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1. REGIONAL BACKGROUND

APA GasNet Australia (Operations) Pty Ltd (APA) is looping (duplicating) parts of the existing Wollert to Wodonga gas transmission pipeline (pipeline licence 101) between Mangalore and Longwood, Victoria (known as Looping 3).

Monarc Environmental Pty Ltd (Monarc) was engaged by APA to undertake a flora and fauna assessment of the APA easement from near Mangalore Kilometre Point 74.7 (KP74.7) to Longwood (KP107.6). The purpose of the assessment is to identify any risks to significant flora and fauna values within the project area and provide the necessary information to enable management recommendations for flora and fauna affected by the proposed project.

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 existing easement. With reference to the starting point of the existing pipeline at Wollert, this looping will commence at Mangalore KP74.7 and finish at Longwood KP107.6, a total distance of 32.9 km. However the actual footprint will begin at KP73.83, south of Back Mountain Road.

An overview of this looping section is provided in **Figure C1** whilst detailed pipeline maps are provided in **Appendix C1**.

1.1 General

The topography of the Mangalore to Longwood route is relatively level, lying at about 170m AHD as it skirts the north-western edge of the Strathbogie Ranges which lie to the south of the Hume Freeway. While the easement predominantly falls within the *Victorian Riverina Bioregion*, which stretches to the north and east, through to the Murray River, the first 5km is located within the *Central Victorian Uplands 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).

Within the local area of the easement, the landform of the predominant bioregion is roughly contiguous with the region known as the *Victorian Riverina*, characterised by flat to gently undulating land and floodplain areas associated with the eight river basin tributaries of the Murray River. Prior to European settlement, the vegetation of the *Victorian Riverina* was a mixture of grasslands and low open woodland, dominated by box species Grey Box *Eucalyptus microcarpa* and Yellow Box *E. melliodora*, Red Gum *E. camaldulensis* and Murray Pine *Callitris sp.* with a sparse grassy understorey. A number of small freshwater wetlands of various types were also scattered across the region.

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 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). Creekline vegetation remnants can retain good connectivity, especially on Hughes Creek, Charles and Muddy Waterhole Creeks while the networks of road reserves and associated vegetation not only provide critical habitat for native bird species but also for colonies of Squirrel Glider. Other threatened fauna within the local area include Bush Stone-curlew, Grey-crowned Babbler, Swift Parrot, and Brush-tailed Phascogale which are often found along connected creeklines and roadsides with large, old, hollow-bearing trees.

1.2 Land Use

1.2.1 Planning Zones

The easement route passes through the following planning schemes:

- Shire of Mitchell KP73.83 to 80.76
- Shire of Strathbogie KP80.76 to 107.6

The zones that apply to parcels of land traversed by the easement are summarised in **Table C1**.

Table C1: Summary of Planning Zones

Local Government Area	Zone	Location
Shire of Mitchell	Farming Zone 1 (FZ)	
	Public Use Zone 4 (PUZ4)	North Eastern Railway (KP79.05)
	Road Zone 1 (RDZ1)	Hume Highway (KP76.95)
Shire of Strathbogie	Farming Zone 1 (FZ)	
	Low Density Residential Zone (LDRZ)	Yearings Rd, Avenel (approx. KP89.6) (corner only)
	Road Zone 2 (RDZ2)	Nagambie-Locksley Road (KP100.3)
	Public Use Zone 4 (PUZ4)	Goulburn Valley Railway (KP82.77)
	Road Zone 1 (RDZ1)	Avenel-Nagambie Rd (KP89.05)

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 area of Crown Land being land associated with Hughes Creek classed as a water frontage reserve, although there is no zoning for this in the Shire of Strathbogie planning scheme.

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 C2**. It should be noted that there are no Environmental overlays that apply to this looping within the Shire of Strathbogie.

The easement does not intersect any areas with a Landscape Significance Overlay but does intersect a few 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.

Table C2: Overlay Descriptions

Overlay	Name	KP	Location	Description
VPO1 under Shire of Mitchell	Vegetation Protection Overlay 1 (Roadside and Corridor Protection)	73.9 79 80.76	Back Mountain Road Seymour Avenel Rd/ Goulburn Valley Railway Mangalore Road	Applied to protect and preserve indigenous vegetation and rare and endangered flora and fauna species on linear reserves
VPO2 under Shire of Mitchell	Vegetation Protection Overlay 2 (Freeway Environs Protection)	KP76.9	Hume Freeway	Applied, <i>inter alia</i> , to preserve and enhance the tree lined character of the roadsides and to ensure that all existing trees and natural features which are within the overlay are conserved within the limits of practicality and are not wantonly damaged, destroyed or removed. Also to preserve and protect indigenous vegetation and rare and endangered flora and fauna species on linear reserves.

Both LGAs associated with this looping, have prepared roadside management plans that identify and categorise roadside vegetation considered to have conservation significance (Shire of Mitchell 2007; Shire of Strathbogie 2011).

In general, the plans cover all rural road reserves in this LGA excluding any road reserves under the management of VicRoads (e.g. arterial roads or highways) or unused roads under the management of DEPI. While there is some variation in definition, roadsides have been generally assigned to one of three rankings: 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 (such as providing habitat for significant species like the Grey-crowned Babbler) have been identified by on-site signage that identifies these areas as Significant Roadside Area.

Both Shires 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 proposed construction ROW.

1.3 Waterways

Natural assets that have been identified along the project area include several perennial waterways as well as some ephemeral waterways and irrigation channels. In general, natural waterways and drainage lines (designated waterways under the Victorian *Water Act 1989*) are the responsibility of the Goulburn Broken Catchment Management Authority (GBCMA) while Goulburn Murray Water is responsible for water storage and associated delivery and drainage systems along the project corridor e.g. irrigation channels. Major named waterways intersected by the project are summarised in **Table C3**. In summary, Mangalore to Longwood (Looping 3) intersects 29 designated waterways of which 8 are named. This includes Hughes Creek near Avenel.

Table C3: Named Waterways Intersected by the Project

Looping	Name	Location	Flow status	Crossing Method	Land Type
Mangalore to Longwood	Four Mile Creek	77.5	Ephemeral	Open cut	Private freehold
	Eight Mile Creek	82.0	Ephemeral	Open cut	Private freehold
	Hughes Creek	88.3	Intermittent	HDD	Crown Land
	Wormangal Creek	92.0	Intermittent	Open cut	Private freehold
	Charles Creek	97.5	Ephemeral	Open cut	Private freehold
	Reedy Creek	97.9	Ephemeral	Open cut	Private freehold
	Burnt Creek	100.5	Ephemeral	Open cut	Private freehold
	Muddy Waterhole Creek	105.15	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 (about 3km from the easement at its closest point, near Mangalore at the commencement 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 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 Hughes Creek that falls within 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 may therefore be required prior to vegetation clearing on Crown Land throughout the construction ROW in these areas.

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.

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

2. FLORA ASSESSMENTS

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 Plains Grassy Woodland with smaller areas supporting other vegetation types summarised below in **Table C4** (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. Extant (2005) EVC mapping shows the majority of native vegetation remaining in the local area is still primarily Plains Grassy Woodland (DEPI 2014b).

