



10.0 FLORA AND FAUNA

10.1 METHODOLOGY

The terrestrial flora and fauna study was undertaken in three stages:

- A desktop review of background information;
- Assessment of potential ecological impacts of preferred alignment options; and
- Field investigations of preferred alignment.

10.1.1 Background Review

A range of information sources were reviewed during this ecological assessment, including:

- Wildlife Online - Department of Environment and Resource Management (DERM, 2009);
- HERBRECS - Queensland Herbarium records (DERM 2009);
- *Environment Protection & Biodiversity Conservation (EPBC) Act Protected Matters Search Tool* - Department of Environment, Water, Heritage and the Arts (DEWHA), 2009);
- Regional Ecosystem Mapping (V5.0) (DERM 2009); and
- Aerial photography and high resolution satellite imagery.

In addition to this, the conservation status of flora and fauna species occurring with the alignment have been assessed in the Commonwealth and State context with reference to the EPBC Act and *Nature Conservation Act 1992* (NC Act).

10.1.2 Field Investigations

Three field surveys were conducted as part of the ecological assessment for the proposed transmission line. A preliminary field investigation was undertaken on the 9th – 11th September 2009 to determine potential ecological considerations for various alignment options, including the preferred alignment to which this report relates.

A more detailed ecological survey was undertaken in the vicinity of the Study Alignment during two field trips on 6th - 8th and 14th - 15th January 2010. The survey tasks and sampling methods were chosen to maximise the likelihood of recording any rare or threatened species that the desktop review phase indicated may be present in the study area. They included:

- Confirmation of the Regional Ecosystems and vegetation communities present in the study area;
- Assessment of habitat potential within study area, particularly for rare or threatened species;
- Assessment of local and landscape scale ecological values of vegetation within the study area;
- Targeted searches of potentially suitable habitat within the study area for rare or threatened flora species (approx. 20 person-hours);
- Targeted active searching of potentially suitable habitat within the study area for rare or threatened reptile species (approx. 30 person-hours);
- Opportunistic bird observations during site visits for targeted flora/fauna surveys;



- Microbat echolocation call detection (Anabat) during driving transects along proposed alignment (approx. 4 hours x 1 detector) and during walking transects in selected habitats within study area (approx 3 hours x 1 detector); and
- Harp-trapping for microbats in potential habitat for rare or threatened bat species (4 sites x 1 trap-night per site).

10.2 EXISTING ENVIRONMENT

10.2.1 Flora

10.2.1.1 Vegetation Communities

Regional Ecosystems

Approximately 40% of the preferred alignment runs through mapped remnant Regional Ecosystems (RE), much of which lies along the existing Powerlink easement in the western half of the proposed alignment. The RE map for the study alignment is reproduced at **Figure 10.1** and vegetation community descriptions for each RE are provided in **Table 10.1**.

The RE mapping provides an accurate representation of the vegetation communities present along most of the study alignment, with several minor exceptions:

- For some polygons that contain multiple REs, not all REs are represented in the study area. For example, no shrubland (RE 11.7.5) was encountered in the study area through the large tract of ridge country west of the Kogan-Warra Road, nor in the ridge country between that road and “Tong Park”.
- Where the proposed alignment crosses Braemar Creek, the Endangered RE 11.4.12 polygon contains vegetation communities aligned with two other REs. The RE 11.4.12 vegetation is restricted to a narrow band on the high western bank of Braemar Creek and small patches on higher ground through the centre of the remnant. The majority of the vegetation in the alignment vicinity could be classified as RE 11.3.25 (river red gum woodland fringing drainage lines) and RE 11.3.3 (coolabah woodland on alluvial plains).

From ecological and conservation perspectives, the most significant RE includes areas of Endangered and Of Concern vegetation on alluvium and clay plains adjacent to the major watercourses that intersect the study alignment (Kogan and Braemar Creeks and fringing channels on the Condamine floodplain). The significance of the Endangered remnant on Braemar Creek (site WD14), immediately below the large dam, is enhanced by the presence of at least one Rare fauna species and abundance of arboreal mammals.

TABLE 10.1 REGIONAL ECOSYSTEM DESCRIPTIONS

RE CODE & PROPORTION OF EACH IN MULTIPLE RE POLYGONS	RE DESCRIPTION	VMA STATUS
11.5.1	<i>Eucalyptus crebra</i> , <i>Callitris glaucophylla</i> , <i>Angophora leiocarpa</i> , <i>Allocasuarina luehmannii</i> woodland on Cainozoic sand plains/remnant surfaces	Least Concern
11.5.20	<i>Eucalyptus moluccana</i> and/or <i>E. microcarpa</i> , <i>E. pilligaensis</i> with <i>E. crebra</i> woodland on Cainozoic sand plains.	Least Concern



