximise the chances of restoration of the understorey. While no trees can be allowed to grow over the pipeline under the conditions of the pipeline licence, the potential for such regeneration of understorey species is demonstrated by the mapping of some communities over the existing pipeline (for example the area of SHW mapped across the ROW within Looping 4).

Table 11: Summary of Ecological Communities found within ROW

	Community	Source of Listing	Location	Impact	
				Area (Ha)	VQA score
Mangalore to Longwood (L3)	Grey Box (<i>E. microcarpa</i>) Grassy Woodlands and Derived Native Grasslands of South-Eastern Australia	EPBC	Mangalore Road (KP80.76)	0.02	0.42
			Babbler Lane (KP91.12)	0.08	0.41
			Martins Road (KP93)	0.06	0.58
			Dargalong Road (KP93.9)	0.09	0.47
			Ryans Lane (KP99.0)	0.01	0.51
			Nagambie-Locklsley Road (KP100.3)	0.31	0.5
			Government Road (KP105.65)	<u>0.14</u>	0.58
				0.71	
	Grey Box - Buloke Grassy Woodland Community	FFG	Ryans Lane (KP99.0)	0.01	0.51
			Nagambie-Locklsley Road (KP100.3)	0.31	0.5
			Government Road (KP105.65)	<u>0.14</u>	0.58
				0.46	
Longwood to Violet Town (L2)	Grey Box (<i>E. microcarpa</i>) Grassy Woodlands and Derived Native Grasslands of South-Eastern Australia	EPBC	Government Road (KP112.1)	0.08	0.34
			S3-57 Creightons Siding Rd to Drysdale Rd (KP116.89 - 117.34)	0.85	0.45
			Government Road (KP118.45)	0.22	0.45
			S3-64 Euroa airstrip (KP120.5 - 121)	1.21	0.51
			Moglonemby Road (KP127.27)	0.11	0.36
			Lawrence Road (KP128.1)	0.04	0.51
			Government Road (KP138.9)	0.07	0.28
			Minahan Lane (KP140.15)	<u>0.03</u>	0.24
				2.61	
	White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	EPBC	Longwood Pranjip Road (KP110.38)	0.087	0.4
	Grey Box - Buloke Grassy Woodland Community	FFG	Government Road (KP112.1)	0.08	0.34
			S3-57 Creightons Siding Rd to Drysdale Rd (KP116.89 - 117.34)	0.85	0.45
			Government Road (KP118.45)	0.22	0.45
			S3-64 Euroa airstrip (KP120.5 - 121)	<u>1.21</u>	0.51
				2.36	
Violet Town to Glenrowan (L4)	Grey Box (<i>E. microcarpa</i>) Grassy Woodlands and Derived Native Grasslands of South-Eastern Australia	EPBC	Dookie-Violet Town Road (KP144.75)	0.26	0.44
			Hoskin Lane (KP145.5)	0.22	0.65
			Four Mile Road (KP165.4)	<u>0.11</u>	0.39
				0.59	
	Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains	EPBC	S3-125 (KP154.12-154.45)	0.7	0.39
	Creekline Grassy Woodland (Goldfields) Community	FFG	One Mile Creek (KP145.55)	0.22	0.65

Most of the communities found within the ROW occupy road reserves and cover less than 0.1ha. Vegetation at these locations qualified as the listed communities largely due to the coverage of indigenous perennial grass species, the patch size and the number of indigenous trees per hectare thereby meeting the recommended thresholds for the listed community. The larger or most significant areas occur on private land adjacent to road sides:

- Nagambie Locksley Rd (Looping 3): the patch intersected by the ROW occurs between the road and Burnt Creek, an ephemeral waterway and has been categorized as Grey Box (*E. microcarpa*) Grassy Woodland or derived grassland. The patch occupies the south-east corner of a grazing property and covers an estimated area of approx 20ha but is contiguous with other vegetation that extends beyond the property boundary. The area intersected by the easement is largely clear of mature trees but has been classed as the community due to its close connection to woodland areas outside the easement. Better quality areas of the patch occur outside the easement and will not be impacted by construction.
- S3-57 (Looping 2): the patch intersected by the ROW is a triangular area located in the north-west corner of a grazing property between Creightons Siding Road and Drysdale Road west of Euroa and has been categorized as Grey Box (*E. microcarpa*) Grassy Woodland. The easement lies near the edge of the patch with the greater part of the patch extending to the north-west of the easement and along Drysdale Road to the east. Further areas of woodland that may also be consistent with the community lie to the north west of the Creightons Siding Road/Drysdale Road corner. The easement is therefore mostly located on the south-western edge of the patch.

