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APPENDICES

1. REGIONAL BACKGROUND

APA GasNet Australia (Operations) Pty Ltd (APA) is looping (duplicating) the existing Wollert to Wodonga gas transmission pipeline (pipeline licence 101) between Wandong and Broadford, Victoria (known as Looping 5).

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 on the southern outskirts of Albury, a total distance of approximately 257km. This pipeline occupies an easement of 35m in width. The proposed pipeline looping is to be installed within the previously disturbed existing easement of the current pipeline. With reference to the starting point of the existing pipeline at Wollert, this looping will commence at Kilometre Point KP27.8 and finish at KP45.2, a total distance of 17.4km.

An overview of this looping section is provided in **Figure E1** whilst detailed pipeline maps are provided in **Appendix E1.**

Monarc Environmental Pty Ltd (Monarc) was engaged by APA to undertake a flora and fauna assessment of the APA easement from near Wandong KP27.8 to Broadford KP45.2. The purpose of the assessment was 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.

1.1 General

The topography of the Wandong to Broadford route is undulating, ranging from approximately 330m AHD at the beginning of this looping at the Wandong Offtake KP27.8, north of Scanlon's Road, to 240m AHD at the end near Broadford. The waterways dissecting this area are generally around 240 – 250m AHD. The easement skirts the western edge of the Great Dividing Range (GDR) which lies to the east of the Hume Freeway. While the easement predominantly falls within the *Central Victorian Uplands Bioregion*, which stretches to the north and west, the first 2km fall into the *Highlands-Northern Fall Bioregion*.

The *Central Victorian Uplands Bioregion* 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. Historically Dry Foothill Forest Complexes dominated the *Central Victorian Uplands*, but large areas of Moist Foothill Forest Complexes and Valley Grassy Woodland Complexes also occurred. The area surrounding the southern end of this looping was predominantly Box Ironbark Forest or dry/lower fertility woodlands (DEPI 2014b)

Today, over 90% of the local area is cleared, mainly for dryland farming involving grazing and mixed cropping. As a result, the once-extensive woodlands are largely cleared, the remnants containing predominantly a mixture of eucalypts such as Red Stringybark *Eucalyptus macrorhyncha,* Messmate *E. obliqua*, Yellow Box *E melliodora* and Bundy *E. goniocalyx* 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). Creekline vegetation remnants can retain good connectivity, especially on Sunday Creek. The networks of road reserves and associated vegetation provide critical habitat for native bird and mammal species. Threatened fauna within the local area include Hooded Robin, Diamond Firetail, Golden Sun Moth and Brush-tailed Phascogale which are often found along connected creeklines and roadsides with large, old, hollow-bearing trees and native grasslands.

1.2 Land Use

1.2.1 Planning Zones

The easement route passes through the following planning schemes:

- Shire of Mitchell KP27.8 to KP45.2

The planning zones that apply to parcels of land traversed by the easement are summarised in **Table E1**.

Table E1: Summary of Planning Zones

Local Government Area	Zone	Location
Shire of Mitchell	Farming Zone 1 (FZ)	
	Road Zone 1 (RDZ1)	Strath Creek Road

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, particularly within central Victoria, have retained a number of the larger old trees as part of the landscape.

In addition to land associated with roads, the easement intersects another parcel of Crown Land being land along Sunday Creek KP34.1.

1.2.2 Environmental 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 overlays that apply to the easement are summarised in **Table E2**.

The easement intersects areas with an Environmental Significance Overlay as well two areas with Vegetation Protection Overlays in the Shire of Mitchell. These have been primarily applied to protect areas of potentially important native vegetation along roadsides and watercourses.

Table E2: Overlay Descriptions

Overlay	Name	KP	Location	Description
VPO1 under Shire of Mitchell	Vegetation Protection Overlay 1 (Roadside and Corridor Protection	35.07	Spur Road	Applied to protect and preserve indigenous vegetation and rare and endangered flora and fauna species on linear reserves
		45.08	Strath Creek Road	
ESO3 under Shire of Mitchell	Environmental Significance Overlay 3 (Water Course Protection)	34.05	Sunday Creek	Applied to, *inter alia*, protect and encourage the long term future of flora and fauna habitats along watercourses, conserve existing wildlife habitats close to natural watercourses and maintain the ability of watercourses to carry natural flows

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

In general, the plans cover all rural road reserves in this Shire excluding any road reserves under the management of VicRoads (eg 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, 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 GBCMA (DSE 2005f). Many of the roads considered to have special value have been identified by on-site signage that identifies these areas as Significant Roadside Areas, on such road is Strath Creek Road KP45.08 (DSE 2005f).

The Shire 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 several perennial waterways and some ephemeral waterways. 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 eg irrigation channels. Major named waterways intersected by the project are summarised in **Table E3**. In summary, Wandong to Broadford (Looping 5) intersects 17 designated waterways of which 6 are named. This includes Sunday Creek near Waterford Park.

Table E3: Named waterways intersected by the project

Looping	Name	Location	Flow status	Crossing Method	Land Type
Wandong to Broadford (Looping 5)	Slaty Creek	28.45	Ephemeral	Open cut	Private freehold
	Slaty Creek	30.9	Ephemeral	Open cut	Private freehold
	Sunday Creek	34.05	Intermittent	HDD	Crown Land
	Sheepwash Creek	36.95	Ephemeral	Open cut	Private freehold
	Stony Creek	38.9	Ephemeral	Open cut	Private freehold
	Mia Mia Creek	43.45	Ephemeral	Open cut	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). All designated waterways intersected by the project corridor drain to the Goulburn River at Seymour (DSE 2005f).

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 waterways intersected by the easement fall within private freehold land, except for Sunday Creek that falls within a parcel of Crown Land. Under the *FFG Act*, 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 2014a). A permit will therefore be required prior to vegetation clearing on Crown Land throughout the project area.

1.4 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.

One landscape zone is identified by GBCMA as applying to this project area – the South West Goulburn Landscape Zone. Key biodiversity assets identified in the plans include examples of Grassy Woodland, Grassy Dry and Damp Forests, 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 plans is therefore to enhance roadsides by encouraging adjacent landowners to widen vegetated areas along roadsides and watercourses (DSE 2006a).

