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APPENDICES

1. REGIONAL BACKGROUND

APA GasNet Australia (Operations) Pty Ltd (APA) is looping (duplicating) part of the existing Wollert to Wodonga gas transmission pipeline (pipeline licence 101) between Violet Town and Glenrowan, Victoria (known as Looping 4).

Monarc Environmental Pty Ltd (Monarc) was engaged by APA to undertake a flora and fauna assessment of the APA easement from near Violet Town (KP141.2) to Glenrowan (KP192.05). 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.

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 of the existing pipeline. With reference to the starting point of the existing pipeline at Wollert, this looping will commence at Kilometre Point KP141.2 and finish at KP192.0, a total distance of 50.8 km. However the actual footprint will end at KP192.05, east of Glenrowan-Boweya Road.

An overview of looping section 4 is provided in **Figure D1** whilst detailed pipeline maps are provided in **Appendix D1.**

1.1 General

The topography of the Violet Town to Glenrowan route is relatively level, lying at about 170m AHD as it skirts the northern edge of the Strathbogie Ranges which lie to the south of the Hume Freeway. The easement predominantly falls within the *Victorian Riverina Bioregion*, which stretches to the north and east, through to the Murray River. There is a small area of *Northern Inland Slopes* north of Baddaginnie, west of Benalla, which corresponds to an increase in the topography to 200m AHD. To the east of Winton Wetlands, near the end of this looping, small "tongues" of *Central Victorian Uplands Bioregion* intersect the easement (DEPI, 2014).

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*, River 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). Remnants of riparian vegetation can retain good connectivity, especially on Broken River, Woolpress and Two Mile 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 Strathbogie KP141.2 to KP158.0
- Benalla Rural City KP158.0 to KP192.05

The zonations that apply to parcels of land traversed by the easement are summarised in **Table D1**.

Table D1: Summary of Planning Zones

Local Government Area	Zone	Location
Shire of Strathbogie	Farming Zone 1 (FZ)	
	Road Zone 1 (RDZ1)	Murchison – Violet Town Road KP142.35 Dookie - Violet Town Road KP144.75
Benalla Rural City	Farming Zone 1 (FZ)	
	Public Conservation and Resource Zone (PCRZ	Baddaginnie Creek KP166.35 approx Broken River KP169.0 approx
	Rural Living Zone (RLZ)	KP166.40 to KP169.0 approx KP171.4 to KP172.1 approx KP172.31 – KP172.7 approx
	Road Zone 1 (RDZ1)	Midland Highway KP170.5 Benalla – Yarrawonga Road KP175.8
	Special Use Zone 1 (SUZ1)	KP172.12 – KP172.3
	Road Zone 2 (RZ2)	Baddaginnie - Goomalibee (Tarnook) Road KP158.34 Basin Road KP165.19 Goomalibee Road KP167.15 Glenrowan-Boweya Road KP192.0
	Industrial Zone 1 (IN1Z)	KP174.45 – KP175.8 approx
	Public Use Zone 4 (PUZ4)	Benalla to Oaklands Rail Line KP172.12
	Public Park and Recreation Zone (PPRZ)	Land associated with Winton Wetlands: KP 81.2 – 181.5 approx KP182.15 – KP182.3 approx KP182.7 – KP183.25 approx KP183.9 – KP184.0 approx
	Public Use Zone 1 (PUZ1)	Irrigation Channel KP176.26 – KP176.40 approx Winton Wetlands KP177.7 – KP179.4 approx
	Industrial Zone 2 (IN2Z)	KP173.95 – KP174.45

Land usage in the area is predominantly rural with the majority of the land classed as a Farming Zone. However the easement passes through a number of different planning zones on the northern outskirts of Benalla related to the activities of this city. The greater part of the region retains an open aspect typical of grazing land and much of this land is subject to either sheep or cattle grazing. While much of the private land has been cleared for agricultural purposes, many areas have retained a number of the larger old trees as part of the landscape.

In addition to land associated with roads, the easement intersects areas of Crown Land being land associated with Woolpress and Baddaginnie Creeks and Broken River classed as water frontage reserves. Crown Land associated with Winton Wetlands (formerly Lake Mokoan) also intersects the easement. This land includes the Mokoan Inlet Channel at KP176.3.

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 D2.** 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 Benalla Rural City. These have been primarily applied

to protect areas of important habitat for threatened bird species, Grey-crowned Babbler and Regent Honeyeater, within this municipality.

Table D2: Summary on Environmental Overlays

LGA	Overlay	Name	KP	Location	Description
Benalla Rural City	VPO2	Vegetation Protection Overlay 2 (Grey-crowned Babbler Habitat Vegetation Protection Area)	158.05 - 160.75 approx.	Leggat Lane to Kelleher Road approx.	Applied to protect areas that support Grey-crowned Babbler populations and to ensure that unnecessary removal of native vegetation in these areas does not occur.
	VPO3	Vegetation Protection Overlay 3 (Regent Honeyeater Habitat/Lurg Ironbark Vegetation Protection Area)	186.2-192.05	West of Gould Rd to just east of Glenrowan-Boweya Road	Applied to protect and stop removal of native vegetation in areas that support Regent Honeyeater. Applicants must show measures proposed to minimize removal of ironbark, White Box, Yellow Box and Blakely's Red Gum.

The Shire of Strathbogie has prepared a roadside management plan that identifies and categorises roadside vegetation considered to have conservation significance (Shire of Strathbogie 2011), while Benalla Rural City has an Environment Strategy (Benalla Rural City Council 2012) that makes reference to roadside vegetation and the adoption of the municipality's draft Roadside Management Plan.

In general, the plans cover all rural road reserves in these LGAs 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 2007b; DSE 2007c). Many of the roads considered to have special value (such as providing habitat for significant species like the Grey-crowned Babbler) have been sign-posted to identify areas as Significant Roadside Area.

Both LGA's 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 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 eg irrigation channels. Major named waterways intersected by the project are summarised in **Table D3**. In summary, this looping intersects 29 designated waterways of which 15 are named. This includes Broken River at Benalla.

Table D3: Named waterways intersected by the project

Looping	Name	Location	Flow status	Crossing Method	Land Type
Violet Town to Glenrowan	Lambing Gunyah Creek	141.6	Ephemeral	Open cut	Private freehold
	Honeysuckle Creek	143.0	Ephemeral	Open Cut	Private freehold
	One Mile Creek	145.55	Intermittent	Open cut	Private freehold
	Two Mile Creek	147.6	Ephemeral	Open cut	Private freehold
	Stony Creek	150.4	Ephemeral	Open cut	Private freehold
	Turnip Creek	152.5	Ephemeral	Open cut	Private freehold
	Folly Creek	156.5	Ephemeral	Open cut	Private freehold
	Woolpress Creek	157.4	Intermittent	Open Cut	Crown Land
	Baddaginnie Creek	166.35	Intermittent	Open cut	Crown Land
	Broken River	169.0	Perennial	HDD	Crown Land
	Kennedys Creek	174.3	Ephemeral	Open cut	Private freehold
	Mokoan Inlet Channel	176.3	Ephemeral	HDD	Crown Land
	Winton Creek	179.45	Ephemeral	Open cut	Private freehold
	Seven Mile Creek	180.3	Ephemeral	Open cut	Private freehold
	Eleven Mile Creek	189.2	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 eventually, either directly or via the Broken River.