Table C4: DEPI modelled pre-1750 Ecological Vegetation Classes within the Local Area

Bioregion	EVC Number and Name	Status	Occurrence
Victorian Riverina	55 Plains Grassy Woodland	Endangered	Common
	56 Floodplain Riparian Woodland	Vulnerable	Common
	61 Box Ironbark Forest	Vulnerable	Common
	68 Creekline Grassy Woodland	Endangered	Common
	74 Wetland Formation	Endangered	N/A
	175_61 Low Rises Grassy Woodland	Endangered	Common
Central Victorian Uplands	61 Box Ironbark Forest	Vulnerable	Common
	68 Creekline Grassy Woodland	Endangered	Common
	55 Plains Grassy Woodland	Endangered	Common

2.1.1 Existing Vegetation Condition

The field assessments identified only isolated fragments of native vegetation remaining in the area and these often contained a mixture of native and exotic species (**Appendix C2**).

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 five EVC's summarised in **Table C5**.

Table C5: Ecological Vegetation Classes Identified during the Field Assessments

Bioregion	EVC Number and Name	Status
Victorian Riverina	55_61 Plains Grassy Woodland	Endangered
	55_62 Riverina Plains Grassy Woodland	Endangered
	68 Creekline Grassy Woodland	Endangered
	175_61 Low Rises Grassy Woodland	Endangered
Central Victorian Uplands	55 Plains Grassy Woodland	Endangered
	61 Box Ironbark Forest	Vulnerable
	68 Creekline 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. Vegetation located along Hughes Creek (EVC: 56 Floodplain Riparian Woodland) will not be impacted as this creek will be crossed by HDD. Therefore, Hughes Creek was not included in any of the field assessments.

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 C3**.

2.1.2 Vegetation Descriptions

Flora Species

A total of 116 flora species were recorded along the easement during the field survey. This included 82 indigenous species and 34 introduced species (including both Australian natives and exotics). A detailed list of all flora species recorded in the easement is provided in **Appendix C2**.

EVC 55_61: Plains Grassy Woodland within the *Victorian Riverina Bioregion* is described as open, eucalypt woodland to 15 metres tall. It occupies well drained, fertile soils on flat or gently undulating plains at low elevations in areas with >600 mm annual rainfall. The understorey consists of a few sparse shrubs over a species-rich grassy and herbaceous ground layer characterised by summer-growing grasses (DEPI 2014c).

Plains Grassy Woodland was generally confined to road sides although some patches of varying quality occurred on private land.

Patches of Plains Grassy Woodland supported by roadside reserves generally incorporated Large Old and Very Large-old Eucalypts. These areas tended to have a relatively depauperate understorey and a high coverage of weedy exotic annuals. The relatively high cover of weedy exotics in these areas invading from contiguous land utilised for agricultural purposes. In spring the understorey tended to be dominated by weedy exotic annual graminoids with the most abundant of these being Annual Veldt-grass *Ehrharta longiflora* along with common infestations of Cocksfoot *Dactylis glomeratus* and Prairie Grass *Bromus catharticus*.

Relatively high quality patches of Plains Grassy Woodland are supported by the Seymour-Avenel roadside reserve and rail reserve at approximately KP79.0 (**Appendix C3**). In these areas Indigenous graminoids were well represented with Kangaroo Grass *Themeda triandra*, Small-flowered Wallaby-grass *Rytidosperma setaceum*, Brown-backed Wallaby-grass *R. duttonianum*, Copper-awned Wallaby-grass *R. fulvum*, Clustered Wallaby-grass *R. racemosa*, Wattle Mat-rush *Lomandra filiformis* ssp. *coriacea*, Black-anther Flax Lily *Dianella admixta* ssp. *revoluta*, Rough Spear-grass *Austrostipa scabra* ssp. *falcata* and Finger Rush *Juncus subsecundus*, Brush Wire Grass *Aristida behriana*, Bulbine Lily *Bulbine bulbosa* and Chocolate Lily *Arthropodium strictum* all observed. Indigenous forbes include Common Everlasting *Chrysocephalum apiculatum* and Clustered Everlasting along with Gold Dust Wattle *Acacia acinacea* and Hedge Wattle *Acacia paradoxa* both observed.

The understorey is relatively weed free, with a coverage of Annual Veldt-Grass *Ehrharta longiflora* around 20% in spring. 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). These environmental weeds listed in **Appendix C2** were absent.

EVC 55_62: Riverina Plains Grassy Woodland within the *Victorian Riverina Bioregion* is described as open, eucalypt woodland to 15 metres tall occurring on a number of geologies and soil types. In contrast to EVC55_61, it occupies fertile clays and clay loam soils on flat or gently undulating plains at low elevations in areas with <600 mm annual rainfall. The understorey consists of a few sparse shrubs over a species-rich grassy and herbaceous ground layer and chenopods are often present (DEPI 2014c).

This vegetation community is closely related to Plains Grassy Woodland EVC 55_61, is supported by similar geology, is subject to the same threatening processes, and is also listed as endangered.

Riverina Plains Grassy Woodland differs only slightly in vegetation composition. It generally has less coverage of medium shrubs and a higher coverage of medium herbs. Canopy species may include those likely to be found in Plains Grassy Woodland 55_61 along with Buloke *Allocasuarina luehmannii*, Yellow Gum *E. leucoxylon* and Black Box *E. largiflorens*.

This vegetation community is poorly represented between Mangalore and Longwood with the exception of a larger patch south of KP100.5 and is confined to roadside reserves.

A small, although significant patch is supported by the Ryans Road roadside reserve with Buloke, Buloke Mistletoe *Amyema linophylla* along with Yellow Gum *E. leucoxylon*, Yellow Box *E. melliodora* and Grey Box *E. microcarpa* comprise the canopy. Understorey species include indigenous graminoids Kangaroo Grass *Themeda triandra*, Small-flowered Wallaby Grass *R. setaceum*, Erect Guinea-flower *Hibbertia riparia* and Common Raspwort *Gonocarpus tetragynus*. Although this patch was the best scoring patch of EVC 55_62: *Riverina* Plains Grassy Woodland between Mangalore and Longwood the understorey is somewhat lacking due to substantial coverage of weedy annual exotics during spring including Annual Veldt-grass and Cape Weed *Arctotheca calendula*.

A patch of EVC 55_62: *Riverina* Plains Grassy Woodland was also observed between KP100.3 and 100.45. This patch is a somewhat swampy version of this EVC incorporating small wetlands reminiscent of a gilgai formation although somewhat larger. For the most part of this patch the area for which the easement pertains has been cleared of canopy species. Understorey is largely comprised indigenous graminoids with Purple Wiregrass *Aristida ramosa*, Weeping Grass *Microlaena stipoides*, Rough Spear Grass and Finger Rush. Indigenous forbs present include Woolly Heads *Myriocephalus rhizocephalus* and Grassland Wood-sorrel *Oxalis perennans*.

This patch is a portion of a grazed paddock bordered by a channelized drain which may provide the remnant with some relief from grazing pressures during the wetter months.

This patch supports weedy exotic species common to grazed land on the plains being Cape Weed *Arctotheca calendula*, Onion Grass *Romulea rosea* and Brown-top Bent-grass *Agrostis capillaris*.