Most of the easement is occupied by understorey species (grasses and forbs) with very few trees on the ROW and has been mapped as a community largely due to the adjacent woodland and the understorey species which have established over the easement, including over parts of the previously installed pipeline. The ROW has been narrowed to 20m throughout this area and no trees are to be removed during the proposed works.

- S3-64 (Looping 2): the patch intersected by ROW is a large area that occurs on land utilised as the Euroa airstrip. It consists of two patches of derived grassland where the ROW intersects the end of the airstrips and three patches of regenerating Grey Box Grassy Woodland between and outside the airstrips. No mature woodland occupies the ROW which has been narrowed throughout the whole area to 20m to avoid a number of trees. Some trees will require removal but no trees larger than a size considered as Medium under the Victorian Native Vegetation Management Framework for this vegetation class (MOT dbh=51cm) will require removal.
- S3-125 (Looping 4) The area intersected by the easement is part of a larger area adjoining the north-west and south-east sides of the easement that have been modelled as Plains Woodland Herb rich Gilgai Wetland Mosaic under the Biodiversity Information Mapping System managed by DEPI. This modelled patch covers 8.5ha with more than 20ha mapped in greater area. The ROW has been narrowed to 20m throughout the area classed as the community and will be restored according to the restoration objectives discussed in Section 2 of this referral. The potential for regeneration of understorey species is demonstrated by the mapping of the community over the existing pipeline and therefore no significant impact is expected from the proposed works.

6.5 Impact Assessment

Legislative obligations with respect to flora and fauna and the potential impacts associated with construction activities are reviewed below.

6.5.1 Environment Protection and Biodiversity Conservation Act 1999

The potential impacts of the Site in relation to the listed triggers have been assessed using the EPBC Act Administrative Guidelines on Significance:

- There are no Ramsar wetlands within or in the vicinity of the easement although the Lower Goulburn River Floodplain is listed on the Directory of Important Wetlands in Australia. This lies about 3km west of the project corridor at its closest point (near Mangalore at the commencement of Looping 3) and is not expected to be impacted by the proposed works;

- The assessment of the project has identified the presence of vegetation consistent with three EPBC listed ecological communities within the proposed construction ROW. These are:
 - Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Victoria;
 - White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland;
 - Seasonal herbaceous wetlands (freshwater) of the temperate lowland plains;
- Extensive surveys of the construction ROW have identified the following locations with a threatened species listed under the Act
 - Growling Grass Frog at Wormangel Creek (Looping 3);
 - Matted Flax-lily *Dianella amoena* at one location within Looping 4.

The construction ROW is not considered to intersect critical habitat of a listed migratory species or provide sufficient habitat for an ecologically significant proportion of any of the listed species.

Refer to Table 9, Table 10 and Table 11 for a summary of the locations of MNES located in the ROW.

Extensive management measures have been proposed to manage and minimise any impacts to MNES (refer Section 6.1). In all cases the ROW has been minimised to at least 20m wide to minimise any impacts to the community (generally the minimum width required to enable safe construction). It is therefore considered that impact to any of the EPBC listed communities intersected by the ROW is not significant. Overall impact to listed communities is also not considered significant.

However, it is recommended that a referral under the *EPBC Act* be prepared for forwarding to the federal Department of Environment to determine whether the proposed action is a controlled action under the *EPBC Act*.

6.5.2 Flora and Fauna Guarantee Act 1988

The assessment has noted the following:

- Presence of fauna species listed under the *FFG Act* at a number of locations within the construction ROW, predominantly within Loopings 2 to 4. These include one record of Growling Grass Frog (Looping 3) and several records of Squirrel Glider (Loopings 2 and 3), Brush-tailed Phascogale (Looping 3) and Grey-crowned Babbler (Loopings 2 and 4)
- Presence of ecological communities listed under the *FFG Act* within the construction ROW in Looping 2 (4 locations), Looping 3 (3 locations) and Looping 4 (one location)

The *FFG Act* applies to all crown land and permits are required under the *FFG Act* for the taking of listed species in these areas. A permit is also required where non-threatened flora that is protected on Crown land requires clearance. Therefore a permit will be required where clearance of native vegetation or habitat is required on areas such as roadsides and Crown land reserves.

Six threatening process listed under the Victorian *FFG Act* could be applicable to the project if appropriate steps were not taken to manage impacts:

- Degradation of native riparian vegetation along Victorian rivers and streams
- Habitat fragmentation as a threatening process for fauna in Victoria
- Increase in sediment input into Victorian rivers and streams due to human activities
- Infection of amphibians with Chytrid fungus resulting in chytridiomycosis
- Invasion of native vegetation by 'environmental weeds'
- Loss of hollow-bearing trees from Victorian native forests

Part of the existing easement was cleared for the construction of the original pipeline in 1975. While removal of some vegetation will be required to allow the project to proceed, the placement of the new pipeline within the existing easement will minimise the potential for removal or fragmentation of existing habitat that may occur with the creation of a new alignment.