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; however Woolpress and Baddaginnie Creek and Broken River fall within Crown Land. Under the *FFG Act*, a permit is required to remove threatened species or additional species identified as protected flora (DEPI 2014a) from Crown Land. 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.

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

2. FLORA ASSESSMENT

2.1 Ecological Vegetation Classes

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 D4 (**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 D4: 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
	67 Alluvial Terraces Herb-rich Woodland	Vulnerable	Minor
	68 Creekline Grassy Woodland	Endangered	Common
	175_61 *Low Rises* Grassy Woodland	Endangered	Common
	235 Plains Woodland/Herb-rich Gilgai Wetland Mosaic	Endangered	N/A
	803 Plains Woodland	Endangered	Common
Northern Inland Slopes	55 Plains Grassy Woodland	Endangered	Naturally Restricted
	61 Box Ironbark Forest	Vulnerable	Common
	175_61 Grassy Woodland	Endangered	Common
Central Victorian Uplands	61 Box Ironbark Forest	Vulnerable	Common
	68 Creekline Grassy Woodland	Endangered	Common
	175_61 Grassy Woodland	Endangered	Common
	235 Plains Woodland/Herb-rich Gilgai Wetland Mosaic	Endangered	N/A

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 (**Appendix D2**).

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 2007). Intact remnant vegetation was characteristic of five EVC's across three bioregions and are summarised in **Table D5.**

Table D5: Ecological Vegetation Classes identified during the field assessments

Bioregion	EVC Number and Name	Status
Northern Inland Slopes	61 Box Ironbark Forest	Vulnerable
	175_61 *Low Rises* Grassy Woodland	Endangered
Victorian Riverina	55_61 Plains Grassy Woodland	Endangered
	55_62 *Riverina* Plains Grassy Woodland	Endangered
	68 Creekline Grassy Woodland	Vulnerable
	175_61 *Low Rises* Grassy Woodland	Endangered
	235 Plains Grassy Woodland/Gilgai Wetland Mosaic	Endangered
	810 Floodway Pond Herbland	Vulnerable
Central Victorian Uplands	235 Plains Woodland/Herb-rich Gilgai Wetland Mosaic	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 D3**.

2.1.2 Vegetation Descriptions

Flora Species

A total of 124 flora species were recorded along the easement during the field survey. This included 82 indigenous species and 42 introduced species (including both Australian natives and exotics). A detailed list of all flora species recorded in the easement is provided in **Appendix D2.**

EVC 55_61: Plains Grassy Woodland within the *Victorian Riverina Bioregion* is described as open, eucalypt woodland to 15m 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. A relatively high cover of weedy exotics in these areas is invading from contiguous land utilised for agricultural purposes. In spring the understorey tended to be dominated by weedy exotic annual/biannual graminoids with the most abundant of these being Annual Veldt-grass *Ehrharta longiflora* along with common infestations of Toowoomba Canary-grass *Phalaris aquatica*, Cocksfoot *Dactylis glomeratus* and Prairie Grass *Bromus catharticus*.

Plains Grassy Woodland 55_61 is poorly represented within the pipeline easement between Violet Town and Glenrowan. Understorey in all remnant patches most attributable to this EVC had less than half of the likely lifeforms present. The best example of this EVC between Violet Town and Glenrowan may be at Kealy Road KP167.8 supported by the roadside reserve which had greater than the benchmark number of Large-old Trees. This patch was quite small being only 0.026 hectares and was largely due to canopy.

The understorey is relatively weed-free, with high coverage of bare ground. High Threat environmental weeds listed in **Appendix D2** were absent.

EVC 55_62: *Riverina* Plains Grassy Woodland within the *Victorian Riverina Bioregion* is described as open, eucalypt woodland to 15m tall occurring on a number of geologies and soil types. In contrast to EVC 55_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 has a better representation than 55_61 between Violet Town and Glenrowan with one of the best examples supported by the Four Mile Road roadside reserve at KP165.4. This patch is a swampy version of the *Riverina* Plains Grassy Woodland vegetation community due to the modified roadside drainage which at the time of assessment was dominated by weedy exotic graminoids including Prairie Grass, Onion Grass *Romulea Rosea,* Cocksfoot and Annual Rye-grass *Lolium rigidum*.

The understorey of this patch is comparatively intact with a large portion of likely indigenous understorey species present including Spreading Wattle *Acacia genistifolia*, Parrot-pea *Dillwynia* spp, Drooping Cassinia *Cassinia arcuata,* Black-anther Flax-lily *Dianella admixta var. revoluta,* Wattle Mat-rush *Lomandra filiformis ssp., coricea,* Knob Sedge *Carex inversa,* Finger Rush *Juncus subsecundus* and Brown-back Wallaby-grass *Rytidosperma duttonianum*.

Relatively good examples of this EVC are supported by the Dookie - Violet Town and Ramage Roads roadside reserves at KP144.75 and KP146.8 respectively.

EVC 68: Creekline Grassy Woodland within 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 mapped at a number of points between Violet Town and Glenrowan (**Appendix D3**).

The best example of Creekline Grassy Woodland supported by areas associated with the One Mile Creek at KP145.5. Over half of the likely understorey lifeforms are present. Species observed include Yellow Rush-lily *Tricoryne elatior,* Chocolate Lily and Sand Rush *Juncus psammophilus*. The patch incorporated Very Large-old Trees and Large Logs.

In spring a high coverage of weedy exotic annuals was observed with Annual Rye-grass, Perennial Thistle *Cirsium arvense,* Rat's-tail Fescue *Vulpia bromoides* and Onion Grass.

EVC: 810 Floodway Pond Herbland within the *Victorian Riverina Bioregion* is described as a low herbland to < 0.3 metres tall with occasional emergent life forms, usually with a high content of ephemeral species. The floors of ponds are associated with floodway systems and contain typically heavy, deeply cracking clay soils. Characteristically smaller wetlands with a more regular flooding and drying cycle in comparison to sites supporting Lake Bed Herbland (DEPI 2014c).

The only example of vegetation most attributable to this EVC occurs on the North -eastern side of Baddaginnie Creek at KP166.45. A small wet depression, likely excavated by a flood, supporting Austral Milfoil *Myriophyllum simulans,* Common Spike Rush *Eleocharis acuta,* Red Pondweed *Potamogeton cheesemanii,* Stonecrop *Crassula helmsii,* and rushes *Juncus* spp. Only a small portion of vegetative

coverage was attributable to exotics with Cooch *Cynodon dactylon* present. This patch is seasonally wet and in summer all vegetation supported during the wetter months had desiccated.