EVC 68: Creekline Grassy Woodland within the *Central Victorian Uplands Bioregion* and the *Victorian Riverina Bioregion* is described as Eucalypt-dominated woodland to 15 metres tall with an 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 can 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 was confined to Four Mile Creek KP77.5, Reedy Creek KP97.9 and other similar watercourses (**Appendix C3**).

The best example of Creekline Grassy Woodland between Mangalore and Longwood was at Reedy Creek KP97.9 with near benchmark levels of Large Old Trees. However, less than 50% of understorey lifeforms were present and the patch was relatively weedy with approximately 30% cover of Barley Grass *Hordeum* sp. and Onion Grass recorded.

EVC 175_61: Low Rises Grassy Woodland within the *Victorian Riverina Bioregion* is described as a variable open eucalypt woodland to 15 metres tall or occasionally Sheoak woodland to 10 m tall on more skeletal soils. Understorey includes a diverse ground layer of grasses and herbs. The shrub component is usually sparse. It occurs on sites with moderate fertility on gentle slopes or undulating hills on a range of geologies (DEPI 2014c).

Remnant vegetation attributable to this EVC was poorly represented between Mangalore and Longwood supported by only two roadsides at KP80.76 and KP93.9. Both roadsides incorporated Large-Old Trees although less than half the likely understorey lifeforms were recorded at both roadsides.

Both these roadsides were relatively weedy supporting a suite of weedy exotic graminoids including Brown-top Bent-grass, Prairie Grass *Bromus catharticus* and Wild Oats *Avena* sp. impeding the realisation of the indigenous understorey present.

EVC 55: Plains Grassy Woodland within the *Central Victorian Uplands Bioregion* is described as open, eucalypt woodland to 15 metres 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).

Vegetation most attributable to the Plains Grassy Woodland in the *Central Victorian Uplands* was observed around only one location between Mangalore to Longwood just south of Four Mile Creek at KP77.38. This patch is a poor representation of this EVC comprised of Eucalypt sapling regeneration only and underscored by a suite of weedy exotic graminoids.

EVC 61: Box Ironbark Forest within the *Central Victorian Uplands Bioregion* 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).

Understorey attributable to Box Ironbark Forest was observed supported by land utilised for agricultural purposes, mainly grazing, from KP74.0 - KP76.8. These patches were comprised mostly of indigenous graminoids, and were a poor representation of this vegetation community.

A higher quality patch of vegetation attributable to Box Ironbark Forest is supported in the Browns Lane reserve. This patch incorporates an understorey for which over 90 percent of the likely lifeforms were present including Grey Everlasting *Ozothamnus obcordatus*, Daphne Heath *Brachyloma daphnoides*, Clustered Everlasting *Chrysocephalum semipapposum*, Chocolate and Small Vanilla-lily, *Arthropodium strictum* and *A. minus* respectively, Hedge Wattle *Acacia paradoxa*, Gold Dust Wattle *A. acinacea* and Drooping Cassinia *Cassinia arcuata*. Indigenous graminoids observed include Wheat Grass *Elymus scaber*, Black-anther Flax-lily, Small-flower Wallaby-grass and Rough Spear Grass.

This patch was relatively weed-free with only small infestations of Onion Grass *Romulea rosea* and Quaking Grasses *Briza* spp.

This patch is proposed to be mostly avoided as the Hume Highway is to be bored under at this point. Only a small portion of this patch is proposed to be cleared.

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 Blakely's Red Gum *Eucalyptus blakelyi*, River Red Gum *E. camaldulensis*, Yellow Box *E. melliodora*, Grey Box *E. microcarpa*, Red Box *E. polyanthemos*, White Box *E. albens*, and Yellow Gum *E. leucoxylon* and Buloke *Allocasuarina luehmannii* (Appendix C4).

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.

Vegetation located at KP81.05 is a designated wildlife corridor and a nationally funded revegetation project (O'Connor 2014 *pers comm*). The revegetation at this location was assessed and mapped as a patch of *Low Rises Grassy Woodland* EVC 175_61, as was the revegetation recorded at KP80.8 assessed as Box Ironbark Forest EVC 61 (Appendix C3). In accordance with the Framework, there will be a requirement to offset the losses of all revegetation areas that have been publicly funded that will be impacted by the construction ROW.

2.1.5 Weeds

A total of seven species are considered high-threat weeds, including four listed as noxious weeds under the *CaLP Act* (Appendix C2). 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 C6. 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 (CEMP) to be prepared for the project.

Table C6: Declared Noxious Weed Species

Species Name	Common Name	Catchment	Declared Noxious Weed Status
<i>Cirsium vulgare</i>	Spear Thistle	GBCMA	Restricted
<i>Marrubium vulgare</i>	Horehound	GBCMA	Regionally Controlled
<i>Oxalis pes-caprae</i>	Soursob	GBCMA	Restricted
<i>Rubus fruticosus spp. agg.</i>	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 lists contained in Appendix C2.

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 2013b). 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 3 is likely to fall under the ‘Moderate’ 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 16.46 hectares (5.04 habitat hectares) of remnant vegetation within the *Central Victorian Uplands* and *Victorian Riverina* comprising seven EVC's and 59 different quality habitat zones. The detailed results of the vegetation quality assessment and Habitat Hectare scores for each habitat zone and KPlacements are provided in **Appendix C3**. A summary of the total area for each EVC is provided in **Table C7**.

Measures have been undertaken to avoid and minimise impacts to remnant vegetation, due to this a total of 11.07 hectares (3.23 habitat hectares) of remnant vegetation is to be removed. The total area of impact for each EVC and bioregion is summarised in **Table C7**.

Table C7: Summary of Habitat Hectare Vegetation Quality Assessment

Bioregion	Target EVC	Total Area (ha)	Total habitat hectares	Total Losses (Ha)	Total Losses (HabHa)	Area (ha) to be retained	Habitat hectares to be retained
<i>Central Victorian Uplands</i>	61 Box Ironbark Forest	4.75	1.04	3.28	0.64	1.45	0.4
	55 Plains Grassy Woodland	0.17	0.06	0.13	0.04	0.04	0.02
	68 Creekline Grassy Woodland	0.2	0.07	0.12	0.04	0.08	0.03
<i>Victorian Riverina</i>	55 Plains Grassy Woodland	8.97	2.92	6.09	1.95	2.86	0.97
	175_61 Low Rises Grassy Woodland	0.27	0.09	0.18	0.06	0.09	0.03
	61 Box Ironbark Forest	0.06	0.02	0.04	0.01	0.02	0.01
	68 Creekline Grassy Woodland	2.04	0.84	1.23	0.49	0.81	0.35
Totals		16.46	5.04	11.07	3.23	5.35	1.81

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 2014). A total of 150 scattered indigenous trees were recorded during the assessment. This total includes 39 VLOTs, 67 LOTs, 28 MOTs, and 16 STs, as summarised in **Table C8**. A detailed list of scattered indigenous trees recorded during the assessment is presented in **Appendix C4**.

A preliminary assessment of impacts to trees has been undertaken by APA. Two scattered trees including one LOT and one ST will be removed from the construction ROW **Appendix C4**.

