



**Australian Rail Track Corporation**

Maitland to Minimbah Third Track Project

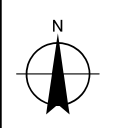
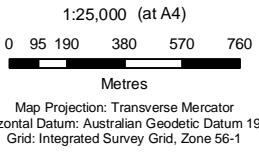
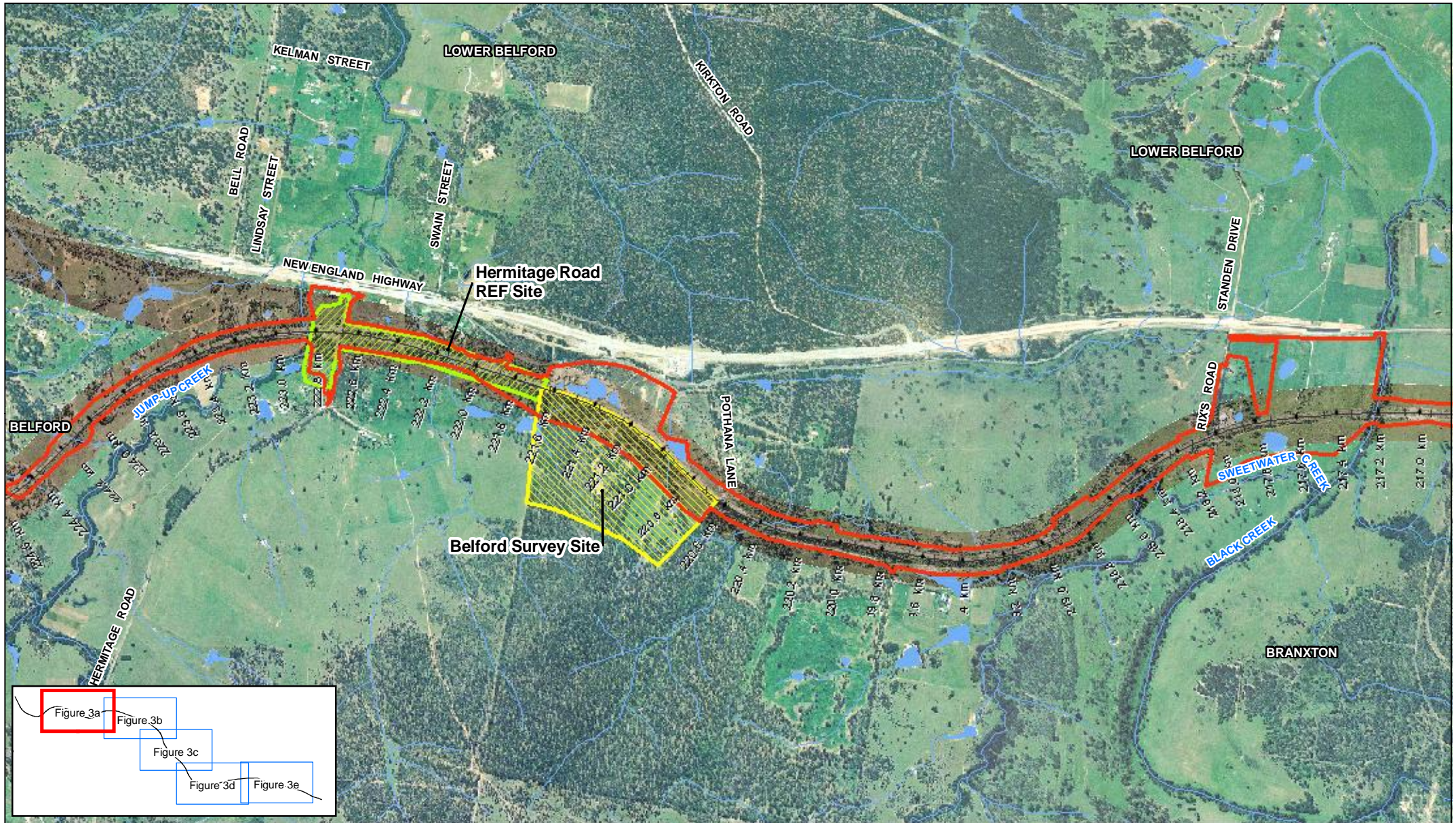
Submissions Report including  
Preferred Project Report

