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1 REGIONAL BACKGROUND

APA GasNet Australia (Operations) Pty Ltd (APA) is looping (duplicating) part of the existing Wollert to Wodonga gas transmission pipeline (pipeline licence PL101) between Broadford and Mangalore (Back Mountain Road, near Seymour), Victoria (known as Looping 6).

The Wollert to Wodonga gas transmission pipeline was constructed in 1975 and runs in an approximately north easterly direction from Wollert on the northern outskirts of Melbourne through to Wodonga, a total distance of approximately 280km. This pipeline occupies an easement of 35m in width. The proposed pipeline looping is to be installed within the existing pipeline easement. With reference to the starting point of the existing pipeline at Wollert, this looping will commence at Kilometre Point (KP) 45.2 and finish at KP74.3, a total distance of 29.1km.

An overview of the section to be looped is provided in **Figure B1** whilst detailed pipeline maps are provided in **Appendix B1.**

Monarc Environmental (Monarc) was engaged by APA to undertake a flora and fauna assessment of the APA construction ROW from Broadford (KP45.2) to Mangalore (KP74.3). The purpose of the assessment is to identify any risks to significant flora and fauna values within the construction ROW and provide the necessary information to enable management recommendations for flora and fauna that may be affected by construction Right Of Way (construction ROW).

1.1 General

Most of the construction ROW is located within the foothills of the north-western edge of the Great Dividing Range. The terrain generally consists of low hills with gentle slopes occasionally intersected by waterways that derive from the ranges to the east. In the northern section of the route, the topography starts to merge with the extensive floodplains and terraces of the Northern Riverine Plains.

Falling predominantly within the *Central Victorian Uplands* and *Victorian Riverina Bioregions*, the local area was once dominated by Grassy Woodlands with the lower lying valleys and plains containing Valley Grassy Forest, Plains Grassy Woodland and Floodplain Riparian Woodland ecosystems (DEPI 2014c).

Today, the majority of the region has been cleared, mainly for pastoral purposes including grazing and mixed cropping. As a result, the once-extensive woodlands have been significantly reduced with the few remnants containing predominantly River Red Gum *Eucalyptus camaldulensis* and Grey Box *E. microcarpa* with grassy understorey and scattered shrubs.

Networks of vegetated roadsides and creeklines now play an important role in sustaining biodiversity across this highly modified landscape (GBCMA 2003). They not only provide critical habitat for native bird species but also for arboreal mammals. Threatened fauna known to occur within the local area include Brown Treecreeper *Climacteris picmunus victoriae* and Brush-tailed Phascogale *Phascogale tapoatafa tapoatafa,* which are often found along connected creeklines and roadsides within large, old, hollow-bearing trees. Habitat for Striped Legless Lizard may also occur within areas of cracked soil and under rocks and fallen timber (Lobert 2015, *pers. comm.*).

1.2 Land Use

1.2.1 Planning Zones

The construction ROW lies wholly within the Shire of Mitchell. The Planning Zones that apply to parcels of land traversed by the construction ROW are summarised in **Table B1**.

Table B1: Summary of Planning Zones

Local Government Area	Zone	Location (KP)
Mitchell Shire Council	Farming Zone 1 (FZ)	Most of the rural areas which the construction ROW traverses.
	Road Zone 1 (RDZ1)	Upper Goulburn Road (59.5)
		Goulburn Valley Highway (67.19)
	Township Zone (TZ)	Tallarook (58.55 - 59.5)
	Public Conservation and Resource Zone (PCRZ)	Telegraph Road (66.1)
	Rural Living Zone (RLZ)	Corner Telegraph and Kobyboyn Road (69.50)
	Low Density Residential Zone (LDRZ)	Whiteheads Creek - Highlands Road (70.8 - KP71.34)
	Public Use Zone - Service and Utilities (PUZ1)	South of Back Mountain Road (73.79 - 74.3)

Land usage in the area is predominantly rural with the majority of the land classed as a Farming Zone. The greater part of the region retains an open aspect typical of grazing land and much of this land is subject to either sheep or cattle grazing. While much of the private land has been cleared for agricultural purposes, many areas have retained a number of the larger old trees as part of the landscape.

In addition to land associated with roads, the construction ROW intersects three other areas of Crown Land. Two of these are classed as Uncategorised Public Land (Dabyminga Creek and Upper Goulburn Road) and the third, the Goulburn River classed as Water Frontage Reserve.

1.2.2 Environmental and Landscape Overlays

Environmental issues of local or regional importance or concern may be recognised under local government planning schemes by the application of environmental overlays or local management requirements regarding vegetation management. Environmental and Landscape Overlays that apply to the construction ROW are summarised in **Table B2**.

The construction ROW intersects one large area with a Landscape Significance Overlay and a few areas with Vegetation Protection Overlays in Mitchell Shire.

Table B2: Summary of Environmental and Landscape Overlays

Local Government Area	Overlay	Name	Location (and KP approx.)	Description
Mitchell Shire Council	VPO1	Vegetation Protection Overlay 1	45.2 - Strath Creek Rd 48.42 - Davis Rd 59.3 – 59.5 - Upper Goulburn Rd 66.2 – 69.55 - Telegraph/Kobyboyn Rd 74.4 - Back Mountain Rd	Roadside vegetation and wildlife corridors are a significant feature of the Mitchell Shire. Many roadsides and corridors throughout the area contain pockets of remnant indigenous vegetation, rare, vulnerable and significant flora species. Some of the roadsides and corridors provide a valuable source of native seed stock and important habitat for wildlife. The conservation and protection of these areas is an important strategy.
	VPO2	Vegetation Protection Overlay 2	50.0 – 50.8, 53.61 – 54.2, 55.2 – 55.4 (approx) - Adjacent to Hume Freeway	Wide freeway reservations frequently contain remnant vegetation and habitat that may be substantially depleted in adjacent freehold areas. Freeways are also significant as the main viewing corridor of many visitors and local residents when travelling through the municipality, thus placing importance upon the maintenance and enhancement of the freeway environs.
	ESO3	Environmental Significance Overlay 3	58.55 - Dabyminga Creek 62.8 - Goulburn River 70.8 - Whiteheads Creek	High quality natural or revegetated stream frontages are important in maintaining clean water, soil stability and diversity of flora and fauna. Protection over these areas is important to minimise the adverse impact often associated with grazing, weeds, pest animals and salinity discharge.
	SLO2	Significant Landscape Overlay 2	56.1 – 58.24 - South of Clearview Court	Tallarook is an historic township within an attractive rural setting which is dominated by the Tallarook Ranges. The ranges provide a significant natural setting, attraction and backdrop to the township environs and provide important habitat and native vegetation areas requiring protection.

1.2.3 Relevant Literature

The Shire of Mitchell has prepared a code of practice for roadside management that identifies and categorises roadside vegetation considered to have conservation significance (Mitchell Shire Council 2007).

In general, the plans cover all rural road reserves in the Mitchell Shire excluding any road reserves under the management of VicRoads (e.g. arterial roads or highways) or unused roads under the management of Department of Environment, Lands, Water and Planning (DELWP). While there is some variation in definition, roadsides have been generally assigned to one of three rankings; High, Medium or Low, as defined in Part A.

A number of roads intersected by this looping have also been assigned a ranking of High Conservation value by the Goulburn Broken Catchment Management Authority (GBCMA). Many of the roads considered to have special value have been identified by on-site signage that identifies these areas as Significant Roadside Areas. Such roads include Davis (KP48.42) and Upper Goulburn (KP59.5) Roads, in the South-west Goulburn Landscape Zone (DSE 2006b) and Telegraph Road (KP67.2-69.4) spanning the Yea, Hughes Creek and Longwood Landscape Zones (DSE 2005a, DSE 2008, DSE 2005b) respectively.