RE CODE & PROPORTION OF EACH IN MULTIPLE RE POLYGONS	RE DESCRIPTION	VMA STATUS
11.4.3/11.5.20 50/50	<i>Acacia harpophylla</i> and/or <i>Casuarina cristata</i> shrubby open forest on Cainozoic clay plains. AND <i>Eucalyptus moluccana</i> and/or <i>E. microcarpa</i> / <i>E. pilligaensis</i> ± <i>E. crebra</i> woodland on Cainozoic sand plains.	Endangered
11.4.12	<i>Eucalyptus populnea</i> woodland on Cainozoic clay plains.	Endangered
11.7.4/11.7.5 90/10	<i>Eucalyptus decorticans</i> and/or <i>Eucalyptus</i> spp., <i>Corymbia</i> spp., <i>Acacia</i> spp., <i>Lysicarpus angustifolius</i> on lateritic duricrust. AND Shrubland on natural scalds on deeply weathered coarse-grained sedimentary rocks.	Least Concern
11.3.2/11.3.17 80/20	<i>Eucalyptus populnea</i> woodland on alluvial plains. AND <i>Eucalyptus populnea</i> woodland with <i>Acacia harpophylla</i> and/or <i>Casuarina cristata</i> on alluvial plains	Of Concern
11.3.2/11.3.18/11.3.4 40/35/35	<i>Eucalyptus populnea</i> woodland on alluvial plains. AND <i>Eucalyptus populnea</i> , <i>Callitris glaucophylla</i> , <i>Allocasuarina luehmannii</i> shrubby woodland on alluvium. AND <i>Eucalyptus tereticornis</i> and/or <i>Eucalyptus</i> spp. tall woodland on alluvial plains.	Of Concern
11.7.7	<i>Eucalyptus fibrosa</i> subsp. <i>nubila</i> ± <i>Corymbia</i> spp. ± <i>Eucalyptus</i> spp. on lateritic duricrust	Least Concern
11.7.4/11.7.7/11.7.5 50/40/10	<i>Eucalyptus decorticans</i> and/or <i>Eucalyptus</i> spp., <i>Corymbia</i> spp., <i>Acacia</i> spp., <i>Lysicarpus angustifolius</i> on lateritic duricrust. AND <i>Eucalyptus fibrosa</i> subsp. <i>nubila</i> ± <i>Corymbia</i> spp. ± <i>Eucalyptus</i> spp. on lateritic duricrust AND Shrubland on natural scalds on deeply weathered coarse-grained sedimentary rocks.	Least Concern
11.3.25/11.3.4/11.3.3 80/10/10	<i>Eucalyptus tereticornis</i> or <i>E. camaldulensis</i> woodland fringing drainage lines AND <i>Eucalyptus tereticornis</i> and/or <i>Eucalyptus</i> spp. tall woodland on alluvial plains AND <i>Eucalyptus coolabah</i> woodland on alluvial plains	Of Concern Sub-Dominant

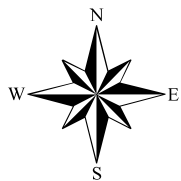
Powerlink Western Downs EIS Regional Ecosystems

Figure 10.1

-  Alignment 18 Jan Ln
-  Existing Substations
-  Existing 275 kV Line
-  Cadastre
-  Highway
-  Main Road
-  Local Road
-  Sub-station
-  Power Station