EVC 175_61: *Low Rises* Grassy Woodland within the *Victorian Riverina* and within the *Northern Inland Slopes Bioregions* 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 most attributable to this EVC was poorly represented between Violet Town and Glenrowan with only three patches mapped. The most representative patch at KP165.9 is very small and is not archetypal of *Low Rises* Grassy Woodland. Understorey of this patch is markedly depauperate in comparison to what would be considered an intact example of this vegetation community with only Wallaby-grass *Rytidosperma* spp., and Rushes *Juncus* spp. present. Grey Box canopy is present and weed cover is low with less than 25% cover of exotics.

EVC 61: Box Ironbark Forest within the *Northern Inland Slopes Bioregion* is described as occurring in low rainfall areas on gently undulating rises, low hills and peneplains on infertile, often stony soils derived from a range of geologies. Open eucalypt forest to 20 metre tall, 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).

Remnant vegetation most attributable to this EVC was poorly represented between Violet Town and Glenrowan only being recorded in three locations. Understorey in all cases was low quality with only a few of the species observed with the Spear Grasses *Austrostipa* spp. and Wallaby-grasses *Rytidosperma* spp. common to all patches. Weeds common to contiguous agricultural land were observed such as Cocksfoot and Panic Veldt-grass *Ehrharta erecta*.

EVC 235: Plains Woodland/ Herb-rich Gilgai Wetland Mosaic within the *Victorian Riverina* and *Central Victorian Uplands Bioregions* is described as open woodland to 15 metres tall on broad alluvial plains and along ephemeral drainage lines. Soils are generally poorly drained heavy clays which form distinctive "gilgai" crests and troughs in a fine-scale mosaic. The understorey consists of few, if any shrubs while the ground layer is made up of a combination of "dryland" herbs/grasses and amphibious herbs/grasses tolerant of seasonal inundation (DEPI 2014c).

A relatively intact patch of vegetation most attributable to this EVC occurs at KP154.13 to KP154.45 on private land. This patch has a diverse understorey and is relatively weed-free. Gilgai formations are apparent with the associated variance of vegetation archetypal and distinct over the micro-topographical gilgai graduation.

Indigenous species present in the wetter depressions include Swamp Billy-buttons *Craspedia paludicola*, Burr Daisy *Calotis anthemoides*, Sun Orchid *Thelymitra* spp., Slender Onion Orchid *Microtis parviflora*, Rough Raspwort *Haloragis aspera*, Pale Sundew *Drosera peltata* ssp. p*eltata*, Rushes *Juncus* spp. and Smooth Solenogyne *Solenogyne dominii*.

Drier rises supported numerous smaller indigenous forbs and graminoids including Scaly Buttons *Leptorhynchos squamatus*, Chocolate Lily, Cut-leaf Goodenia *Goodenia pinnatifida*, Bulbine Lily *Bulbine bulbosa*, Early Nancy *Wurmbea dioica*, Milkmaids *Burchardia umbellata* and Wallaby-grasses *Rytidosperma* spp.

This patch qualifies as the EPBC listed community '*Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains'*.

Numerous larger lower quality patches of vegetation most attributable to this EVC were mapped between Violet Town and Glenrowan between KP151.6 and KP153.6 and around KP187.7. These patches all occur on land cleared of woody lifeforms and is utilised for agricultural purposes. Indigenous vegetation supported by these areas is largely graminoids and subjected to grazing pressures.

2.1.3 Weeds

A total of 15 species are considered high-threat weeds, including nine listed as noxious weeds under the *CaLP Act* (**Appendix D2**). 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 D6.** 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 D6: Declared Noxious Weed Species

Species Name	Common Name	Catchment	Declared Noxious Weed Status
Echium plantagineum	Paterson's Curse - High Threat	GBCMA	Regionally Controlled
Genista monspessulana	Montpellier Broom - High Threat	GBCMA	Regionally Controlled
Marrubium vulgare	Horehound - High Threat	GBCMA	Regionally Controlled
Silybum marianum	Variegated Thistle	GBCMA	Regionally Controlled
Cirsium vulgare	Spear Thistle - High Threat	GBCMA	Restricted
Genista linifolia	Flax-leaf Broom - High Threat	GBCMA	Restricted
Oxalis pes-caprae	Soursob	GBCMA	Restricted
Rosa rubiginosa	Sweet Briar	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 lists contained in **Appendix D2**.

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 4 is likely to fall under the 'Moderate to High' risk-based pathway. The risk-based pathway however will ultimately be determined by DEPI.

2.2.2 Habitat Hectare Assessment

The easement contains approximately 15.08 hectares (4.09 habitat hectares) of remnant vegetation within three bioregions: *Victorian Riverina*, *Central Victorian Uplands* and *Northern Inland Slopes* comprising seven EVC's and 63 different quality habitat zones. The detailed results of the vegetation quality assessment and Habitat Hectare scores for each habitat zone and KP locations are provided in **Appendix D3**.

Measures have been undertaken to avoid and minimise impacts to remnant vegetation, due to this a total of 10.35 hectares (2.85 habitat hectares) of remnant vegetation is to be removed. Therefore a total of 4.73 hectares (1.24 habitat hectares) of remnant vegetation will be retained. The total area of impact for each EVC and bioregion is summarised in **Table D7**.

Table D7: 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
Northern Inland Slopes	61 Box Ironbark Forest	0.29	0.11	0.14	0.05	0.15	0.06
	175_61 *Low Rises* Grassy Woodland	0.47	0.12	0.39	0.1	0.08	0.02
Victorian Riverina	55 Plains Grassy Woodland	3.84	0.97	2.35	0.61	1.49	0.36
	56 Floodplain Riparian Woodland	0.03	0	0	0	0.03	0
	68 Creekline Grassy Woodland	1.59	0.61	1.1	0.44	0.49	0.17
	175_61 *Low Rises* Grassy Woodland	0.99	0.2	0.71	0.14	0.28	0.06
	235 Plains Woodland/ Herb-rich Gilgai Wetland Mosaic	6.79	1.89	4.96	1.38	1.83	0.51
	810 Floodway Pond Herbland	0.04	0.01	0.02	0.01	0.02	0
Central Victorian Uplands	235 Plains Woodland/Herb-rich Gilgai Wetland Mosaic	1.05	0.18	0.68	0.12	0.37	0.06
Totals		**15.08**	**4.09**	**10.35**	**2.85**	**4.73**	**1.24**

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 215 scattered indigenous trees were recorded during the assessment. This total includes 99 VLOTs, 62 LOTs, 26 MOTs, and 28 STs, as summarised in **Table D8.** A detailed list of scattered indigenous trees recorded during the assessment is presented in **Appendix D4**.