The Mitchell Shire Council 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.

1.3 Waterways

Natural assets that have been identified along the project area include perennial waterways such as the Goulburn River as well as ephemeral waterways. In general, natural waterways and drainage lines (designated waterways under the Victorian *Water Act 1989*) are the responsibility of the GBCMA while Goulburn Murray Water is responsible for water storage and associated delivery and drainage systems. In summary, Broadford to Mangalore (Looping 6) intersects 25 designated waterways including the Goulburn River, south of Seymour. These waterways intersected by Looping 6 are summarised in **Table B3**.

Table B3: Designated Waterways Intersected by the Project

Name	Location (KP approx)	Flow status	Land Type
Unnamed Creek	45.65	Ephemeral	Private freehold
Unnamed Creek	46.55	Ephemeral	Private freehold
Unnamed Creek	47.38	Ephemeral	Private freehold
Unnamed Creek	48.1	Ephemeral	Private freehold
Unnamed Creek	48.7	Ephemeral	Private freehold
Unnamed Creek	49.0	Ephemeral	Private freehold
Unnamed Creek	50.5	Ephemeral	Private freehold
Unnamed Creek	52.05	Ephemeral	Private freehold
Unnamed Creek	53.3	Ephemeral	Private freehold
Dabyminga Creek (crossing #1)	55.6	Intermittent	Crown Land
Unnamed Creek	56.1	Ephemeral	Private Freehold

Name	Location (KP approx)	Flow status	Land Type
Unnamed Creek	56.7	Ephemeral	Private Freehold
Unnamed Creek	57.5	Ephemeral	Private Freehold
Dabyminga Creek (crossing #2)	58.55	Intermittent	Crown Land
Unnamed Creek	61.5	Ephemeral	Private Freehold
Unnamed Creek	61.95	Ephemeral	Private Freehold
Goulburn River	62.9	Perennial	Crown Land
Unnamed Creek	63.9	Ephemeral	Private Freehold
Unnamed Creek	66.15	Ephemeral	Private Freehold
Unnamed Creek	67.2	Ephemeral	Private Freehold
Unnamed Creek	69.2	Ephemeral	Private Freehold
Unnamed Creek	70.05	Ephemeral	Private Freehold
Whiteheads Creek	70.8	Ephemeral	Crown Land
Back Creek	71.95	Ephemeral	Private freehold
Unnamed Creek	72.8	Ephemeral	Private freehold

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). Perennial waterways include Dabyminga Creek and the Goulburn River. All designated waterways intersected by the construction ROW drain to the Goulburn River near Seymour at the northern end of this looping.

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 Environmental Management Plan (SEMP) to the GBCMA and will include construction plans and drawings along with appropriate methods of construction and rehabilitation.

Most of the waterways intersected by the construction ROW 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 (DEPI 2014i). A permit will therefore be required prior to vegetation clearing on Crown Land throughout these areas.

1.4 Previous Studies

A number of Conservation Management Plans have been prepared by the 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.

Four landscape zones identified by GBCMA apply to the local area – South West Goulburn, Yea, Hughes Creek and Longwood Landscape Zones (DSE 2006b, 2005a, 2008, 2005b). Key biodiversity assets identified in the plans include examples of 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 to enhance roadsides by encouraging adjacent landowners to widen vegetated areas along roadsides to at least 40 metres.

2 FLORA ASSESSMENT

2.1 Ecological Vegetation Classes

DELWP modelled pre-1750 EVC mapping for the region shows that south of Tallarook, the construction ROW and the immediate surrounds was originally dominated by EVC 175 Grassy Woodland with smaller areas supporting other vegetation types along creek lines and low lying areas. North of Tallarook, the landscape was originally dominated by EVC 61 Box Ironbark Forest with small areas of EVC 55 Plains Grassy Woodland and EVC 56 Floodplain Riparian Woodland along Dabyminga Creek in the *Central Victorian Uplands Bioregion*. Within the *Victorian Riverina Bioregion*, EVC 56 Floodplain Riparian Woodland was the dominant community along the Goulburn River floodplain with EVC 61 Box Ironbark Forest and EVC55 Plains Grassy Woodland further north. All pre-1750 EVC modelled vegetation types, within the construction ROW are summarised below in **Table B4** (DEPI 2014c).

Table B4: DELWP modelled pre-1750 Ecological Vegetation Classes within the Local Area

Bioregion	EVC Number and Name	Status	Occurrence
Central Victorian Uplands	22 Grassy Dry Forest	Depleted	Common
	55 Plains Grassy Woodland	Endangered	Common
	56 Floodplain Riparian Woodland	Endangered	Common
	61 Box Ironbark Forest	Vulnerable	Common
	175 Grassy Woodland	Endangered	Common
Victorian Riverina	55 Plains Grassy Woodland	Endangered	Common
	56 Floodplain Riparian Woodland	Vulnerable	Common
	61 Box Ironbark Forest	Vulnerable	Minor
	68 Creekline Grassy Woodland	Endangered	Common

However, due to extensive clearing in the area, historic EVCs have been vastly reduced in size, distribution and quality, resulting in habitat fragmentation and loss of biodiversity. Extant EVC mapping since 2005 shows that the majority of native vegetation remaining in the vicinity of the construction ROW comprises small areas of EVC 175 Grassy Woodland and EVC 61 Box Ironbark Forest with small areas of EVC 56 Floodplain Riparian Woodland along the Goulburn River and Dabyminga Creek (DEPI 2014c).

2.1.1 Existing Vegetation Condition

The recent field assessments identified only isolated fragments of native vegetation remaining in the area and these contained a mixture of native and exotic species of varying quality (**Appendix B2**).

In general, extensive clearing for agriculture has left the majority of the construction ROW and surrounding land largely devoid of remnant vegetation. However, the construction ROW was found to intersect several areas of 'intact' remnant vegetation, as identified during the field surveys in accordance with native vegetation guidelines. Intact remnant vegetation was characteristic of the six EVCs summarised in **Table B5**.

Table B5: Ecological Vegetation Classes identified during the Field Assessments

Bioregion	Ecological Vegetation Class	Status
Central Victorian Uplands	55 Plains Grassy Woodland	Endangered
	56 Floodplain Riparian Woodland	Endangered
	61 Box Ironbark Forest	Vulnerable
	68 Creekline Grassy Woodland	Endangered
	175_61 Low-rises Grassy Woodland	Endangered
Victorian Riverina	55_62 Plains Grassy Woodland	Endangered
	56 Floodplain Riparian Woodland	Vulnerable
	61 Box Ironbark Forest	Vulnerable
	68 Creekline Grassy Woodland	Endangered

The presence of these EVCs was determined based on vegetation composition, soil types and location. Areas of remnant vegetation largely occurred within roadside reserves and along creeklines and low lying areas. A number of indigenous scattered trees were also identified either on the construction ROW, or near the edge of the construction ROW. All remaining areas were largely dominated by introduced pasture grasses.

The condition of the native vegetation along the construction ROW ranges from poor to good. The variation in vegetation condition is attributable to the species composition, the percentage of weed cover and the presence or absence of canopy trees. All EVCs identified during the assessments are described in Section 2.1.2 below and includes examples of the vegetation condition. The overall condition of the vegetation is detailed in the habitat hectare tables presented in **Appendix B3**.

2.1.2 Vegetation Descriptions

Flora Species

A total of 173 flora species were recorded within the proposed construction ROW during the field survey. This includes 109 indigenous species and 64 introduced species (including both Australian natives and exotics). A detailed list of all flora species recorded in the construction ROW is provided in **Appendix B2.**

EVC 55_61: Plains Grassy Woodland is described as open, eucalypt woodland to 15m tall occurring on a number of geologies and soil types. It occupies poorly drained, fertile soils on flat or gently undulating plains at low elevations. The understorey consists of a few sparse shrubs over a species-rich grassy and herbaceous ground layer (DEPI 2014c).