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 large 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 the Construction Environmental Management Plan (CEMP) to be prepared for the project.

Table C8: Summary of Scattered Indigenous Trees per EVC

Bioregion	Relevant EVC	VLOTs	LOTs	MOTs	STs	Total
Central Victorian Uplands	61 Box Ironbark Forest	2	6	4	-	12
	68 Creekline Grassy Woodland	-	-	-	2	2
	55 Plains Grassy Woodland	-	1	-	-	1
Victorian Riverina	68 Creekline Grassy Woodland	5	3	1	2	11
	56 Floodplain Riparian Woodland	1	3	-	2	6
	175_61 Low Rises Grassy Woodland	3	4	-	-	7
	55_61 Plains Grassy Woodland	16	21	12	4	53
	55_62 Plains Grassy Woodland	12	29	11	6	58
Totals		39	67	28	16	150

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 2014). A total of 111 indigenous trees in patches were recorded during the assessment. This total includes 25 VLOTs, 57 LOTs and 29 MOTs as summarised in Table C9. A detailed list of indigenous trees recorded during the assessment is presented in Appendix C4.

A preliminary assessment of impacts to trees has been undertaken by APA. A total of six indigenous trees from within patches will be removed and included three LOTs and three MOTs from the construction ROW Appendix C4.

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 have been undertaken by the qualified arborist assessment and will involve discussions with APA.

Table C9 Summary of Indigenous Trees in patches per EVC

Bioregion	Relevant EVC	VLOTs	LOTs	MOTs	Total
Central Victorian Uplands	61 Box Ironbark Forest	-	7	2	9
	68 Creekline Grassy Woodland	2	-	2	4
	55 Plains Grassy Woodland	-	2	-	2
Victorian Riverina	68 CreeklineGrassy Woodland	5	9	4	18
	175_61 Low Rises Grassy Woodland	1	1	-	2
	55_61 Plains Grassy Woodland	7	17	9	33
	55_62 Plains Grassy Woodland	10	21	12	43
Totals		25	57	29	111

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 C5** and **Appendix C6a**). 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 C6a**. 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.

2.3.1 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 C5** and **Appendix C6a**).

Three *EPBC Act* and five *FFG Act* listed flora species have previously been recorded within the local area (within 5 kilometres of the easement) (DEPI 2014h), and are summarised in **Table C10**. An additional five nationally significant species, and four state significant species not previously documented within the local area, also have habitat potentially occurring within the vicinity of the easement (DSEWPac 2013). Furthermore, due to the presence of suitable habitat, Small Scurf-pea *Cullen parvum* and Emu-foot *C. tenax* listed under the *FFG Act* and DSE Advisory list were also considered during targeted surveys.

An additional nine 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 C10**.

The assessment of threatened species and their potential to occur within the construction ROW has been provided in **Appendix C6a**. A description for each listed flora species with the potential to occur, their habitat preference and specific flowering time is presented in **Appendix C7**.

Surveys for Spiny Rice-flower *Pimelea spinescens subsp. spinescens* were undertaken in winter within all areas of suitable habitat listed in **Appendix C6b**.

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

No nationally significant flora species were recorded within the construction ROW during any of the targeted surveys and therefore any nationally listed flora species are unlikely that occur.

Two state significant species however was recorded during the field assessments: Buloke *Allocasuarina luehmannii* and Buloke Mistletoe *Amyema linophylla subsp. orientale* were recorded within the easement, at Ryan’s Road, Locksley KP99.92 on Crown Land within Plains Grassy Woodland vegetation.

One species listed on the DSE Advisory List was also recorded during the field assessments: Late-flower Flax-lily *Dianella tarda*. Populations of Late-flower Flax-lily were recorded from Martins Lane and Ryan’s Lane, KP93.0 and KP99.9 respectively, Locksley within Plains Grassy Woodland vegetation.

Table C10: Summary of Threatened Flora Species recorded within 5 km of the Easement

Scientific Name	Common Name	Latest Year	EPBC Act	FFG Act	DEPI Advisory List
<i>Acacia penninervis</i> var. <i>penninervis</i>	Hickory Wattle	1988			Rare
<i>Allocasuarina luehmannii</i>	Buloke	2004		Listed	
<i>Amyema linophylla</i> subsp. <i>orientale</i>	Buloke Mistletoe	2004			Vulnerable
<i>Brachyscome muelleroides</i>	Mueller Daisy	2002	Vulnerable	Listed	Endangered
<i>Cardamine microthrix</i>	Eastern Bitter-cress	1995			Vulnerable
<i>Cassinia ozothamnoides</i>	Cottony Cassinia	2008			Vulnerable
<i>Dianella tarda</i>	Late-flower Flax-lily	2007			Vulnerable
<i>Goodenia macbarronii</i>	Narrow Goodenia	1992	Vulnerable	Listed	Vulnerable
<i>Hibbertia humifusa</i> subsp. <i>erigens</i>	Euroa Guinea-flower	1996	Vulnerable	Listed	Vulnerable
<i>Pultenaea vrolandii</i>	Cupped Bush-pea	1989			Rare
Protected Matters Search Tool					
<i>Dianella amoena</i>	Matted flax-lily	N/A	Endangered	Listed	Endangered
<i>Glycine latrobeana</i>	Clover Glycine	N/A	Vulnerable	Listed	Vulnerable
<i>Pimelea spinescens</i> subsp. <i>spinescens</i>	Spiny Rice-flower	N/A	Critically Endangered	Listed	Endangered
<i>Amphibromus fluitans</i>	River Swamp Wallaby-grass	N/A	Vulnerable		
<i>Thelymitra matthewsii</i>	Spiral Sun-orchid	N/A	Vulnerable	Listed	Vulnerable
Monarc Additions					
<i>Cullen parvum</i>	Small Scurf-pea	N/A		Listed	Endangered
<i>Cullen tenax</i>	Emu-foot	N/A		Listed	Endangered

No other state significant flora species were recorded during the field assessment. However, a total of 18 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
- And members of the genera *Acacia* - Wattles - excluding *Acacia dealbata*, *Acacia decurrens*, *Acacia implexa*, *Acacia melanoxylon*, *Acacia paradoxa*.

Species recorded on the construction ROW and protected under the *FFG Act* are highlighted in Appendix C2.

2.3.2 Targeted Surveys for Threatened Vegetation Communities

EPBC Act listed Communities

Five vegetation communities listed under the *EPBC Act* have the potential to occur in the construction ROW and are listed in Table C11 (DSEWPaC 2013).

Due to the quality of the vegetation identified during the assessments, one of the listed communities was identified as occurring within the construction ROW. This was 'Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-Eastern Australia' (listed as Endangered). A detailed description of this listed vegetation community is presented in Part A.