A preliminary assessment of impacts to trees has been undertaken by APA. A total of four STs will be removed from the construction ROW **Appendix D4.**

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 D8: Summary of Scattered Indigenous Trees per EVC

Bioregion	Relevant EVC	VLOTs	LOTs	MOTs	STs	Total
Central Victorian Uplands	68 CreeklineGrassy Woodland	-	-	-	1	**1**
	175_61 Low Rises Grassy Woodland	2	-	-	-	**2**
	235 Plains Woodland/Herb-rich Gilgai Wetland Mosaic	4	-	1	-	**5**
Northern Inland Slopes	61 Box Ironbark Forest	-	3	3	3	**9**
	175_61 Low Rises Grassy Woodland	1	1	-	-	**2**
Victorian Riverina	55_61 Plains Grassy Woodland	30	15	7	7	59
	55_62 Plains Grassy Woodland	31	20	4	9	**64**
	56 Floodplain Riparian Woodland	3	1	4	5	**13**
	68 CreeklineGrassy Woodland	6	7	4	2	**19**
	175_61 Low Rises Grassy Woodland	-	2	-	1	**3**
	235 Plains Woodland/Herb-rich Gilgai Wetland Mosaic	20	9	2	-	**31**
	803 Plains Woodland	2	4	1	-	**7**
Totals		**99**	**62**	**26**	**28**	**215**

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 97 indigenous trees in patches were recorded during the assessment. This total includes 17 VLOTs, 46 LOTs and 34 MOTs, as summarised in **Table D9**. A detailed list of indigenous trees recorded during the assessment is presented in **Appendix D4**.

A preliminary assessment of impacts to trees has been undertaken. A total of three indigenous trees from within in patches will be removed from the construction ROW and includes three MOTs **Appendix D4.**

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 the qualified arborist assessment and discussions with APA.

Table D9 Summary of Indigenous Trees in patches per EVC

Bioregion	Relevant EVC	VLOTs	LOTs	MOTs	Total
Northern Inland Slopes	61 Box Ironbark Forest	-	5	3	**8**
Victorian Riverina	55_61 Plains Grassy Woodland	1	4	4	**9**
	55_62 Plains Grassy Woodland	7	16	11	**34**
	56 Floodplain Riparian Woodland	-	2	2	**4**
	68 CreeklineGrassy Woodland	8	12	6	**26**
	175_61 Low Rises Grassy Woodland	-	3	-	**3**
	235 Plains Woodland/Herb-rich Gilgai Wetland Mosaic	1	3	8	**12**
	803 Plains Woodland	-	1	-	**1**
Totals		**17**	**46**	**34**	**97**

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 (**Appendix D6** and **Appendix D6a)**. 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 D6a**. 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 D5** and **Appendix D6a).**

Three *EPBC Act* and four *FFG Act* listed flora species have previously been recorded within the local area (within 5 kilometres of the easement) (DSE, 2012), and are summarised in **Table D10.** An additional four nationally significant species, three of which are also state significant species not previously documented within the local area, also have habitat potentially occurring within the vicinity of the easement (DSEWPaC 2013a). Matted Flax-lily *Dianella amoena* listed as endangered under the *EPBC Act* and listed on the DSE Advisory List was also targeted for during the assessment due to the presence of potential habitat.

An additional 11 species listed on the DSE Advisory List (DSE 2005a) have also have previously been recorded within the local area (within five kilometres of the easement) and are presented in **Table D10**.

The assessment of threatened species and their potential to occur within the construction ROW has been provided in **Appendix D6**. A description for each listed flora species with the potential to occur, their habitat preference and specific flowering time is presented in **Appendix D8**.

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 D10: Summary of Threatened Flora Species recorded within 5 km of the Easement

Scientific Name	Common Name	Year	*EPBC Act*	*FFG Act*	*DSE Advisory List*
Acacia ausfeldii	Ausfeld's Wattle	2001			Vulnerable
Acacia deanei subsp. paucijuga	Deane's Wattle	1996			Rare
Acacia flexifolia	Bent-leaf Wattle	1994			Rare
Alternanthera sp. 1 (Plains)	Plains Joyweed	1999			Poorly known
Amphibromus fluitans	River Swamp Wallaby-grass	2006	Vulnerable		
Cardamine moirensis	Riverina Bitter-cress	1985			Rare
Diuris p. var. punctata	Purple Diuris	2009		Listed	Vulnerable
Eleocharis macbarronii	Grey Spike-sedge	2006			Poorly known
Eucalyptus sideroxylon s.s.	Mugga	1993			Rare
Fimbristylis dichotoma	Common Fringe-sedge	1992			Vulnerable
Goodenia macbarronii	Narrow Goodenia	2005	Vulnerable	Listed	Vulnerable
Isolepis congrua	Slender Club-sedge	1996		Listed	Vulnerable
Juncus psammophilus	Sand Rush	1985			Rare
Pultenaea foliolosa	Small-leaf Bush-pea	1996			Rare
Ranunculus pumilio var. politus	Ferny Small-flower Buttercup	1991			Poorly known
Swainsona recta	Mountain Swainson-pea	1999	Endangered	Listed	Endangered
Protected Matters Search Tool					
Caladenia cremna	Don's Spider Orchid		Critically Endangered	Listed	
Eucalyptus cadens	Warby Range Swamp Gum		Vulnerable	Listed	Vulnerable
Glycine latrobeana	Clover Glycine		Vulnerable	Listed	Vulnerable
Hibbertia humifusa subsp. erigens	Euroa Guinea-flower		Vulnerable		Rare

One nationally significant flora species was recorded during the targeted surveys. Populations of Matted Flax-lily were recorded within *Riverina* Plains Grassy Woodland EVC 55_62 vegetation located within the Lorimers Lane road reserve (KP151.57). This species is also listed under the *FFG Act*, so translocation of these plants will be required from Lorimers Lane.

Furthermore populations of two species listed on the DEPI Advisory List were also recorded during the field assessments: Late-flower Flax-lily *Dianella tarda* and Sand Rush. Late-flower Flax-lily was recorded at Two Mile Creek (KP147.5), within Lorimers Lane and Pagets Road (KP151.5 and KP155.2 respectively).

Populations of Sand Rush were found at One Mile Creek KP145.55, Two Mile Creek and Turnip Creek (KP147.5 and KP152.5 respectively) within moderate to good quality Creekline Grassy Woodland.

No other state significant flora species were recorded during the field assessment. However, a total of 12 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
- Orchidaceae - Orchids - all species
- Epacridaceae – Heaths – all species

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

- Acacia - Wattles - excluding *Acacia dealbata*, *Acacia decurrens*, *Acacia implexa*, *Acacia melanoxylon*, *Acacia paradoxa*

Species recorded on the construction ROW and protected under the *FFG Act* are highlighted in **Appendix D2.**

2.3.2 Targeted Surveys for Threatened Vegetation Communities

<u>*EPBC Act* listed Communities</u>

Four vegetation communities listed under the *EPBC Act* have the potential to occur in the construction ROW and are listed in **Table D11** (DSEWPaC 2013). Due to the modelled EVC's showing Plains Woodland Herb-rich Gilgai Wetland Mosaic as potentially being present in this looping, Monarc also considered '*Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains'* a possibility due to the affinity with this EVC.

Due to the quality of the vegetation identified during the assessments, two of the listed communities were 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) and '*Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains'* (listed as Critically Endangered). A detailed description of this listed vegetation community is presented in **Appendix D8**.