September 2010

H8R-REP-S2G-ENV-0019-0



Appendix C  
Terrestrial Fauna Study



LEGEND	
	Existing Railway
	Watercourse
	Watercourse Area
	Revised Investigation Area
	Additional Survey Sites
	REF Site
	Survey Site



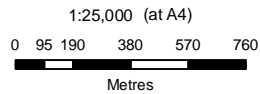
Maitland to Minimbah Third Track  
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Date	August 2010

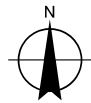
Survey Sites

Figure 3a

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Map Projection: Transverse Mercator  
 Horizontal Datum: Australian Geodetic Datum 1966  
 Grid: Integrated Survey Grid, Zone 56-1



**LEGEND**

- Existing Railway
- Watercourse
- Watercourse Area
- Revised Investigation Area
- Additional Survey Sites
- REF Site
- Survey Site

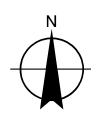
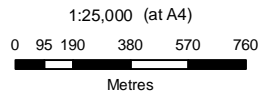
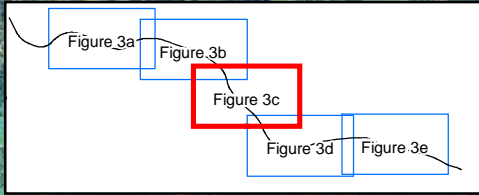
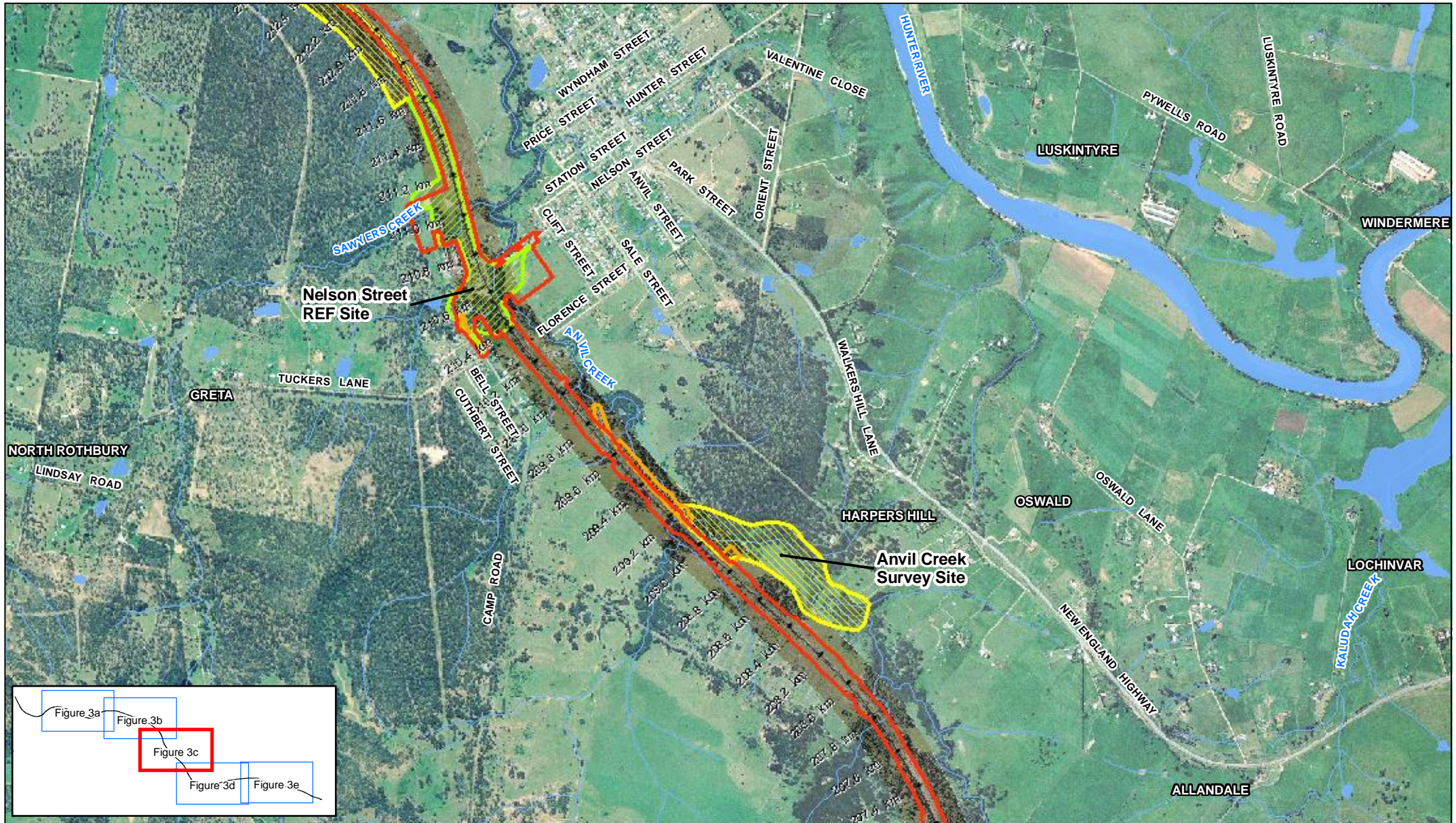