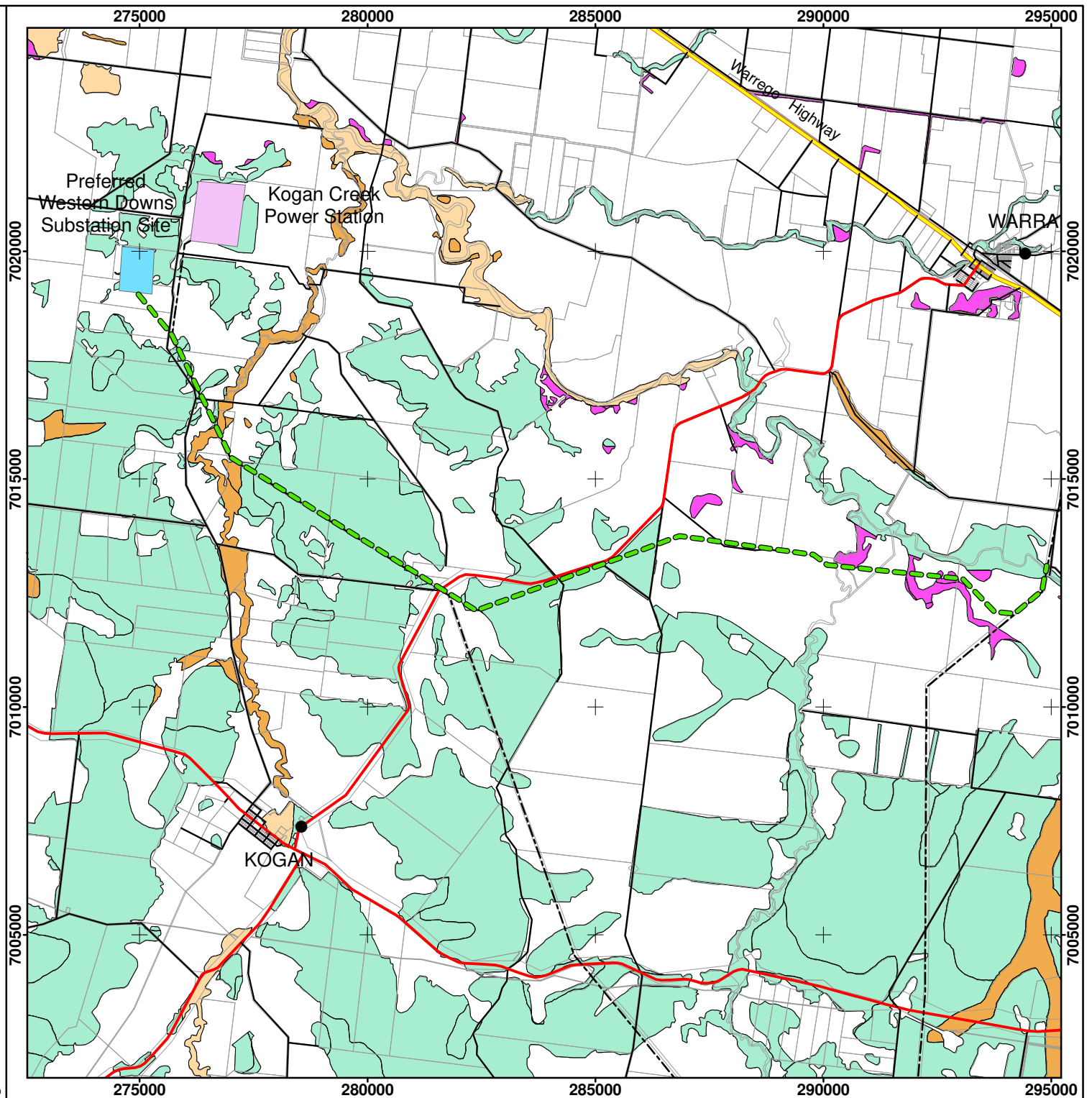
Regional Ecosystems

-  Non-remnant / regrowth
-  Endangered - Sub-dominant
-  Endangered - Dominant
-  Of Concern - Sub-dominant
-  Of Concern - Dominant
-  Not Of Concern
-  Plantation forest



0 500 1,000 2,000 3,000 4,000
Metres

Scale 1 : 120 000
Datum / Projection: GDA94 MGA Zone 56





10.2.1.2 Rare and Threatened Flora Species

The potential occurrence of significant flora and fauna species listed under the NCA and EPBC Act was assessed through a review of data obtained from the Wildlife Online and EPBC Protected Matters databases. Data derived from these databases indicates that eight nationally significant and nine state significant flora species may occur in the study area. Further assessment of the potential occurrence of these species within the study area was based on an understanding of the species' preferred habitats and knowledge of types and condition of habitat present within the study area. The likelihood of rare or threatened flora species being present in the study area is discussed in **Table 10.2**.

One significant plant species - *Philotheca sporadica* – was known by Powerlink and Conics, prior to this study, to occur in the general vicinity of the study area. Indeed, this species was recorded at two locations within the study area during the field investigations undertaken by Conics.

Several other significant species may also be present but were not detected during this study. The detectability of plants and availability of plant material required for reliable species identification (e.g. flowers and fruits) varies greatly with the time of year that sampling is undertaken and prevailing climatic conditions preceding surveys. Since the present survey was undertaken over a short period in mid-summer it should not be regarded as a comprehensive flora survey and does not provide conclusive evidence that certain species do not occur in the study area.

TABLE 10.2 **LIKELIHOOD OF SIGNIFICANT FLORA SPECIES OCCURRENCE**

SPECIES	COMMON NAME	NCA STATUS	EPBC STATUS	HABITAT	LIKELIHOOD OF OCCURRENCE
<i>Eucalyptus curtisii</i>	Plunkett Mallee	R		Sandstone ridges in woodland / open forest	Possibly occurs in western portion of alignment but only marginal habitat suitability; not observed during this study.
<i>Philotheca sporadica</i>		V	V	Condamine River catchment on soils derived from low fertility laterised Cretaceous sandstones	Several known populations in study area, including two populations on and adjacent to existing Powerlink easement
<i>Solanum papaverifolium</i>		E		Grows in heavy clay soils, sometimes as a weed of crops	Possibly occurs on floodplain soils at eastern end of Study Area but not observed during this study.



SPECIES	COMMON NAME	NCA STATUS	EPBC STATUS	HABITAT	LIKELIHOOD OF OCCURRENCE
<i>Acacia chinchillensis</i>		NT	V	Confined to sandy or gravelly soil in the Chinchilla area.	Possibly occurs in western portion of alignment but only marginal habitat suitability; not observed during this study.
<i>Cadellia pentastylis</i>	Ooline	V	V	Occurs in vine thickets or dry rainforest, and more rarely woodlands. It is a relict rainforest species and tends to favour upper and mid slope positions, often with a northerly aspect. It commonly occurs on sandy-loam to clay soils of low to medium fertility	Unlikely due to lack of suitable habitat.
<i>Dichanthium queenslandicum</i>	King Blue-grass	V	V	Confined to black clay soils that support Bluegrass communities.	Possibly occurs on floodplain soils at eastern end of Study Area but not observed during this study.
<i>Digitaria porrecta</i>	Finger Panic Grass	R	E	Grasslands and grassy woodlands, particularly Qld bluegrass communities	Possibly occurs on floodplain soils at eastern end of Study Area but not observed during this study.
<i>Diuris sheaffiana</i>	Tricolour Diuris		V	Dry sclerophyll woodland and forest among grass; often with Callitris. Soils are often sandy or lateritic and landform ranges from flat to low lateritic hills	Possible in western two-thirds of study area; not observed during this study but poor seasonal timing for this species.
<i>Homopholis belsonii</i>	Belson's Panic	E	V	Dry woodlands including Mountain Coolibah, Wilga, Poplar Box and Belah, on basaltic and other soils.	Possibly occurs on floodplain soils at eastern end of Study Area but not observed during this study.
<i>Rhaponticum australe</i>	Austral Cornflower	V	V	Grasslands and grassy woodlands on heavy soils	Possibly occurs on floodplain soils at eastern end of Study Area but not observed during this study.