Table D11: Threatened *EPBC Act* Listed 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	-	-
Grey Box (Eucalyptus microcarpa) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia	Endangered	EPBC	Yes	158.23	0.4586
Natural Grasslands of the Murray Valley Plains	Critically Endangered	EPBC	No	-	-
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	Critically Endangered	EPBC	No	-	-
***EPBC Act* Listed Communities likely to occur (Monarc 2014)**					
Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains	Critically Endangered	EPBC	Yes	8.5	0.6275

*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:

<u>'Grey Box (Eucalyptus microcarpa) Grassy Woodlands and Derived Native Grasslands of South-Eastern Australia'</u>

The on-ground assessment of the easement has located two locations in the construction ROW where this community is believed to occur, primarily as linear strips within roadside reserves.

A total of 0.4586 ha was recorded within the construction ROW and occurs within three locations at:

- Dookie – Violet Town Road KP144.75
- Hoskins Lane KP145.5
- Four Mile Road KP165.38

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.

'Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains'

The on-ground assessment of the easement has located one location in the construction ROW where this community is believed to occur, on private property used for grazing.

A total of 0.6275 ha was recorded within the construction ROW at:

- KP154.13 to KP154.45 adjacent to the east side of Robinsons Road

Vegetation at this location qualified as the listed community largely due to being consistent with the key diagnostic characteristics of landscape, hydrology and biota identified in the *EPBC Act* listing advice (TSSC 2012). Some of these include the ground layer comprising more than 50% of native species characteristic of Seasonal Herbaceous Wetlands, the nature of the surrounding vegetation and wetland size.

This community was deemed to be of a very high quality according to Part D of the condition thresholds. These thresholds require at least three species identified in Table 1 of the listing advice, to be present (TSSC, 2012). This patch had six species being *Brachyscome basaltica, Calotis anthemoides*, *Craspedia paludicola, Diuris* spp., Slender Onion Orchid and *Thelymitra* spp.

In particular, management measures have focused on the reduction in the construction ROW to 20m throughout this community. 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 and functioning as a wetland.

FFG Act listed Communities

Three vegetation communities listed under the *FFG Act* also have the potential to occur, on public land, within the construction ROW according to the DEPI modelling, and are listed in **Table D12** (DEPI, 2014a).

Table D12: Threatened *FFG Act* Listed Communities along the easement

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

All remnant patches that qualify as EVC 55_61 Plains Grassy Woodland and EVC 55_62 Plains Grassy Woodland identified in **Table D7** and **Appendix D3**, 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 Creekline Grassy Woodland also qualifies the *FFG Act* listed community '*Creekline Grassy Woodland (Goldfields)'Community* according to the DEPI modelling (DEPI 2014b). One location was identified as having this community at One Mile Creek KP145.52.

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 273 species registered for the local area. The total records comprise of: 14 fish, 9 amphibian, 18 reptiles, 204 birds and 28 mammal species. Of these there were 19 introduced species recorded from 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 D5**.

From these results, a total of 36 listed species with national or state significance have been reported in the local area while an additional 10 species listed under the *EPBC Act* are considered to be potentially present in the area. Also 17 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 D6b** 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 or scattered trees and aquatic/riparian habitats provided by watercourses and farm dams.

3.2.1 Open Farmland

The existing 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 areas are also ploughed. Logs and other potential surface habitats typical of the region are almost entirely absent from the existing 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 existing 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 existing easement traverses Broken River and another 14 creeks, a former irrigation channel and a number of minor drainage lines. There are also a number of farm dams near the easement as well as a few ephemeral wetlands. The easement also passes to the south of Winton Wetlands (formerly Lake Mokoan) from KP178.0 to KP186.0 approximately.

[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 waterways 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 important corridors for habitat and dispersal of native fauna.

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.

Winton Wetlands provides significant habitat to many waterbirds, including national and international migratory species with many of the VBA records for the local area being from here.

In forming conclusions on the likelihood of a species occurrence in the area and the potential impact from construction, the following general considerations were taken into account (other species specific considerations may apply):

- Areas devoid of remnant native vegetation, such as agricultural paddocks, are generally considered to have few if any ecological values and are usually of negligible significance for threatened native fauna.
- Species richness or diversity is relatively limited within these areas.
- As the construction ROW is not within the Winton Wetlands, the construction of this new pipeline is anticipated to have little or no impact on species using this wetland.

3.3 Targeted Surveys for Threatened Fauna

Twenty eight 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 birds and reptiles, nocturnal surveys for mammals, birds and frogs. All species observed or heard were recorded (**Appendix D10**). It should be noted that surveys were not conducted for Swift Parrot *Lathamus discolor,* as the timing of construction works is planned during the time the parrot is at its breeding grounds in Tasmania.

From the assessment of the "Likelihood of Occurrence" (**Appendix D6b**) the following species were targeted for surveys (excluded aquatic species) (**Table D13)** due to their Moderate or High likelihood of occurrence in the local area:

Table D13: Summary of Threatened Fauna Species

Common Name	Scientific Name	Status (EPBC/FFG/DEPI)	Likelihood of Occurrence
Brown Toadlet#	*Pseudophryne bibronii*	-/Listed/Endangered	Moderate
Growling Grass Frog	*Litoria raniformis*	Vulnerable/Listed/Endangered	Low
Carpet Python	*Morelia spilota metcalfei*	-/Listed/Endangered	Moderate
Common Bearded Dragon	*Pogona barbata*	-/-/Vulnerable	High
Lace Monitor	*Varanus varius*	-/-/Endangered	High
Black-chinned Honeyeater	*Melithripterus g. gularis*	-/-/Near Threatened	Moderate
Brown Treecreeper	*Climacteris p. victoriae*	-/-/Near Threatened	High
Bush Stone-curlew	*Burhinus grallarius*	-/Listed/Endangered	Moderate
Diamond Firetail	*Stagonopleura guttata*	-/Listed/Vulnerable	Moderate
Eastern Great Egret	*Ardea modesta*	CAMBA,JAMBA/Listed/Vulnerable	Moderate
Fork-tailed Swift	*Apus pacificus*	CAMBA,JAMBA,ROKAMBA	Moderate
Grey-crowned Babbler	*Pomatostomus t. temporalis*	-/Listed/Endangered	High
Hardhead	*Aythya australis*	-/-/Vulnerable	Moderate
Hooded Robin	*Melanodryas c. cucullata*	-/Listed/Vulnerable	Moderate
Latham's Snipe	*Gallinago hardwickii*	C,J,R*/Nominated/Near Threatened	Moderate
Pied Cormorant	*Phalacrocorax varius*	-/-/Near Threatened	Moderate
Rainbow Bee-eater	*Merops ornatus*	Migratory/-/-	Moderate
Swift Parrot	*Lathamus discolor*	Endangered/Listed/Endangered	Moderate
White-throated Needletail	*Hirundapis caudacutus*	C,J,R*/-/Vulnerable	Moderate
Brush-tailed Phascogale	*Phascogale t. tapoatafa*	-/Listed/Vulnerable	Moderate
Southern Myotis	*Myotis macropus*	-/-/Near Threatened	Moderate
Squirrel Glider	*Petaurus norfolcensis*	-/Listed/Endangered	High

Brown Toadlet surveys were conducted in autumn 2013. A separate report of these surveys can be found in **Appendix D11.**
*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 D8.**

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 D14**.

