Chapter 10

Fauna

10.0 Fauna

10.1 Existing Environment

This chapter provides an assessment of fauna values associated with the proposed transmission line and substation sites. References to the Draft Alignment in this Chapter refer to the entire Project (i.e. transmission line, Copperfield River substation and Mount Fox substation). Where the transmission line easement corridor, Mount Fox substation or Copperfield River substation is differentiated in this Chapter, values apply in those areas respectively. Detailed ecology survey reports are provided in Appendix E Ecology (Substation) Technical Report and Appendix F Ecology (Transmission Line) Technical Report, and summarised within this Chapter. Sources of information in relation to the Project elements are detailed below.

- Mount Fox Substation Ecology Technical Report (Appendix E Ecology (Substation) Technical Report)
- Transmission Line Ecology Technical Report (Appendix F Ecology (Transmission Line) Technical Report)
- Copperfield River substation: Fauna Technical Report, Kidston Solar Stage Two (AECOM, 2018)

Detailed ecology information for the proposed Copperfield River Substation and surrounding area has been taken from the above report completed for Genex's proposed Kidston Solar Farm Stage Two Project.

The Draft Alignment also includes a short 6km transmission line connection from the Copperfield River substation to Genex's proposed Kidston Solar Farm Stage Two substation and Kidston Pumped Storage Hydro substation. The Draft Alignment in this location traverses the Kidston Mining Lease (ML3347) held by Kidston Gold Mines Limited, a Genex company. The site is heavily disturbed due to previous mining activity, and the fauna values are limited. Fauna values associated with this short connection are therefore not considered further in this chapter.

10.1.1 Methodology

Fauna values associated with the Draft Alignment have been assessed through a range of methodologies. Methodologies employed include the following.

- Desktop assessment to characterise and identify potential fauna species and their habitat that may be present within the Draft Alignment. The desktop assessment included a review of literature, and searches of publicly available datasets and online mapping.
- Field surveys to undertake habitat assessments, and identify conservation significant species present or likely to be present within the Draft Alignment. Four surveys targeting fauna values have been undertaken. The baseline sampling of fauna species was undertaken using standard methodologies for the systematic survey of terrestrial fauna in Queensland (Eyre *et al.*, 2014) as well as a number of non-standard observational methods. Methods employed during the field program included fauna habitat assessments; active searches; microchiropteran bat call detection; camera traps; spotlighting; visual and auditory identification surveys of birds; and incidental observations.
- A likelihood of occurrence assessment for conservation significant fauna species identified during the desktop review was undertaken. The assessment considered known habitat and ecological requirements of the conservation significant species against the vegetation communities and habitat values identified in the field surveys.
- Potential habitat maps for the conservation significant fauna species identified as having a likelihood presence of 'high' or 'known' have been created to identify potential habitat across the Draft Alignment.

Further detail on methodology is provided within the full ecology survey reports in Appendix E Ecology (Substation) Technical Report and Appendix F Ecology (Transmission Line) Technical Report. Results of this assessment are presented in this chapter.

10.1.2 Desktop assessment results

10.1.2.1 Conservation significant fauna

The desktop assessment identified 31 conservation significant fauna species with the potential to occur within the Draft Alignment, including 11 bird, 14 mammal, 3 reptile and 3 amphibian species. These species and their respective conservation status under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and *Nature Conservation Act 1992* (NC Act) are detailed in Table 10-1 below. Table 10-1 presents results for the transmission line, Mount Fox substation and Copperfield River substation.

10.1.2.2 Migratory fauna

The desktop assessment identified 16 migratory species with the potential to occur within the Draft Alignment, including 1 migratory marine bird, 9 migratory terrestrial and 6 migratory wetland species. These species and their respective conservation status under the EPBC Act and NC Act are detailed in Table 10-2 below.

10.1.2.3 Essential habitat

The eastern end (Mount Fox end) of the transmission line intersects an area mapped as essential habitat for the Sharman's rock-wallaby (*Petrogale sharmani*) (Figure 10-1). Essential habitat for the black-throated finch (southern) (*Poephila cincta cincta*) and the short-beaked echidna (*Tachyglossus aculeatus*) also occurs close to the transmission line (Figure 10-1).

No essential habitat is mapped in proximity to the Mount Fox substation or the Copperfield River substation site.

10.1.2.4 Biodiversity and conservation values

Biodiversity significance is attributed by DES on a bioregional scale through a Biodiversity Planning Assessment (BPA). BPAs assign three levels of overall biodiversity significance:

1. State significance - areas assessed as being significant for biodiversity at the bioregional or state scales. They also include areas assessed by other studies/processes as being significant at national or international scales.
2. Regional significance - areas assessed as being significant for biodiversity at the subregional scale. These areas have lower significance for biodiversity than areas assessed as being of State significance.
3. Local significance and/or other values - areas assessed as not being significant for biodiversity at state or regional scales. Local values are of significance at the local government scale.

An analysis of the BPA for the Einasleigh Uplands bioregion shows that the transmission line is within areas of ‘State significance’, ‘regional significance’ and ‘local significance and/or other values’ (Figure 10-2).

The Queensland Government has identified Bioregional State Wildlife Corridors across Queensland. These are not statutory areas, but are priority conservation areas to be accorded special consideration when development applications are lodged. The transmission line intersects State-wide ecological corridors, which are illustrated in Figure 10-2 and are described as follows.

- A terrestrial corridor that runs from Undara Volcanic National Park to Blackbraes National Park, west of Greenvale.
- A terrestrial corridor that runs along the east coast of Queensland, from Lakefield to Mackay.
- Riparian corridors along the Copperfield River, the Einasleigh River, Lee (McKinnons) Creek, Gray Creek, the Burdekin River and Douglas Creek.

There is currently no BPA for the Wet Tropics bioregion for the Mount Fox substation site. DES is currently undertaking a BPA assessment for this bioregion which is expected to be released in November 2018. The Copperfield River substation site intersects with local significance areas only.

Table 10-1 Desktop Results for Conservation Significant Fauna (TL = Transmission Line; MF = Mount Fox Substation Site; CR = Copperfield River Substation Site).