(Source: Wildlife Online (EPA) & EPBC Database (DEWHA))

E = Endangered V = Vulnerable R= Rare NT= Near Threatened



10.2.1.3 Weeds of Management Concern

Three declared weed species, listed under the *Land Protection (Pest and Stock Route Management) Act 2002* (LPA), were identified during the ecological assessment. These were:

- *Opuntia tomentosa* (Velvety Tree Pear) - Class 2 Declared Plant;
- *Opuntia aurantiaca* (Tiger Pear) - Class 2 Declared Plant; and
- *Opuntia stricta* (Prickly Pear) – Class 2 Declared Plant.

These species occur as scattered individuals or small open clumps throughout the Study Alignment, both within native vegetation patches and along existing easements. Under the LPA, landowners must take reasonable steps to keep land free of Class 2 plants.

A number of other exotic plant species occur in the study area that are not declared under the LPA but some of which are considered as environmental weeds. These species are highlighted in the flora species list presented in **Appendix E**.

10.2.2 Fauna

10.2.2.1 Fauna habitats

Much of the study area is vegetated with remnant woodlands that provide habitat for a range of fauna species. Whilst historic land use activities (e.g. clearing, logging and grazing) have had a negative impact on the overall habitat condition in some of the remnant vegetation areas, these habitats remain structurally diverse and retain much of their original species composition. Several previously-cleared areas contain quite dense regrowth woodland that adds to the habitat diversity of the study area; and cleared pasture lands provide limited habitat potential for grassland-dependent species.

Throughout most of the study area, the ironbark-dominated woodland communities provide significant vertical habitat diversity with a tall eucalypt canopy, lower tree layer, shrubby understorey and grassy ground layer. Combined with generally high levels of fine organic litter and coarse woody debris, plus significant areas of rocky habitat, these habitats support a range of woodland-dependant birds (especially small passerines such as thornbills, whistlers and pardalotes), ground-dwelling reptiles (e.g. litter skinks) and macropods. The general lack of old hollow-bearing trees in the ironbark woodlands, however, is evidenced by the fact that no arboreal mammals and few hollow-dependent woodland birds were observed in the upland areas during this study.

In contrast to the ironbark woodlands on the hills, the river red gum, coolabah and box woodlands of the riparian and floodplain areas (especially along Braemar Creek) provide relatively less structural diversity but a high abundance of large, old hollow-bearing trees. These areas are inhabited by fewer woodland dependent small passerines but have a high abundance of arboreal mammals (e.g. brush-tail possum and sugar glider) and hollow-dependent birds (e.g. Australian owlet-nightjar and parrots).

Wetland habitats include ephemeral riverine environments, primarily in the major watercourses (Kogan and Braemar Creeks and Condamine River overflow channels), and an artificial lacustrine wetland behind the large dam on Braemar Creek. Some disturbance has occurred in the Kogan Creek riverine wetland due to clearing and resultant erosion and sedimentation; however, the fringing and in-stream habitat areas appear to be stabilising in



the disturbed area. The riverine wetland of Braemar Creek has a substantially altered hydrological regime due to the presence of the large dam and is probably only rarely connected to the Condamine River during large flood events. The lacustrine wetland on Braemar Creek provides a variety of wetland habitats, including deep and shallow open water, emergent aquatic vegetation and muddy margins. Numerous dead trees remain standing within the wetland, providing potential roosting, perching and nesting habitat for a range of waterbirds.

10.2.2.2 Fauna Diversity

Despite the diversity of habitats available, particularly from a structural viewpoint, overall fauna diversity appears to be relatively low throughout the study area. It must be remembered, however, that this survey was not intended to be comprehensive, and that it represents only a small temporal 'snapshot' of the local fauna. Further surveys encompassing a range of seasonal conditions, and including more comprehensive methods, may yield a higher species richness than that observed during this survey.

Eighty-three (83) vertebrate fauna species were observed in the study area, including: 60 birds, 13 mammals (including 8 bats), and 10 reptiles (see **Appendix E** for a full species list). Most of these species were found in the native woodland areas, with only a small number of disturbance-tolerant species (e.g. Australian Magpie, Crested Pigeon and Eastern Grey Kangaroo) observed in the developed farming and grazing areas.

The artificial lacustrine wetland on Braemar Creek supported only low numbers of a few wetland-dependant species (Pacific Black Duck, Grey Teal, Eastern Great Egret, White-faced Heron, Dusky Moorhen, Black-winged Stilt, Australian Reed Warbler and Water Dragon).

Reptile diversity and abundance was particularly low, despite an apparent abundance of suitable habitat for ground-dwelling species throughout the woodland areas. This result is likely due, at least in part, to the lack of trapping effort during this survey. The standard herpetological method of pitfall trapping was avoided due to time and logistical constraints, and may have yielded a greater diversity of cryptic species such as skinks, small snakes, pygopods and ground-active geckos. Furthermore, the seasonal timing of the survey may have reduced reptile observability (e.g. lack of moisture in litter and soil surface layers possibly reduced activity levels in cryptic and fossorial species).