Table D14: Summary of Fauna Surveys Undertaken

Location	KP	Survey Type		
		Diurnal	Nocturnal	GGF
Crilly (Boyle) Rd	144.25	✓		
Dookie-Violet Town Rd	144.75	✓	✓	
Hoskins Lane & One Mile Creek	145.5	✓	✓	
Ramage Rd	146.85	✓	✓	
Waters Rd	147.2	✓	✓	
Two Mile Creek	147.55	✓	✓	✓
Swamp Creek	149.2	✓	✓	✓
Peck Rd	149.5	✓	✓	
Harrison Rd	149.71	✓	✓	
Lorimers Lane	151.5	✓	✓	
Turnip Creek	152.5		✓	✓
Robinsons Rd	154.1	✓	✓	
Pagets Rd	155.2		✓	
Leggat Lane	158.05	✓	✓	
Tarnook Rd	158.33	✓	✓	
Kelleher Rd	160.59	✓	✓	
Sloan Rd	161.4	✓	✓	
Carroll Rd	162.95	✓	✓	
Basin & Four Mile Roads	165.19 - 165.39	✓	✓	
Baddaginnie Creek[#] (& Tributary – sites combined for diurnal and nocturnal surveys)	166.35 - 166.70	✓	✓	✓
Baddaginnie Creek Tributary	166.70			✓
Kealy Rd	167.84		✓	
S3-167/9[#] (Between the Midland Highway and North Road)	171.32 - 171.6	✓		✓
Nelson Rd Channel (S4-20)	176.3	✓		
S4-26/9 (Between Winton Creek and Nelson Road)	179.5	✓	✓	
Seven Mile Creek*	180.3			✓
Eleven Mile Creek* and Channel[#]	189.25 and 189.6			✓
Glenrowan-Boweya Rd	192.0		✓	

*Only one survey was undertaken in these locations as the waterbody was dry at the time of the second survey.
[#]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 four species were observed during the 104 separate surveys across the 28 sites. An additional species, the Eastern Great Egret, was observed during the flora assessments earlier in 2013. The locations of those species recorded are summarised in **Table D15** below and a full species list of fauna recorded at each location can be found in **Appendix D9.**

Table D15: Findings of Fauna Surveys

Species	Survey findings
Brown Toadlet	• None recorded during Autumn 2013 surveys
Growling Grass Frog	• None recorded
Carpet Python	• None recorded
Common Bearded Dragon	• None recorded
Lace Monitor	• None recorded
Black-chinned Honeyeater	• One bird was recorded in the patch of vegetation between Winton Creek and Nelson Road KP179.5
Brown Treecreeper	• A group were observed in trees along Swamp Creek KP149.2. One was observed to be checking out hollows in a dead River Red Gum west of the existing easement. Birds were also recorded from this location during flora surveys. • One individual was observed at Baddaginnie Creek KP166.35 checking out a hollow, north of the existing easement. • Two birds were observed west of the easement on Basin Road KP165.19.
Bush Stone-curlew	• This species was heard calling from approximately 500m south of Pagets Road KP155.2 • Again this species' distinctive call was heard approximately 200m east of the easement on Sloan Road KP161.4
Diamond Firetail	• None recorded
Eastern Great Egret	• One individual was observed feeding in a farm dam adjacent to the easement at KP154.5 during vegetation surveys; however none were recorded during the fauna surveys.
Fork-tailed Swift	• None recorded
Grey-crowned Babbler	• Five birds were recorded during both surveys on Crilly (Boyle) Road KP144.25, approximately 100 metres to the east, on the roadside and adjacent area of planted vegetation. • Three birds were recorded on Ramage Road, just north of the Waters Road (KP147.2), intersection. • Babbler nests were observed on Peck Road KP149.5 in eucalypt saplings beside the road and in the paddock to the west of the road. • Two babbler nests were recorded in Harrisons Road KP149.71 to the east of the easement. • A group of Babblers were observed in Lorimers Lane KP151.5 during the flora surveys and again seen there during follow-up field work in March 2014. • Six babblers were observed adjacent to the easement on the east side of Robinson Road KP154.1. Seven babblers were recorded from the same location during the second survey. Many nests were observed in eucalypt saplings nearby. • One nest was observed in Sloan Road KP161.4 • Four birds were recorded during follow-up field work in March 2014, approximately 100m north of the easement on Four Mile Road KP165.5.
Hardhead	• None recorded

Species	Survey findings
Hooded Robin	• None recorded
Latham's Snipe	• None observed.
Pied Cormorant	• None observed.
Rainbow Bee-eater	• None observed.
Swift Parrot	• None observed.
White-throated Needletail	• None observed.
Brush-tailed Phascogale	• None observed.
Southern Myotis	• None observed.
Squirrel Glider	• None observed.

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, Black-chinned Honeyeater and Brown Treecreeper are not discussed in further detail in this report.

Growling Grass Fog

Although the Likelihood of Occurrence for this species was determined to be low (see **Appendix D6b**), surveys for this species were undertaken due to their listing under the *EPBC Act* and previous records from within the 5km buffer of the easement.

Eight 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 at least twice, except for Seven Mile Creek which was dry at the time of the second scheduled survey. Where the two surveys were not completed before the end of December, a total of three surveys were conducted at each site in line with detection probabilities, outlined in Heard *et al* 2010, before the end of January 2014. The three sites surveyed on three occasions were Baddaginnie Creek KP166.35, properties S3-167 to S3-169 and the Eleven Mile Creek channel KP189.6.

No Growling Grass Frogs were recorded during the surveys. Other more common species, Peron's Tree Frog *Litoria peronii*, Spotted Marsh Frog *Limnodynastes tasmaniensis*, Eastern Banjo Frog *L. dumerilii*, Striped Marsh Frog *L. peronii* and Plains Froglet *Crinia parinsignifera*, were recorded across these sites during the surveys. Peron's Tree Frog was recorded at every survey site, at least once.

The bio-climatic data for these survey locations can be found in **Appendix D10**.

Bush Stone-curlew

The Bush Stone-curlew is a cryptic bushland species that is listed under the *FFG Act* and is considered endangered in Victoria (DSE 2013). This bird is one of 13 bird species classified as endangered that occurs in the Goulburn-Broken Catchment (GBCMA 2014).

While there were no sightings of these birds, their very distinctive call was heard in two locations during the nocturnal surveys. The first location record was while surveying Pagets Road KP155.2, with the surveyors estimating that the calls were about 500m south of easement at this point. The second location calls were heard was approximately 200m east of the easement on Sloan Road KP161.4.

There are historical records from this area with the latest being 2009, approximately 5km north-west of the Sloan Road location at Burness Road, Tarnook (Birdlife Australia 2014b).