2. FLORA ASSESSMENT

2.1 Ecological Vegetation Classes

DEPI modelled EVC mapping for the region shows that the easement and the immediate surrounds would have originally been dominated by *Central Victorian Uplands Bioregion* and a mosaic of EVC's comprising: Grassy Dry Forest, Valley Grassy Forest and Herb-rich Foothill Forest interspersed with Riparian Forest along major water courses listed in **Table E4 (**DEPI 2014b). However, due to extensive clearing, historic EVC classes have been vastly reduced in size, distribution and quality, resulting in habitat fragmentation and loss of biodiversity. All EVC's that once occurred within the *Highlands-Northern Fall Bioregion* within the easement no longer exists and has been replaced by a plantation. Extant (2005) EVC mapping shows the majority of native vegetation remaining in the local area is still primarily Plains Grassy Woodland (DEPI 2014b).

Table E4: DEPI modelled pre-1750 Ecological Vegetation Classes within the local area

Bioregion	EVC Number and Name	Status	Occurrence
Highlands-Northern Fall	18 Riparian Forest	Least Concern	Common
	23 Herb-rich Foothill Forest	Least Concern	Common
Central Victorian Uplands	18 Riparian Forest	Vulnerable	Naturally Restricted
	22 Grassy Dry Forest	Depleted	Common
	23 Herb-rich Foothill Forest	Depleted	Common
	47 Valley Grassy Forest	Vulnerable	Common
	55 Plains Grassy Woodland	Endangered	Common
	127 Valley Heathy Forest	Vulnerable	Naturally Restricted
	175_61 Grassy Woodland	Endangered	Common

2.1.1 Existing Vegetation Condition

The field assessments identified only isolated fragments of native vegetation that remains in the area and these often contained a mixture of native and exotic species. These species can be found in **Appendix E2**.

In general, extensive clearing for agriculture has left the majority of the easement and surrounding land largely devoid of remnant vegetation and does not support the extent of original vegetation type that once occurred. However, the easement was found to intersect several areas of 'intact' remnant vegetation, as identified during the field surveys in accordance with the *Guide for assessment of referred planning permit applications* (DSE 2007a). Intact remnant vegetation was characteristic of seven EVC's summarised in **Table E5.**

Table E5: Ecological Vegetation Classes identified during the field assessments

Bioregion	EVC Number and Name	Status
Central Victorian Uplands	18 Riparian Forest	Vulnerable
	22 Grassy Dry Forest	Depleted
	23 Herb-rich Foothill Forest	Depleted
	47 Valley Grassy Forest	Vulnerable
	55 Plains Grassy Woodland	Endangered
	127 Valley Heathy Forest	Vulnerable
	175_61 Grassy Woodland	Endangered

The presence of these EVC's was determined based on vegetation composition, soil types and location. Areas of remnant vegetation largely occurred within roadside vegetation and along creeklines and low lying areas. A number of indigenous scattered trees were also identified either on the easement, or near the edge of the easement.

The condition of the native vegetation along the easement 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 EVC's 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 E3**.

2.1.2 Existing Vegetation Conditions

Flora Species

A total of 183 flora species were recorded along the easement during the field survey. This included 134 indigenous species and 49 introduced species (including both Australian natives and exotics). A detailed list of all flora species recorded in the easement is provided in **Appendix E2.**

EVC 22: Grassy Dry Forest is described as occurring on a variety of gradients and altitudes and on a range of geologies. The overstorey is dominated by a low to medium height forest of eucalypts to 20m tall, sometimes resembling open woodland with a secondary, smaller tree layer including a number of *Acacia* species. The understorey usually consists of a sparse shrub layer of medium height. Grassy Dry Forest is characterised by a ground layer dominated by a high diversity of drought-tolerant grasses and herbs, often including a suite of fern species (DEPI 2014c).

There are small patches of Grassy Dry Forest occurring at two locations between Wandong and Broadford. An example of this occurs at KP42.2 on a steep south facing slope. Numerous Indigenous understorey species were observed including graminoids such as Small Grass Tree *Xanthorrhoea minor,* Yellow Rush Lily *Tricoryne elatior*, Veined Spear-grass *Austrostipa rudis* ssp. *rudis* and Wheat Grass *Elymus scaber*. Forbs present included Pale Sundew *Drosera peltata* ssp. *peltata,* Small St. John's Wart *Hypericum gramineum* and Hoary Guinea Flower *Hibbertia obtusifolia*.

Coverage of weedy exotics were typical of areas utilised for grazing being Brown-top Bent-grass *Agrostis capillaris,* Cape Weed *Arctotheca calendula,* Sweet Vernal *Anthoxanthum odoratum* and Cocksfoot *Dactylis glomeratus*.

EVC 23: Herb-rich Foothill Forest is described as occurring on relatively fertile, moderately well-drained soils on an extremely wide range of geological types and in areas of moderate to high rainfall. Occupies easterly and southerly aspects mainly on lower slopes and in gullies. A medium to tall open forest or woodland to 25m tall with a small tree layer over a sparse to dense shrub layer. A high cover and diversity of herbs and grasses in the ground layer characterise this EVC (DEPI 2014c).

Three small patches of Herb Rich Foothill Forest are supported by the Stott's Road and Clonbinane Road roadside reserves at approximately KP30.1 and KP33.38 respectively and the area around Taits Road from KP35.45 – KP35.67. Both roadside reserve patches incorporate Large-old Trees and a representative understorey strata and species, with Black Wattle *Acacia melanoxylon,* Silver Wattle *A. dealbata* and Golden Wattle *A. pycnantha* constituting the medium shrubs. Smaller lifeforms for both of these patches contribute to moderately diverse understories with a typical suite of grassy weeds for areas contiguous with agricultural land with Brown-top Bent-grass, Cocksfoot and Sweet Vernal recorded amongst others.