10.2.2.3 Fauna of Conservation Significance

A desktop review of the potential for rare and threatened species to occur in the study area was based on Wildlife Online and EPBC Protected Matters database search results and local knowledge of species distributions and habitat availability. This review indicated that as many as 24 federally significant and 26 state significant fauna species may occur in the study area. The likelihood of presence of each of these species is discussed in **Table 10.3**.

One Rare species, listed under the NCA, was recorded within the study area during this survey. A single Little Pied Bat (*Chalinolobus picatus*) was captured in a harp trap in the riparian woodland on Braemar Creek, below the dam. One further potential record of the species was obtained from the Anabat echolocation call surveys of the ironbark woodland west of the Kogan-Warra Road, along the existing Powerlink easement. This record, however, was not substantiated as the call data was not sufficient to obtain a definitive identification of the bat



responsible (the call was most likely from *C. picatus* but it may have also been from the little broad-nosed bat *Scotorepens greyii*).

The little pied bat is primarily a hollow-roosting bat that depends upon the abundant presence of live and dead hollow-bearing trees to provide a range of suitable roosting and breeding sites for use throughout the year (Churchill 2008¹). It forages for insect prey around and beneath the woodland canopy and has been known to fly a round trip of some 30km between its roost and foraging area in a single night (Ford *et al.* 2008²). The capture locality for this species on Braemar Creek provides ideal habitat with abundant hollow trees and foraging habitat as well as a continuous habitat connection to the Condamine River riparian zone, which provides similar habitat.

No other significant fauna species listed under the EPBC Act or NCA were recorded during the field investigations.

¹ Churchill, S. (2008). *Australian Bats*. Allen & Unwin, Sydney.

² Ford, G.I., Pennay, M., Young, R.A. & Richards, G.C. (2008). Little Pied Bat *Chalinolobus picatus* pp.539-540 in *The Mammals of Australia* Third Edition (S. van Dyck & R. Strahan, ed.), New Holland Publishers, Sydney.



TABLE 10.3 **LIKELIHOOD OF OCCURRENCE OF THREATENED FAUNA SPECIES**

SPECIES	COMMON NAME	NCA STATUS	EPBC STATUS	HABITAT	LIKELIHOOD OF OCCURRENCE
Reptiles					
<i>Acanthophis antarcticus</i>	Common Death Adder	R	-	Favours undisturbed habitat in open woodland, scrub and heathland areas.	Suitable habitat available in study area; possibly present, particularly in ironbark woodlands.
<i>Furina dunmali</i>	Dunmall's Snake	V	V	Prefers Brigalow (<i>Acacia harpophylla</i>) forest and woodland growing on cracking black clay and clay loam soils on the Darling Downs.	May be present - potential habitat occurs on floodplain areas in eastern portion of study area.
<i>Hemiaspis damelii</i>	Grey Snake	E	-	Favours cracking flood-prone soils in the Brigalow Belt. Shelters in soil cavities.	May be present - potential habitat occurs on floodplain areas in eastern portion of study area.
<i>Anomalopus mackayi</i>	Five-clawed Worm-skink	E	V	Natural grasslands on deep cracking clays.	Low probability of occurrence, although marginal habitat present on heavier soils in eastern portion of study area.
<i>Egernia rugosa</i>	Yakka Skink	V	V	Usually found in open dry sclerophyll forest or woodland. The core habitat of this species is within the Mulga Lands and Brigalow Belt South Bioregions. Yakka Skinks occur in a wide variety of vegetation types including Poplar Box (<i>Eucalyptus populnea</i>), Ironbark (<i>Eucalyptus</i> spp.), Brigalow (<i>Acacia harpophylla</i>) and White Cypress Pine (<i>Callitris</i> spp.).	Potentially suitable habitat occurs within study area; possibly present.
<i>Delma torquata</i>	Collared Delma	V	V	Currently known from only four sites: Mount Crosby, Lake Manchester, Karana Downs and the Bunya Mts. In general, the species occurs on rocky hillsides on basalt and lateritic soils supporting open eucalypt and Acacia woodland with a sparse understorey of shrubs and tussocks or semi-evergreen vine thicket.	Potentially suitable habitat occurs within study area; possibly present.
<i>Paradelma orientalis</i>	Brigalow Scalyfoot	V	V	Woodland and open forest including ironbark, box, cypress, bulloak and brigalow on variety of substrates from cracking clays to loamy, sandy and rocky areas.	Potential habitat occurs throughout study area, particularly in hilly ironbark woodlands.