Table C11: Threatened Communities along the easement

Community	Status	Source	Recorded within construction ROW footprint	*Extent of community (approx. Ha)	Total area of impact by construction ROW (Ha)
Buloke Woodlands of the Riverina and Murray-Darling Depression Bioregions	Endangered	EPBC	No	N/A	N/A
Grey Box (<i>Eucalyptus microcarpa</i>) Grassy Woodlands and Derived Native Grasslands of South-Eastern Australia	Endangered	EPBC	Yes	690	0.9
Natural Grasslands of the Murray Valley Plains	Critically Endangered	EPBC	No	N/A	N/A
White Box - Yellow Box - Blakely's Red Gum grassy woodlands and derived native grasslands	Critically Endangered	EPBC	No	N/A	N/A
Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains	Critically Endangered	EPBC	No	N/A	N/A

*Extent of the EPBC community = the estimated total area of remnant patches believed to be intersected by the construction ROW based on EVC 2005 mapping (DEPI 2014b). It is not an estimation of the total remaining extent of the whole community.

Based on the threatened vegetation community criteria thresholds we have identified the following locations as meeting the requirements for these communities.

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

The on-ground assessment of the easement has located several locations in the construction ROW where the communities are believed to occur, primarily as thin linear strips within roadside reserves.

A total of 0.9 ha was recorded within the construction ROW and occurs within six patches located at:

- Mangalore Road KP80.76
- Babbler Lane KP91.12
- Martins Road KP93.0
- Dargalong Road KP94.0
- Nagambie-Locksley Rd KP100.3
- Government Rd KP105.65

Vegetation at these locations qualified as the listed 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 2012a).

These patches are only portions of much larger patches of the community intersected by the construction ROW. Small portions only of each patch will be impacted and a number of measures have been taken to minimise impacts. In particular, management measures have focused on the retention of as many mature trees as possible. Grading of the topsoil prior to installation of the pipeline and its replacement following construction will also assist in maximising the retention of the existing seed bank and maximise the chances of restoration of the understorey.

FFG Act listed Communities

Three vegetation communities listed under the *FFG Act* also have the potential to occur, on Crown Land, within the construction ROW according to the DEPI modelling, and are listed in **Table C12** (DEPI 2014a).

Table C12: Threatened FFG Act Listed Communities along the easement

Community	Source	Associated EVC	Recorded within construction ROW footprint
<i>Grey Box - Buloke Grassy Woodland Community</i>	FFG	EVC 55_61 Plains Grassy Woodland	Yes
		EVC 55_62 Plains Grassy Woodland	
<i>Northern Plains Grassland Community</i>	FFG	EVC 55_61 Plains Grassy Woodland	No
		EVC 55_62 Plains Grassy Woodland	
<i>Creeklane Grassy Woodland (Goldfields) Community</i>	FFG	EVC 68 Creeklane Grassy Woodland	No

All remnant patches that qualify as EVC 55_61 Plains Grassy Woodland and EVC 55_62 Plains Grassy Woodland identified in **Table C7** and **Appendix C3**, are synonymous with two *FFG Act* listed communities '*Grey Box - Buloke Grassy Woodland Community*' and '*Northern Plains Grassland Community*', according to the DEPI modelling (DEPI 2014b). However, based on the description of the *Northern Plains Grassland Community* in Part A, it is not expected that this community will occur within the construction ROW.

Furthermore all remnant patches that qualify as EVC 68 Creeklane Grassy Woodland also qualifies as the *FFG Act* listed community '*Creeklane Grassy Woodland (Goldfields) Community*', according to the DEPI modelling (DEPI 2014b). Again based on the description of the *Creeklane Grassy Woodland (Goldfields) Community* in Part A, it is not expected that this community will occur within the construction ROW.

It must be noted that implications in terms of the *FFG Act* will only apply to areas located on Crown Land i.e. roadsides and designated waterways.

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 the Department (including the locality and date of sighting) and has a total of 227 species registered for the local area. The total records comprise of: 2 invertebrate, 4 fish, 7 amphibian, 11 reptiles, 182 birds and 21 mammal species. Of these, there were 14 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 kilometres¹. The results of the search are provided in **Appendix C5**.

From these results, a total of 18 listed species with national or state significance have been reported in the in the local area while an additional 18 species listed under the *EPBC Act* are considered to be potentially present in the area. Also 14 species recorded in the local area have been listed under the DEPI Advisory List as Endangered, Vulnerable, Near Threatened or Data Deficient in Victoria (DSE 2013)². Refer to **Appendix C6c**. 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. Remnants of the original Plains Grassy Woodland, Box-Ironbark Forest and Creekline Grassy Woodland were identified along roadsides or water courses respectively.

Generally the roadsides contained higher quality Plains Grassy Woodland vegetation than that found scattered through individual properties. Many of the roadsides have been identified by the GBCMA 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 Grey-crowned Babbler and Squirrel Glider.

3.2.3 Watercourses and Dams

The easement traverses one major creek (Hughes Creeks) and another seven 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.

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 2005f).

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

19 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 frogs. All species observed or heard were recorded (**Appendix C10**).

From the assessment of the “Likelihood of Occurrence” (**Appendix C6c**) the following species were targeted for surveys (excluded aquatic species) (**Table C13**) due to their Moderate or High likelihood of occurrence in the local area:

Threatened species descriptions including status, habitat and ecology and distribution for each of the above species can be found in **Appendix C8**.

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 were undertaken in the season appropriate to the subject species. The survey locations for threatened fauna are summarised below in **Table C14**.

3.4 Results of Targeted Surveys

Of the targeted species surveyed for, only three species were observed during the 84 separate surveys across the 19 sites. Two other state threatened species were recorded, being the Emu *Dromaius novaehollandiae* and Common Long-necked Turtle *Chelodina longicollis*. The locations that these species were recorded are summarised in **Table C15** below and a full species list of fauna recorded at each location can be found in **Appendix C9**.

As mentioned in Part A, species that are listed as near threatened and data deficient are not considered to be at the same level of risk as higher categories of threat (vulnerable, endangered or critically endangered). Therefore, Brown Treecreeper, Emu and Common Long-necked Turtle are not discussed in further detail in this report.

Table C13: Summary of Threatened Fauna Species

Common Name	Scientific Name	Status (DoE/FFG/DEPI)	Likelihood of Occurrence
Golden Sun Moth	<i>Synemon plana</i>	Critically Endangered / Listed / Critically Endangered	Low
Dwarf Galaxias	<i>Galaxiella pusilla</i>	Vulnerable/Listed/Endangered	Moderate
Growling Grass Frog	<i>Litoria raniformis</i>	Vulnerable/Listed/Endangered	Moderate
Brown Toadlet#	<i>Pseudophryne bibronii</i>	-/Listed/Endangered	Moderate
Common Bearded Dragon	<i>Pogona barbata</i>	-/-/Vulnerable	Moderate
Black-chinned Honeyeater	<i>Melithripterus g. gularis</i>	-/-/Near Threatened	Moderate
Brown Treecreeper	<i>Climacteris p. victoriae</i>	-/-/Near Threatened	High
Bush Stone-curlew	<i>Burhinus grallarius</i>	-/Listed/Endangered	Moderate
Cattle Egret	<i>Ardea ibis</i>	CAMBA, JAMBA/-/-	Moderate
Diamond Firetail	<i>Stagonopleura guttata</i>	-/Listed/Vulnerable	Moderate
Grey-crowned Babbler	<i>Pomatostomus t. temporalis</i>	-/Listed/Endangered	High
Hardhead	<i>Aythya australis</i>	-/-/Vulnerable	Moderate
Latham's Snipe	<i>Gallinago hardwickii</i>	C,J,R*/Nominated/Near Threatened	Moderate
Rainbow Bee-eater	<i>Merops ornatus</i>	Migratory/-/-	Moderate
Swift Parrot	<i>Lathamus discolor</i>	Endangered/Listed/Endangered	Moderate
White-throated Needletail	<i>Hirundapis caudactucus</i>	C,J,R*/-/Vulnerable	Moderate
Brush-tailed Phascogale	<i>Phascogale t. tapoatafa</i>	-/Listed/Vulnerable	Moderate
Squirrel Glider	<i>Petaurus norfolcensis</i>	-/Listed/Endangered	High

Brown Toadlet surveys were conducted in Autumn 2013. A separate report of these surveys can be found in Appendix C12.