Plains Grassy Woodland occurred in five habitat zones all of which are south of Seymour.

The most representative area identified in terms of quality was within habitat zones L6_32 and L6_33 upslope of Telegraph Rd (**Appendix B3)**. Indigenous trees consisted of River Red Gums with Kangaroo Grass *Themeda triandra* dominating the understorey. Other indigenous species present included Veined Spear-grass *Austrostipa rudis* subsp *rudis,* Reed Bent-grass *Deyeuxia quadriseta,* Bristly Wallaby-grass *Rytidosperma setaceum*, Swamp Wallaby-grass *Amphibromus nervosus,* Yellow Rush Lily *Tricoryne elatior,* Sun-orchid *Thelymitra* sp., Onion Orchid *Microtis* sp., Common Rice-flower *Pimelea humilis,* Tall Sundew *Drosera peltata* ssp. *auriculata,* Red-leg Grass *Bothriochloa macra,* and Copper-awned Wallaby-grass *Rytidosperma linkii* var. *fulvum*. Exotic weed cover was moderate and organic litter was representative of the Plains Grassy Woodland EVC benchmark.

EVC 55_62: Riverina Plains Grassy Woodland is described as open, eucalypt woodland to 15m tall occurring on a number of geologies and soil types. It occupies poorly drained, fertile soils on flat or gently undulating plains at low elevations. The understorey consists of a few sparse shrubs over a species-rich grassy and herbaceous ground layer (DEPI 2014c).

Riverina Plains Grassy Woodland was poorly represented in Looping 6, generally being a vegetation community associated with areas further north. Two areas of Riverina Plains Grassy Woodland were identified near KP73.3 within habitat zones L6_50 and L6_51 (**Appendix B3)**. Vegetation was of poor quality and had less than half of representative lifeforms qualifying as present according to the EVC benchmark. No significant species were observed.

EVC 56: Floodplain Riparian Woodland is described as open eucalypt woodland to 20m tall over a medium to tall shrub layer with a ground layer consisting of amphibious and aquatic herbs and sedges. It occurs along the banks and floodplains of the larger meandering rivers and major creeks, often in conjunction with one or more floodplain wetland communities. Elevation and rainfall are relatively low and soils are fertile alluviums subject to periodic flooding and inundation (DEPI 2014c).

Floodplain Riparian Woodland was generally in poor condition with the exception of habitat zone L6_52 located at KP58.6 (**Appendix B3).** Vegetation was generally within the riparian zone of Dabyminga Creek and the Goulburn River. The tree layer was dominated by River Red Gums and the understorey contained quite a number of native species however it was dominated by weedy exotic graminoids typical of land utilised for grazing.

EVC 61: Box Ironbark Forest is described as occurring on gently undulating rises, low hills and peneplains on infertile, often stony soils derived from a range of geologies. The open overstorey to 20m tall consists of a variety of eucalypts, often including one of the Ironbark species. The mid storey often forms a dense to open small tree or shrub layer over an open ground layer ranging from a sparse to well-developed suite of herbs and grasses. (DEPI 2014c).

Box Ironbark Forest vegetation occurred within 16 habitat zones. All areas were of land utilised for agricultural or residential purposes with the exception of a few roadside reserves.

Vegetation within the Telegraph Road reserve KP66.2, habitat zones L6_34 and L6_35 supported a relatively intact/representative suite of species, given the small patch size (**Appendix B3)**. Indigenous understorey species comprised Golden Wattle *Acacia pycnantha,* Common Raspwort *Gonocarpus tetragynus,* Parrot Pea *Dillwynia sericea*, Common Wheat-grass *Anthosachne scabra,* Rough Spear-grass *Austrostipa scabra,* Wattle Matt-rush, Variable Sword-sedge *Lepidosperma laterale,* Chocolate Lily *Arthropodium strictum,* Wallaby Grasses *Rytidosperma* spp., Drooping Cassinia *Cassinia arcuata* and Copper-awned Wallaby-grass. The cover of exotic weed species was low to moderate in most cases. The cover of large old trees and the presence of logs were consistent with the benchmark score for Box Ironbark Forest vegetation. (DEPI 2014c).

EVC 68: Creekline Grassy Woodland is described as eucalypt-dominated woodland to 15m tall with occasional scattered shrub layer over a mostly grassy/sedgy to herbaceous ground-layer. It occurs on low-gradient ephemeral to intermittent drainage lines, typically on fertile colluvial/alluvial soils, on a wide range of suitably fertile geological substrates. These minor drainage lines may include a range of graminoid and herbaceous species tolerant of waterlogged soils, and are presumed to have sometimes resembled a linear wetland or system of interconnected small ponds (DEPI 2014c).

Creekline Grassy Woodland vegetation occurred within Whiteheads Creek located at KP70.8, habitat zone L6_45 and supported relatively intact vegetation (**Appendix B3)**. The tree layer comprised a mix of River Red Gums, Grey Box and Red Box *Eucalyptus polyanthemos*. The understorey was

dominated by Kangaroo Grass with Yellow Rush-lily, Bristly Wallaby-grass and Common Tussock-grass *Poa labillardieri* scattered throughout. The weed species present accounted for half of the understorey cover.

EVC 175_61: Low-rises Grassy Woodland is described as variable open eucalypt woodland to 15m tall over a diverse ground layer of grasses and herbs. The shrub component is usually sparse. It occurs on sites with moderate fertility on plains or undulating hills on a range of geologies. (DEPI 2014c).

Grassy Woodland vegetation was well represented along the construction ROW and occurred within 28 habitat zones (DEPI 2013a). The most representative examples of Grassy Woodland vegetation were habitat zones L6_5 and L6_6 located at KP47.5 to KP47.7 and within habitat zone L6_15 at KP53.3 (**Appendix B3)**.

Habitat zones L6_5 and L6_6 have been subjected to a history of grazing and therefore lack a large portion of the original diversity, however the indigenous eucalypt species are regenerating well (**Appendix B3)**. Understorey indigenous species present included Bristly Wallaby-grass, Common Rice Flower, Snake Wattle *Acacia aculeatissima*, Common Raspwort, Variable Cranesbill *Geranium* sp.2, Drooping Cassinia, Grassland Wood-sorrel *Oxalis perennans*, Smooth Solenogyne *Solenogyne dominii*, Golden Wattle, Violet Kunzea *Kunzea parvifolia*, Scented Sundew *Drosera aberrans*, Pale Sundew *Drosera peltata*, Common Early Nancy *Wurmbea dioica*, Red-anther Wallaby-grass *Rytidosperma pallidum*, Velvet Tussock-grass *Poa morrisii* and Wattle Matt-rush *Lomandra filiformis* subsp. *coriacea*.

Weeds included the Quaking Grasses *Briza maxima* and *B. minor*, Annual Veldt-grass *Ehrharta longiflora*, Onion Grass *Romulea rosea*, Cocksfoot *Dactylis glomerata* and Canary Grass *Phalaris aquatica*.

The remaining areas of Grassy Woodland vegetation varied in vegetation quality largely due to poor species diversity and the absence of large old trees. A suite of weeds typical of land used for agricultural purposes was also present.

2.1.3 Scattered Indigenous Trees

The canopy component of remnant vegetation communities that the construction ROW transects would have comprised of River Red Gum, Bundy *E. goniocalyx*, Red Stringybark *E. macrorhyncha*, Yellow Box *E. melliodora*, Grey Box, Red Box and Red Ironbark *E. sideroxylon*.