SPECIES	COMMON NAME	NCA STATUS	EPBC STATUS	HABITAT	LIKELIHOOD OF OCCURRENCE
<i>Tympanocryptis pinguicollis</i>	Grassland Earless Dragon	E	V	All specimens are known from highly modified agricultural land. Large areas of native and introduced grasses existing as headlands, and along drainage lines are a feature of the farmlands where the dragon exists. Soils are essentially black, cracking clays of the Condamine River flood plain.	May be present - potential habitat occurs on floodplain areas in eastern portion of study area.
Frogs					
<i>Cyclorana verrucosa</i>		R	-	Heavy cracking soils in Brigalow Belt	Potentially suitable habitat present; very likely to occur in study area.
Birds					
<i>Anthochaera phrygia</i>	Regent Honeyeater	E	E	Eucalypt woodlands typified by box and ironbark species, particularly on the western slopes of the Great Dividing Range	Marginal habitat present and may occur sporadically when ironbark woodlands are in flower
<i>Apus pacificus</i>	Fork-tailed Swift	-	M	Low to very high airspace over varied habitat, rainforest to semi-desert.	Possible fly-over
<i>Ardea alba</i>	Great Egret	-	M	Wetlands, flooded pastures, dams, estuarine mudflats, mangroves and reefs.	Probable intermittent occurrence on dams watercourses; observed during survey at "Tong Park" lake.
<i>Ardea ibis</i>	Cattle Egret	-	M	Wide range of open habitats from grazing paddocks to wetlands and tidal mudflats.	Probable intermittent occurrence at dams and on floodplains
<i>Lophoictinia isura</i>	Square-tailed Kite	R	-	Eucalyptus woodland, open forest and heath-woodland.	Possible occurrence.
<i>Erythrorhynchus radiatus</i>	Red Goshawk	E	V	Open forests, woodlands especially near rivers, wetlands, rainforest fringes	Remote possibility
<i>Gallinago hardwickii</i>	Latham's snipe	-	M	Soft wet ground or shallow tussocks and other green or dead growth.	Possible intermittent occurrence, particularly at the lacustrine wetland on "Tong Park"
<i>Geophaps scripta scripta</i>	Squatter Pigeon	V	V	Grassy understorey of eucalypt woodland, usually with ready access to water	Potentially suitable habitat but unlikely to be present
<i>Grantiella picta</i>	Painted Honeyeater	R	-	Species is found in dry open forests and woodlands, and is strongly associated with mistletoe. It may also be found along rivers, on plains with scattered trees and on farmland with remnant vegetation.	Probably moves through the study area when suitable habitat/seasonal conditions prevail.



SPECIES	COMMON NAME	NCA STATUS	EPBC STATUS	HABITAT	LIKELIHOOD OF OCCURRENCE
<i>Melithreptus gularis</i>	Black-Chinned Honeyeater	R	-	Occupies mostly upper levels of drier open forests or woodlands dominated by box and ironbark eucalypts. It is often found along waterways, especially in arid and semi-arid areas and in northern Australia.	Possible intermittent occurrence along major watercourses.
<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle	-	M	Usually coastal, over islands, reefs, headlands, beaches, bays, estuaries, mangroves, seasonally flooded inland swamps, lagoons and floodplains.	Probable intermittent occurrence, particularly at the lacustrine wetland on "Tong Park" and along the Condamine River
<i>Hirundapus caudacutus</i>	White-throated Needletail	-	M	High open spaces above almost any habitat.	Probably fly-over
<i>Lathamus discolor</i>	Swift Parrot	E	E	Eucalypt forests and woodlands, plantations and banksias	Possible sporadic occurrence when ironbark in flower
<i>Calyptorhynchus lathamii</i>	Glossy Black-Cockatoo	V	-	Forests and woodlands with abundant Casuarina trees.	Possible occurrence in ironbark country but habitat marginal
<i>Lophochroa leadbeteri</i>	Major Mitchell's Cockatoo	V	-	Open, sparsely timbered grasslands, drier farmlands with well-treed paddocks, Callitris and Casuarina country.	Highly improbable
<i>Neophema pulchella</i>	Turquoise Parrot	R	-	Woodland and open grassland, natural or partially cleared.	Highly improbable
<i>Merops ornatus</i>	Rainbow Bee-eater	-	M	Open country of woodlands, open forest, semi-arid scrub, grasslands, clearings in heavier forests and farmlands.	Probably move through on annual migration; observed during survey
<i>Nettapus coromandelianus</i>	Cotton Pygmy-Goose	R	M	Deeper freshwater swamps, lagoons, dams.	Possible intermittent occurrence at lacustrine wetland on "Tong Park"
<i>Neochima ruficauda</i> <i>ruficauda</i>	Star Finch	E	E	Swamp vegetation, open grassland with sparse vegetation, cultivated land.	Unlikely due to lack of suitable habitat. Probably locally extinct
<i>Rostratula australis</i>	Australian Painted Snipe	-	V	Well vegetated shallows and margins of wetlands and other water courses.	Possible intermittent occurrence at lacustrine wetland on "Tong Park"
Mammals					
<i>Chalinolobus dwyeri</i>	Large-eared Pied Bat	R	V	Caves and mines in dry sclerophyll forests and woodlands as well as higher altitude moist eucalypt forest and edges of rainforest.	Unlikely - lack of suitable habitat.
<i>Chalinolobus picatus</i>	Little Pied Bat	R	-	Dry eucalypt woodlands and forests, brigalow, cypress, bullock, mulga woodlands	Suitable habitat present; recorded in study area during this survey.