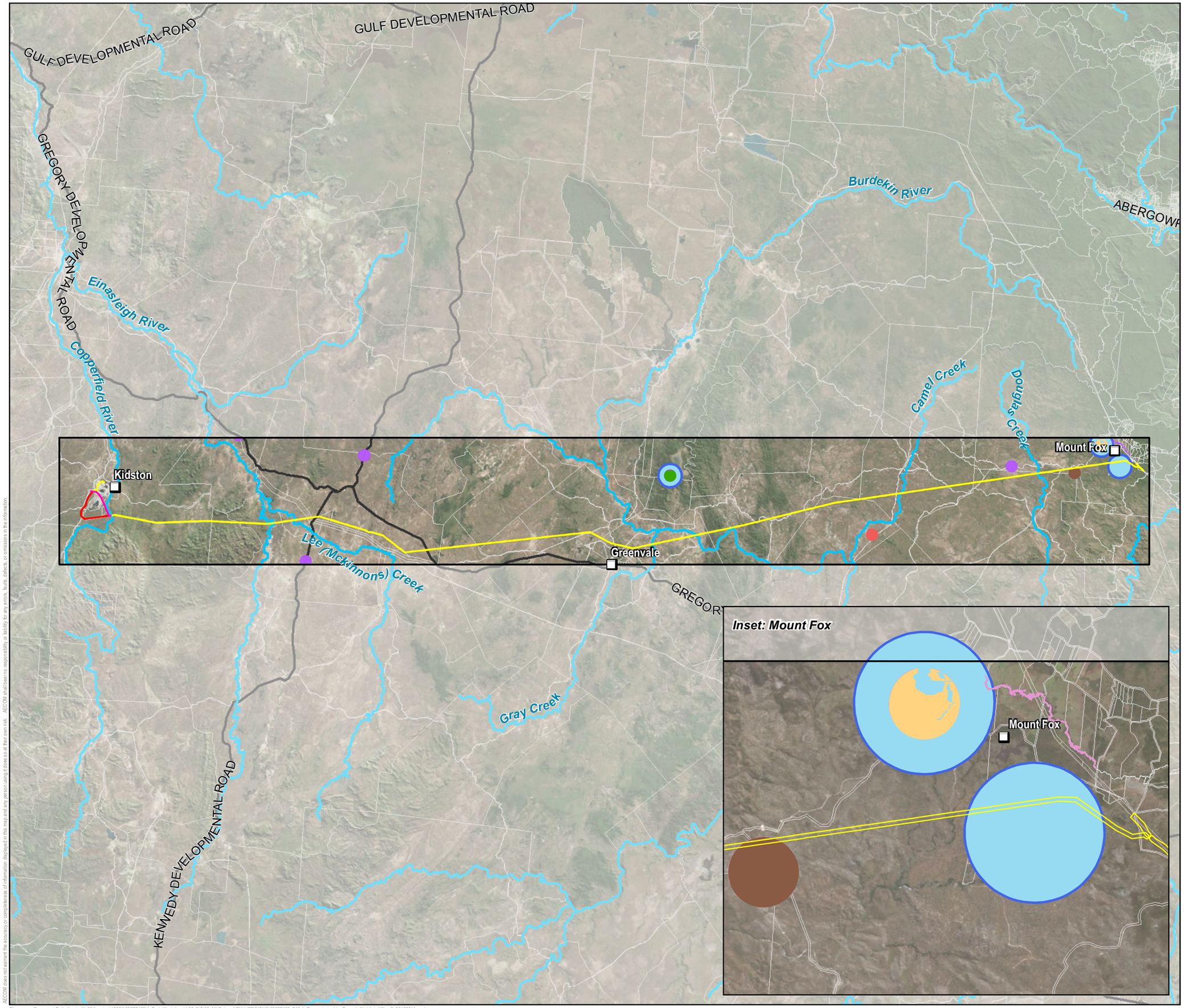
Common Name	Scientific Name	EPBC Act	NC Act	TL	MF	CR
Birds						
Curlew sandpiper	*Calidris ferruginea*	Critically Endangered	Endangered	✓	✓	✓
Southern cassowary	*Casuarius casuarius johnsonii*	Endangered	Vulnerable	✓	✓	X
Red goshawk	*Erythrotriorchis radiatus*	Vulnerable	Endangered	✓	✓	✓
Gouldian finch	*Erythrura gouldiae*	Endangered	Endangered	✓	X	✓
Grey falcon	*Falco hypoleucos*	-	Vulnerable	✓	✓	X
Squatter pigeon (southern)	*Geophaps scripta scripta*	Vulnerable	Vulnerable	✓	X	X
Painted honeyeater	*Grantiella picta*	Vulnerable	Vulnerable	✓	X	X
Eastern curlew	*Numenius madagascariensis*	Critically Endangered	Endangered	✓	✓	X
Black-throated finch (southern)	*Poephila cincta cincta*	Endangered	Endangered	✓	✓	✓
Australian painted snipe	*Rostratula australis*	Endangered	Vulnerable	✓	✓	✓
Masked owl (northern)	*Tyto novaehollandiae kimberli*	Vulnerable	Vulnerable	✓	✓	✓
Mammals						
Northern bettong	*Bettongia tropica*	Endangered	Endangered	X	✓	X
Northern quoll	*Dasyurus hallucatus*	Endangered	-	✓	✓	✓

Common Name	Scientific Name	EPBC Act	NC Act	TL	MF	CR
Spotted-tailed quoll	*Dasyurus maculatus gracilis*	Endangered	Endangered	✓	X	X
Semon's leaf-nosed bat	*Hipposideros semoni*	Vulnerable	Endangered	✓	✓	X
Ghost bat	*Macroderma gigas*	Vulnerable	Endangered	✓	✓	✓
Black-footed tree-rat	*Mesembriomys gouldii rattoides*	Vulnerable	-	✓	✓	✓
Greater glider	*Petauroides volans*	Vulnerable	Vulnerable	✓	✓	✓
Sharman's rock-wallaby	*Petrogale sharmani*	Vulnerable	Vulnerable	✓	✓	X
Koala	*Phascolarctos cinereus*	Vulnerable	Vulnerable	✓	✓	✓
Spectacled flying-fox	*Pteropus conspicillatus*	Vulnerable	Vulnerable	✓	✓	X
Grey-headed flying-fox	*Pteropus poliocephalus*	Vulnerable	-	✓	✓	X
Large-eared horseshoe bat	*Rhinolophus philippinensis*	Vulnerable	Endangered	✓	✓	✓
Bare-rumped sheath-tailed bat	*Saccolaimus saccolaimus nudicluniatus*	Vulnerable	Endangered	✓	✓	✓
Chestnut dunnart	*Sminthopsis archeri*	-	Near Threatened	✓	X	X
Short-beaked echidna	*Tachyglossus aculeatus*	-	Special Least Concern	✓	✓	X
Reptiles						
Common death adder	*Acanthophis antarcticus*	-	Vulnerable	✓	✓	X
Saltwater crocodile	*Crocodylus porosus*	Migratory	Vulnerable	✓	X	X

Common Name	Scientific Name	EPBC Act	NC Act	TL	MF	CR
Yakka Skink	*Egernia rugosa*	Vulnerable	Vulnerable	✓	✓	X
Mount Cooper striped lerista	*Lerista vittata*	Vulnerable	Vulnerable	X	X	✓
Amphibians						
Australian lace-lid	*Litoria dayi*	Endangered	Endangered	✓	✓	X
Waterfall frog	*Litoria nannotis*	Endangered	Endangered	✓	✓	X
Common mistfrog	*Litoria rheocola*	Endangered	Endangered	✓	X	X

Table 10-2 Desktop Results for Migratory Fauna (TL = Transmission Line; MF = Mount Fox Substation Site; CR = Copperfield River Substation Site).

Common Name	Scientific Name	EPBC Act	NC Act	TL	MF	CR
Migratory Marine Birds						
Fork-tailed swift	*Apus pacificus*	Migratory	Special Least Concern	✓	✓	✓
Migratory Terrestrial Species						
Oriental cuckoo	*Cuculus optatus*	Migratory	Special Least Concern	✓	✓	✓
White-throated needletail	*Hirundapus caudacutus*	Migratory	Special Least Concern	✓	✓	X
Barn swallow	*Hirundo rustica*	Migratory	Special Least Concern	✓	✓	✓
Black-faced monarch	*Monarcha melanopsis*	Migratory	Special Least Concern	✓	✓	X
Grey wagtail	*Motacilla cinerea*	Migratory	Special Least Concern	✓	✓	✓
Yellow wagtail	*Motacilla flava*	Migratory	Special Least Concern	✓	✓	✓
Satin flycatcher	*Myiagra cyanoleuca*	Migratory	Special Least Concern	✓	✓	X
Rufous fantail	*Rhipidura rufifrons*	Migratory	Special Least Concern	✓	✓	X
Spectacled monarch	*Symposiarchus trivirgatus*	Migratory	Special Least Concern	✓	✓	X
Migratory Wetland Species						
Common sandpiper	*Actitis hypoleucos*	Migratory	Special Least Concern	✓	✓	✓
Sharp-tailed sandpiper	*Calidris acuminata*	Migratory	Special Least Concern	✓	✓	✓
Pectoral sandpiper	*Calidris melanotos*	Migratory	Special Least Concern	✓	✓	✓
Latham's snipe	*Gallinago hardwickii*	Migratory	Special Least Concern	✓	✓	✓
Osprey	*Pandion haliaetus*	Migratory	Special Least Concern	✓	✓	✓
Common greenshank	*Tringa nebularia*	Migratory	Special Least Concern	✓	X	X