Measures will also be implemented where possible to minimise impacts to existing vegetation and habitat. For instance:

- The ROW has been narrowed to 20m in all instances where listed species and/or communities have been recorded in order to minimise impacts
- Emphasis has been placed on the retention of large trees wherever possible in recognition of their value as habitat and landscape features. The whole construction ROW has been carefully inspected and steps taken to avoid or minimise impacts to patches of native vegetation and large old trees (LOTs) or very large old trees (VLOTs) that currently exist within the existing easement. As a result the ROW has been reduced where it intersects most patches of remnant vegetation or LOTs/VLOTs: only 11 LOTs will require removal across all four loopings.
- The construction ROW will be rehabilitated following construction to restore the construction area to its previous use and ensure the restoration of land and waterways crossed by the project to avoid degradation of habitat
- A Management Plan will be prepared specifically for the crossing of waterways to be approved by GBCMA. This will provide details on construction methods to be employed at all designated waterways from minor drainage lines to major creeks and rivers. Methods of waterway restoration will be described as well as methods to be utilised to rehabilitate the bed of the waterways and margins
- A Construction Environment Management Plan (CEMP) to be prepared for the project and approved by the regulator (DSDBI) will stipulate management measures to mitigate impacts from construction. This should include:
 - Measures to mitigate impacts to any of the listed species recorded within the ROW;
 - Measures to control of the introduction or spread of ‘environmental weeds’;
 - Measures to ensure the potential for spread of chytrid fungus between waterways is minimised.

It is therefore considered that impact to any of the FFG listed species communities intersected by the ROW is not significant. Overall impact to listed communities is also not considered significant. However, a number of mitigation measures are recommended for inclusion in the CEMP to ensure impact to these communities is minimised. These are discussed in the following section.

6.5.3 Environment Effects Act 1978

The *Environment Effects Act* requires the preparation of an Environment Effects Statement (‘EES’) where proposed works may potentially have a significant effect on the environment. A project with potential adverse environmental effects that individually or in combination could be significant in a regional or State context should generally be referred to the Minister administering the *Environment Effects Act* to determine whether an EES is required.

A summary of those criteria relevant to biodiversity issues, and an assessment of their application to the project, is provided in Table 12.

It is noted that about 37ha of native vegetation is proposed for clearing across all four loopings to allow the project to proceed. Of this, about 11ha would be considered to be vegetation of very high conservation significance under the former NVMF.

As previously noted, extensive management measures have been proposed to manage and minimise any impacts to listed species and communities (refer Section 6.1). In all cases the ROW has been minimised to at least 20m wide to minimise any impacts to vegetation and/or habitat (generally the minimum width required to enable safe construction). It is therefore considered that impact to any of the FFG listed communities intersected by the ROW is not significant. Overall impact to listed communities is also not considered significant.

However, it is recommended that a referral be prepared for forwarding to the Minister of Environment to determine whether the proposed action will require the preparation of an Environment Effects Statement.

Table 12: Summary of Biodiversity related EES Triggers

Impacts	Assessment	Looping 2 Longwood to Violet Town	Looping 3 Mangalore to Longwood	Looping 4 Violet Town to Glenrowan	Looping 5 Wandong to Broadford
Individual potential environmental effects on the environment that might be of regional or State significance and therefore warrant referral of a project are					
<ul style="list-style-type: none"> Potential clearing of 10ha or more of native vegetation of very high conservation significance (VHCS) or from an EVC identified as endangered by DSE⁶ 		Clearance of 7.2ha of endangered veg or 2.7ha of veg of VHCS	Clearance of 7.8ha of endangered veg or 2.5ha of veg of VHCS	Clearance of 10.1ha of endangered veg or 1.5ha of veg of VHCS	Clearance of 2.2ha of endangered veg or 4.3ha of veg of VHCS
<ul style="list-style-type: none"> Potential long-term loss of significant proportion of known remaining habitat or population of a threatened species within Victoria 	NO	NO	NO	NO	NO
<ul style="list-style-type: none"> Potential long-term change to the ecological character of a wetland listed under the Ramsar Convention or in 'A Directory of Important Wetlands in Australia' 	NO	No Ramsar listed wetlands within proximity. Goulburn River listed on Directory lies at least 20km to W of Longwood	No Ramsar listed wetlands within proximity. Goulburn River listed on Directory lies about 3km to W at closest point	No Ramsar listed wetlands within proximity. Goulburn River listed on Directory lies at least 30km to W	No Ramsar listed wetlands within proximity. Goulburn River listed on Directory lies at least 14km to N
<ul style="list-style-type: none"> Potential major effects on the health or biodiversity of aquatic, estuarine or marine ecosystems over the long term 	NO	NA	NA	NA	NA
A combination of two or more of the following types of potential effects on the environment that might be of regional or State significance would also warrant referral of a project					
<ul style="list-style-type: none"> Potential clearing of 10ha or more of native vegetation 		Clearance of 7.9ha of native vegetation	Clearance of 11.1ha of native vegetation	Clearance of 10.3ha of native vegetation	Clearance of 7.5ha of native vegetation
<ul style="list-style-type: none"> Matters listed under the <i>Flora & Fauna Guarantee Act 1988</i> <ul style="list-style-type: none"> Potential loss of a significant area of a listed ecological community Potential loss of a genetically important population of an endangered or threatened species including as a result of loss or fragmentation of habitats Potential loss of critical habitat Potential significant effects on habitat values of a wetland supporting migratory bird species 		Intersects 2.36ha of Grey Box-Buloke Grassy W'land NO	Intersects 0.46ha of Grey Box-Buloke Grassy W'land NO	Intersects 0.22ha of Creepline Grassy W'land NO	- NO
		NO	NO	NO	NO
		NO	NO	NO	NO