However, the best example of this vegetation community occurs between KP35.45 and KP35.67. A relatively diverse species list was compiled with records of Wiry Buttons *Leptorhynchos tenuifolius,* Small Grass Tree, Red Anther Wallaby-grass *Rytidosperma pallidum,* Woodrush *Luzula* sp., Common Beard Heath *Leucopogon virgatus,* Sun Orchid *Thelymitra* spp. and Bulbine Lily *Bulbine bulbosa*. This patch does suffer the impacts associated with moderate weed coverage with numerous species recorded. The more noxious of these include Rat's-tail Rescue *Vulpia bromoides,* Briar Rose *Rosa rubiginosa,* Yorkshire Fog *Holcus lanatus* and Blackberry *Rubus fruticosus*.

EVC 175: Grassy Woodland is described as occurring on a variety of gradients and altitudes and on a range of geologies. The overstorey is dominated by a low to medium height forest of eucalypts to 20m tall, sometimes resembling open woodland with a secondary, smaller tree layer including a number of *Acacia* species. The understorey usually consists of a sparse shrub layer of medium height (DEPI 2014c).

Two relatively large patches, of relatively high quality vegetation most attributable to the Grassy Woodland EVC persist between Wandong and Broadford around KP43.0 and KP44.5.

The patch at approximately KP43.0 is a mosaic, with the vegetation at various stages of regeneration post clearance. The quality of this patch is diverse, and to some extent representative of a likely remnant Grassy Woodland.

Indigenous graminoids present include Black Anther Flax-Lily *Dianella admixta* ssp. *revoluta,* Kangaroo Grass *Themeda triandra,* Hill Wallaby-grass *Rytidosperma eriantha,* Spear Grass *Austrostipa oligostachya* x *semibarbata* and Kneed Wallaby-grass *R. geniculata.* Indigenous woody species observed include Grey Box, River Red Gum *E. camaldulensis,* Red Stringybark *E. macrorhyncha,* Hedge Wattle *Acacia paradoxa,* Snake Wattle *A. aculeatissima* and Box Mistletoe *Amyema miquelii.*

This patch is subject to grazing and consequently is a mosaic of weedier areas dominated by a mix of exotic and indigenous species towards the edge of what was mapped as this patch. Weedy species present include Onion Grass *Romulea rosea,* Cocksfoot and Sweet Vernal amongst others.

The majority of the patch at KP44.5 is subject to a slashing regime which has effectively managed biomass loading and subsequently allowed for the maintenance of a relatively diverse suite of indigenous graminoids including Sword Sedge *Gahnia radula,* Yellow Rush Lily, Kneed Wallaby-grass, Wattle Mat-rush *Lomandra filiformis* ssp. *coriacea* and Club Rush *L. multiflora* ssp. *multiflora.*

Forbs observed include Varied Raspwort *Haloragis heterophylla,* Slender Speedwell *Veronica gracilis,* Chocolate Lily *Arthropodium strictum,* Scaly Buttons *Leptorhynchos squamatus,* Dwarf Sunray *Triptilodiscus pygmaeus* and Stinking Pennywort *Hydrocotyle laxiflora.*

Woody species present include Bundy *Eucalyptus goniocalyx*, Gorse Bitter Pea *Daviesia ulicifolia,* Matted Bush Pea *Pultenaea pedunculata* and Snake Wattle *Acacia aculeatissima.*

Coverage of weedy exotics was overall was low however coverage of weedy grasses increased towards the western edge of the patch and defined this boundary. This coverage was mostly due to Brown-top Bent-grass *Agrostis capillaris* and Sweet Vernal with Briar Rose *Rosa rubiginosa* was recorded.

The patch of grassy woodland on the south side of Strath Creek Road, KP45.07, is another likely representation of Grassy Woodland between Wandong and Broadford however this is a lot smaller than the two described above. This patch is relatively diverse and weed free compared to the two described above with additional species observed including Small Grass Tree, Grey Parrot Pea *Dillwynia cinerascens*, Bent Goodenia *Goodenia geniculata,* Cranberry Heath and Daphne Heath.

EVC 55: 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 is rather poorly represented between Wandong and Broadford as the distribution of this EVC is sparse along this stretch of country. It was mapped at Mia Mia Creek KP43.45 and south of Strath Creek Road at KP45.0. Both patches are associated with watercourses and although DEPI has these areas mapped as Plains Grassy Woodland, and they were assessed as such, they may be more attributable to Creekline Grassy Woodland. Both patches supported grassy weeds including Yorkshire Fog *Holcus lanatus*, Soft Brome *Bromus hordeaceus ssp. hordeaceus* and Brown-top Bent-grass *Agrostis capillaris.*

The patch at KP45.0 supported are more representative understorey with numerous species contributing to the smaller lifeforms including Kneed Wallaby-grass, Small-flowered Wallaby-grass *R. setaceum,* Hill Wallaby-grass *R. eriantha,* Spear Grasses *Austrostipa* spp., Red Anther Wallaby-grass and Drooping Cassinia *Cassinia arcuata.*

EVC 18: Riparian Forest is described as a tall forest to 30m tall along river banks and associated alluvial terraces with occasional occurrences in the heads of gullies leading into creeks and rivers. Soils are fertile alluvium, regularly inundated and permanently moist. Dominated by tall eucalypts, but also has an open to sparse secondary tree layer of wattles and scattered dense patches of shrubs, ferns, grasses and herbs (DEPI, 2014c).

A small and degraded patch of vegetation most attributable to Riparian Forest was mapped at KP38.85, north of Coulson Road. Most of the likely lifeforms of this EVC were absent from the understorey. Over 50% of the vegetative cover was due to exotic species and the highest scoring component of the Vegetation Quality Assessment was due to the landscape context of the patch.

EVC 47: Valley Grassy Forest is described as occurring under moderate rainfall regimes of 700-800 mm per annum on fertile well-drained colluvial or alluvial soils on gently undulating lower slopes and valley floors. Open forest to 25m tall may carry a variety of eucalypts, usually species that prefer more moist or more fertile conditions over a sparse shrub cover. In season, a rich array of herbs, lilies, grasses and sedges dominate the ground layer but at the drier end of the spectrum the ground layer may be sparse and slightly less diverse, but with the moisture-loving species still remaining (DEPI 2014c).