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Kilometers

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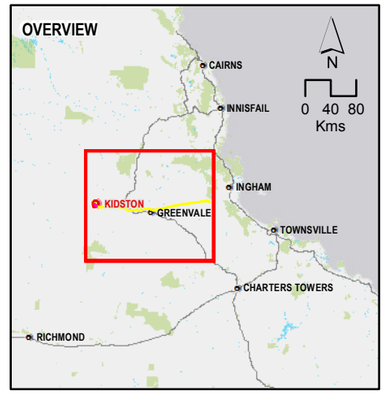
Legend

- Point Of Interest
- Major Roads
- Major Watercourses
- Regional Context Area
- Draft Alignment
- Draft Alignment A
- Draft Alignment B
- Flora Survey Trigger Area

Essential Habitat

- *Acacia tingoorensis (Tingoora wattle)*
- *Lepturus minutus*
- Sharman's rock-wallaby *(Petrogale sharmani)*
- Black-throated finch *(southern) (Poephila cincta cincta)*
- Short-beaked echidna *(Tachyglossus aculeatus)*



Data sources:
DCDB, Watercourses - DNRM 2017
Wildlife Habitat, Essential Habitat - DEHP 2017
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TRANSMISSION LINE MAPPED ESSENTIAL HABITAT

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Figure F10-1

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- Places
- Major Watercourses
- Regional Context Area
- National Park
- Draft Alignment
- Draft Alignment A
- Draft Alignment B

Biodiversity Significance Einasleigh Uplands

- State Significance
- Regional Significance
- Local Significance

Statewide Ecological Corridors

- Terrestrial
- Riparian

Data sources:
DCDB, Watercourses - DNRM 2017
Biodiversity Planning Assessment, Statewide Ecological Corridors - DEHP 2017
Site Features and Layout - AECOM 2018
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Figure
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10.1.3 Field survey results

Due to landholder access restrictions, Lot 5234 SP275834 and Lot 1 OC64 have only been surveyed where public roads cross the Draft Alignment. All other properties traversed the Draft Alignment have been assessed during at least one of the field surveys. On the basis of the above, this Draft EAR adopts a conservative mitigation and impacts assessment regime for Lot 5234 SP275834 and Lot 1 OC64, meaning that it has been assumed certain fauna species may be present and measures are proposed to mitigate potential impacts.

10.1.3.1 Conservation significant fauna

Four conservation significant fauna species were recorded during the field surveys for the transmission line.

- Squatter pigeon (southern) (*Geophaps scripta scripta*), listed as Vulnerable under the EPBC Act and the NC Act.
- Sharman's rock-wallaby (*Petrogale sharmani*), listed as Vulnerable under the EPBC Act and the NC Act.
- Greater glider (*Petauroides volans*), listed as Vulnerable under the EPBC Act and the NC Act.
- Short-beaked echidna (*Tachyglossus aculeatus*), listed as Special Least Concern under the NC Act.

The locations in which the above species were recorded are shown in Figure 10-3. No migratory fauna were identified during the field surveys.

No conservation significant fauna species were identified within the Project site during the field survey for the Mount Fox substation site.

Field surveys of the Kidston Stage Two solar farm footprint identified Koala as being present within the wider Project footprint. Evidence of Koala activity was found within the riparian corridors of the wider area. No Koala was observed immediately within the Copperfield River substation area.

10.1.3.2 Habitat values

Eight dominant habitat types were recorded across the proposed transmission line corridor (Table 10-3; Figure 10-3). A detailed description of each habitat type is presented in Appendix F Ecology (Transmission Line) Technical Report.

Table 10-3 Fauna habitat types – transmission line

Habitat Type	Habitat Summary	Analogous REs	Area (ha) within Project Site Option A	Area (ha) within Project Site Option B
1	Open *Eucalyptus* Woodland on Alluvium or Sand Plains	9.3.3a, 9.3.5, 9.3.6a, 9.3.16, 9.3.20, 9.3.22a, 9.5.3, 9.5.11	311.3	311.3
2	Open *Eucalyptus*, *Casuarina* and *Melaleuca* Riparian Woodland	9.3.1, 9.3.13	57.0	58.1
3	Native Grassland	9.3.25, 9.8.13	4.7	4.7
4	Low Open Forest of *Acacia shirleyi* and *Eucalyptus persistens* on Laterite	9.7.1, 9.7.2	302.1	302.3
5	Open Woodland of *Eucalyptus* and *Corymbia* on Basalt	7.8.18, 9.8.1, 9.8.4	82.5	82.6

Habitat Type	Habitat Summary	Analogous REs	Area (ha) within Project Site Option A	Area (ha) within Project Site Option B
6	Woodland of *Eucalyptus* and *Corymbia* on Metamorphic Hills	9.11.1a, 9.11.2a, 9.11.5, 9.11.15a, 9.11.16, 9.11.23b	802.6	768.0
7	*Eucalyptus and Corymbia* Woodland on Igneous Hills and/or Granite	7.12.29, 9.12.1a, 9.12.10, 9.12.12, 9.12.16, 9.12.26, 9.12.32	139.1	227.7
8	Non-remnant Vegetation, Including Artificial Wetlands (Dams)	Non-remnant	552.4	552.2

Two fauna habitat types were recorded within the Mount Fox substation site (Table 10-4) and one was recorded within the Copperfield River substation site (Table 10-5).

Table 10-4 Fauna habitat types – Mount Fox substation site

Habitat Type	Habitat Summary	Analogous REs	Area (ha) within Project Site
1	Open forest of *Corymbia intermedia*, *Lophostemon suaveolens* and *Corymbia tessellaris* on basalt	7.8.18	6.1
2	Non-remnant vegetation	-	1.4

Table 10-5 Fauna habitat types – Copperfield River substation site

Habitat Type	Habitat Summary	Analogous REs	Area (ha) within Project Site
1	*Eucalyptus* and *Corymbia* open woodland with native grassy ground-layer on low undulating hills	9.12.12	7.5

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- Point Of Interest

Conservation Significant Species

- Short-beaked echidna *(Tachyglossus*
- Squatter Pigeon (southern subspecies) *(Geophaps scripta scripta)*
- Sharman's rock-wallaby *(Petrogale*
- Greater glider *(Petauroides*
- *Leptospermum Pallidum*
- Major Roads
- Major Watercourses
- Regional Context
- Draft Alignment
- Draft Alignment A
- Draft Alignment B
- Cadastral Boundaries

Conservation Significant Species Locations and Fauna Habitat Types

- Open Eucalyptus Woodland on Alluvium or Sand Plains
- Open Eucalyptus, Casuarina and Melaleuca Riparian Woodland
- Native Grassland
- Low Open Forest of Acacia shirleyi and Eucalyptus persistens on Laterite
- Open Woodland of Eucalyptus and Corymbia on Basalt
- Woodland of Eucalyptus and Corymbia on Metamorphic Hills
- Eucalyptus and Corymbia Woodland on Igneous Hills and/or Granite
- Non-remnant Vegetation, Including Artificial Wetlands (Dams)