⁶ Note that the NVMF (which defines how vegetation is classed as high or very high conservation significance) was replaced by the Biodiversity Assessment Guidelines in December 2013 (DEPI 2013). The triggers for an EES referral are based on the NVMF which has therefore been used as the basis for this review

7. RECOMMENDATIONS

7.1 General Mitigation Measures

A Construction Environment Management Plan (CEMP) is required to be prepared for the project to ensure environmental issues are appropriately managed during construction and that regulatory obligations are met. Environmental controls will be documented within the CEMP. The aim of APA's environmental controls is to, in order of preference:

- avoid impacts to flora and fauna;
- minimise impacts to flora and fauna; and
- compensate for impacts to flora and fauna using other mitigation measures such as relocation of species or offsetting.

The CEMP should include the practices discussed below.

7.1.1 Flora and Fauna impacts

To minimise impacts to the ecological values within the construction ROW the following will be implemented:

- Induction of employees and contractors prior to commencement of works to highlight environmental, cultural and other construction issues (such as threatened flora and fauna, vegetation communities etc.);
- Photo monitoring points should be established prior to construction to monitor ecologically sensitive areas throughout the project including prior to construction, during construction and post-reinstatement;
- Vegetation to be retained shall be identified and located on the construction alignment sheets and clearly flagged in the field as not to be disturbed;
- Any native vegetation that is to be removed as a result of construction works is to be offset in accordance with legislative requirements;
- Fencing of remnant vegetation prior to and during construction activities to prevent damage to the vegetation and to prevent any construction access to retained vegetation. Tree protection, if required, will be in accordance with the *Australian Standard - AS 4970-2009 Protection of trees on development sites*;
- An arborist be present during any vegetation clearance and trenching works within the vicinity of treed vegetation identified in the Arborist report;
- No works, including loading and unloading, storage of materials, dumping of waste, vehicle access and parking or other construction activity, will occur within areas of retained native vegetation identified in the route maps (Appendix A in each of Parts B to E of this report);
- All excavated soil should be stockpiled in areas free of remnant native vegetation;
- Stockpiles should be stored away from areas of surface water flow and not impede surface drainage or water flow;
- All waterways, drainage systems and waterbodies should be protected from the impact of sediment with appropriately installed sediment fences to prevent turbid water entering the waterway;
- Regular environmental inspections should be undertaken by appropriately qualified environmental specialists throughout the project to monitor impacts to flora and fauna.

The following mitigation measures should be employed to reduce impacts to fauna habitat and to minimise faunal injury or mortality:

- Checking of trees for fauna prior to removal by licensed wildlife handler. This includes checking of stags for fauna such as bats, reptiles, bird, mammals;

- Adopting a safe speed limit along the construction ROW through sensitive areas (identified on the route maps) of no greater than 40kph to minimise the potential for collision with fauna moving through roadside or other remnant vegetation;
- Minimising the period and length of time that the trench remains open, particularly in areas where sensitive habitat has been identified nearby.
- Use of end caps on pipe strings to prevent entry of fauna prior to laying;
- Daily monitoring of open sections of trench at regular intervals for trapped animals such as reptiles and small ground-dwelling mammals, particularly in areas where sensitive habitat has been identified;
- Constructing trench plugs and ramps with slopes no greater than 45% at regular intervals along the pipeline trench to provide exits for fauna;
- Checking of the open trench for fauna prior to backfill and removal of any trapped animals;
- If fauna is located during the inspection, they will be relocated by a suitably qualified and experienced animal handler that holds a current wildlife permit issued by DEPI;
- Reporting of injured or dead native wildlife within construction sites to regional DEPI personnel;
- Any accumulated trench water will be disposed in a manner that will ensure no adverse impacts from sediment load or low dissolved oxygen levels to waterways. Water from trench de-watering should therefore be disposed to land via an energy-dissipating and sediment-trapping system (eg via grassed areas, straw bales or geotextile filter/fabrics) and should not be disposed directly into a waterbody or result in flooding of the area.