Trees were supported by roadside reserves, creekline riparian zones and were also scattered throughout private land. A number of scattered trees were identified either on the construction ROW, or near the edges of the construction ROW. These are discussed further in Section 2.2.3 below.

2.1.4 Planted Vegetation

Much of the construction ROW transects paddocks sown and/or colonised with exotic pasture and exotic weedy grasses utilised for cropping and grazing purposes.

There are a number of shelterbelts and replanted areas that also intersected the construction ROW in this looping such as at KP57.05, KP60.5 and KP61.4. It is yet to be determined if these areas have been publicly funded and if there is a requirement to offset these vegetation losses.

2.1.5 Weeds

A total of 18 species are considered High Threat weeds, including ten listed as noxious weeds under the *CaLP Act* (**Appendix B2)** (DSE 2014g). High Threat weed species are defined as those introduced species (including non-indigenous 'natives') with the ability to out-compete and substantially reduce one or more indigenous life forms in the longer term assuming on-going current site characteristics and disturbance regime (DSE 2004a).

The EVC benchmarks list typical weed species for the EVCs in the bioregion and provides an estimate of their 'invasiveness' and 'impact'. In general, those weed species considered to have a high impact are considered high threat regardless of their invasiveness (DSE 2004a).

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 the catchment is undertaken by the relevant CMA.

The field surveys noted the prevalence of opportunistic weed infestations throughout the construction ROW and surrounding areas, particularly in agricultural properties and along creeklines. Some properties displayed a relatively high prevalence of weeds.

The list of declared noxious weeds are summarised in **Table B6**. Appropriate measures to manage the potential spread or introduction of weeds during construction are recommended.

Table B6 Declared Noxious Weed Species

Species Name	Common Name	Catchment	Declared Noxious Weed Status
Cirsium vulgare	Spear Thistle	GBCMA	Restricted
Echium plantagineum	Paterson's Curse	GBCMA	Regionally Controlled
Genista monspessulana	Cape Broom	GBCMA	Regionally Controlled
Hypericum perforatum	St. John's Wort	GBCMA	Regionally Controlled
Marrubium vulgare	Horehound	GBCMA	Regionally Controlled
Oxalis pes-caprae	Soursob	GBCMA	Restricted
Rosa rubiginosa	Sweet Briar	GBCMA	Regionally Controlled
Rubus fruticosus	Blackberry	GBCMA	Regionally Controlled
Salix sp.	Willow	GBCMA	Restricted
Xanthium spinosa	Bathurst Burr	GBCMA	Regionally Controlled

Several weed species not listed under the *CaLP Act* were also recorded along the construction ROW and are included in the flora list found in **Appendix B2**.

2.2 Permitted Clearing Assessment

The assessment to determine the implications along the construction ROW was based on the *Permitted Clearing of Native Vegetation - Biodiversity Assessment Guidelines* (DEPI 2013a). This involved an in-field habitat hectare and scattered tree assessment, and the risk modelling undertaken by DELWP (based on these data). The calculation of the risk based pathway and biodiversity equivalence score are used to inform implications should vegetation be removed (e.g. offsets). The risk-based pathway and the results of habitat hectare and scattered tree assessment are summarised below.

2.2.1 Risk-based Pathway

Based on the DELWP modelling (DEPI 2014c), the location of the project and amount of native vegetation to be impacted (greater than one hectare), Looping 6 is likely to fall under the 'Moderate' risk-based pathway within Location Risk A. The risk-based pathway will ultimately be determined by DELWP.

2.2.2 Habitat Hectare Assessment

For the previous Victorian Northern Interconnect Expansion projects (Loopings 1 to 5), the construction ROW was reduced from 28m to 20m in areas where the construction ROW intersected a remnant patch. This was undertaken to minimise impacts to native vegetation. In this instance the construction ROW will also be reduced to 20m and "reversed" in some locations for Looping 6.

Following this reduction, the construction ROW supports 65 habitat zones, accounting for approximately 4.89ha (2.04 habitat hectares) of native vegetation within the Central Victorian Uplands and Victorian Riverina Bioregions, attributable to six EVCs.

Based on the discussion between the pipeline regulator and DELWP, as mentioned in Section 4.2.6 of Part A, the habitat hectare assessments were filtered by the mentioned exemption to arrive at the final habitat hectare figures summarized in **Tables B7 and B8** below. The detailed results of the Vegetation Quality Assessment and Habitat Hectare scores for each habitat zone and their KP locations are provided in **Appendix B3**. Measures to avoid and minimise the impact on areas of remnant vegetation are outlined in **Section 5**.

Table B7: Summary of Habitat Hectare Assessments to be Offset

Bioregion	Ecological Vegetation Class (EVC)	Total Area (Ha)	Total Area (HabHa)
Central Victorian Uplands	55 Plains Grassy Woodland	0.038	0.018
	61 Box Ironbark Forest	0.075	0.024
	175_61 Low-rises Grassy Woodland	0.315	0.175
Victorian Riverina	55_62 *Riverina* Plains Grassy Woodland	0.046	0.017
Total		**0.474**	**0.234**

Table B8: Summary of Habitat Hectare Assessments exempt from Offset

Bioregion	Ecological Vegetation Class (EVC)	Total Area (Ha)	Total Area (HabHa)
Central Victorian Uplands	55 Plains Grassy Woodland	0.230	0.089
	56 Floodplain Riparian Woodland	0.121	0.045
	61 Box Ironbark Forest	1.403	0.648
	68 Creekline Grassy Woodland	0.107	0.045
	175_61 Low-rises Grassy Woodland	1.780	0.733
Victorian Riverina	55_62 *Riverina* Plains Grassy Woodland	0.449	0.099
	68 Creekline Grassy Woodland	0.116	0.048
	61 Box Ironbark Forest	0.213	0.102
Total		**4.419**	**1.809**

2.2.3 Tree Assessment

As part of the Arborists assessment of Looping 6, all trees with a DBH of 40cm or more were tagged including scattered indigenous trees and those that occurred in patches, while trees less than 40cm DBH were considered as tree groups and identified also. In total there were 432 trees tagged, a further 106 were identified as having been planted or outside the construction ROW along with 79 tree groups (Tree Logic 2015a).

A total of 19 scattered indigenous trees have been identified as being impacted by the construction works. The summary of these trees per modelled EVC is found in **Table B9**. A detailed tree summary is provided in the Arborist Assessment report (Tree Logic 2015a).

An assessment of impacts to the scattered indigenous trees was also undertaken with the arborist report outlining recommendations to avoid or minimise impacts to these trees. Indigenous trees that occur within a remnant patch of vegetation were also included in this report. Recommendations to avoid or minimise are summarised in **Section 5.**

Table B9: Summary of Scattered Indigenous Trees to be Impacted per EVC

Bioregion	Relevant EVC	VLOT	LOT	MT	ST	Total
Central Victorian Uplands	22 Grassy Dry Forest		1			**1**
	55 Plains Grassy Woodland				6	**6**
	61 Box Ironbark Forest				5	**5**
	175_61 Low Rises Grassy Woodland		2	1	1	**4**
Victorian Riverina	61 Box Ironbark Forest				2	**2**
	175_61 Low Rises Grassy Woodland	1				**1**
Totals		**1**	**3**	**1**	**14**	**19**

2.3 Targeted Surveys for Threatened Flora & Vegetation Communities

The construction ROW has been subject to significant disturbance from rural development resulting in minimal areas of undisturbed native groundcovers being present.

The majority of the construction ROW represents limited colonisation opportunity for native flora. Weed colonisation is likely to continue to be problematic due to current land use practices being in direct competition with native plant species.