Valley Grassy Forest is well represented between KP40.25 and KP42.2 with numerous relatively large patches boasting relatively high biodiversity. All patches appear to be subject to a light grazing regime, if any. Structurally these patches were generally indicative of the likely pre-1750 vegetation community to a reasonable degree with Large-old Trees and Logs present in most patches.

Species recorded include Grey Box, Red Stringybark and Red Box *Eucalyptus polyanthemos*. The understorey included Cranberry Heath, Milkmaids *Burchardia umbellata*, Urn Heath *Melichrus urceolatus*, Small Grass Tree, Hoary Guinea Flower, Chocolate Lily, Black Anther Flax Lily, Finger Rush *Juncus subsecundus*, Red Anther Wallaby-grass, Honey Pots *Acrotriche serrulata* and Box Mistletoe.

Weed coverage was generally low toward the centre of the patches however they did persist amongst areas dominated by a suite weedy graminoids common to agricultural land including Sweet Vernal and Cocksfoot.

EVC 127: Valley Heathy Forest is described as a low, open forest to 15m tall with a sedgy/grassy understorey with a component of small ericoid shrubs and grass-trees. Soil and moisture factors are critical in delimiting the vegetation (DEPI 2014c).

A relatively intact patch of vegetation was mapped as Valley Heathy Forest at KP38.1.

The understorey of this remnant is diverse with numerous indigenous forbs, graminoids and shrubs recorded. Indigenous forbs include Poverty Raspwort *Gonocarpus tetragynus*, Cotton Fire Weed *Senecio quadrifida*, Blue Bells *Wahlenbergia* spp., Cudweed *Gnaphalium* spp and Wiry Buttons.

Indigenous graminoids observed include Saw Sedge *Gahnia radula*, Fox-tail Spear Grass, *Austrostipa densiflora*, Kangaroo Grass *Themeda triandra*, Red Anther Wallaby-grass and numerous other Wallaby-grasses, Small Grass-tree, Grey Tussock Grass *Poa sieberiana*, Grass Triggerplant *Stylidium graminifolium*, Milkmaids and Chocolate Lily.

Indigenous shrubs observed include Common Heath *Epacris impressa*, Cat's Claws *Grevillia alpina*, Totem-poles *Melaleuca decussata*, Common Beard-heath *Leucopogon virgatus*, Violet Kunzea *Kunzea parvifolia*, Sweet Bursaria *Bursaria spinosa*, Showy Parrot-pea *Dillwynia sericea* and Drooping Cassinia.

Canopy species include Red Box, Messmate *Eucalyptus obliqua* and Long-leaf Box *E. goniocalyx*.

It appears that this area has been subject to grazing pressure in the past however at the time of assessment the vegetation appeared to be in an advanced stage of recovery.

Weedy exotics typical of grazed areas were observed including Large Quaking-grass *Briza maxima*, Cape Weed, Sweet Vernal and Blackberry.

Valley Heathy Forest also occurs on the Mia Mia and Taits Road roadside reserves.

2.1.3 Scattered Indigenous Trees

Scattered indigenous tree species that once formed the canopy component of the EVC's identified within the local area of the easement comprised River Red Gum *E. camaldulensis*, Yellow Box *E. melliodora*, Grey Box *E. microcarpa*, Red Box *E. polyanthemos*, and Candlebark *E. rubida* (**Appendix E4)**

Trees were supported by roadsides, creeklines and scattered throughout private land. A number of scattered trees were identified either on the easement, or near the edge of the easement.

2.1.4 Planted vegetation

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

2.1.5 Weeds

A total of 19 species are considered high-threat weeds, including three listed as noxious weeds under the *CaLP Act* (**Appendix E2**). 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 EVC's 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 easement 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 E6.** Appropriate measures to manage the potential spread or introduction of weeds during construction are recommended and will be included in the Construction Environment Management Plan to be prepared for the project.

Table E6: Declared Noxious Weed Species

Species Name	Common Name	Catchment	Declared Noxious Weed Status
Cirsium vulgare	Spear Thistle	GBCMA	Restricted
Opuntia stricta	Prickly Pear	GBCMA	Restricted
Rubus fruticosus spp. agg.	Blackberry	GBCMA	Regionally Controlled

Several weed species not listed under the *CaLP Act* were also recorded along the easement and are included in the flora list contained in **Appendix E2**.

2.2 Permitted Clearing Assessment

The assessment to determine the implications along the pipeline is based on the '*Permitted Clearing of Native Vegetation - Biodiversity assessment guidelines'* (DEPI 2013). This involves an in-field habitat hectare and scattered tree assessment and, based on this data and the risk modelling undertaken by DEPI, the calculation of the risk based pathway and biodiversity equivalence score 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 is summarised below.

2.2.1 Risk-based Pathway

Based on the DEPI modelling (DEPI 2014b), the location of the project and amount of native vegetation to be impacted (≥ 1 hectare), Looping 5 is likely to fall under the 'Moderate to high' risk-based pathway within location risk A. The risk-based pathway however will ultimately be determined by DEPI.

2.2.2 Habitat Hectare Assessment

The easement contains approximately 10.99 hectares (5.04 habitat hectares) of remnant vegetation within the *Central Victorian Uplands* comprising seven EVC's and 32 different quality habitat zones. The detailed results of the Vegetation Quality Assessment, Habitat Hectare scores for each habitat zone and KP locations are provided in **Appendix E3**. A summary of the total area for each EVC is provided in **Table E7**.

Measures have been undertaken to avoid and minimise impacts to remnant vegetation, due to this, a total of 7.5 hectares (3.55 habitat hectares) of remnant vegetation is to be removed. The total area of impact for each EVC and bioregion is summarised in **Table E7**.