In addition, it is recommended that the following management plans be prepared:

- A Striped Legless Lizard (SLL) Management Plan to describe contingency measures to be employed in the event that SLL are located during construction;
- A Growling Grass Frog (GGF) Management Plan to describe contingency measures to be employed in the event that GGF are located during construction.

Plans should be prepared in accordance with DEPI protocols.

A number of indigenous trees have been identified for removal, whether within a patch or as scattered trees. As many of these contain hollows of some kind, they provide roosting or nesting sites for birds, marsupials such as gliders and phascogales, microbats and reptiles. Remnant patches with shrubs and saplings within the construction ROW, especially on the roadsides in Loopings 2 and 4, provide nesting sites for Grey-crowned Babbler.

A Management Plan to reduce the impact on local hollow-dependant fauna and babblers is also recommended. Measures that should be considered for inclusion in the Plan include:

- Where hollow bearing trees are to be removed, nest boxes should be installed in adjacent non-impacted vegetation at least several days prior to tree removal;
- Tree collars to be installed on the hollow-bearing trees to be removed three days before scheduled removal to prevent fauna from re-entering hollows;
- An appropriately qualified zoologist/wildlife handler to carefully inspect all hollows for fauna using an endoscope prior to felling of hollow-bearing trees;
- Hollow-bearing trees to be removed carefully by qualified arborists under the direction of an appropriately licenced and qualified zoologist/wildlife handler;
- An appropriately qualified zoologist/wildlife handler to carefully inspect all hollows for fauna using an endoscope after felling of hollow-bearing trees;
- Where applicable and appropriate, restoration works should include the planting of shrubs, particularly *Acacia* species, within the ROW following construction;
- Lopping saplings and shrubs prior to the breeding season (June to October) in areas where babblers have been observed or nests recorded. In doing this it would eliminate the chance of nesting occurring in the construction ROW while breaking ground and construction activities are happening.

7.1.2 Weed Management

Vehicles and personnel have the potential to transfer or spread weeds and disease, since they can carry seeds or organic matter caught on clothing, in tyres or under the vehicle body. Similarly, weeds can be introduced to an area via equipment that is contaminated with plant matter or soil from previous work sites. The potential impact of weeds into areas that were previously weed free can be substantial, from both environmental and economic perspectives.

Hygiene procedures are required during all phases of the project to minimise the risk of spreading weeds and disease. Contractors are advised to reference the Civil Contractors Federation *Guide for Machinery Hygiene for Civil Construction, 2011*. These guidelines outline industry best practice for weed and disease management. Key management guidelines include:

- All vehicles will be washed-down prior to entering the construction area to prevent the transfer of weeds. Wash-down details should be recorded in a Wash-Down Register;
- All personnel will receive induction training in procedures for weed and disease control personal hygiene practices, such as removing seeds and mud from clothing and footwear;
- To prevent the introduction of weeds and disease, equipment used during works or vegetation clearing will be delivered to the site free of soil and organic matter to prevent the introduction of exotic species to the site and adjacent areas. A visual inspection will be undertaken and documented prior to acceptance of the vehicle or equipment item onto the construction ROW;
- Cleaning will be thorough so as to remove all soil or organic matter from the surface of vehicles, equipment and portable infrastructure, including the undercarriage and running gear;
- Grading of soil from the ROW will minimise the transfer of soil between properties;
- Where the works require the importation of material, such as sand, gravel or spoil, the material will be sourced from a reputable (preferably local) supplier, be weed free as far as possible and be certified by the supplier to meet the Environment Protection Authority's Fill Material criteria and to meet human health and environmental criteria;
- All construction vehicle and equipment movement will be confined to the construction ROW, designated access tracks/roads and allocated parking areas;
- Revegetation and weed-control will be undertaken as soon as practicable after construction;
- Post-construction weed monitoring and control will be carried out throughout the project life to minimise environmental weeds colonising disturbed areas and to control and prevent the spread of noxious weeds;
- Prior to clear and grade, wash down points will be set up at locations when moving from an identified contaminated area to a weed free area;

In addition, the following areas that qualify for recognition as an EPBC listed community should have wash down bays installed at the entry to the area to minimise the potential for spread of weeds into these areas:

- Looping 2: S3-57 Creightons Siding Road to Drysdale Road (KP116.89 - 117.34)
S3-64 Euroa airstrip (KP120.5 - 121)
- Looping 4: S3-125 (KP154.13-154.45)

7.2 Specific Mitigation Measures

DEPI recommends the application of a three step hierarchy to minimise impacts to biodiversity issues of significance:

- Avoidance of impacts;
- Minimisation of impacts where they cannot be avoided;
- Identification of appropriate offset options where impacts are unavoidable.