However, remnant native vegetation was identified within the construction ROW at a number of locations and a number of threatened flora species and vegetation communities are considered to have the potential to occur in some areas along the construction ROW based on modelling or the presence of suitable habitat (**Appendix B4** and **B5a)**. An assessment of threatened species and communities and their Likelihood of Occurrence is found in **Appendix B5a**.

2.3.1 Targeted Surveys for Threatened Flora

The construction ROW is located within a region that is heavily disturbed. The local flora has therefore been significantly impacted by previous development and the few remnants may form habitat for once widespread species. Moderate to good quality habitat, however, does occur for some listed species and therefore targeted surveys were undertaken.

A search of the Protected Matters Search Tool (PMST) (DoE 2014) and the Victorian Biodiversity Atlas (VBA) (DEPI 2014a) was conducted for the local area surrounding the construction ROW with a five kilometre buffer to obtain a species profile from modelling or existing records (**Appendix B4** and **B5a** respectively**)**.

One EPBC Act and two FFG Act listed flora species were previously recorded within the local area (within 5km of the construction ROW) (DEPI 2014h), and are included in **Table B10**. An additional four species listed on the DELWP *Advisory List of Rare or Threatened-Plants in Victoria* (DEPI 2014d) ('DELWP Flora Advisory List') have also been recorded within the local area (within 5km of the construction ROW). Seven nationally significant species, not previously documented within the local area, also have the potential to occur within the vicinity of the construction ROW (DoE 2014).

Table B10: Summary of Threatened Flora Species Recorded within 5km of the Construction ROW

Scientific Name	Common Name	Most Recent Year (VBA)	Status (DoE/FFG/DELWP)
Diuris palustris	Swamp Diuris	1977	-/Listed/Vulnerable
Fimbristylis aestivalis	Summer Fringe-sedge	1853	-/-/Poorly known
Hypoxis vaginata var. *brevistigmata*	Yellow Star	1991	-/-/Poorly known
Senecio macrocarpus	Large-headed Fireweed	unknown	Vulnerable/Listed/Endangered
Solanum cinereum	Narrawa Burr	1954	-/-/Poorly known
Sporobolus creber	Western Rat-tail Grass	1972	-/-/Vulnerable
Protected Matters Search Tool			
Amphibromus fluitans	River Swamp Wallaby-grass	n/a	Vulnerable /-/-
Dianella amoena	Matted Flax-lily	n/a	Endangered/Listed/Endangered
Dodonaea procumbens	Trailing Hop-bush	n/a	Vulnerable /-/Vulnerable
Glycine latrobeana	Clover Glycine	n/a	Vulnerable /Listed/Vulnerable
Pimelea spinescens subsp. *spinescens*	Spiny Rice-flower	n/a	Critically Endgrd/Listed/Endangered
Prasophyllum frenchii	Maroon Leek-orchid	n/a	Endangered/Listed/Endangered
Thelymitra matthewsii	Spiral Sun-orchid	n/a	Vulnerable/Listed/Vulnerable

A description for each listed flora species with the potential to occur, their habitat preference and specific flowering time is presented in Appendix B6.

Targeted surveys were undertaken during the optimal flowering time for each species below, focusing on habitat that had a moderate to high likelihood of occurrence. The targeted spring surveys were undertaken concurrently with the vegetation assessments, while the winter surveys for Spiny Rice-flower focussed on the patches with higher quality understorey (Appendix B5b).No nationally significant flora species were recorded during targeted surveys and are therefore unlikely to occur within the construction ROW.

One specimen of Plump Swamp Wallaby-grass *Amphibromus pithogastrus*, a FFG Act listed flora species and listed as Endangered on the DELWP Flora Advisory List, was recorded during the original assessments within private land at KP59.01. It was recorded from a heavily grazed hillside within Grassy Woodland vegetation. A subsequent investigation was not able to locate the species in the ROW.

One flora species listed on the DELWP Flora Advisory List as Vulnerable was recorded during the recent assessment: Late-flower Flax-lily *Dianella tarda* at Telegraph Rd (KP67.75) within Box Ironbark Forest vegetation.

No other state significant flora species were recorded during the field assessment. However, a total of 16 flora species recorded are members of plant families and genera that are considered protected on Crown Land under the FFG Act and will require a FFG Act Permit to take Protected Flora. They include members of the following plant families:

- Asteraceae - Daisies - all species
- Orchidaceae - Orchids - all species
- Pteridophyta - All clubmosses, ferns and fern allies, excluding *Pteridium esculentum* - Austral Bracken

Members of the following genera are protected and were also recorded during the current assessment:

- *Acacia* - Wattles - excluding *Acacia dealbata, Acacia decurrens, Acacia implexa, Acacia melanoxylon, Acacia paradoxa*
- *Xanthorrhoea* - Grass-trees - all species

Species protected under the FFG Act that were recorded within the construction ROW are highlighted in **Appendix B2.**

2.3.2 Targeted Surveys for Threatened Vegetation Communities

EPBC Act listed Communities

Two vegetation communities listed under the EPBC Act have the potential to occur within the construction ROW and are listed in **Table B11**.

Due to the quality of the vegetation identified during the assessments, *Grey Box (Eucalyptus microcarpa) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia* (listed as Endangered) was determined to occur at 19 locations within the construction ROW, totalling 2.63Ha in area. Of these 19 locations, four are being avoided totalling 0.07ha. These are shown with an * in the Table below and not included in the total area. No areas qualified as *White Box - Yellow Box - Blakely's Red Gum Grassy Woodlands and Derived Native Grassland*. Detailed descriptions of these listed vegetation communities are presented in Part A.

Vegetation at these locations qualified as the listed Grey-Box community largely due to comprising more than 10% cover indigenous perennial grass species, the patch size and the number of indigenous trees per hectare thereby meeting the recommended thresholds for the listed community (DSEWPaC 2012b).

These habitat zones are only portions of much larger patches of the community intersected by the construction ROW. Only small portions of each patch are likely to be impacted but consideration of where further measures could be implemented to avoid or minimise impacts, such as the retention of as many mature trees as possible and a reduction in the width of the construction ROW, is recommended.

Table B11: Threatened EPBC Act Ecological Communities along the Construction ROW

Community	Status	Recorded within the construction ROW	Total area within the construction ROW (Ha)	Location (KP)	Habitat Zone
Grey Box (Eucalyptus microcarpa) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia	Endangered	Yes	2.56	47.40	L6_4
				47.50	L6_5
				47.70	L6_6
				48.40	L6_7
				48.40	L6_54
				52.97	L6_14
				53.33	L6_15
				53.33	L6_66*
				53.77	L6_16
				59.40	L6_27
				59.50	L6_28*
				59.50	L6_58*
				59.50	L6_59*
				66.20	L6_34
				66.21	L6_35
				67.10	L6_36
				68.60	L6_41
				71.30	L6_47
				71.30	L6_48

FFG Act listed Communities

Three vegetation communities listed under the FFG Act also have the potential to occur within the construction ROW according to the DELWP modelling, and are listed in **Table B12** (DEPI 2014c).

Table B12: Threatened FFG Act Listed Communities along the Construction ROW

Community	Associated EVC	Recorded within the construction ROW
Grey Box - Buloke Grassy Woodland Community	55_61 Plains Grassy Woodland 55_62 Plains Grassy Woodland	No
Northern Plains Grassland Community	55_61 Plains Grassy Woodland 55_62 Plains Grassy Woodland	No
Creekline Grassy Woodland (Goldfields) Community	68 Creekline Grassy Woodland	Yes

It must be noted that implications in terms of the FFG Act only apply to areas located on Crown Land, such as roadsides and designated waterways.

A total of 0.038ha of the FFG Act listed *Creekline Grassy Woodland (Goldfields) Community* occurs within EVC 68 Creekline Grassy Woodland located at L6_1 at Sunday Creek tributary (KP45.7) on private land. While private land is exempt from the FFG Act, as mentioned above, mitigation measures will be implemented to reduce impacts on this community.