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GULF DEVELOPMENTAL ROAD
GULF DEVELOPMENTAL ROAD
GREGORY DEVELOPMENTAL ROAD
ABERGOWR
Burdekin River
Camel Creek
Douglas Creek
Kidston
F7-1
F7-2
F7-3
Greenvale
F7-4
F7-5
Mount Fox
GREGORY DEVELOPMENTAL ROAD
KENNEDY DEVELOPMENTAL ROAD
Copperfield River
Lee (McKinnons) Creek
Gray Creek
Einasleigh River
HERVEY RANGE ROAD

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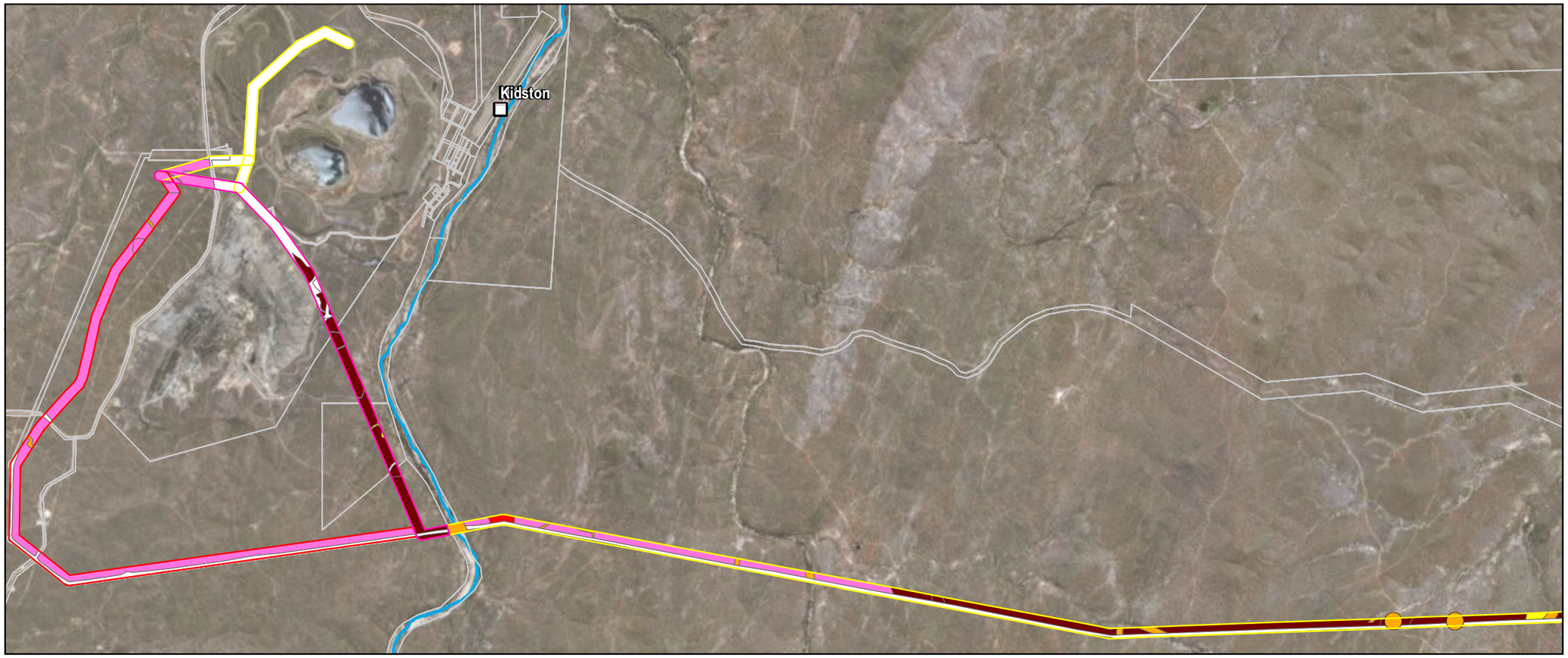

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Legend

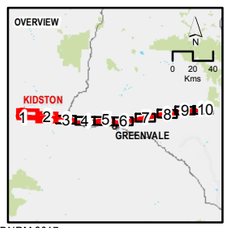
- Point Of Interest

EVNT Species Locations

- Short-beaked echidna *(Tachyglossus aculeatus)*
- Squatter pigeon *(southern subspecies)* (Geophaps scripta scripta)
- Sharman's rock-wallaby *(Petrogale sharmani)*
- Greater glider *(Petauroides volans)*
- *Leptospermum pallidum*
- Major Roads
- Major Watercourses
- Regional Context
- Draft Alignment
- Draft Alignment A
- Draft Alignment B
- Cadastral Boundaries

Conservation Significant Species Locations and Fauna Habitat Types

- Eucalyptus and Corymbia Woodland on Igneous Hills and/or Granite
- Low Open Forest of Acacia shirleyi and Eucalyptus persistens on Laterite
- Native Grassland
- Open Eucalyptus Woodland on Alluvium or Sand Plains
- Open Eucalyptus, Casuarina and Melaleuca Riparian Woodland
- Open Woodland of Eucalyptus and Corymbia on Basalt
- Woodland of Eucalyptus and Corymbia on Metamorphic Hills
- Non-remnant Vegetation, Including Artificial Wetlands (Dams)



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0 650 1,300 1,950 2,600
Meters

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Legend

- Point Of Interest

EVNT Species Locations

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- Squatter pigeon *(southern subspecies)* (Geophaps scripta scripta)
- Sharman's rock-wallaby *(Petrogale sharmani)*
- Greater glider *(Petauroides volans)*
- *Leptospermum pallidum*
- Major Roads
- Major Watercourses
- Regional Context Area
- Draft Alignment
- Draft Alignment A
- Draft Alignment B
- Cadastral Boundaries

Conservation Significant Species Locations and Fauna Habitat Types

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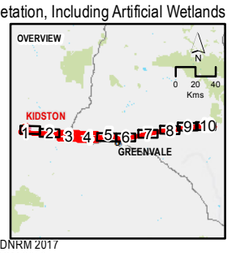
- Woodland of Eucalyptus and Corymbia on Metamorphic Hills
- Non-remnant Vegetation, Including Artificial Wetlands (Dams)