The following measures are proposed to be undertaken to minimise the impacts of this project on indigenous flora and fauna at selected locations along the construction ROW:

- Horizontal Directional Drilling of some watercourses and other sensitive areas to avoid impact to vegetation, flora or fauna;
- The minimisation of the construction ROW to 20m or less at most locations where the construction ROW intersects native vegetation. This will reduce the amount of flora and therefore fauna habitat required to be cleared by over 30%;
- Shifting of the narrowed construction ROW (20m), in some cases, westwards over the existing pipeline to avoid impacts on remnant vegetation in the 'eastern' area of the easement;
- Extensive planning to reduce the number of large and very large old trees (hollow-bearing trees and therefore potential habitat) that are required to be felled;
- Reinstatement of the construction ROW following construction to allow the land to be used for its previous purpose.

A summary of the overall impact to the area of native vegetation requiring removal is provided in Table 5. A summary of where these measures have been applied is contained in Parts B to E being:

- Table B15 within Part B (Looping 2) and accompanying route maps within Appendix B1;
- Table C16 within Part C (Looping 3) and accompanying route maps within Appendix C1;
- Table C16 within Part D (Looping 4) and accompanying route maps within Appendix D1;
- Table E14 within Part E (Looping 5) and accompanying route maps within Appendix E1.

In some circumstances, salvage and/or relocation of native flora and fauna may be appropriate before native vegetation or habitat is removed.

A construction footprint that defines the extent of the area to be disturbed during construction has been prepared during the preparation of this assessment and is included within the discussion on the relevant looping section contained within Parts B to E. It is understood that this will be included as part of the tender documentation to be provided to the pipeline contractor. This together with a CEMP and audit schedule approved by the regulator will ensure that proposed mitigation measures are achieved.

The following table summarises additional measures to vegetation clearance minimisation and arborist requirements required at specific locations.

Table 13: Summary of Management Measures

Looping	Location	KP	Additional Management Measures		
			Flora	Fauna	Other
3	Four Mile Creek	77.5		Pre-clearance survey Management measures for Phascogale	
	Mangalore Road	80.8	FFG permit for protected flora		
	Babbler Lane	91.1			
	Wormangal Creek	91.8 - 92		GGF Management Plan	
	Martins Road	93.0	FFG permit for protected flora		
	Dargalong Road	94.0			
	Scattered Tree	95.9		Fauna survey of tree prior to removal	
	Government Road & Charles Creek	97.25 97.5		Pre-clearance survey Management measures for Squirrel Glider	
	Ryan's Lane	99.9	Relocation of Late-flower Flax-lily <i>Dianella tarda</i> prior to preconstruction clearance	Pre-clearance survey Management measures for Squirrel Glider	Exclude from use by construction traffic as access to ROW
	Nagambie-Locksley Road	100.3		Pre-clearance survey Management measures for Squirrel Glider	
	Muddy Waterhole Creek	105.2		Pre-clearance survey Management measures for Phascogale	
	Government Road	105.7		Fauna survey of tree prior to removal	
	2	Kirwan's Bridge - Longwood Road and Pranjip Creek	109.6 - 109.7	FFG permit for protected flora	Pre-clearance survey Management measures for Squirrel Glider
Longwood - Pranjip Road		110.4			

Looping	Location	KP	Additional Management Measures		
			Flora	Fauna	Other
2	Government Road	112.1	Relocation of Late-flower Flax-lily <i>Dianella tarda</i> prior to preconstruction	Pre-clearance survey Management measures for Squirrel Glider and Grey-crowned Babbler	Exclude from use by construction traffic as access to ROW
	S3-57 and adjoining roadsides	116.9 to 117.2	FFG permit for protected flora	Pre-clearance survey Management measures for Squirrel Glider	
	Government Road	118.35	FFG permit for protected flora		
	Angle Road	119.2	Relocation of Late-flower Flax-lily <i>Dianella tarda</i> prior to preconstruction FFG permit for protected flora	Pre-clearance survey Management measures for Squirrel Glider and Grey-crowned Babbler	Exclude from use by construction traffic as access to ROW
	S3-64 (Euroa airstrip)	120.5 to 121.1			
	Moglonemby Road	127.3			
	Lawrence Road	128.1			
	Government Road	139	FFG permit for protected flora		
	Minahan Lane	140.2		Pre-clearance survey Management measures for Squirrel Glider and Grey-crowned Babbler	
	Alan McDiarmid Road	141.2		Pre-clearance survey Management measures for Squirrel Glider and Grey-crowned Babbler	
4	Crilly (Boyle) Road	144.25		Pre-clearance survey Management measures for Grey-crowned Babbler	
	Dookie - Violet Town Road	144.75	FFG permit for protected flora		
	Hoskin Lane and One Mile Creek	145.5	Salvage and relocation of Sand Rush <i>Juncus psammophilus</i> prior to preconstruction		