SPECIES	COMMON NAME	NCA STATUS	EPBC STATUS	HABITAT	LIKELIHOOD OF OCCURRENCE
<i>Dasyurus hallucatus</i>	Northern Quoll	-	E	Variety of vegetation types, but particularly in rocky eucalypt woodlands and near creeks.	Unlikely – study area is well south of known range
<i>Nyctophilus corbeni</i> Formerly <i>N. timoriensis</i> (South-eastern form)	Eastern Long-eared Bat	V	V	A range of dry woodland and shrubland communities, roosts mainly in tree hollows, forages low amongst the canopy and shrub layers.	Possibly present in extensive woodland areas but habitat only marginal suitability
Ray-finned fishes					
<i>Maccullochella peelii peelii</i>	Murray Cod	-	V	Prefers deep holes with abundant snags in slow-moving rivers	Probably in Condamine River but unlikely to occur in other watercourses that intersect study alignment
Insects					
<i>Hypochrysops piceata</i>	Bullock Jewel Butterfly	E	-	Bullock forest and woodland	Potentially suitable habitat available and may be present in study area.
<i>Jalmenus eubulosa</i>	Pale Imperial Hairstreak	V	-	Brigalow and yarran forests and woodlands	Small areas of potentially suitable habitat available; remote possibility of presence in study area.



10.2.2.4 Introduced Fauna

Five introduced fauna species - Fox (*Vulpes vulpes*), Indian Mynah (*Sturnus tristis*), Cat (*Felis catus*), Rabbit (*Oryctolagus cuniculus*) and Brown Hare (*Lepus europaeus*) - were identified in the study area during the field surveys. It is highly likely that Pig (*Sus scrofa*) and Cane Toad (*Rhinella marinus*) also inhabit parts of the study area. All of these feral species may impact upon local native fauna through predation and competition for resources.

10.3 POTENTIAL IMPACTS AND MITIGATION

The impacts to flora and fauna from the construction and operation of this transmission line are largely associated with the clearing of native vegetation. Where the new transmission line is proposed to follow the existing Powerlink line, it is anticipated that the easement will be widened by up to 40m, necessitating the removal of about 30ha of remnant vegetation. New easement clearing, to a width of c. 60m, will be required through several remnant vegetation areas that are relatively undisturbed at present, resulting in the loss of a further c. 25ha.

10.3.1 Flora Impacts and Mitigation

10.3.1.1 Construction Phase Impacts - Flora

The construction of the new transmission line may result in negative impacts to the Regional Ecosystems and threatened flora that occur within the proposed alignment area. The key anticipated impacts of construction include:

- Reduced area of “Of Concern” and “Endangered” RE;
- Reduced habitat for threatened plant species;
- Direct impacts on threatened plant species (e.g. damage, death, reduced populations).

Most of the vegetation to be cleared is “Not of Concern” RE and represents a very small proportion of the large tracts of similar vegetation adjacent to the alignment. There is, however, a small area (c. 1ha) of “Of Concern” RE 11.3.2 woodland that is likely to be cleared at the Kogan Creek crossing. Relocation of the proposed alignment has occurred to minimise disturbance of patches of Endangered RE 11.3.1 and 11.4.3 and habitat at Braemar Creek at the eastern end of the alignment.

Direct loss of individual plants or populations is a significant issue for the construction phase, particularly with regard to rare and threatened species known to be present in the study area. The primary concern in this regard will be the two populations of *Philotheca sporadica* on and adjacent to the existing easement at Sites WDH04 and WD07 (see **Figure 10.2**). Construction activities such as indiscriminate clearing, vehicle movement, mulching and tower installation may kill, remove or damage individual *P. sporadica* plants and/or reduce the size of these populations.

The loss of native vegetation cover and disturbances to soil also increases the opportunities for weed species to invade the site and encroach into surrounding bushland. Machinery and vehicles may also import weed species on to the site during site construction activities. Environmental weeds may compromise the condition and integrity of surrounding bushland if not managed appropriately.



10.3.1.2 Operational Phase Impacts - Flora

The impacts of transmission line operation are largely associated with vehicle traffic and vegetation management along the easement, plus potential bushfire hazard.

Vehicle activity may damage individual threatened plants (*P. sporadica*), but the anticipated low vehicle activity during the operational phase is unlikely to be a significant concern.

Vegetation management activities (e.g. cutting, poisoning and mulching of regrowth) have the potential to damage individual threatened plants and/or reduce threatened plant populations.

The transmission line may provide a potential fire source, thereby posing a potential bushfire risk to surrounding vegetation. The onset of a bushfire could result in threatened plant mortalities as well as loss and degradation of habitats and/or threatened plant populations.

10.3.1.3 Flora Impact Mitigation

An Environmental Work Plan (EWP) will be prepared for the transmission line to address the clearing of vegetation and protection of threatened flora species on the proposed easement.

Threatened plants (*P. sporadica*) need careful management during clearing and construction operations. All individuals likely to fall within the construction zone should be identified and clearly marked. Clearing operations in the vicinity of the populations should be done by hand in a way that reduces the likelihood of damaging or removing *P. sporadica* plants. Contractors, staff and visitors likely to be working in the area containing threatened plant populations should be advised during the induction process of the location identification and management requirements of the species. Ongoing vegetation management during the operational phase should adopt similar practices to avoid damage or loss of *P. sporadica* plants.

Where possible, any clearing as a result of the construction of the transmission line will be undertaken in a manner that will minimise any impacts to the small patches of “Endangered” RE at the eastern end of the alignment. Any clearing which must occur, should be undertaken carefully to minimise the overall area of clearing necessary. This is possible by siting towers close to these areas in order to allow lower growing species to be retained under the line, selective lopping and a minimal clearing width.