*CAMBA/JAMBA/ROKAMBA international migratory bird treaties

Table C14: Summary of Locations and Fauna Surveys Undertaken

Location	KP	Survey Type		
		Diurnal	Nocturnal	GGF
Back Mountain Rd	73.9	✓	✓	
Browns Lane / Hume Highway	76.8 - 77.0	✓	✓	
Hanleys Lane / Four Mile Creek	77.3 - 77.5	✓	✓	✓
Seymour-Avenel Rd / Magpie Lane	78.95 - 79.12	✓	✓	
Mangalore Rd	80.76	✓	✓	
Gerrards Rd	82.64	✓	✓	
Station Rd	83.75	✓	✓	
Government Rd and Burrows Lane	86.16 - 86.33	✓	✓	
Babblers Lane	91.1	✓	✓	
nearby dam and Wormangal Creek	91.8 - 92.0	✓	✓	✓
Martins Rd	93.0	✓	✓	
S3-19 to Dargalong Rd	93.67 - 93.9	✓	✓	
Government Rd to Reedy Creek	97.25 - 97.95	✓	✓	✓*
Ryans Lane	99.9	✓	✓	
Nagambie - Locksley Rd	100.3	✓	✓	
Burnt Creek	100.35 - 100.5	✓	✓	✓*
Breen Rd	101.95	✓	✓	
Carmody Rd	103.29	✓	✓	
Muddy Waterhole Creek	105.15	✓	✓	

*Only one survey was undertaken in these locations as the waterbody was dry at the time of the second survey.

Table C15: Findings of Fauna Surveys

Species	Survey findings
Golden Sun Moth	<ul style="list-style-type: none"> None recorded
Dwarf Galaxias	<ul style="list-style-type: none"> Aquatic surveys will be undertaken in Autumn 2014
Brown Toadlet#	<ul style="list-style-type: none"> None recorded during surveys in Autumn 2013
Growling Grass Frog	<ul style="list-style-type: none"> An aural record of up to four Growling Grass Frog from the dam (KP91.8) associated with Wormangal Creek (KP92.0)
Common Long-necked Turtle	<ul style="list-style-type: none"> 15 individuals observed in a farm dam beside the easement, between Ryan's Lane and Nagambie-Locksley Rd (KP99.9 - 100.3, respectively)
Common Bearded Dragon	<ul style="list-style-type: none"> No ne were recorded during the fauna surveys, however one individual was observed during other field work east of Babbler Lane at KP91.4.
Black-chinned Honeyeater	<ul style="list-style-type: none"> None recorded
Brown Treecreeper	<ul style="list-style-type: none"> None recorded
Bush Stone-curlew	<ul style="list-style-type: none"> None recorded
Emu	<ul style="list-style-type: none"> One bird was observed at Four Mile Creek (KP77.5). It is believed that this bird may be a pet.
Cattle Egret	<ul style="list-style-type: none"> None recorded
Diamond Firetail	<ul style="list-style-type: none"> None recorded
Grey-crowned Babbler	<ul style="list-style-type: none"> None recorded
Hardhead	<ul style="list-style-type: none"> None recorded
Latham's Snipe	<ul style="list-style-type: none"> None recorded
Rainbow Bee-eater	<ul style="list-style-type: none"> Birds were seen and heard on both survey occasions at Burnt Creek KP100.5
Swift Parrot	<ul style="list-style-type: none"> None recorded
White-throated Needletail	<ul style="list-style-type: none"> None recorded
Brush-tailed Phascogale	<ul style="list-style-type: none"> One individual recorded at Four Mile Creek (KP77.5). One individual record at Muddy Waterhole Creek (KP105.15)
Squirrel Glider	<ul style="list-style-type: none"> An individual observed on Charles Creek (KP97.5) during the first survey. A family consisting of two adults and a juvenile observed feeding in an acacia along Charles Creek (KP97.5) during the second survey. Another individual observed on Government Rd (KP97.25) during the second survey of this combined site. Three individuals observed on Ryan's Lane (KP99.9) during the second survey. An individual observed on both occasions on the Nagambie-Locksley Rd (KP100.3)

Golden Sun Moth

Following discussions with DEPI Hume Region staff (Smith 2013 *pers comm.*), it was decided that although the assessed likelihood of occurrence of Golden Sun Moth *Synemon plana*, was considered "Low", it would be prudent to undertake surveys for this species to confirm its presence or absence from suitable habitat in the lower part of this easement. There are known populations of Golden Sun Moth near Whiteheads Creek, east of Seymour (approximately 11km) from the beginning of this looping and at Mt Piper, near Broadford (approximately 27km) from the beginning of the looping.

From vegetation surveys undertaken earlier in 2013, one site was determined to be possibly suitable habitat near the beginning of this looping at KP76.35 - KP76.8 just south of the Hume Highway. 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. The Whiteheads Creek sites are believed to be all on private property, making access difficult.

No Golden Sun Moths were recorded during any of the four surveys at either the reference site or survey site. Other sites closer to Melbourne where Golden Sun Moth was recorded on the same days as the Monarc surveys were used as secondary reference sites. The bio-climatic data and vegetation description for this survey location can be found in **Appendix C10**.

Growling Grass Frog

Four sites, within this looping, had been determined from the preliminary inspection as containing possible habitat for Growling Grass Frog based on their environmental characteristics. Each site was assessed once but only two of the sites were assessed for a second time, in early December, as the other two sites were dry. The two remaining sites were Four Mile Creek KP77.5 and a farm dam and nearby Wormangal Creek KP91.8 - 92.0 respectively.

Up to four Growling Grass Frogs were heard calling from areas of grass and tussocks surrounding the dam on the first survey evening. No Growling Grass Frogs were recorded during the second survey, two nights later, despite the warmer night time temperature. The observers commented that the lack of any observations on the second night may be due to the increased wind speed, approximately 10kmh. The bio-climatic data, water quality, habitat descriptions and frog species recorded for these survey locations can be found in **Appendix C11**.

Other more common species, Perons Tree Frog *Litoria peronii*, Spotted Marsh Frog *Limnodynastes tasmaniensis* and Plains Froglet *Crinia parinsignifera*, were recorded across these sites during the surveys.

Grey-crowned Babbler

There were no sightings of Grey-crowned Babbler during the surveys for this looping. A review of the 21 records for this species dating back to 1978 (DEPI 2014h) show that nearly all of the records are not from the local area of the easement being either north or east of this looping.