Eastern Great Egret

A single bird was observed, during the flora surveys, feeding in a farm dam next to the easement at KP154.5.

As the construction ROW does not pass through any habitat of significance for this species, the impact of this project on this species will be negligible.

Grey-crowned Babbler

The Grey-crowned Babbler is a state and regionally significant species and Strathbogie Shire is home to an estimated one third of the State's population of the endangered Grey-crowned Babbler (Shire of Strathbogie 2011). Many revegetation projects within the GBCMA have been designed to recreate habitat for this species and a number of roadsides have been identified as being Grey-crowned Babbler habitat and are sign-posted as such. The Friends of the Grey-crowned Babbler also conduct regular surveys for this species throughout the area.

There were numerous sightings of birds or nests across the local area of the easement from Violet Town to Benalla but no observations beyond Benalla. This is consistent with records of this species from the VBA (DEPI 2014h) as there are numerous records between Violet Town and Benalla and only two records beyond Benalla, north of the Hume Highway within the vicinity of the easement, both dating back to the mid-1990's.

There were five locations within the first 15km of this looping between Crilly (Boyle) and Robinsons Roads, KP144.25 and 154.1 respectively, that the birds were recorded. 20 birds were observed in four groups in these locations with at least 10 nests also recorded.

The birds were using areas of revegetation or regeneration where the understorey of shrubs and saplings, and or fallen timber, was present. The babbler's distinctive stick nests were found in eucalypt saplings along Peck Road KP149.5, Harrisons Road KP149.71 and Robinsons Road KP154.1. As these babblers build similar nests for communal roosting and breeding (Pizzey and Knight 1997) it was hard to determine the actual purpose of the nests observed. In discussion with a local landholder, he said that the babblers nested in Peck Road and the adjacent trees to the west (Crocker 2013, *pers comm.*). Babblers have been recorded in the Peck Road-Harrisons Road area dating back to the early 1990's.

The second cluster of sightings was between Sloan Road KP161.4 and Four Mile Road KP165.5. A babbler's nest was observed on Sloan Road during the nocturnal surveys at this location. Four birds were also recorded during follow-up field work in March 2014, approximately 100m north of the easement on Four Mile Road, on the outskirts of Benalla.

It is interesting to note that Grey-crowned Babblers were not observed within the area covered by the Benalla Rural City VPO2, see **Table D2**, during any of the field work in 2013 or 2014.

Squirrel Glider

There were no sightings of Squirrel Glider during the surveys for this looping. This is consistent with records from the VBA showing that there are only three records of this species from across the local area of this looping, especially east of Violet Town. The DSE Action Statement for Squirrel Gliders (DSE, 2003b) mentions sub-populations occurring between Euroa and Violet Town and Reef Hills State Park to Warrenbayne being west and south of the easement respectively.

Although there were no sightings in this looping, it is possible that Squirrel Gliders could be present on roadsides and watercourses 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

One nationally significant flora species was recorded during the targeted surveys, Matted Flax-lily.

Of the 26 species of listed fauna that may potentially occur in the local area only one species, the Eastern Great Egret, was recorded during any of the fauna surveys or other fieldwork conducted across this looping section. The easement is not considered 'important habitat' for any migratory or marine species and there no wetlands of international significance within the local area of the easement.

The construction ROW does contain two vegetation communities that are to be impacted:

- *'Grey Box (Eucalyptus microcarpa) Grassy Woodlands and Derived Native Grasslands of South-Eastern Australia' (listed as Endangered);*
- *'Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains'* (listed as Critically Endangered).

Due to the presence of listed vegetation communities and the Matted Flax-lily a referral to the Commonwealth Environment Minister will be required.

4.2 State Legislation

4.2.1 Flora and Fauna Guarantee Act 1988

Two *FFG Act* listed communities occur on Crown Land within areas of remnant vegetation identified as Plains Grassy Woodland; EVC 55_61, *Riverina* Plains Grassy Woodland; EVC 55_62 and Creekline Grassy Woodland; EVC 68. These communities are:

- *'Grey Box - Buloke Grassy Woodland Community';*
- *'Creekline Grassy Woodland (Goldfields)'.*

Matted Flax-lily is also listed under the *FFG Act* and was recorded on Crown Land. Furthermore 12 species were identified that belong to plant families or genera that are protected on Crown Land under the *FFG Act*. It is noted that all plant taxa that belong to listed communities are protected.

Three *FFG Act* fauna species were identified during the field surveys, being Bush Stone-curlew, Eastern Great Egret and Grey-crowned Babbler.

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.

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, such as scattered trees or trees in patches, being impacted then salvage and relocation of any fauna may be required for the construction activities. These will be discussed in Section 5 for habitat identified.

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 will 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 will therefore be implemented within the easement generally either through the narrowing of the ROW or other construction techniques such as drilling 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 undertake 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 ROW passes;
- Shifting of the narrowed construction ROW (20m), in some cases, westwards over the existing pipeline to avoid impacts on remnant vegetation in the 'eastern' area of the easement. In general, the construction process will avoid work or movement of heavy construction traffic over the existing pipeline. In some cases, however, in areas where a specialist crew is proposed, such as at waterway crossings, impacts can be reduced by shifting the narrowed ROW westwards over the old 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;
- Every effort has been made to minimise impacts on Large-Old Trees whether within remnant patches or as trees scattered through the project area. Furthermore 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 D16**.

Table D16: Summary of Vegetation Clearance Measures

Vegetation Type	Strategy	Avoidance/Minimisation Measures	Property Ref	Map Ref (App D1)
Trees	Avoid	Scattered trees that qualify as LOTs to be avoided by HDD	S3-163 KP169-169.3	A-43
Remnant Patches	Avoid	Impacts to waterway vegetation to be avoided by use of drilling techniques to pass under the waterway	Broken River KP169	A-44
	Minimise	Impacts to Remnant Patch to be minimised by narrowing of construction ROW to 20m	S3-106 Lambing Gunyah Cek	A-2
			Crilly (Boyle Rd) KP144.3	A-5
			Dookie Violet Town Road KP144.8	A-6
			Hoskins Lane KP145.5	A-7
			S3-115 KP146.25	A-9
			S3-115 to Ramage Road KP146.8	A-10
			Two Mile Creek KP147.6	A-12
			S3-119 KP149.2	A-14
			S3-122 to 124 KP151.6 to KP153.7	A-18-21
			S3-125 KP154.1 to 154.4	A-22
			Pagets Road KP155.2	A-24
			S3-127 KP155.5	A-24
			Folly Creek KP156.5	A-26
			Woolpress Creek KP157.5	A-27
			S3-128 KP157.55 to 158	A-27-28
			Leggat Lane KP158.1	A-28
			S3-132 KP160.4 to 160.55	A-31
			S3-134 KP160.8	A-31
			S3-148 KP165.8	A-37
			Baddaginnie Ck KP166.4	A-39
			S3-153 KP166.7	A-40
			Goomalibee Rd KP167.2	A-41
			S3-157 KP167.5	
			Kealy Road KP167.8	A-42
			S4-26 KP179.35 to 179.6	A-52
			Seven Mile Ck KP180.35	
			S4-39 KP187.7 to 188.2	A-57
		Impacts to Remnant Patch 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)	Waters Road KP147.2	A-11
			Peck Road KP149.5	A-15
			Harrisons Road KP149.7	A-16
			Lorimers Lane KP151.55	A-18
			Kelleher Road KP160.6	A-31
			Sloan Road KP161.4	A-32
			Carroll Road KP162.9	A-34
			Basin Road KP165.2	A-36
			Four Mile Road KP165.4	A-36

5 RECOMMENDATIONS

A Construction Environment Management Plan (CEMP) is required to be prepared for the project to ensure environmental issues are appropriately managed during construction and that regulatory obligations are met. Environmental controls will be documented within the CEMP.