Looping	Location	KP	Additional Management Measures		
			Flora	Fauna	Other
4	Ramage Road	146.85		Pre-clearance survey Management measures for Grey-crowned Babbler	
	Waters Road	147.2		Pre-clearance survey Management measures for Grey-crowned Babbler	
	Two Mile Creek	147.5	Salvage and relocation of Sand Rush <i>Juncus psammophilus</i> and Late-flower Flax-lily <i>Dianella tarda</i> prior to preconstruction		
	Peck Road	149.5		Pre-clearance survey Management measures for Grey-crowned Babbler	
	Harrisons Road	149.71		Pre-clearance survey Management measures for Grey-crowned Babbler	
	Lorimers Lane	151.5	Relocation of Matted Flax-lily <i>Dianella amoena</i> and Late-flower Flax-lily <i>Dianella tarda</i> prior to preconstruction FFG permit for protected flora		
	Turnip Creek	152.5	Salvage and relocation of Sand Rush <i>Juncus psammophilus</i> prior to preconstruction		
	Robinsons Road and adjacent Community EPBC	154.1 154.1 - 154.45		Pre-clearance survey Management measures for Grey-crowned Babbler	
	Sloan Road	105.65		Pre-clearance survey Management measures for Grey-crowned Babbler	Salvage of woody vegetation or fallen timber from the construction ROW for replacement back onto the easement as part of the restoration process
	Four Mile Road	165.38	FFG permit for protected flora	Pre-clearance survey Management measures for Grey-crowned Babbler	

8. GLOSSARY & ABBREVIATIONS

AHD	Australian Height Datum (the surface that passes through mean sea level as defined by the National Mapping Council)
APA	APA GasNet Australia (Operations) Pty Ltd
Benchmark	Native vegetation in Victoria has been categorised into Ecological Vegetation Classes by DEPI. An EVC benchmark is a standard vegetation-quality reference point relevant to the vegetation type and represents the average characteristics of a mature and apparently long-undisturbed state of the same vegetation type
BIMS	Biodiversity Information Management System, an online geographic information system maintained by DEPI
Bioregion	An area of land that can be identified as a unit on the basis of biological and geographical criteria
CAMBA	China Australia Migratory Bird Agreement. The agreement lists terrestrial, water and shorebird species which migrate between the two countries and requires both parties to protect the listed birds.
CEMP	Construction Environment Management Plan
CMA	Catchment Management Authority
DBH	Diameter at Breast Height, a measure used to categorise the size of a tree. This is generally determined to be at 1.3m or 1.4m from ground level
Declared noxious weed	Declared noxious weeds in Victoria are plants that have been proclaimed under the <i>Catchment and Land Protection Act 1994</i> which requires landholders to control and eradicate these weeds
DEPI	Department of Environment and Primary Industries (state, as of April 2013)
DoE	Department of Environment (federal, as of September 2013)
DSDBI	Department of State Development, Business and Innovation
DSE	Department of Sustainability and Environment (state, pre April 2013)
DSEWPaC	Department of Sustainability, Environment, Water, Population and Communities (federal, pre September 2013)
EES	Environment Effects Statement
EPBC	<i>Environment Protection and Biodiversity Conservation Act 1999</i> (federal)
ESO	Environmental Significance Overlay, applied by the local planning authority to land which is considered to provide significant habitat or natural resource value
ESV	Energy Safe Victoria
EVC	Ecological Vegetation Class, a floristic community that appears to be associated with a recognisable environmental niche
FFG	<i>Flora and Fauna Guarantee Act 1988</i> (Victorian)
Forb	A non-woody (herbaceous) flowering plant
GBCMA	Goulburn Broken Catchment Management Authority
GGF	Growling Grass Frog (<i>Litoria raniformis</i>)
GIS	Geographic Information System, a computer based system that allows mapping and management of geographic or spatially based data
Gilgai	A natural soil formation associated with the shrinkage or swelling of clay soils that results in small mounds and depressions
Government Road	An undeveloped and unnamed road reservation
GPS	Global Positioning System, a satellite based navigation system
Graminoid	Grass like plants with narrow leaves growing from the base such as the true