Rainbow Bee-eater

Rainbow Bee-eaters, an *EPBC Act* listed migratory species, were seen along Burnt Creek at KP100.5 during both surveys at this location. The creek may provide suitable habitat for these birds to nest as they excavate their nest in suitable creek banks. There were no nest cavities observed in the construction ROW during the surveys but it seemed likely that they were nesting somewhere nearby.

Brush-tailed Phascogale

The Brush-tailed Phascogale is a listed species under the *FFG Act* and vulnerable on the DEPI Advisory List of Threatened Vertebrate Fauna in Victoria (DSE 2013). The GBCMA identify it as a focal species for the Longwood Landscape Zone which covers the area of this looping (DSE 2005f). Brush-tailed Phascogales, along with Squirrel Gliders, are often found along connected roadsides with large, old, hollow-bearing trees (DSE 2005f).

The two phascogales that were observed were found along creeklines at either end of this looping. The first sighting was from Four Mile Creek KP77.5 at the southern end of the looping with the second sighting from Muddy Waterhole Creek KP105.15 at the northern end.

Squirrel Glider

The Squirrel Glider is a state and regionally significant species, being listed on the *FFG Act* and identified by the GBCMA as one of five mammal species that are critically endangered or endangered in the Goulburn Broken Catchment (DSE 2005f). The roadsides provide critical habitat for this species, as they are generally the most-well vegetated and connected.

Squirrel Gliders were recorded at five locations across this looping in two clusters of less than half a kilometre each. A total of at least eight individuals were recorded from these two clusters. Both clusters were within three kilometres of each other, towards the northern end of the looping, along well vegetated roadsides and creeklines.

The first cluster was between KP97.25 and KP97.5, centred on Charles Creek. There was one individual recorded in the first survey while there were three, possibly four individuals, recorded during the second survey. A family consisting of two adults and a juvenile were seen feeding in a large Black Wattle *Acacia mearnsii* just downstream of the easement. The possible individual was observed along the Government Road at KP97.25.

The second cluster was between Ryan's Lane and Nagambie-Locksley Road (KP99.9 and KP100.3 respectively). There was one individual observed at KP100.3 during the first survey rising to four individuals observed during the second survey including three at KP99.9.

Although these were the only sightings in this looping, it is possible that Squirrel Gliders could be present on every roadside and watercourse irrespective of the quality of the understorey (Van Der Ree 2013 *pers comm*).

4. LEGISLATIVE IMPLICATIONS

4.1 Environment Protection and Biodiversity Conservation Act 1999

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

Of the 24 species of listed fauna that may potentially occur in the local area, only the Growling Grass Frog 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.

The construction ROW does contain one vegetation community that is to be impacted:

- 'Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-Eastern Australia' (listed as Endangered)

Due to the presence of a listed vegetation community a referral to the Commonwealth Environment Minister will be required.

4.2 State Legislation

4.2.1 Flora and Fauna Guarantee Act

Two *FFG Act* listed flora species were recorded during the current assessment: Buloke and Buloke Mistletoe located on Crown Land. Furthermore 18 species were identified that belong to plant families or genera that are protected on Crown Land under the *FFG Act*. Three *FFG Act* listed communities also possibly occur on Crown Land within remnant areas identified as Plains Grassy Woodland; EVC 55_61, *Riverina* Plains Grassy Woodland; EVC 55_62 and Creekline Grassy Woodland; EVC 68. As stated earlier, *Grey Box-Buloke Grassy Woodland* was the only community recorded in the construction ROW.

Three *FFG Act* fauna species were identified during the field surveys, being Growling Grass Frog, Brush-tailed Phascogale and Squirrel Glider.

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 at these locations.

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 and Spear Thistle listed as 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 within the existing previously disturbed easement created in 1975, for the initial pipeline construction. 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, 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, impact to all patches of native vegetation intersected by the construction ROW has been minimised by the application of one of the above measures. Every effort has also been made to minimise impacts on all trees whether within remnant patches or as trees scattered through the easement.
- An arborist has been contracted to undertake an arboricultural assessment to determine the impact of construction on large 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 C16**.

Table C16: Summary of Vegetation Clearance Measures

Vegetation Type	Strategy	Avoidance/Minimisation Measures	Location Ref	Map Ref (App C1)
Scattered Trees	Removal	Scattered trees that qualify as LOTs to be removed	Government Rd (KP95.93) Tree No 87 (KP106.3)	A-38 A-57
Remnant Patches	Avoid	Impacts to roadside vegetation to be avoided or minimised by use of drilling techniques to pass under the road	Hume Fwy/Browns Lane	A-5/6
		Impacts to waterway vegetation to be avoided by use of drilling techniques to pass under the waterway	Hughes Creek	A-24
		Impacts to Remnant Patch to be avoided by narrowing of construction ROW to 20m and shifting of construction ROW by 7m over old pipeline	Aerodrome Road	A-23
	Minimise	Impacts to Remnant Patch to be minimised by narrowing of construction ROW to 20m	Back Mountain Road	A-1
			S2-112/113	A-2
			S2-114	A-3
			S2-117	A-5
			Seymour Avenel Road (E)	A-11
			Magpie Lane	A-11
			Mangalore Road	A-14
S2-125	A-15			
Gerrards Road	A-17			
Station Road	A-19			
Vearings Road	A-26			
Babbler Lane	A-29			
S3-17	A-30			
Wormangal Creek	A-30			
Martins Road	A-32			
S3-19	A-33			
Dargalong Road	A-34			
S3-20	A-36 to 38			
S3-22	A-39			
S3-23	A-40/41			
Nagambie Locksley Road	A-45			
Government Road S3-29	A-48			
S3-30	A-48			
S3-31 (KP103.5)	A-51			
S3-31 (KP103.7)	A-52			
Government Rd (KP105.65)	A-56			

Vegetation Type	Strategy	Avoidance/Minimisation Measures	Location Ref	Map Ref (App C1)
Remnant Patches	Minimise	Impacts to Remnant Patches to be minimised by narrowing of construction ROW to less than 20m	Seymour-Avenel Road (W) Ryans Lane	A-11 A-44
		Impacts to Remnant Patches to be minimised by narrowing of construction ROW to 20m and shifting of construction ROW by 7m over existing pipeline ("reverse" ROW) (but remaining within existing easement)	Hanleys Lane S2-119 Four Mile Creek Seymour Avenel Road (E) Burrows Lane Dudmans Road Charles Creek Reedy Creek S3-28 S3-30 creek Carmody's Road S3-31 (KP103.4) S3-31 (KP104.2) Muddy Waterhole Creek	A-7 A-8 A-11 A-22 A-27 A-40 A-41 A-46 A-48 A-50 A-51/2 A-53/4 A-55

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.

Locations where the most significant issues have been identified are discussed below together with any specific mitigation measures applied.

5.1 Four Mile Creek KP77.5

One *FFG Act* listed fauna species, the Brush-tailed Phascogale, was recorded at this location. Although this creek is on private property and is not a publicly managed watercourse, it should be taken into account to reduce any impacts on this species as outlined in the EES Referral.