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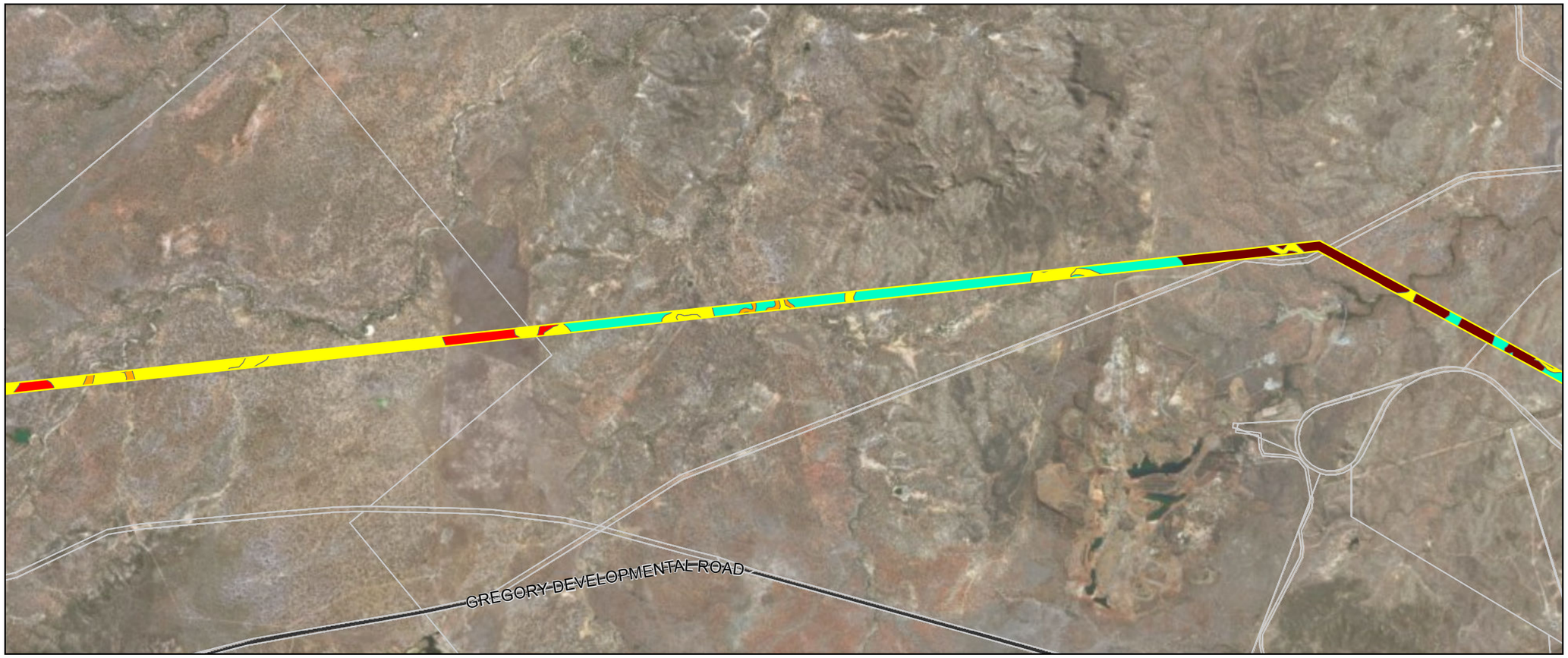

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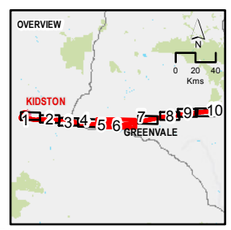
EVNT Species Locations

- Short-beaked echidna *(Tachyglossus aculeatus)*
- Squatter pigeon *(southern subspecies)* (Geophaps scripta scripta)
- Sharman's rock-wallaby *(Petrogale sharmani)*
- Greater glider *(Petauroides volans)*
- *Leptospermum pallidum*
- Major Roads
- Major Watercourses
- Regional Context
- Draft Alignment
- Draft Alignment A
- Draft Alignment B
- Cadastral Boundaries

Conservation Significant Species Locations and Fauna Habitat Types

- Eucalyptus and Corymbia Woodland on Igneous Hills and/or Granite
- Low Open Forest of Acacia shirleyi and Eucalyptus persistens on Laterite
- Native Grassland
- Open Eucalyptus Woodland on Alluvium or Sand Plains
- Open Eucalyptus, Casuarina and Melaleuca Riparian Woodland
- Open Woodland of Eucalyptus and Corymbia on Basalt
- Woodland of Eucalyptus and Corymbia on Metamorphic Hills
- Non-remnant Vegetation, Including Artificial Wetlands (Dams)



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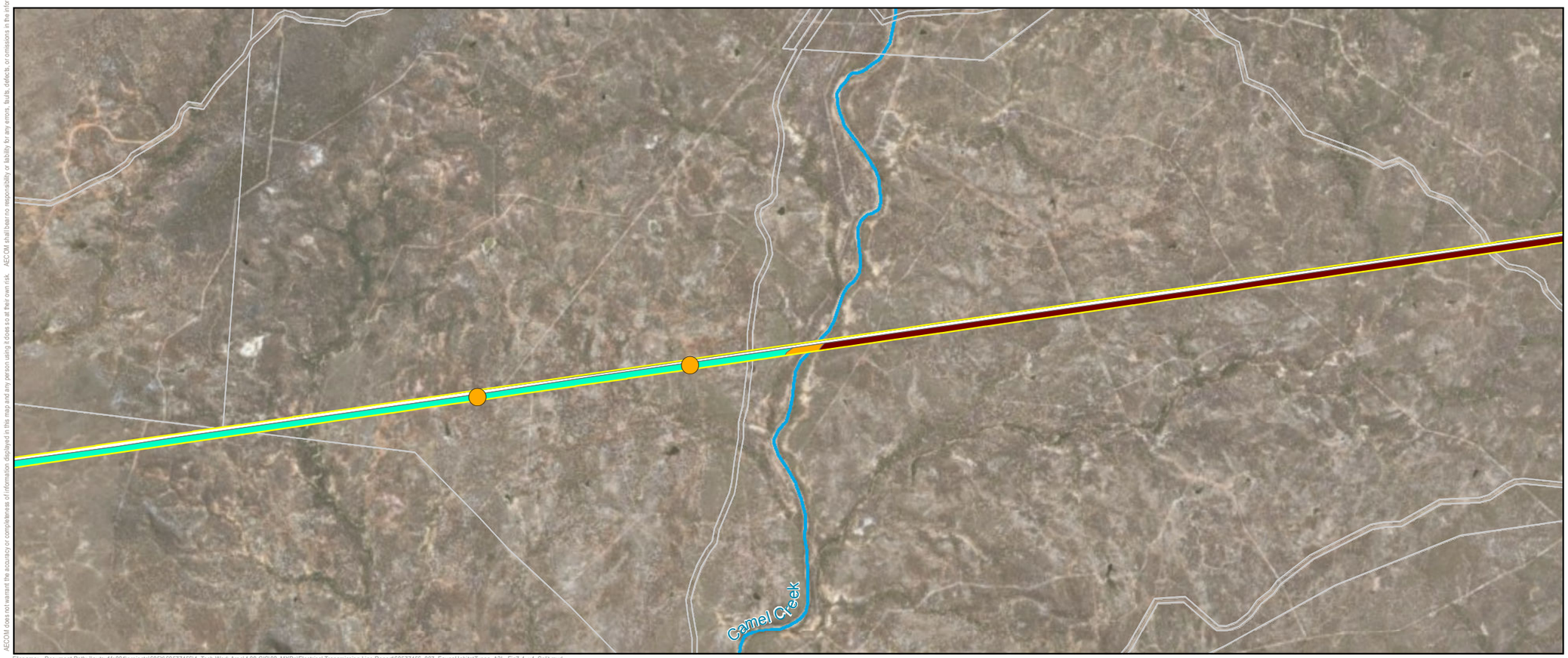

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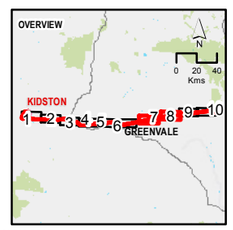