All remaining vegetation does not qualify due to the lack of representative species as described in the listing advice for each community (DELWP 2015). Furthermore no remnant patches of EVC 55_61 Plains Grassy Woodland and EVC 55_62 *Riverina* Plains Grassy Woodland identified in **Appendix B3**, qualify as the *Grey Box - Buloke Grassy Woodland Community*. This is largely due to the absence of Buloke *Allocasuarina luehmannii* which is described in the listing advice as the lower stratum for this community (DELWP 2015).

Northern Plains Grassland Community, as described in the listing advice for the community extends from extends from Echuca in the east to the Patho Plains near the Loddon River in the west (DELWP 2015). This occurrence is approximately 100km from Looping 6 and therefore does not occur within the construction ROW.

3 FAUNA ASSESSMENT

A combination of general and targeted field surveys conducted along the entire Looping 6 construction ROW and adjacent land recorded a total of 81 terrestrial fauna species, comprising 11 mammals (nine native and two introduced), 59 birds (58 native and one introduced), three reptiles and eight frogs (**Appendix B8)**. There were also six species of fish recorded from the two perennial waterways during targeted aquatic surveys (Dabyminga Creek and Goulburn River), of which four species were native (**Appendix B11)**.

The majority of the species recorded are common in Victoria. However, two birds and one reptile (White-bellied Sea-eagle *Haliaeetus leucogaster (FFG Act listed-Vulnerable),* Hardhead *Aythya australis* and Long-necked Turtle *Chelodina longicollis* (DELWP *Advisory List of Threatened Vertebrate Fauna in Victoria* (DEPI 2013)) were all identified within or adjacent to the construction ROW.

A summary of the results are given below and detailed results are presented in **Appendix B8**.

3.1 Habitat Types and Significance

The local area supports three broad habitat types: introduced grassland/pasture with occasional remnant native species, remnant patches of native woodland and scattered trees and aquatic/riparian habitats provided by watercourses and farm dams.

3.1.1 Open Farmland

The construction ROW is located in a region dominated by open pasture subject to grazing. The vegetation in these areas contains very little middle canopy cover and groundcover is mostly made up of introduced grass species that are either grazed or cropped while other parts are also ploughed. Large trees are often left in these areas to provide shade for stock. These trees are largely scattered throughout the landscape and may provide roosting and nesting sites for some hollow-dependent fauna. Logs and other potential surface habitats typical of the region were almost entirely absent from the majority of the construction ROW. As a result, introduced grassland/pasture is generally considered of low habitat value for native fauna, especially in the absence of large trees.

3.1.2 Woodland

Many areas of woodland were identified within the construction ROW of Looping 6. Remnants of the original Grassy Woodland, Plains Grassy Woodland, Box-Ironbark Forest, Floodplain Riparian Woodland and Creekline Grassy Woodland were identified along roadsides and water courses.

Generally, the roadsides contained higher quality native vegetation than that found scattered throughout individual properties. There are some exceptions to this with Grassy Woodland found on the properties along Box Tree Lane (KP47.5 to KP48.1) and south of Ennis Road (KP53.3 to KP53.7) being high to very high quality. A number of the roadsides have been identified by the GBCMA (DSE 2005a, 2005b, 2006b and 2008) as having a level of conservation significance as they provide corridors of remnant woodland that connect to larger areas of native woodland in the area. These woodland corridors have been identified as important habitat for native fauna such as the Brush-tailed Phascogale *Phascogale tapoatafa tapoatafa*.

3.1.3 Watercourses and Dams

The construction ROW traverses one major river (Goulburn River), several creeks along with a number of minor drainage lines. There are also a number of farm dams on or near the construction ROW as well as a few ephemeral wetlands.

The riparian margins of the Goulburn River and larger creeks in the vicinity of the construction ROW include River Red Gums representative of the overstorey vegetation that originally occupied the area. The understorey vegetation ranged from good quality native vegetation to one almost completely dominated by exotic species, within the construction ROW. These waterways have been identified as important corridors for habitat and dispersal of native fauna and are included in the GBCMA BAP sites (DSE 2006b).

The minor creeks and drainage lines are generally ephemeral watercourses that lack significant water for most of the year but were often holding water at the time of the inspection due to good rainfall in the preceding months. Habitat elements such as surface cover, overhanging riparian vegetation (indigenous or otherwise), indigenous embankment vegetation and in-stream snags are absent within some drainage lines on the plains. These areas are considered to be of low to moderate habitat value but may provide dispersal opportunities for smaller fauna such as amphibians into other habitat areas.

Most of the dams and wetlands identified during the surveys are similarly subject to climatic factors and may therefore provide only limited habitat value within the warmer months. However some or the larger dams could provide important refuges for native amphibians and reptiles such as turtles when other water bodies are dry.

3.2 Targeted Surveys for Threatened Fauna

3.2.1 Desktop Assessment

A search of the VBA was conducted of the local area surrounding the construction ROW with a five kilometre buffer to obtain a species profile from existing records maintained by DELWP. A total of 43 threatened species have been recorded within the local area comprising: three invertebrates, two fish, two frogs, four reptiles, 27 birds and four mammal species. These can be found in **Appendix B5c.** A search was also conducted in relation to EPBC Act listed species that may occur in the local area of the construction ROW utilising the PMST (DoE 2014) with a buffer of five kilometres. A total of 24 species were listed on this PMST (**Appendix B4**).

From these results, a total of 29 listed species with Commonwealth or State significance have been reported in the local area, with an additional 13 species recorded in the local area that are listed under the DELWP Fauna Advisory List as Endangered or Vulnerable in Victoria. An additional eight nationally significant species, not previously documented within the local area, also have habitat potentially occurring within the vicinity of the construction ROW (DoE 2014).

3.2.2 Targeted Surveys

The threatened species targeted for surveys (including aquatic species) were selected due to their moderate or high likelihood of occurrence in the local area, advice from DEPI staff or listed under the EPBC Act with previous records. These species are summarised in **Table B13**. Despite records of the following EPBC Act species, Swift Parrot, Spot-tailed Quoll and Plains Wanderer, surveys were not undertaken for these three species due to the proposed timing of works during spring and summer or lack of suitable habitat along the construction ROW. Refer to **Appendix B5c** for the complete listing of species assessed for their Likelihood of Occurrence in the area.

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 limited within these areas.

Twelve sites within the construction ROW and adjacent areas were surveyed by qualified zoologists and ecologists from October 2013 to January 2014 and again in April 2015. These surveys consisted of diurnal surveys for birds, reptiles and moths, nocturnal surveys for mammals, birds and frogs. All species observed or heard were recorded (**Appendix B8**).