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**Survey Sites**

**Figure 3b**



LEGEND

- Existing Railway
- Watercourse
- Watercourse Area
- Revised Investigation Area
- Additional Survey Sites
- REF Site
- Survey Site

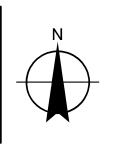
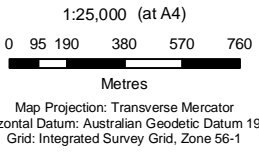
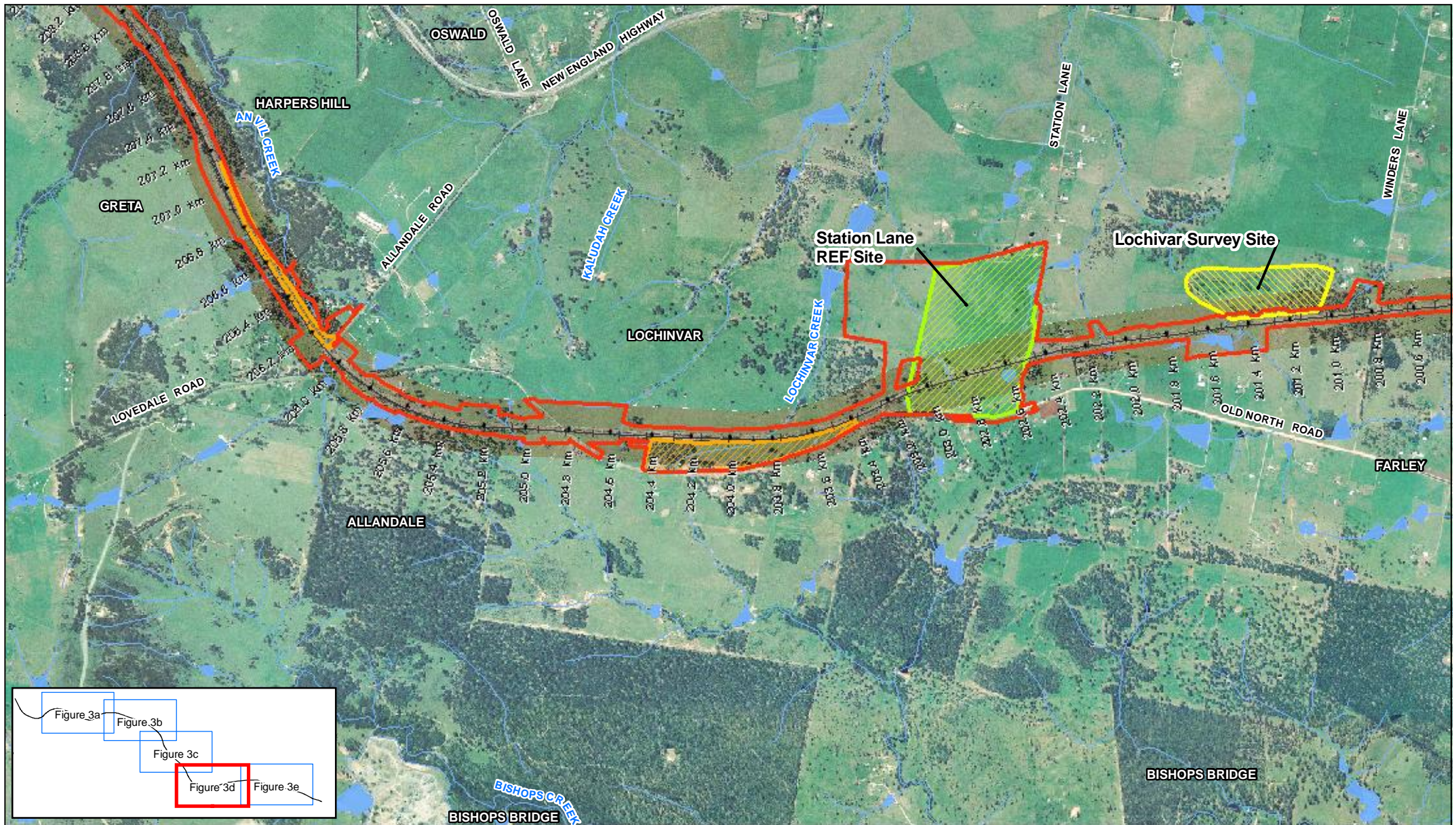