The construction ROW at this location has been narrowed to 20m and a “reverse” construction ROW put in place to minimise impacts to habitat, especially on the large trees, within the area. Consideration should be given to further measures to minimise the impacts of construction as much as possible such as avoiding the optimal breeding season for this species which is mid-May to mid-summer. This takes into account the mating, gestation, weaning and subsequent dispersal of any young from the nesting tree.

5.2 Mangalore Road KP80.76

This roadside fits the criteria for being the *EPBC Act* listed community of *Grey Box (Eucalyptus microcarpa) Grassy Woodlands and Derived Native Grasslands of South-Eastern Australia*. In addition, one species of flora protected on Crown Land (*Acacia acinacea*) was also recorded from the construction ROW.

The construction ROW at this location has been narrowed to 20m, on the south-side of the road, to minimise impacts to habitat within the area.

5.3 Babbler Lane KP91.12

This roadside fits the criteria for being the *EPBC Act* listed community of *Grey Box (Eucalyptus microcarpa) Grassy Woodlands and Derived Native Grasslands of South-Eastern Australia*.

The construction ROW at this location has been narrowed to 20m to minimise impacts to habitat within the area.

5.4 Dam and nearby Wormangal Creek KP91.8 - KP92

This location was the only site that Growling Grass Frog was recorded in this looping. It is recommended that a section be included in the CEMP that highlights the implementation of management measures to protect any populations of Growling Grass Frog that may be using this area as habitat. These measures should include frog surveys prior to breaking ground, the installation of frog proof fencing, setting up of hygiene guidelines for the site and appropriate staff induction.

5.5 Martins Road KP93.0

This roadside fits the criteria for being the *EPBC Act* listed community of *Grey Box (Eucalyptus microcarpa) Grassy Woodlands and Derived Native Grasslands of South-Eastern Australia*. In addition, five species from two protected flora families were also recorded from the construction ROW.

The construction ROW at this location has been narrowed to 20m to minimise impacts to habitat within the area.

5.6 Dargalong Road KP94.0

This roadside fits the criteria for being the *EPBC Act* listed community of *Grey Box (Eucalyptus microcarpa) Grassy Woodlands and Derived Native Grasslands of South-Eastern Australia*

The construction ROW at this location has been narrowed to 20m to minimise impacts to habitat within the area.

5.7 Scattered Tree KP95.93

This is one of the two trees to be removed to make way for the construction ROW in this looping. As it occurs adjacent to a well-treed road reserve, it is recommended that this tree be inspected prior to, and during removal, by a qualified and appropriately licenced zoologist to determine if fauna reside in this tree and require relocation.

5.8 Government Road and Charles Creek KP97.25 and KP97.5 respectively

One FFG Act listed fauna species, the Squirrel Glider, was recorded at these locations. Although the creek is on private property and is not a publicly managed watercourse, it should be taken into account to reduce any impacts on this species as outlined in the EES Referral.

The construction ROW at these locations have been narrowed to 20m and a “reverse” construction ROW put in place at Charles Creek to minimise impacts to habitat, especially on the large trees, within the area. Consideration should be given to further measures to minimise the impacts of construction as much as possible such as avoiding the optimal breeding season for this species which is mid-May to mid-November. This takes into account mating, gestation and weaning.

5.9 Ryan’s Lane KP99.93

This laneway has a number of issues that require further consideration:

- Vegetation on this roadside qualifies for inclusion as the EPBC Act listed community of Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-Eastern Australia.
- Based on the FFG descriptions found in Part A, it is believed that Ryan’s Lane also fits the FFG Act listed community of Grey-Box - Buloke Grassy Woodland.
- Two FFG Act listed flora, Buloke and Buloke Mistletoe were recorded on Ryan’s Lane while Squirrel Glider, an FFG Act listed fauna species were recorded on this laneway. Also Late-flower Flax-lily *Dianella tarda*, a DEPI Advisory List species was recorded in the easement.

The construction ROW at this location has been significantly narrowed to 10m to minimise impacts on the listed species above. The relocation of any Late-flower Flax-lily that is found in this reduced construction ROW is also recommended, in line with DEPI guidelines.

The construction ROW at this location has been significantly narrowed to 10m to minimise impacts on the listed species above. The relocation of any Late-flower Flax-lily that is found in this reduced construction ROW is also recommended, in line with DEPI guidelines.

It is recommended that due to the factors highlighted above, the road reserve be excluded from use by construction traffic as an access point to the construction ROW.

5.10 Nagambie-Locksley Road KP100.3

Nagambie-Locksley Road also has a number of environmental issues, similar to the nearby Ryans Lane. These are:

- Vegetation on this roadside qualifies for inclusion as the EPBC Act listed community of Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-Eastern Australia.
- The FFG Act listed Squirrel Glider was recorded on this roadside.

The construction ROW from this location to Burnt Creek KP100.45 has been narrowed to 20m to minimise impacts to habitat, especially on the large trees, within the area.

The construction ROW from this location to Burnt Creek KP100.45 has been narrowed to 20m to minimise impacts to habitat, especially on the large trees, within the area.

5.11 Burnt Creek KP100.5

One *EPBC Act* listed migratory fauna species, the Rainbow Bee-eater, was recorded at this location. This creek is on private property and provides ideal habitat for this species to breed, having sandy banks. This bird was not observed during at any other location, further enhancing this site as being suitable habitat.

The construction ROW at this location has been narrowed to 20m to minimise impacts on the listed species above. It is recommended that an ornithologist inspect the creek for nesting burrows prior to breaking ground. Another mitigation measure could be to install shade cloth or weed matting on the banks across the entire easement prior to Spring. This would possibly deter the birds from excavating nests in this location.

5.12 Muddy Waterhole Creek KP105.15

One *FFG Act* listed fauna species, the Brush-tailed Phascogale, was recorded at this location. Although this creek is on private property and is not a publicly managed watercourse, it should be taken into account to reduce any impacts on this species as outlined in the EES Referral.

The construction ROW at this location has been narrowed to 20m and a “reverse” construction ROW put in place to minimise impacts to habitat, especially on the large trees, within the area.

5.13 Government Road KP105.65

Vegetation within this road reserve qualifies for inclusion as the *EPBC Act* listed community of *Grey Box (Eucalyptus microcarpa) Grassy Woodlands and Derived Native Grasslands of South-Eastern Australia*.

The construction ROW at this location has been narrowed to 20m to minimise impacts to habitat within the area. The second tree to be removed in this looping, is from the patch in this location. As it occurs adjacent to a well-treed road reserve, it is recommended that this tree be inspected prior to, and during removal, by a qualified and appropriately licenced zoologist to determine if fauna reside in this tree and require relocation.

5.14 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. Remnant patches with shrubs and saplings, within the construction ROW, especially on the roadsides, provide nesting sites for Grey-crowned Babbler.

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

- Where hollow bearing trees are to be removed, nest boxes should be installed in adjacent non-impacted vegetation at least several days prior to tree removal.
- Tree collars to be installed on the hollow-bearing trees to be removed three days before scheduled removal to prevent fauna from re-entering hollows.
- An appropriately 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.
- Lopping saplings and shrubs prior to the breeding season (June to October) in areas where babblers have been observed or nests recorded. In doing this it would eliminate the chance of nesting occurring in the construction ROW while breaking ground and construction activities are happening