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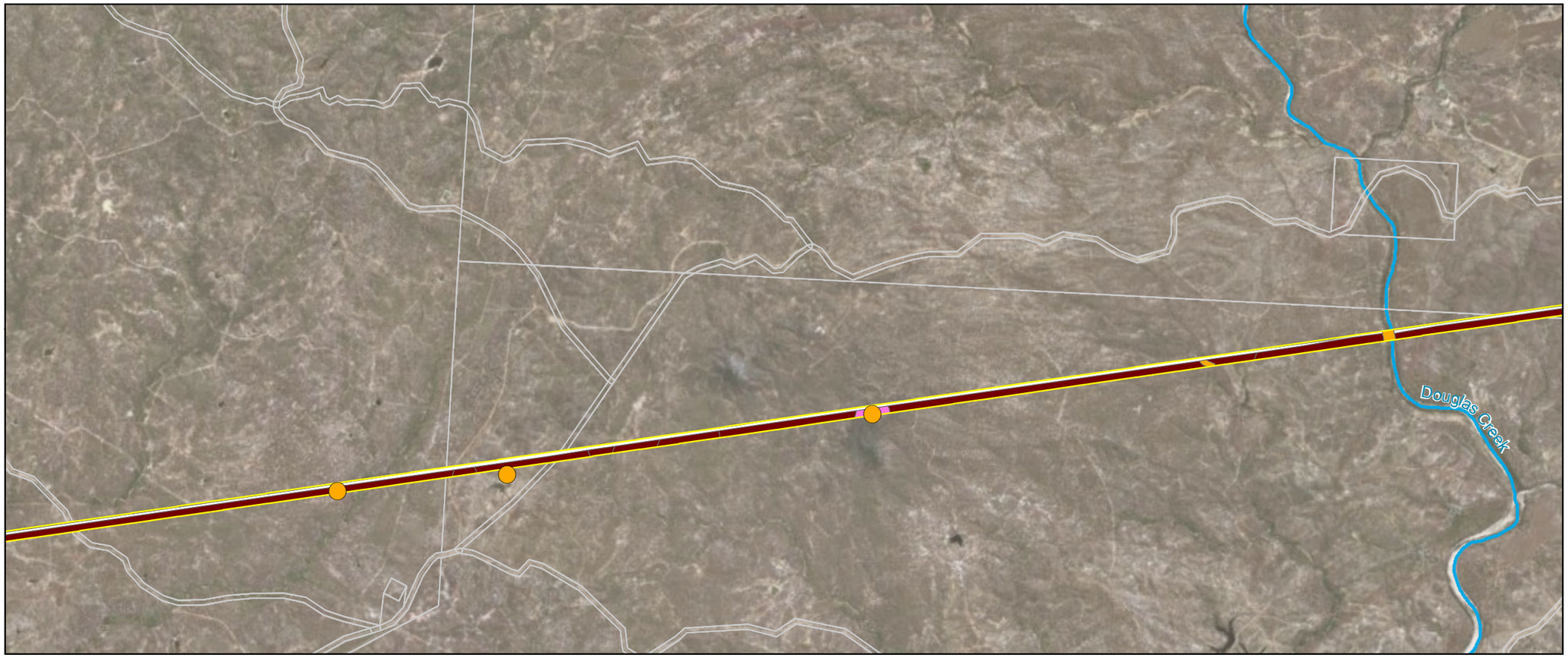

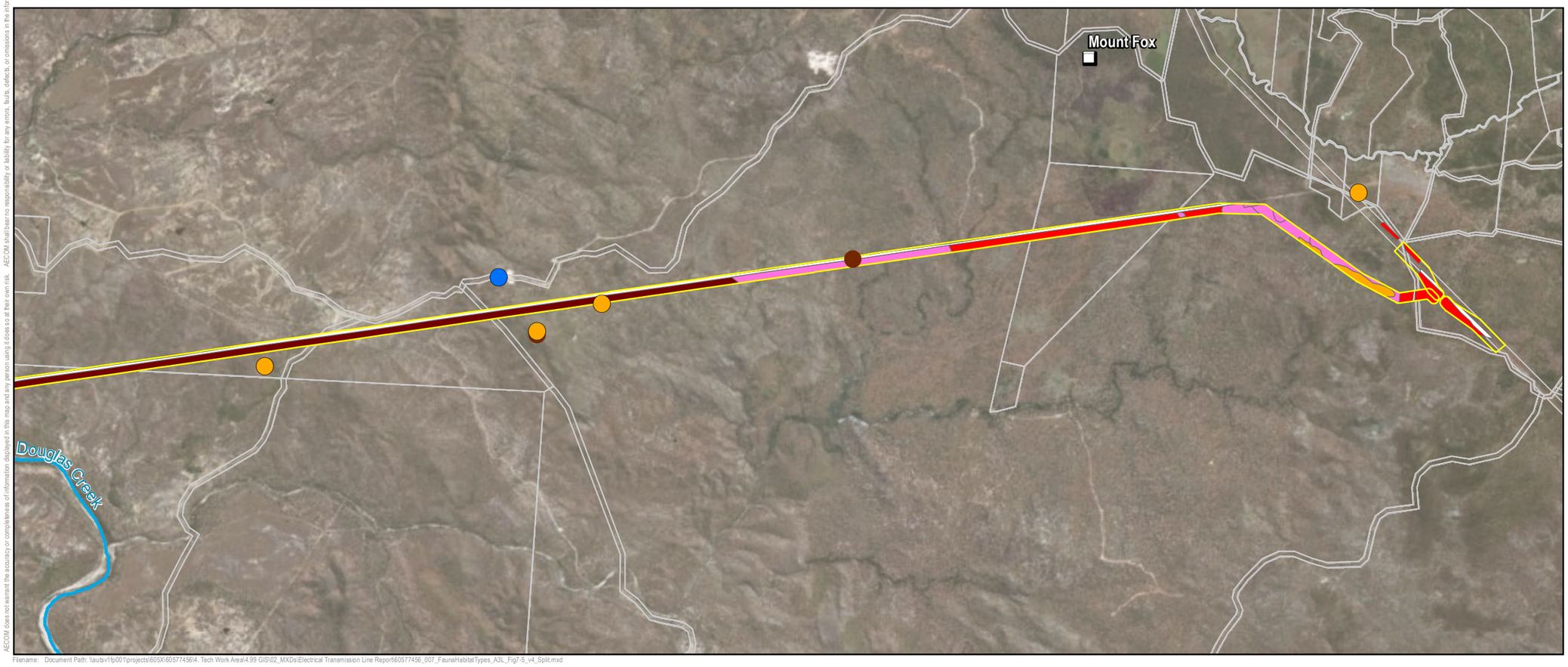

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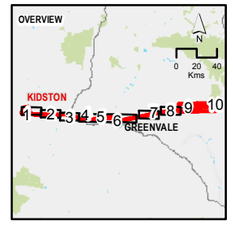

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10.1.3.3 Likelihood of occurrence

The likelihood of occurrence assessment identified 10 conservation significant fauna species and 3 migratory species with a moderate or high likelihood of occurring within the transmission line corridor based on the habitat encountered during the field surveys (Table 10-6). Four conservation significant fauna species are known to occur as they were identified during the field surveys. The likelihood of occurrence assessments for all conservation significant fauna and migratory species is presented in Table 10-6, Table 10-7 and Table 10-8.

Table 10-6 Fauna likelihood of occurrence assessment results – transmission line

Value	Likelihood of Occurrence		
	Moderate	**High**	**Known**
Conservation Significant Fauna	• Red goshawk (*Erythrotriorchis radiatus*) • Australian painted snipe (*Rostratula australis*) • Curlew sandpiper (*Calidris ferruginea*) • Common death adder (*Acanthophis antarcticus*) • Chestnut dunnart (*Sminthopsis archeri*) • Grey falcon (*Falco hypoleucos*)	• Koala (*Phascolarctos cinereus*) • Northern quoll (*Dasyurus hallucatus*) • Black-throated finch (southern) (*Poephila cincta cincta*) • Ghost bat (*Macroderma gigas*)	• Squatter pigeon (southern) (*Geophaps scripta scripta*) • Short-beaked echidna (*Tachyglossus aculeatus*) • Greater glider (*Petauroides volans*) • Sharman's rock-wallaby (*Petrogale sharmani*)
Migratory Fauna	• Oriental cuckoo (*Cuculus optatus*) • Common sandpiper (*Actitis hypoleucos*) • Common greenshank (*Tringa nebularia*)	-	-

The likelihood of occurrence assessment identified five conservation significant fauna species with a moderate to high likelihood of occurring within the Mount Fox substation site based on the habitat encountered during the field survey (Table 10-7). The likelihood of occurrence assessments for all conservation significant fauna and migratory species is presented in Appendix E Ecology (Substation) Technical Report.