	grasses and sedges and rushes
GSM	Golden Sun Moth (<i>Synemon plana</i>)
HDD	Horizontal Directional Drill
Hha	Habitat Hectares, a measure of the quality of a patch of native vegetation as determined by a method documented in the Vegetation Quality Assessment manual (DSE 2004)
JAMBA	Japan Australia Migratory Bird Agreement
KP	Kilometre Point, being the distance in kilometres along the pipeline from its starting point
kPa	Kilopascal, a unit of pressure
LGA	Local Government Authority
Looping	A means to increase both the gas flow rate and the volume of gas stored within the pipeline infrastructure by duplicating an existing pipeline for a certain distance and tying it back into the existing pipeline
LOT	Large Old Tree. Large trees are defined by a minimum DBH threshold measurement as indicated in the benchmark for the relevant EVC
MNES	Matter of National Environmental Significance being those items protected under the EPBC Act such as listed threatened species and communities
Native vegetation	Defined in the Victoria Planning Provisions as ‘plants that are indigenous to Victoria, including trees, shrubs, herbs and grasses’.
NVMF	Native Vegetation Management Framework, a policy prepared by the Victorian Government to regulate the clearance of native vegetation in Victoria (DNRE 2002). This was superseded by the <i>Biodiversity assessment guidelines</i> in December 2013 (DEPI 2013).
Offsets	Actions undertaken to offset the permitted clearing of native vegetation and ensure that there is no net loss as a result of the clearance (ie a neutral impact to Victoria’s biodiversity)
Offtake	A valve on a pipeline that allows another pipeline to be connected to it
PMST	Protected Matters Search Tool, a predictive database maintained by DoE that can be used to identify MNES that may occur in a given area
Regionally controlled weeds	These weeds are usually widespread and established in a particular region. To prevent their spread, continuing control measures are required. Land owners have the responsibility to take all reasonable steps to control and prevent the spread of these weeds on their land and the roadsides that adjoin their land.
Remnant patch	An area of native vegetation that meets the definition provided in the <i>Biodiversity assessment guidelines</i> (DEPI 2013)
Restricted weeds	Declared noxious weeds that must not be sold or traded in Victoria. The category of Restricted Weeds is intended to include plants that are a serious threat to primary production, Crown land, the environment or community health in another State or Territory of Australia, which have the potential to spread into and within Victoria, and pose an unacceptable threat.
Reverse ROW	The ‘normal’ pipeline construction ROW is located ‘east’ of the existing pipeline. A ‘reverse ROW’ has been shifted ‘westwards’ to lie over the existing pipeline (but still within the existing pipeline easement). This requires a reversal of the Working and Trench side of the ROW depicted in Figure 2 of PART A.
Riparian zone	The area on or adjacent to a waterway or waterbody
ROKAMBA	Republic of Korea Australia Migratory Bird Agreement
ROW	Right-of-Way
SPRAT	Species Profile and Threats database maintained by DoE to assemble information on EPBC Act listed species

Transmission pipeline	A high-pressure pipeline that transports natural gas over long distances. This is distinct from a distribution main which is used to transport natural gas from a transmission pipeline to the customer
VBA	Victorian Biodiversity Atlas, a database of flora and fauna records maintained by DEPI
VLOT	Very Large Old Tree being at least 1.5 times the benchmark dbh for LOTs
VPP	Victorian Planning Provisions
WCS	Wollert Compressor Station

9. STATEMENT OF LIMITATIONS

Monarc Environmental Pty Ltd (Monarc) has prepared this flora and fauna assessment on behalf of APA GasNet Australia (Operations) Pty Ltd (APA) for the Victorian Northern Interconnect Expansion project.

Monarc has exercised care in checking and interpreting the data and information referred to in this report. The Assessment has been designed in good faith in a manner that seeks to confirm the information available and test its accuracy and completeness. However, Monarc cannot guarantee the accuracy or completeness of that data and information. Accordingly, while our conclusions are based on the information available to us during our assessment of the Site, some of the conclusions could be different if the information upon which they are based is determined to be inaccurate.

Persons seeking to rely upon the report should only do so after seeking independent expert advice from appropriately qualified persons. The extent of any environmental risks associated with the site may vary significantly according to the proposed use or development of the site.

Therefore, any representation, statement, opinion or advice expressed or implied in this report is made in good faith but on the basis that Monarc, its agents and employees are not liable to any person for any damage or loss whatsoever which has occurred or may occur in relation to that person taking or not taking (as the case may be) action in respect of any representation, statement or advice referred to above.

Monarc disclaims any obligation to update the report for events taking place, information becoming available or known to us, after the preparation of this report.