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

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

5.1 Crilly (Boyle) Road KP144.25

One *FFG Act* listed fauna species, the Grey-crowned Babbler, was recorded at this location. While not on the easement, the birds were seen nearby amongst an area of revegetation.

The construction ROW at this location has been narrowed to 20m. 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 June to October.

5.2 Dookie – Violet Town Road KP144.75

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. As noted earlier in 4.2.1, all plant taxa in this community is protected under the *FFG Act* and consideration should be given to lengthening the planned bore to include the roadside vegetation as well as the bitumen road.

5.3 Hoskins Lane and One Mile Creek KP145.5

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*'.

One Mile Creek which transects Hoskins Lane, just north of the easement and flows through the eastern side of the roadside reserve had a population of Sand Rush, listed as rare on the DEPI Advisory List, that will require salvaging and relocating prior to construction in accordance with DEPI guidelines.

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

5.4 Ramage and Waters Road KP146.85 and KP147.2 respectively

One *FFG Act* listed fauna species, the Grey-crowned Babbler, was recorded near these locations. While not on the easement, the birds were seen within 250m of both crossings on Ramage Road, just north of the Waters Road intersection.

The construction ROW at this location has been narrowed to 20m on Ramage Road and a "reverse" ROW installed on Waters Road to avoid four LOTs within the easement. 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 these babblers which is June to October.

5.5 Two Mile Creek KP147.5

Two Mile Creek had a population of Sand Rush and Late-flower Flax-lily, listed as rare and vulnerable respectively on the DEPI Advisory List, which will require salvaging and relocating prior to construction in accordance with DEPI guidelines.

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

5.6 Peck Road KP149.5

Grey-crowned Babbler nests were recorded at this location, in sapling eucalypts on the roadside reserve and in the paddock to the west of Peck Road.

The construction ROW at this location has been narrowed to 20m and a "reverse" ROW installed to avoid a large majority of these saplings. 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 June to October.

5.7 Harrisons Road KP149.71

Grey-crowned Babbler nests were recorded at this location, in sapling eucalypts on the roadside reserve. This is most likely to be the same birds whose nests were observed on Peck Road, some 200m away. Grey-crowned Babblers have been recorded in this area for over 20 years (DEPI 2014h)

The construction ROW at this location has been narrowed to 20m and a "reverse" ROW installed to avoid a large majority of these saplings. 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 June to October.

5.8 Lorimers Lane KP151.5

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

- A number of Matted Flax-lily plants, an *EPBC Act* listed flora, were recorded from this site.
- One *FFG Act* listed fauna species, the Grey-crowned Babbler, was recorded at this location. While not on the easement, the birds were seen nearby feeding amongst fallen timber.
- Late-flower Flax-lily, a *DEPI Advisory* List species was recorded in the easement also.

The construction ROW at this location has been narrowed to 20m and a "reverse" ROW installed to significantly reduce impacts to the habitat on this laneway. 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 June to October.

The salvaging and relocation of Matted and Late-flower Flax-lilies that are found in this reduced construction ROW will be required to be undertaken prior to breaking ground, in line with EPBC and 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.

5.9 Turnip Creek KP152.5

Turnip Creek had a population of Sand Rush listed as rare on the DEPI Advisory List, which will require salvaging and relocating prior to breaking ground, in accordance with DEPI guidelines.

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

5.10 Robinsons Road KP154.1 and adjacent EPBC Community KP154.12 - KP154.45

One *FFG Act* listed fauna species, the Grey-crowned Babbler, was recorded on Robinsons Road, near the easement. Six birds were observed during the first survey and seven during the second survey. The VBA has records dating back to 1991 of Grey-crowned Babblers from this location.

The area between KP154.12 and KP154.45 has been identified as the critically endangered *EPBC Act* community '*Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains*'.

The vegetation in this general area is the approximate location that Bush Stone-curlews were heard calling from during nocturnal surveys on Pagets Road KP155.2.

The construction ROW at this location has been narrowed to 20m on through this EPBC community. Consideration should be given to further measures to minimise the impacts of construction:

- Avoiding the optimal breeding season for the babblers which is June to October and the Bush Stone-curlew which is August to January;
- Further reducing the construction ROW through this EPBC community.

5.11 Sloan Road KP105.65

Grey-crowned Babbler nests were recorded at this location, in sapling eucalypts on the roadside reserve Another FFG ACT listed species, the Bush Stone-curlew was heard during nocturnal surveys at this site. The calls were estimated to be coming from approximately 200m further along Sloan Road, to the east of the easement.

The construction ROW at this location has been narrowed to 20m and a "reverse" ROW installed to reduce impacts in this 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 the babblers which is June to October and the Bush Stone-curlew which is August to January.

It is also suggested that any woody vegetation or fallen timber that needs to be removed from the construction ROW prior to breaking ground, be placed back onto the easement as part of the restoration process. This will help restore habitat for both species, especially the stone-curlew which relies on fallen timber for nesting sites and protection from predators.

5.12 Four Mile Road KP165.38

This roadside and surrounding area 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*'. Also one *FFG Act* listed fauna species, the Grey-crowned Babbler, was recorded on Four Mile Road, approximately 100m north the easement.

The construction ROW at this location has been narrowed to 20m and a "reverse" ROW installed to minimise impacts to habitat within the area. As noted earlier in 4.2.1, all plant taxa in this community is protected under the *FFG Act* and consideration should be given to lengthening the planned bore to include the roadside vegetation as well as the bitumen road.

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 the babblers which is June to October.

5.13 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 zoologist/wildlife handler to carefully inspect all hollows for fauna using an endoscope prior to felling of hollow-bearing trees;
- Hollow-bearing trees to be removed carefully by qualified arborists under the direction of an appropriately licenced zoologist/wildlife handler;
- An appropriately zoologist/wildlife handler to carefully inspect all hollows for fauna using an endoscope after felling of hollow-bearing trees;
- Where applicable and appropriate, restoration works should include the planting of shrubs, particularly *Acacia* species, within the ROW following construction;

- Lopping saplings and shrubs prior to the breeding season (June to October) in areas where babblers have been observed or nests recorded. In doing this it would eliminate the chance of nesting occurring in the construction ROW while breaking ground and construction activities are happening.