Table 10-7 Fauna likelihood of occurrence assessment results – Mount Fox substation site

Value	Likelihood of Occurrence		
	Moderate	High	Known
Conservation Significant Fauna	• Ghost bat (*Macroderma gigas*) • Red goshawk (*Erythrotriorchis radiatus*)	• Koala (*Phascolarctos cinereus*) • Greater glider (*Petauroides volans*) • Short-beaked echidna (*Tachyglossus aculeatus*)	-
Migratory Fauna	-	-	-

The likelihood of occurrence assessment identified six conservation significant fauna species and one migratory species with a moderate to high likelihood of occurring within the Copperfield River substation site based on the habitat encountered during the field survey (Table 10-8).

Table 10-8 Fauna likelihood of occurrence assessment results – Copperfield River substation site

Value	Likelihood of Occurrence		
	Moderate	High	Known
Conservation Significant Fauna	• Ghost bat (*Macroderma gigas*) • Red goshawk (*Erythrotriorchis radiatus*) • Gouldian finch (*Erythrura gouldiae*) • Masked owl (northern) (*Tyto novaehollandiae kimberli)*	• Koala (*Phascolarctos cinereus*) • Short-beaked echidna (*Tachyglossus aculeatus*)	-
Migratory Fauna	• Oriental cuckoo (*Cuculus optatus*)	-	-

10.1.4 Habitat modelling

Habitat modelling was only undertaken for the transmission line corridor given the linear nature of the infrastructure. The likelihood of occurrence assessments identified eight conservation significant fauna species as either known to occur or considered to have a high likelihood of occurrence within the transmission line corridor. Potential habitat for these species has been modelled within the Draft Alignment, using the modelling rules detailed in Appendix F Ecology (Transmission Line) Technical Report.

The short-beaked echidna (*Tachyglossus aculeatus*) was excluded from habitat modelling despite its recorded presence due to its broad habitat requirements and lesser conservation status of Special Least Concern under the NC Act. This species is wide ranging, with remnant and non-remnant vegetation types constituting General Habitat for the species.

The results of the habitat modelling are outlined in Table 10-9 and the mapping is presented in Appendix F Ecology (Transmission Line) Technical Report.

Table 10-9 Habitat modelling areas – transmission line

Species	Primary Habitat Known (ha)	Primary Habitat Possible (ha)	General Habitat (ha)
Option A Draft Alignment			
Greater glider (*Petauroides volans*)	2.5	60.0	258.0
Sharman's rock-wallaby (*Petrogale sharmani*)	21.7	106.1	53.8
Squatter pigeon (southern) (*Geophaps scripta scripta*)	46.5	606.5	739.4
Northern quoll (*Dasyurus hallucatus*)	0.0	59.2	194.4
Koala (*Phascolarctos cinereus*)	0.0	82.7	1,340.9
Black-throated finch (southern) (*Poephila cincta cincta*)	0.0	115.1	914.5
Ghost bat (*Macroderma gigas*)	0.0	27.8	152.4
Option B Draft Alignment			
Greater glider (*Petauroides volans*)	2.5	60.0	259.3
Sharman's rock-wallaby (*Petrogale sharmani*)	21.7	106.1	53.8
Squatter pigeon (southern) (*Geophaps scripta scripta*)	46.5	602.5	782.7
Northern quoll (*Dasyurus hallucatus*)	0.0	59.2	194.4
Koala (*Phascolarctos cinereus*)	0.0	83.8	1,392.0
Black-throated finch (southern) (*Poephila cincta cincta*)	0.0	115.2	980.6
Ghost bat (*Macroderma gigas*)	0.0	27.9	165.2

10.2 Potential Impacts

The following section details the potential impacts to fauna values within the Draft Alignment. The potential impacts have been considered in the following ways:

- construction phase impacts
- operation and maintenance phase impacts
- conservation significance species.

10.2.1 Construction phase impacts

10.2.1.1 Loss of fauna habitat

The clearance of native vegetation can adversely affect native fauna species. Potential impacts resulting from clearing native vegetation can include the following:

- Loss of habitat causing a reduction of biological diversity or loss of local populations and genotypes.
- Fragmentation of populations, which can reduce gene flow between small isolated populations, reduce the potential for species to adapt to environmental change and loss or severe modification of the interactions between species.
- Disturbance which can permit the establishment and spread of exotic species that may displace native species.
- Loss of leaf litter, removing habitat for a wide variety of vertebrates and invertebrates.
- Loss of food resources such as foliage, flowers, nectar, fruit and seeds.

The riparian habitats on watercourses that are present in the Project area provide an important wildlife corridor refuge and provide food and water resources for a range of fauna species. There is the potential that these locations are used by conservation significant species and hence are considered environmentally sensitive areas. Additionally, large trees containing hollows are present throughout the Project area, and provide habitat opportunities for up to 300 vertebrate species (including conservation significant fauna species). Due to the long time period required for trees to form hollows (100+ years); hollow-bearing trees are considered to be an important habitat feature in the landscape.

10.2.1.2 Fauna mortality or injury

Clearing of vegetation can result in injury or mortality of fauna, particularly ground dwelling fauna (e.g. the Vulnerable squatter pigeon (southern) (*Geophaps scripta scripta*)), that may be crushed by machinery or struck by vehicles. Arboreal mammals (such as the Vulnerable koala (*Phascolarctos cinereus*)) may be trapped in trees as they are felled.

10.2.1.3 Changes to the aquatic environment

Direct construction impacts on the general aquatic environment will be negligible as Powerlink transmission structures will be located away from the banks of riparian areas, where possible and will not be located within any of the watercourses. Potential impacts may arise as a result of trimming/lopping of branches of larger trees that may lie within the Draft Alignment over the creeks, and any erosion and sedimentation that may occur as a result of access to the Draft Alignment and transmission structures in the immediate vicinity of the watercourses.

Additionally, spills of chemicals or significant erosion and sedimentation events during construction have the potential to affect the water quality of the surrounding watercourses. Such impacts upon water quality can also impact on aquatic ecosystem health, including aquatic plant damage and aquatic fauna health implications.

10.2.1.4 Activity and noise

During the construction phase, there will be an increase in noise and activity in the Draft Alignment as machinery undertakes clearing and access, foundations, tower erection and line stringing activities. It is important to note that these potential impacts will not affect the entire Draft Alignment simultaneously nor will they persist in any one area for a considerable period of time (months).

However, when activity and noise is occurring in areas adjoining retained habitat, potential impacts may include:

- reduced foraging ability by auditory predators due to increased background noise
- increased risk of predation by visual predators due to increased background noise
- increased potential for collisions with vehicles
- human visitation causing disturbance to foraging or breeding behaviours.

Current research indicates that there are no government policies or other widely-accepted guidelines in respect to the noise levels which may be acceptable to wildlife. The levels or character of noise that may "startle" or otherwise affect the feeding or breeding pattern of birds or other wild animals are also not firmly established in the technical literature.