Table E7: Summary of Habitat Hectare Vegetation Quality Assessment

Bioregion	EVC	Total Area (ha)	Total Habitat hectares (Habha)	Total Losses (ha)	Total Losses (Habha)	Area (ha) to be retained	Habitat hectares (Habha) retained
Central Victorian Uplands	18 Riparian Forest	0.17	2.10	0.12	0.02	0.05	0.66
	22 Grassy Dry Forest	0.24	0.11	0.14	0.07	0.10	0.04
	23 Herb-rich Foothill Forest	0.86	0.45	0.57	0.29	0.29	0.16
	47 Valley Grassy Forest	5.47	0.75	3.81	1.92	1.66	0.2
	55 Plains Grassy Woodland	0.54	1.10	0.36	0.18	0.18	0.4
	127 Valley Heathy Forest	0.97	0.31	0.7	0.23	0.27	0.08
	175_61 Grassy Woodland	2.75	0.22	1.8	0.84	0.95	0.06
Totals		**10.99**	**5.04**	**7.50**	**3.55**	**3.49**	**1.60**

2.2.3 Tree Assessment

Scattered indigenous trees

Scattered indigenous trees were classified as Very Large Old Trees (VLOTs), Large Old Trees (LOTs), Medium Old Trees (MOTs) or Small Trees (STs) according to the relevant EVC Benchmark (DEPI, 2014c). A total of 92 scattered indigenous trees were recorded during the assessment. This total includes 11 VLOTs, 30 LOTs, 27 MOTs, and 24 STs, as summarised in **Table E8.** A detailed list of scattered indigenous trees recorded during the assessment is presented in **Appendix E4**.

A preliminary assessment of impacts to trees has been undertaken by APA **(Appendix E4).** Five scattered trees including two VLOTs, one LOT and two STs will be removed from the construction ROW **Appendix E4.**

Tree Protection Zones, as defined under the Australian Standard (AS 4970-2009 Protection of trees on development sites), may also impinge on the construction ROW in some areas and have also been taken into consideration. An arborist has therefore been contracted to undertake an arboricultural assessment to determine the impact of construction on trees 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. Protection measures will be included in a Construction Environment Management Plan (CEMP) to be prepared for the project.

Table E8: Summary of Scattered Indigenous Trees per EVC

Bioregion	Relevant EVC	VLOTs	LOTs	MOTs	STs	Total
Central Victorian Uplands	19 Riparian Forest	-	-	1	-	**1**
	22 Grassy Dry Forest	-	5	3	2	**10**
	23 Herb-rich Foothill Forest	3	3	3	7	**16**
	47 Valley Grassy Forest	4	19	15	13	**51**
	55 Plains Grassy Woodland	-	**2**	-	-	**2**
	56 Floodplain Riparian Woodland	**2**		**2**	-	**4**
	175_61 Grassy Woodland	**2**	**1**	**3**	**2**	**8**
Totals		**11**	**30**	**27**	**24**	**92**

Indigenous trees in patches

Indigenous trees in patches were classified as Very Large Old Trees (VLOTs), Large Old Trees (LOTs) and Medium Old Trees (MOTs) according to the relevant EVC Benchmark (DEPI, 2014c). A total of 44 indigenous trees in patches were recorded during the assessment. This total includes five VLOTs, 20 LOTs and 19 MOTs, as summarised in Table E9. A detailed list of indigenous trees recorded during the assessment is presented in **Appendix E4**.

A preliminary assessment of impacts to trees has been undertaken. One LOT will be removed from the construction ROW **(Appendix E4).**

Tree Protection Zones, as defined under the Australian Standard (AS 4970-2009 Protection of trees on development sites), may also impinge on the construction ROW in some areas and has also been taken into consideration. All impacts to indigenous trees will be subject to a qualified arborist assessment and discussions with APA.

Table E9 Summary of Indigenous Trees in patches per EVC

Bioregion	Relevant EVC	VLOTs	LOTs	MOTs	Total
Central Victorian Uplands	22 Grassy Dry Forest	-	1	-	**1**
	23 Herb-rich Foothill Forest	1	2	5	**8**
	47 Valley Grassy Forest	4	7	4	**15**
	55 Plains Grassy Woodland	-	**1**	4	**5**
	127 Valley Heathy Forest	-	**4**	2	**6**
	175_61 Grassy Woodland	-	**5**	**4**	**9**
Totals		**5**	**20**	**19**	**44**

2.3 Targeted Surveys for Threatened Flora & Vegetation Communities

The easement has been subject to significant disturbance from rural development with there being minimal areas of undisturbed native groundcover present.

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

However, remnant native vegetation has been identified within the easement 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 easement (**Appendix E5** and **Appendix E6a)**. An assessment

of threatened species and communities and presumed "Likelihood of Occurrence" in areas of the easement, and targeted survey results have been provided in **Appendix E6a**. A number of threatened species and vegetation communities were considered to have the potential to occur along the easement, due to the presence of suitable habitat.

2.2.1 Targeted Surveys for Threatened Flora

The easement 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 important refuges 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 VBA and the PMST was conducted of the local area surrounding the easement with a five kilometre buffer to obtain a species profile from existing records (**Appendix E5** and **Appendix E6a).**

No *EPBC Act* listed flora species have previously been recorded within the local area, however one *FFG Act* listed species was previously recorded within 5 kilometres of the easement (DEPI 2012h) **Table E10**. Six nationally and state significant flora species, not previously documented within the local area, also have habitat potentially occurring within the vicinity of the easement (DSEWPaC 2013).

An additional three species listed on the *DSE Advisory List* (DSE, 2005) have also have previously been recorded within the local area (within five kilometres of the easement) and are presented in **Table E10**.

The assessment of threatened species and their potential to occur within the construction ROW has been provided in **Appendix E6**. Species that have not been previously recorded (i.e. prior to 1934) as listed in **Table E10** were not considered for targeted surveys and therefore are unlikely to occur. Surveys for Spiny Rice-flower *Pimelea spinescens subsp. spinescens* were undertaken in winter within all areas of suitable habitat listed in **Appendix E6b.**

A description for each listed flora species with the potential to occur, their habitat preference and specific flowering time is presented in **Appendix E7**.

Targeted surveys were undertaken during the optimal flowering time for each species focusing on habitat that had a moderate to high likelihood of occurrence.