Aquatic surveys were also undertaken on the more significant waterways (Dabyminga Creek and Goulburn River) that are planned to be crossed, either by HDD or trenching, after discussion with Hume DEPI staff regarding fish and aquatic invertebrates. It was noted that known populations of threatened species occurred upstream, in some cases several kilometres, of the construction ROW (Smith 2013, *pers. comm.*). These surveys were undertaken in November 2014 by qualified aquatic ecologists. The aquatic fauna survey report (GHD 2015) is provided in **Appendix B11.**

Table B13: Summary of Threatened Fauna Species flagged for targeted surveys

Common Name	Scientific Name	Status (DoE/FFG/DELWP)	Likelihood of Occurrence
Golden Sun Moth@	*Synemon plana*	Critically Endangered/Listed/ Critically Endangered	Low
Murray Cod	*Maccullochella peelii peelii*	Vulnerable/Listed/Vulnerable	Moderate
Macquarie Perch	*Macquaria australasica*	Endangered/Listed/Endangered	Moderate
Silver Perch	*Bidyanus bidyanus*	Critically Endangered /Listed/Vulnerable	Moderate
Southern Pygmy Perch (Murray-Darling lineage)	*Nannoperca australis*	-/-/Vulnerable	Moderate
Brown Toadlet	*Pseudophryne bibronii*	-/Listed/Endangered	Moderate
Growling Grass Frog@	*Litoria raniformis*	Vulnerable/Listed/Endangered	Low
Common Bearded Dragon	*Pogona barbata*	-/-/Vulnerable	Moderate
Striped Legless Lizard	*Delma impar*	Vulnerable/Listed/Endangered	High
Barking Owl	*Ninox connivens connivens*	-/Listed/Endangered	Moderate
Diamond Firetail	*Stagonopleura guttata*	-/Listed/Vulnerable	Moderate
Latham's Snipe	*Gallinago hardwickii*	*J,R/Nominated/Near Threatened	Moderate
Painted Honeyeater	*Grantiella picta*	Vulnerable/Listed/Vulnerable	Moderate
Speckled Warbler	*Chthonicola sagittatus*	-/Listed/Vulnerable	Moderate
Square-tailed Kite	*Lophoictinia isura*	-/Listed/Vulnerable	Moderate
White-throated Needletail	*Hirundapus caudacutus*	*C,J,R /-/Vulnerable	Moderate
Brush-tailed Phascogale	*Phascogale t. tapoatafa*	-/Listed/Vulnerable	Moderate
Squirrel Glider	*Petaurus norfolcensis*	-/Listed/Endangered	High

@ Surveyed after advice from DELWP staff (Smith 2013, *pers comm*) or previous records of listed EPBC species.
*CAMBA/JAMBA/ROKAMBA international migratory bird treaties.

Threatened species descriptions including status, habitat and ecology and distribution for each of the above species can be found in **Appendix B7.**

All surveys were based on guidelines prepared by DoE or those requirements found in the *Biodiversity Precinct Structure Planning Kit* (BPSP) (DSE 2010). Although the BPSP is directed at the urban growth area of Melbourne, it provides a clear set of survey methodologies for threatened fauna, including a number of species targeted by Monarc's surveys. These were undertaken in the season appropriate to the each species' requirements. The survey locations for threatened fauna are summarised below in **Table B14.**

Table B14: Summary of Locations and Fauna Surveys Undertaken

Location	Location (KP)	Survey Type						
		Diurnal	Nocturnal	GSM	Aquatic	Toadlet	SLL	GGF
Sunday Creek tributary	45.65	✓	✓			✓	✓	✓
Box Tree Lane	46.5 – 47.9	✓	✓			✓	✓	
Davis Road	48.4	✓	✓					
Ennis Road (locality)	53.2 - 54.0			✓			✓	
Dabyminga Creek (crossing #1)	55.6		✓			✓		✓
Dabyminga Creek (crossing #2)	58.55	✓	✓		✓	✓		✓
Upper Goulburn Rd	59.48	✓	✓	✓			✓	
Goulburn River	62.8				✓			
Telegraph/Kobyboyn Roads	66.2 - 69.54	✓	✓				✓	
Whiteheads Creek	70.8	✓	✓			✓		✓
Highlands Road	71.3	✓	✓					
Back Creek	71.95	✓	✓			✓		✓
Tarcombe to Back Mountain Roads	73.3 - 74.3						✓	

3.2.3 Striped Legless Lizard

Following discussions with Hume DELWP staff and an independent local expert on SLL, it is noted that there are two recent records (less than four years old, not yet appearing in the VBA) in the vicinity of Looping 6 (Lobert 2015, pers comm.). One of these records is approximately 600m and the other 1600m east of the construction ROW, near Broadford. There is also a record on the VBA for the eastern outskirts of Seymour, from 2003, which lies approximately three kilometres west of the pipeline corridor (DEPI 2014c).

The EPBC Act modelled distribution for SLL covers most of Looping 6 (DSEWPaC 2011b). Both discussions suggested that a large portion of the country through which the Looping 6 construction ROW traverses is likely to be potential habitat for SLL, even though it is sub-optimal. These areas have not been previously surveyed for SLL; hence targeted surveys would usually be required by DELWP. The field assessments undertaken by Monarc also identified areas of potential habitat during the recent surveys within Looping 6.

It was also discussed that as Looping 6 runs through cattle grazed country, using the standard approach of laying tile grids to undertake targeted surveys may be detrimental to the species. Cattle could possibly trample the tiles, potentially killing SLL and/or Olive Legless Lizard *Delma inornata*, which has the same habitat requirements, or other fauna species within and surrounding

areas of Looping 6. Furthermore, construction for Looping 6 is likely to be scheduled for late spring/early summer and therefore, the checking of tiles would coincide with construction and may therefore delay the project.

An alternative survey technique, endorsed by DELWP, was to undertake the 'Winter Search Method' in areas of potential habitat. This involves an active search under surface material (i.e. timber/fallen debris/rocks/logs) looking for specimens, which is less detrimental to the species. This approach has previously been undertaken in the upper Goulburn River catchment with successful results (Lobert 2015, pers. comm; Smith 2014, pers. comm).

Based on this information, an active winter survey was conducted by two qualified zoologists to identify potential habitat and the presence of SLL within the construction ROW.

3.3 Results of Targeted Surveys

A full species list of fauna recorded at each location is found in **Appendix B8.** No species listed on the EPBC Act, FFG Act or listed as endangered or vulnerable on the DELWP Advisory List were recorded during the surveys.

While no threatened species were recorded during surveys on this looping, it is possible that threatened species could be present during construction. It is therefore recommended that contingency measures be in place in the event that threatened species are found during construction.

4 LEGISLATIVE IMPLICATIONS

4.1 Environment Protection and Biodiversity Conservation Act 1999

No nationally significant flora or fauna species were recorded within the construction ROW during any of the targeted surveys, however a listed marine species the White-bellied Sea-eagle *Haliaeetus leucogaster* was observed flying over treatment ponds to the west of the easement. The construction ROW is not considered 'important habitat' for any migratory or marine species and no wetlands of international significance occur within the vicinity of the construction ROW. Whilst no Striped Legless Lizards (SLL) were recorded during winter surveys, several areas of potential habitat are present within the construction ROW and recent records of the species occur within the vicinity of the ROW. Therefore, mitigation measures are proposed to prevent potential impacts to the species. These are discussed further in Section 5.4.1.

One vegetation community *Grey Box (Eucalyptus microcarpa) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia* (listed as Endangered), was identified at 15 locations along the construction ROW.

Due to the presence of a listed vegetation community a referral to the Commonwealth Environment Minister will be required if the areas cannot be avoided.

4.2 State Legislation

4.2.1 Flora and Fauna Guarantee Act 1988

One FFG Act listed community *Creekline Grassy Woodland (Goldfields) Community*, occurs on private land, within a remnant area at the Sunday Creek tributary. No listed species were recorded within Crown Land and therefore the FFG Act does not apply. However, 16 flora species were identified that belong to plant families or genera that are protected on Crown Land under the FFG Act.

No FFG Act listed fauna species or aquatic fauna species were identified during the targeted field surveys. An immature White-bellied Sea-eagle was observed flying over the Seymour Treatment Plant, approximately 300m west of the construction ROW, during the arborist assessment of this looping but is considered highly unlikely to be impacted by construction.

Given the construction ROW intersects Crown Land on roadsides and several publicly managed watercourses, an FFG Act permit will be required for any construction activities that will disturb areas with protected flora species.

4.2.2 Environment Effects Act 1978

At this stage is it believed that there are no issues that would trigger the requirement for an Environmental Effects Statement pending further investigation as discussed in Section 5.