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Survey Sites

Figure 3c



**LEGEND**

Existing Railway	Revised Investigation Area
Watercourse	Additional Survey Sites
Watercourse Area	REF Site
	Survey Site



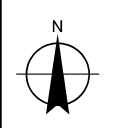
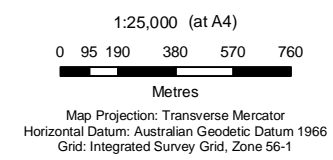
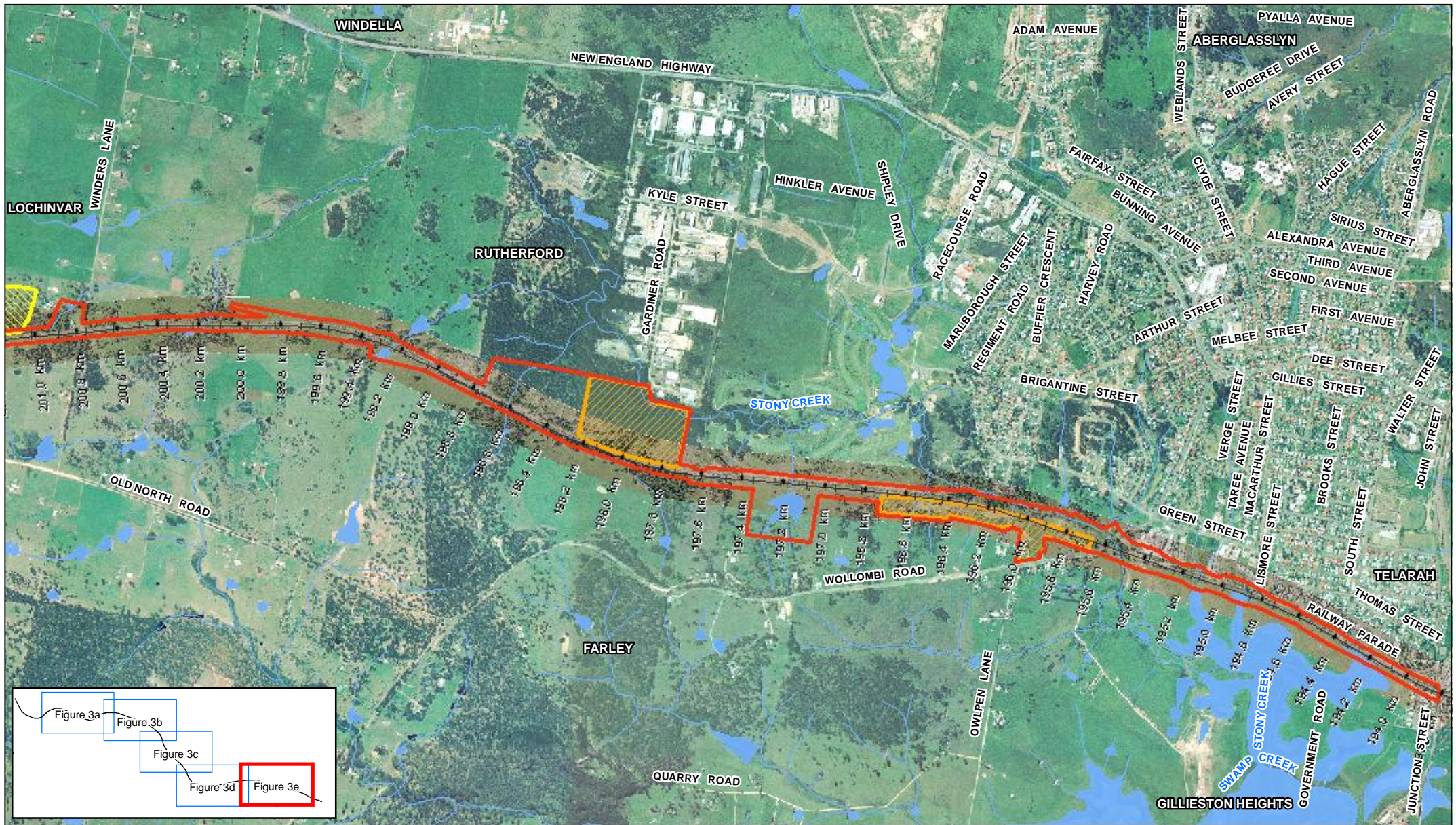
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Survey Sites

Figure 3d

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- LEGEND**
- Existing Railway
  - Watercourse
  - Watercourse Area
  - Revised Investigation Area
  - Additional Survey Sites
  - REF Site
  - Survey Site