Table E10: Summary of Threatened Flora Species recorded within 5km of the Easement

Scientific Name	Common Name	Latest Record	*EPBC Act*	*FFG Act*	*DSE Advisory List*
Acacia ausfeldii	Ausfeld's Wattle	1980			Vulnerable
Diuris palustris	Swamp Diuris	1977		Listed	Vulnerable
Solanum cinereum	Narrawa Burr	1954			Poorly known
Sporobolus creber	Western Rat-tail Grass	1972			Vulnerable
Protected Matters Search Tool					
Dianella amoena	Matted Flax-lily		Endangered	Listed	Endangered
Glycine latrobeana	Clover Glycine		Vulnerable	Listed	Vulnerable
Pimelea spinescens subsp. Spinescens	Spiny Rice-flower		Critically Endangered	Listed	Endangered
Pomaderris vacciniifolia	Round-leaf Pomaderris		Critically Endangered	Listed	Vulnerable
Prasophyllum frenchii	Maroon Leek-orchid		Endangered	Listed	Endangered
Thelymitra matthewsii	Spiral Sun-orchid		Vulnerable	Listed	Vulnerable

No national or state significant flora species were recorded within the construction ROW during any of the targeted surveys and therefore are unlikely to occur.

No species listed on the DSE Advisory List were recorded during any of the field assessments.

However a total of 23 flora species recorded are members of plant families and genera that are considered protected on Crown Land under the *FFG Act*. They include members of the following plant families:

- Asteraceae - Daisies - all species
- Epacridaceae - Heaths - all species
- Orchidaceae - Orchids - all species

And members of the genera:

- *Acacia* - Wattles - excluding *Acacia dealbata, Acacia decurrens, Acacia implexa, Acacia melanoxylon, Acacia paradoxa*.
- *Grevillea* - Grevilleas - all species
- *Stylidium* - Trigger-plants - all species
- *Xanthorrhoea* - Grass-trees - all species

Species recorded on the construction ROW and protected under the *FFG Act* are highlighted in **Appendix E2.**

2.2.2 Targeted Surveys for Threatened Vegetation Communities

***EPBC Act* listed Communities**

Two vegetation communities listed under the *EPBC Act ('Grey Box (Eucalyptus microcarpa) Grassy Woodlands and Derived Native Grasslands of South-Eastern Australia'* listed as Endangered and *'White Box - Yellow Box - Blakely's Red Gum grassy woodlands and derived native grasslands'* listed as Critically Endangered have the potential to occur within the construction ROW **Appendix E6a** (DSEWPaC 2012a).

Due to the quality of the vegetation and based on the threatened vegetation community criteria thresholds, no *EPBC Act* or *FFG Act* listed communities were identified during the assessments within the construction ROW.

3. FAUNA ASSESSMENT

3.1 Fauna Profile

A search of the VBA was conducted of the local area surrounding the easement with a five kilometre buffer to obtain a species profile from existing records maintained by DEPI. The database records sightings of all species reported to DEPI (including the locality and date of sighting) and has a total of 221 species registered for the local area. The total records comprise of: 4 invertebrate, 2 fish, 10 frogs, 14 reptiles, 165 birds and 26 mammal species. Of these, there were 11 introduced species recorded in the search area.

A search was conducted in relation to *EPBC Act* listed species that may occur in the local area of the easement utilising the PMST (DSEWPaC 2013) with a buffer of five kilometres[1]. The results of the search are provided in **Appendix E5**.

From these results, a total of 17 listed species with national or state significance have been reported in the in the local area while an additional 23 species listed under the *EPBC Act* are considered to be potentially present in the area. Also 9 species recorded in the local area have been listed under the DEPI Advisory List as Critically Endangered, Endangered, Vulnerable, Near Threatened or Data Deficient in Victoria (DSE 2013)[2]. Refer to **Appendix E6c** for a summary of the significant fauna species that have been identified as either occurring or potentially occurring in the local area.

3.2 Habitat Types and Significance

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

3.2.1 Open Farmland

The easement is located in a region dominated by open pasture subject to heavy 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 were also ploughed. Logs and other potential surface habitats typical of the region were almost entirely absent from the easement. As a result, introduced grassland/pasture is generally considered of low habitat value for native fauna.

3.2.2 Woodland

Many areas of woodland were identified within the easement of this looping section. Mosaic remnants of the original Grassy Woodland, Herb-rich Foothill Forest, Grassy Dry Forest and Creekline Grassy Woodland were identified along roadsides or water courses respectively.

Generally the roadsides contained higher quality Grassy Dry Forest and Grassy Woodland vegetation than that found scattered through individual properties. A number of roadsides have been identified by the GBCMA as being significant roadsides, such as Strath Creek and Spur Roads; as they protect important patches of vegetation and 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 and other focal species of wildlife (DSE 2006).

3.2.3 Watercourses and Dams

The easement traverses one major creek (Sunday Creek) and another four creeks along with a number of minor drainage lines. There are also a number of farm dams near the easement as well as a few ephemeral wetlands.

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[1] Note that the EPBC database lists those species that may potentially occur within the area based on general distribution maps (with a broad buffer zone) while the VBA listing is based on records of individual sightings

[2] A list prepared by DSE for use in a range of planning processes. It is not the same as the statutory list of threatened fauna established under the *FFG Act*: there are no legal requirements that flow from inclusion of a species on this list

The riparian margins of the larger creeks in the vicinity of the easement include River Red Gums representative of the overstorey vegetation that originally occupied the area. The understorey vegetation ranged from good quality native vegetation to almost completely dominated by exotic species within the easement. These waterways have been identified as major bioregional habitat links and important habitat for the majority of threatened species within the CMA (DSE 2006a).

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.

3.3 Targeted Surveys for Threatened Fauna

Thirteen sites within the easement and adjacent areas were surveyed by qualified and experienced zoologists and ecologists between October 2013 and January 2014. These surveys took the form of diurnal surveys for Golden Sun Moth, birds and reptiles; nocturnal surveys for mammals, birds and Growling Grass Frog. All species observed or heard were recorded (**Appendix E9**).