4.2.3 Wildlife Act 1975

A Management Authorisation permit is required under the *Wildlife Act* if salvage and relocation of fauna is to be undertaken as part of any mitigation measures for the project. Given that there is the possibility of impacts to suitable fauna habitat, salvage and relocation of protected wildlife will be required before commencing construction activities.

4.2.4 Catchment and Land Protection Act 1994

Noxious weeds such as Blackberry, Paterson's Curse and Spear Thistle are listed as regionally controlled within the Goulburn Broken Catchment according to the *CaLP Act*. Appropriate weed control and hygiene measures should be implemented when removing vegetation, or traversing areas where noxious weeds are present. This also includes travel along roadsides and government roadsides, to ensure noxious weeds are not spread within, from, or to the area.

4.3 Permitted Clearing Regulations

When considering an application to remove native vegetation under the moderate or high risk pathways, the referral authority (DELWP) will consider whether the applicant has taken reasonable steps to avoid and minimise impacts prior to securing the required offset. 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.

Emphasis is placed on the consideration of measures to avoid or minimise impacts on native vegetation where possible. Offsets for vegetation permitted for removal are only considered once it can be demonstrated that these steps have been taken into account.

The design of the route is constrained by the use of the existing easement. All construction is proposed to be within the existing easement created in 1975 for the existing pipeline. Measures to avoid or minimise impacts can therefore only be confined to techniques to be implemented within the construction ROW.

Subsequent to the assessment of the original proposal for the construction ROW (covering the 28m of the easement that lies east of the existing pipeline), the easement was therefore inspected with APA in August/September 2015 to determine where impacts to native vegetation could be avoided or minimised. As a result, APA has proposed the following measures to minimise impacts to vegetation:

- Reduction of construction ROW to 20m width where it intersects a remnant patch in order to minimise impacts to native vegetation;
- Reduction of construction ROW to the minimum width necessary in order to avoid impacts to scattered trees that do not grow 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 countryside through which the construction ROW passes.
- Shifting of the narrowed construction ROW (20m), in some cases, westwards over the existing pipeline ('reverse ROW') to further avoid impacts on remnant vegetation in the 'eastern' area of the construction ROW. In general, the construction process will 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 ROW westwards over the existing pipeline. Note that, due to safety risks, this is only proposed in areas where a reduction in impacts can be demonstrated (in some properties, vegetation that has grown 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.

As a result, every effort has been made to minimise impacts on Large Old Trees whether within remnant patches or as trees scattered through the project area.

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.

5 RECOMMENDATIONS

A number of general measures to minimise impacts to flora and fauna values identified within the construction ROW have been recommended for the project and are included in PART A of this report.

5.1 Avoid and minimise

As part of Victoria's *Permitted Clearing of Native Vegetation: Biodiversity Assessment Guidelines*, DELWP has produced models for Victoria describing the extent of habitat for each listed rare or threatened species. These models are called 'habitat importance models' and they assign a 'habitat importance score' to a location based on the importance of that location in the landscape as habitat for a particular rare or threatened species (DEPI 2013a).

Under the Guidelines, these models form the basis for determining the impact of potential native vegetation clearing on rare and threatened species. The habitat importance scores are used to calculate the type and extent of biodiversity offsets required for native vegetation removal that impacts on individual rare or threatened species habitat.

Preliminary information was submitted to DELWP to determine offset obligations for this looping (as discussed in section 2.2. Those areas that generate an offset were targeted during the 'avoid and minimise' inspection. An application was then made to DELWP to determine final offset obligations.

Tree Protection Zones, as defined under the *AS 4970-2009 Protection of trees on development sites* (Standards Australia 2010), may also impinge on the construction ROW in some areas and this has been taken into consideration. An arborist was contracted to undertake an arboricultural assessment to determine the impact of construction on trees to be retained within or close to the construction 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, have been provided in the subsequent arboricultural report (Tree Logic 2015a). Protection measures will be included in the Construction Environment Management Plan (CEMP) to be prepared for this project.

5.2 Threatened Flora and Vegetation Communities Mitigation Measures

It is recommended that the width of the construction ROW be pegged with coloured stakes and no vehicles and personnel be allowed outside the bounds of the construction ROW for areas that support an EPBC Act Listed community.

It is further recommended that a Flora Management Plan be prepared for approval by DELWP for any threatened species that are to be impacted. This should include the following:

- If threatened flora is to be impacted then salvage should be considered prior to construction.
- All individual threatened flora adjacent to /outside the construction ROW should be flagged prior to construction.

All relevant permits must be obtained prior to construction activities beginning and any conditions stated on the permits be met.

5.3 Fauna Mitigation Measures

5.3.1 Striped Legless Lizard

No Striped Legless Lizard were identified during the field surveys undertaken for the project.

No SLL were detected in Looping 6 during winter active searches, although five areas of potential SLL habitat were identified during habitat assessments, based on characteristics identified at known SLL sites. These five areas were characterised by a grassy ground layer, interspersed with surface rock, fallen timber and /or other bits of refugia. They were also contiguous with surrounding woodland and grassland habitat, where there was little evidence of intensive agricultural activities. These are:

- Site 1. Property T119-7-84 and T119-7-85 at KP 46.3-46.65, west of Box Forest Road, between Davis Road and Strath Creek Road (EVC 175 Grassy Woodland)
- Site 2. Property T119-7-87 at KP 47.5-47.85 along Box Forest Road (EVC 175 Grassy Woodland)
- Site 3. Property T119-7-93 at KP 52.1-52.4, east of the Hume Freeway, south of Ennis Road (EVC 55 Plains Grassy Woodland)
- Site 4. Property T119-7-121 (KP65.6) and T119-7-122 (KP65.78)
- Site 5. Property T119-7-152 at KP 73.3-74.3 (EVC 55 Plains Grassy Woodland and EVC 61 Box Ironbark Forest).

It is recommended that these sites be marked out for inspection prior to the clear and grade phase of construction and a plan be prepared for potential salvage of SLL by fully qualified zoologists at these locations.

5.3.2 Other Fauna Mitigation Measures

It is recommended that a Fauna Management Plan be prepared for approval by DELWP for any native species that may be impacted by construction works. This will include measures discussed below.

Native Fish

While no threatened fish species were recorded during the aquatic surveys of waterways in this looping (**Appendix B11**), a number of Commonwealth and State threatened fish species have been previously recorded in these waterways.

It is prudent to undertake fish salvaging prior to the open-cut crossing of waterways that have the potential to contain such species. Obviously if the waterway is dry at the time of crossing, then salvaging will not be required.

General Fauna

Salvage will be required where trees are to be removed, whether within a patch or as scattered trees as they may contain hollows/loose bark or fissures that provide roosting or nesting sites for birds, possums and gliders, phascogales, microbats and reptiles. Remnant patches with shrubs and saplings, within the construction ROW, especially on the roadsides, could provide nesting sites for native birds and will require a fully qualified zoologist on site during removal.

The following measures should be undertaken to reduce the impact on local hollow-dependant fauna:

- 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.
- An appropriately qualified and licenced zoologist/wildlife handler to carefully inspect accessible hollows using an elevated work platform (e.g. mobile tower) prior to felling of hollow-bearing trees. The actual inspection of each hollow should be undertaken using suitable equipment such as an endoscope.
- Hollow-bearing trees to be removed carefully by qualified arborists under the direction of an appropriately licenced zoologist/wildlife handler.
- An appropriately qualified and licenced zoologist/wildlife handler to carefully inspect all hollows for fauna using an endoscope after felling of hollow-bearing trees.

Other threatened and common native fauna may also use understorey vegetation and fallen timber, rocks etc. for nesting or shelter. The checking of this vegetation and removal of shelter from the construction ROW is also recommended before construction begins.