All vehicles should be free of weeds prior to entering and exiting the site to prevent the spread of weed species. Washdown facilities should be provided and frequent inspections should be undertaken by suitably qualified staff.

All works are to be undertaken in accordance with the EMP (see **Appendix G**).



10.3.2 Fauna Impacts and Mitigation

10.3.2.1 Construction Phase Impacts - Fauna

The construction of the new transmission line may result in negative impacts to the ecosystems, habitats and species that occur within the proposed alignment area. The key anticipated impacts of construction include:

- Habitat loss;
- Habitat fragmentation; and
- Direct impacts on rare or threatened species (e.g. injury, death, reduced populations).

These impacts are largely associated with the clearing of native vegetation. Where the new transmission line is proposed to follow the existing Powerlink line, it is anticipated that the easement will be widened by up to 40m, necessitating the removal of about 30ha of remnant vegetation. New easement clearing, to a width of c. 60m, will be required through several remnant vegetation areas that are relatively undisturbed at present, resulting in the loss of a further c. 25ha.

The required vegetation clearing will reduce habitat availability for wildlife in the study area; however, given the extent of adjoining remnant vegetation along most of the alignment, this loss of habitat will be relatively minor. Habitat loss due to clearing will be most significant in relation to the riparian areas that support a relatively high abundance of mature hollow-bearing trees. Of greatest concern in this regard would be any clearing in the river red gum/coolabah/poplar box community on Braemar Creek (Site WD14; see **Figure 10.2**), where the rare Little Pied Bat was recorded. Through this area, the alignment has been relocated to the south to avoid this community.

The fragmentation effect caused by enlarging the existing easement by a further 40m is also a significant concern from a wildlife perspective. The resultant gap in vegetation canopy (approximately 90m) will further impact on the ability of less mobile species (e.g. small mammals and reptiles) to disperse between the woodlands on either side of the easement. The overall impact of this fragmentation will, however, be lessened by the provision and maintenance of ground cover through mulching, as has been done on the existing easement. The wide canopy gap may also impact negatively on the ability of gliders (e.g. sugar glider) to move between remnant vegetation areas; however, no gliders were observed along the existing easement during the Conics surveys. If gliders are present in the area subject to easement widening, it is expected their densities are very low and the resultant fragmentation impacts, are likely to be minor.

Direct loss of individual animals is a significant issue for the construction phase, particularly with regard to rare and threatened species known or likely to be present in the study area. Clearing of hollow-bearing trees has the potential to harm roosting bats, such as the rare Little Pied Bat, and other hollow-dwelling species (e.g. birds, gliders and reptiles).

Construction traffic may also injure fauna during site construction activities. In particular, less mobile and nocturnal species are highly susceptible during construction as they may lack the opportunity to migrate to safe habitats.



10.3.2.2 Operational Phase Impacts - Fauna

The impacts of transmission line operation are largely associated with vehicle traffic and vegetation management along the easement, plus potential bushfire hazard.

Vehicles provide a potential source of fauna injury or death due to collision and crushing; however, the frequency and intensity of vehicle traffic along the easement is likely to be very low and poses only a minor threat in this regard.

Vegetation management activities (e.g. cutting, poisoning and mulching of regrowth) will maintain a large gap between remnant vegetation areas, therefore continually restricting fauna movement capabilities. Vegetation management operations also have the potential to damage or kill individual threatened animals (e.g. ground-dwelling reptiles) through crushing by machinery.

10.3.2.3 Fauna Impact Mitigation

Vegetation clearing should be undertaken in a manner that reduces potential injuries and mortalities to fauna. It is recommended that areas to be cleared should be surveyed by the project environmental officer, a spotter catcher or ecologist within 24 hours prior to clearing to identify habitat trees that could be occupied by fauna. These trees should be clearly marked and retained during the clearing phase until fauna has had the opportunity to move into nearby habitat on their own accord. Habitat trees could be gently disturbed (e.g. by bumping with machinery or knocking with a hammer) to warn residents of impending clearing and encourage them to move to alternative habitat. Clearing should also be undertaken in the presence of a fauna spotter/catcher to ensure disturbed and/or injured animals are appropriately managed.

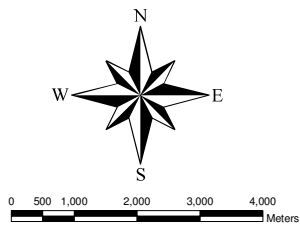
Where possible, vegetation management during construction and operation of the transmission line should aim to retain and/or enhance ground-level habitat within the easement. This could be achieved through mulching cleared vegetation and leaving areas of coarse debris and low-growing understorey plants to provide dispersal and shelter opportunities for fauna.

Appropriate traffic management should be implemented during construction and operation. All vehicles, except in the event of an emergency, should be restricted to designated access tracks with a maximum speed limit of 40km/hr. Signs should be erected to notify of speed limits and the potential presence of wildlife.

All works are to be undertaken in accordance with the EMP (see **Appendix G**).

Powerlink
 Western Downs EIA
 Key Sites and EVR
 Figure 10.2

-  Survey Sites and EVR
-  Study Alignment
-  Existing 275 kV Line
-  Highway
-  Main Road
-  Local Road
-  Watercourse
-  Cadastre
-  Power Station
-  Sub-station



Scale 1 : 120 000
Datum / Projection: GDA94 MGA Zone 56