From the assessment of the "Likelihood of Occurrence" (**Appendix E6c**), the following species were targeted for surveys (excluded aquatic species) (**Table E11)** due to their moderate or high likelihood of occurrence in the local area:

Table E11: Summary of Threatened Fauna Species

Common Name	Scientific Name	Status (DoE/FFG/DEPI)	Likelihood of Occurrence
Golden Sun Moth	*Synemon plana*	Critically Endangered / Listed / Critically Endangered	Moderate
Brown Toadlet#	*Pseudophryne bibronii*	-/Listed/Endangered	Moderate
Growling Grass Frog	*Litoria raniformis*	Vulnerable/Listed/Endangered	Moderate
Brown Treecreeper	*Climacteris p. victoriae*	-/-/Near Threatened	Moderate
Cattle Egret	*Ardea ibis*	CAMBA,JAMBA/-/-	Moderate
Hardhead	*Aythya australis*	-/-/Vulnerable	Moderate
Latham's Snipe	*Gallinago hardwickii*	C,J,R*/Nominated/Near Threatened	Moderate
Speckled Warbler	*Chthonicola sagittata*	-/Listed/Vulnerable	Moderate
Square-tailed Kite	*Lophoictinia isura*	-/Listed/Vulnerable	Moderate
White-throated Needletail	*Hirundapis caudacutus*	C,J,R*/-/Vulnerable	Moderate

Brown Toadlet surveys will be conducted in autumn 2014. *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 E9.**

Aquatic surveys are yet to be undertaken and then only on those waterways that are currently planned to be bored. After discussion with Hume DEPI staff regarding aquatic vertebrates and invertebrates, it was noted that known populations of threatened species occurred upstream, in many cases several kilometres, of the easement (Smith 2013, *pers comm.*). It was decided that surveys would be done in autumn 2014, as a contingency measure for the boring.

All surveys were based on guidelines prepared by DoE or those requirements found in the Biodiversity Precinct Structure Planning Kit ('BPSP') (DSE 2010b). 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 surveys were undertaken in the season

appropriate to the subject species. The survey locations for threatened fauna are summarised below in **Table E12.**

Table E12: Summary of Locations and Fauna Surveys Undertaken

Location	KP	Survey Type			
		Diurnal	Nocturnal	GGF	GSM
Plantation Dam#	29.85			√	
Stotts Rd	30.16	√	√		
S2-3 (north of Stotts Rd)	30.16 – 31.0				√
Slaty Creek	31.0			√	
Clonbinane Rd	33.39	√			
Sunday Creek	34.05	√	√	√	
S2-15/16 (south of Taits Rd)	35.45 - 35.55	√	√		√
Sheepwash Creek	36.95	√		√	
S2-25 "Coulston Rd"	38.02 - 38.7	√	√		
S2-28/29 (north of Skye Rd West) (GSM 41.0 – 42.0 only)	40.5 – 42.0	√	√		√
Mia Mia Rd	42.65	√	√		
Mia Mia Creek	43.45	√			
S2-33/34/Strath Creek Rd	44.2 - 45.08	√			√

#Three surveys undertaken, due to the timing of surveys, as per Heard et al 2010.

3.4 Results of Targeted Surveys

Of the targeted species surveyed for, only two species were observed during the 57 separate surveys across the 13 sites. The locations that these species were recorded are summarised in **Table E13** below and a full species list of fauna recorded at each location can be found in **Appendix E9.**

Table E13: Findings of Fauna Surveys

Species	Survey findings
Golden Sun Moth	• None recorded
Brown Toadlet	• Surveys to be undertaken in autumn 2014.
Growling Grass Frog	• None recorded
Brown Treecreeper	• None recorded
Cattle Egret	• None recorded
Hardhead	• One Hardhead was observed on a farm dam near the easement at KP38.2
Latham's Snipe	• Two Latham's Snipe were flushed from a dam in the plantation at KP29.85 during one of the GGF surveys.
Speckled Warbler	• None recorded
Square-tailed Kite	• None recorded
White-throated Needletail	• None recorded

As mentioned in Part A, species that are listed as near threatened and data deficient are not considered to be of the same level of risk as higher categories of threat (vulnerable, endangered or critically endangered). Therefore Hardhead is not discussed in further detail in this report.

Golden Sun Moth

Following discussions with DEPI Hume Region staff (Smith 2013, *pers comm.*), it was decided that it would be prudent to undertake surveys for Golden Sun Moth *Synemon plana*, to confirm the presence or absence of this species in suitable habitat on the easement of this looping. There is a known population of Golden Sun Moth at Mt Piper, near Broadford (approximately 6km) from the end of this looping.

From vegetation surveys undertaken earlier in 2013, four sites were determined to possibly be suitable habitat across this looping. As per EPBC requirements, four surveys were undertaken across the "flying season" from late December 2013, until the end of January 2014. DEPI Hume staff were satisfied with the extension of the "flying season" by Mark Winfield (Environment and Water Regional Manager, Port Phillip Region) in an email on 23 December 2013, until the end of January 2014. It was again extended until the end of February by Alan Webster in an email on 30 January 2014.

The Mount Piper site was chosen as the primary reference site for surveys in this looping, following advice from DEPI Hume staff (Smith 2013, *pers comm)* as it allowed public access due to being a Nature Conservation Reserve and was relatively close to the easement.

No Golden Sun Moths were recorded during any of the four surveys at either the reference site or survey sites. Other sites closer to Melbourne where Golden Sun Moths were recorded on the same days as the Monarc surveys were used as secondary reference sites. The bio-climatic data for this survey location can be found in **Appendix E10**.

Growling Grass Frog

Following the preliminary surveys in 2012, seven sites within this looping had been determined to contain possible habitat for Growling Grass Frog based on the site's environmental characteristics. By the time of the surveys in November 2013, only four sites were still deemed to be suitable as the other three sites were dry. Each site was assessed once in late November but only three of the sites were assessed for a second time by the end of November. The remaining site at KP29.85 was surveyed a further two times in January 2014 in accordance with Heard *et al.* 2010. This site was outside of the easement but was considered for surveys as a drainage line into the dam crossed the easement and as a precautionary measure prior to any construction works.

No Growling Grass Frogs were recorded during the surveys at any of the four locations despite there being suitable habitat and climatic conditions. The bio-climatic data for these survey locations can be found in **Appendix E11**.