Sudden loud, impulsive or impact noises are capable of causing birds and other fauna to become startled, which if occurring over the longer term, may affect feeding and breeding behaviour in some species. It is expected that excavation, construction and earthmoving associated with the Project will potentially cause disturbance to all groups of fauna, especially birds. This will most likely result in avoidance of the area for the duration of these activities.

10.2.2 Operation phase impacts

As a transmission entity, Powerlink Queensland is obligated to manage electricity infrastructure to ensure the safe and reliable provision of electricity. To satisfy safety requirements, periodic vegetation management works will be undertaken within the Draft Alignment.

Impacts associated with the maintenance and access during the operational phase of the Project is similar to those identified for the construction phase. Impacts will be temporary, and mitigation measures outlined above will apply.

10.2.3 Conservation significant species

Section 10.1.3.1 identified the conservation significant species known to occur and with a high likelihood of occurrence. These species are discussed in detail in Appendix F Ecology (Transmission Line) Technical Report. Table 10-10 provides a summary of the species, occurrence and potential impacts.

Table 10-10 Summary of potential impacts to conservation significant species

Likelihood of Occurrence	Species	Summary of Potential Impacts
Known to Occur	Greater Glider	• Loss and/or fragmentation of habitat, particularly from the loss of hollow-bearing trees • Locally restrict movement of the species
	Sharman's Rock-wallaby	• Loss of suitable habitat • Disturbance, Mortality and / or Stress during clearing and construction
	Squatter Pigeon (southern)	• Habitat loss and/or fragmentation • Direct mortality from vehicle strike or destruction of nests
	Short-beaked Echidna	• Habitat loss and/or fragmentation • Direct mortality from vehicle strike
High Likelihood of Occurrence	Northern Quoll	• Habitat loss and/or fragmentation • Reduction in available prey species

Likelihood of Occurrence	Species	Summary of Potential Impacts
	Koala	• Habitat loss and/or fragmentation • Increased vulnerability to dog attack and vehicle strike
	Black Throated Finch	• Loss and/or fragmentation of foraging grass seed and/or nesting habitat (however unlikely to alter the composition of grasses)
	Ghost Bat	• Loss and/or minor fragmentation of foraging habitat

10.3 Mitigation and Management Measures

10.3.1 Loss of fauna habitat

While the extent of vegetation clearing for the proposed powerline will mean that impacts on fauna habitat are unavoidable, there are a range of measures that will be taken to minimise the level of impact. These include the following.

- Powerlink's preferred approach in environmentally sensitive areas is to adopt a program of vegetation management that includes selective hand clearing, lopping/trimming and chemical treatment (where required) in preference to total clearing of the easement.
- Clearing of large habitat trees, particularly those around creek lines and those with hollows present should be avoided by implementing design measures such as raising towers heights, where possible and spanning transmission lines overhead.
- Suitably qualified fauna spotters will be present during vegetation clearing to minimise fauna harm.
- Environmental Work Plans (EWP) and a Construction Environmental Management Plan will be prepared to provide clear guidance on no-go zones, sensitive vegetation and habitat (such as identified nests), areas to be cleared and retained, methods for clearing, role of the spotter catcher and other relevant environmental protection matters.
- Habitat features such as felled trees and logs will be considered for relocation to other areas where practical to provide microhabitat for fauna.

10.3.2 Fauna mortality or injury

Mitigation measures to reduce the likelihood of injury or mortality to fauna include the following.

- Pre-clearance surveys to identify shelters and breeding places potentially utilised by Least Concern species, colonial breeders and conservation significant fauna will be undertaken.
- Fauna spotter-catchers will be used to capture and relocate fauna prior to clearing.
- No unauthorised off-track driving.
- Any injured, sick and dead vertebrate fauna will be recorded before (by fauna spotter-catchers), during and after construction and operation.

10.3.2.1 Changes to the aquatic environment

A range of measures will be incorporated into the construction phase of the Project to minimise the level of impact on the aquatic environments.

- Appropriate erosion and sediment control measures will be installed and maintained.
- Watercourses, waterways, lakes and low lying gullies, will be kept clear of felled trees, vegetation cuttings and debris.

- The integrity of the beds or banks will be maintained and disturbance in these areas minimised.
- The falling of large trees that may cause damage to protective bank vegetation may be stem injected and left standing providing there are no additional safety risks.
- The use of chemicals near any watercourse is to be strictly supervised and no overall spraying is to occur. A separate operational risk assessment will be documented prior to this practise occurring.
- Interference to or disturbance of the beds and banks of watercourses by heavy equipment will be kept to an absolute minimum.
- Where located near watercourses, stockpiles will be made on the downstream side of the centre line of the transmission line. Stockpiles will have gaps between them of sufficient width to permit the safe passage of stock and vehicles. Such gaps will be spaced at no more than 50 m intervals.
- The stockpiled material will be located at least 50 m clear of all drains, watercourses or their flood banks so as to prevent any obstruction to water flow and 10 m clear of standing timber, scrub or undergrowth, or as directed.

10.3.3 Conservation significant species

The following section details the additional mitigation measures proposed for the Project, in addition to the general mitigation measures identified above. Where no specific mitigation measures are identified for a species, the general mitigations apply.

Greater glider

- Avoid clearing hollow-bearing trees in areas of mapped primary greater glider habitat, where possible.

Sharman's rock-wallaby

- The Project will retain the landscape structure (boulders) in known primary habitat areas to ensure no loss or reduction in the area of occupancy.
- Shrubs and preferred forage species such as fig trees will be retained throughout the known primary habitat areas.
- The Project will retain as much tall vegetation as practicable within known primary habitat to help preserve shelter sites and reduce predation risk. Where possible, the Project will consider spanning transmission lines overhead of vegetation to avoid the impacts described above.
- A spotter catcher must thoroughly search the area for any individuals hiding in shrubs or grass during all works.
- The clearing of canopy vegetation (where unavoidable) must be hand-cleared in known primary habitat areas to reduce noise and machinery impacts.
- Works performed within the known primary habitat of this species may require a Species Management Plan for the Sharman's rock-wallaby.
- Traffic and access will be restricted through known primary habitat areas.
- Where possible, Project construction works should be undertaken in a way that reduces disturbance across breeding cycles (i.e. in one succession). This is to avoid disturbance across multiple breeding cycles and also re-disturbing individuals that may re-establish in the area.

Squatter pigeon

- Wherever practicable, signage should be erected to increase awareness of squatter pigeons (southern) in the area.
- Prior to site entry, all site personnel will be appropriately trained and made aware of the responses of this species to vehicle movement.
- Due to the tendency for this species to utilise disturbed areas (such as access tracks and pastoral grasslands) vehicle and machinery speed limits will be restricted to 40 km/hr within mapped

squatter pigeons (southern) known primary habitat. Should the species be recorded frequently elsewhere on the alignment during the course of construction, speed limits will also be restricted.

- Due to the location of nests (on ground) and the ground dwelling nature of the birds, all vehicles, plant, equipment and machinery will remain within the designated access tracks and work areas.
- Locate site offices, construction camps, stockpiling/laydown areas, plant and equipment storage areas away from mapped habitat.

Koala

- If an individual is found prior to or during clearing activities, it must not be forcibly relocated. Any tree that has a koala present, as well as any tree with its crown overlapping that tree, must not be removed and remain in place until the koala vacates the tree of its own accord.
- Where possible, riparian vegetation and preferred food tree species along creeks and rivers will be retained within mapped koala primary habitat.

Northern quoll

- The Project will retain all boulders and rocky screes within mapped areas of Primary Habitat (possible).