Each site had at least three common species of frog present during these surveys with a total of seven frog species recorded across the four sites The more common species were; Spotted Marsh Frog *Limnodynastes tasmaniensis,* Striped Marsh Frog *L. peronii*, Eastern Banjo Frog *L. dumerilii*, Common and Plains Froglets *Crinia signifera and C. parinsignifera*, Peron's and Brown Tree Frogs *Litoria peronii* and *L. ewingii* respectively, were recorded at these sites during the two or three surveys.

Latham's Snipe

This migratory species was not observed during the diurnal bird surveys but was flushed from beside the plantation dam, south of Stott's Road at KP29.85 during a Growling Grass Frog survey. There is no suitable habitat on the easement itself for this species so it is anticipated that the construction works will have no impact on this species.

4. LEGISLATIVE IMPLICATIONS

4.1 Environment Protection and Biodiversity Conservation Act 1999

No nationally significant flora species or listed communities species were recorded within the easement during any of the targeted surveys.

Of the 27 species of listed fauna that may potentially occur in the local area, only Latham's Snipe was recorded during any of the fauna surveys conducted across this looping section. The easement is not considered 'important habitat' for any migratory or marine species and no wetlands of international significance within the local area of the easement.

A referral to the Commonwealth Environment Minister will not be required for looping 5.

4.2 State Legislation

4.2.1 Flora and Fauna Guarantee Act 1988

No *FFG Act* listed flora or communities were identified during the assessment, however, 27 species were identified that belong to plant families or genera that are protected on Crown Land under the *FFG Act*.

One *FFG Act* fauna species, the Latham's Snipe, was identified during the field surveys; however this species is currently only nominated for listing.

Given the construction ROW intersects Crown Land on roadsides and several publicly managed watercourses, an *FFG Act* permit will be required for the construction activities in these areas.

4.2.2 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 suitable fauna habitat being impacted, salvage and relocation may be required for the construction activities.

4.2.3 Catchment and Land Protection Act 1994

The construction ROW of this looping contains a number of noxious weeds such as Blackberry, Spear Thistle listed and Prickly Pear regionally controlled within the Goulburn Broken Catchment. 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.

4.3 Permitted Clearing Regulations

When considering an application to remove native vegetation under the moderate or high risk pathways, the responsible authority (local council) and referral authority (DEPI) 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 confined 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 construction ROW or, if feasible, other construction techniques such as HDD or boring.

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 to determine where impacts to native vegetation could be avoided or minimised. As a result, APA will implement 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 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 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 avoid impacts on remnant vegetation in the 'eastern' area of the easement. 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 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 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.
- Every effort has also been made to minimise impacts on all trees whether within remnant patches or as trees scattered through the easement. Furthermore an arborist has therefore been contracted to undertake an arboricultural assessment to determine the impact of construction on trees 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. Protection measures will be included in a Construction Environment Management Plan (CEMP) to be prepared for the project.

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. Measures taken to avoid or minimise impacts are summarised in **Table E14**.

Table E14: Summary of Vegetation Clearance Measures

Vegetation Type	Strategy	Avoidance/Minimisation Measures	Location Ref	Map Ref (App E1)
Trees	Removal	Scattered trees that qualify as LOTs to be removed	S2-10 (KP32.7) S2-21 (KP37.1) S2-27 (KP39.46)	A-6 A-17 A-22
Remnant Patches	Avoid	Impacts to waterway vegetation to be avoided by use of drilling techniques to pass under the waterway	Sunday Creek (KP34.1)	A-9
		Impacts to Remnant Patch to be avoided by narrowing of construction ROW to 20m	S2-16 (KP35.6)	A-14
	Minimise	Impacts to ROW to be minimised by shifting of construction ROW by 7m over existing pipeline ("reverse" ROW) (but remaining within existing easement)	S2-28 (KP40.9-41.1) S2-28 (KP41.2-41.3) S2-34 (KP44.9-45.05) Strath Creek Rd (KP45.1)	A-27/28 A-29
		Impacts to Remnant Patch to be minimised by narrowing of construction ROW to 20m	Stotts Road (KP30.2) Clonbinane Road (KP33.4) Spur Road (KP35.1) Taits Road (KP35.7) S2-17 (KP35.7-35.9) S2-22 (KP37.3) S2-24/25 (KP37.9-38.5) S2-26 (KP38.85) S2-27 (KP39.8-40) S2-28 (KP40.2-40.4) S2-28 (KP40.6) S2-28 (KP40.7-40.85) S2-28 (KP41.1-41.2) S2-28 (KP41.3-41.5) S2-28-30 (KP41.6-42.1) S2-30 (KP42.2) S2-30 (KP42.3-42.6) Mia Mia Road (KP42.6) S2-31 (KP42.7-43.1) Mia Mia Creek (KP43.45) S2-33 (KP44.1-44.9)	A-4 A-8 A-13 A-14 A-15 A-17 A-19 A-20 A-23 A-25 A-26 A-27 A-28 A-29 A-30/31 A-31 A-33 A-34 A-34/5 A-47 A-39
		Impacts to Remnant Patch to be minimised by narrowing of construction ROW to less than 20m	S2-15 (KP35.5)	A-12

5. RECOMMENDATIONS

A 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.

A number of 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.

As there have been few flora and fauna issues identified across this looping, from all of the surveys conducted, this section aims to reinforce mitigation measures discussed in Part A.

5.1 Tree and Vegetation Removal

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, possums and gliders, phascogales, microbats and reptiles.

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

- Tree collars to be installed on all hollow-bearing trees in the construction ROW three days prior to breaking ground or the scheduled removal, whichever comes first, to prevent fauna from entering hollows.
- 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 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 qualified and 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.
- Where applicable and appropriate, restoration works should include the planting of shrubs, particularly *Acacia* species, within the ROW following construction.

5.2 *FFG Act* Protected Flora

As every roadside in this looping has protected flora species under the *FFG Act*, it is recommended that an application be made to DEPI for permission to clear these roadsides, watercourses and any other Crown Land where necessary, as required by the Act.