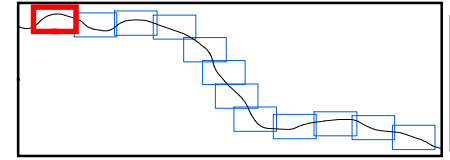
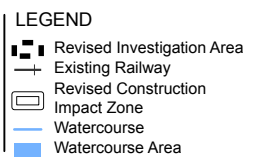
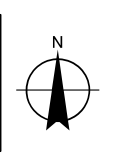
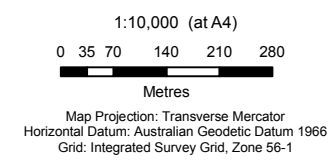
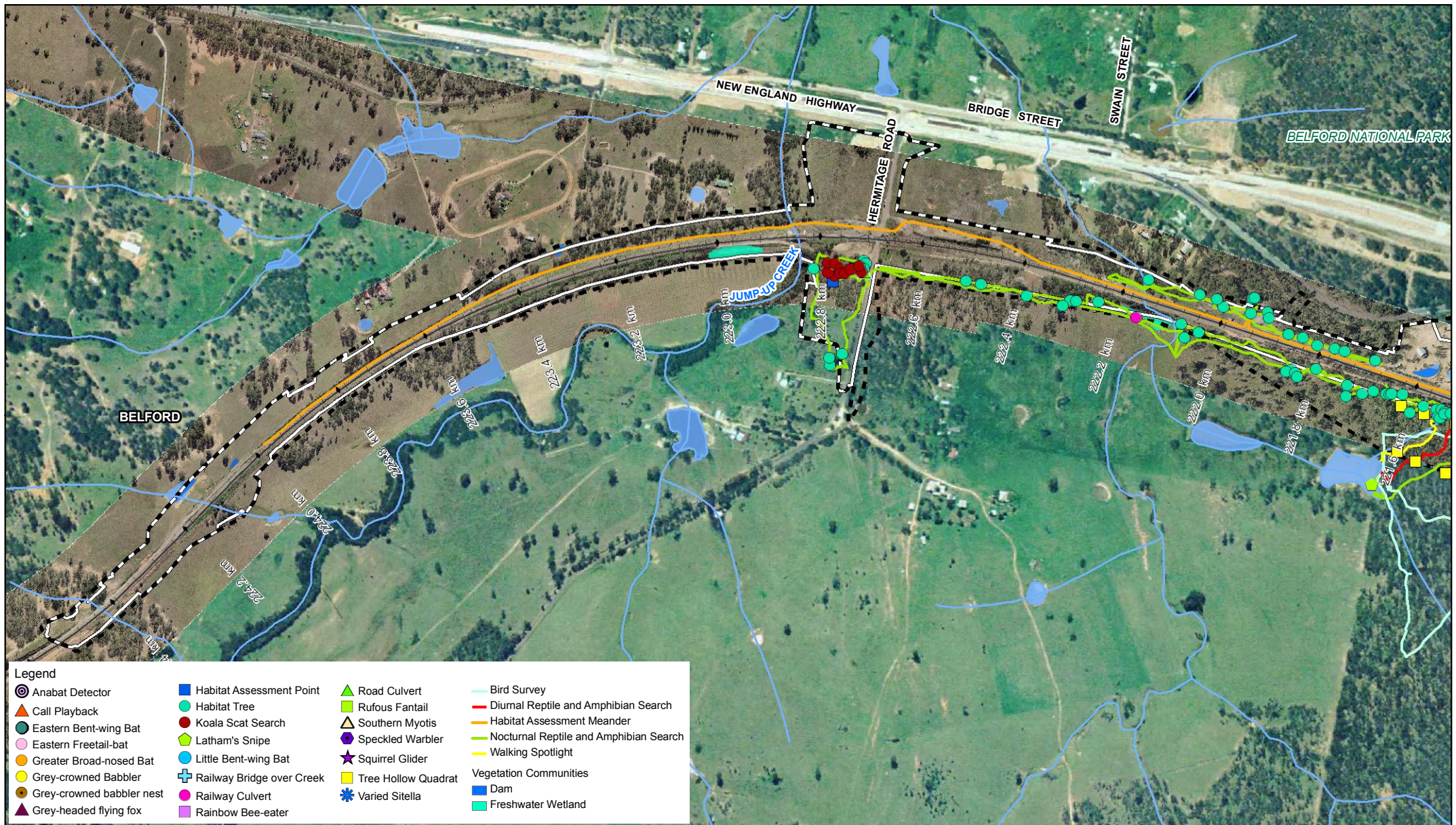


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Survey Sites **Figure 3e**

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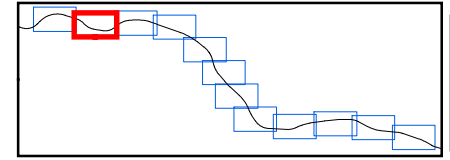
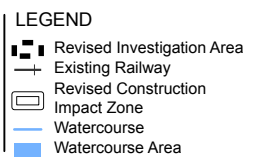
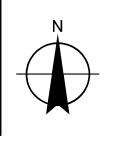
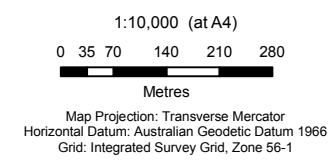
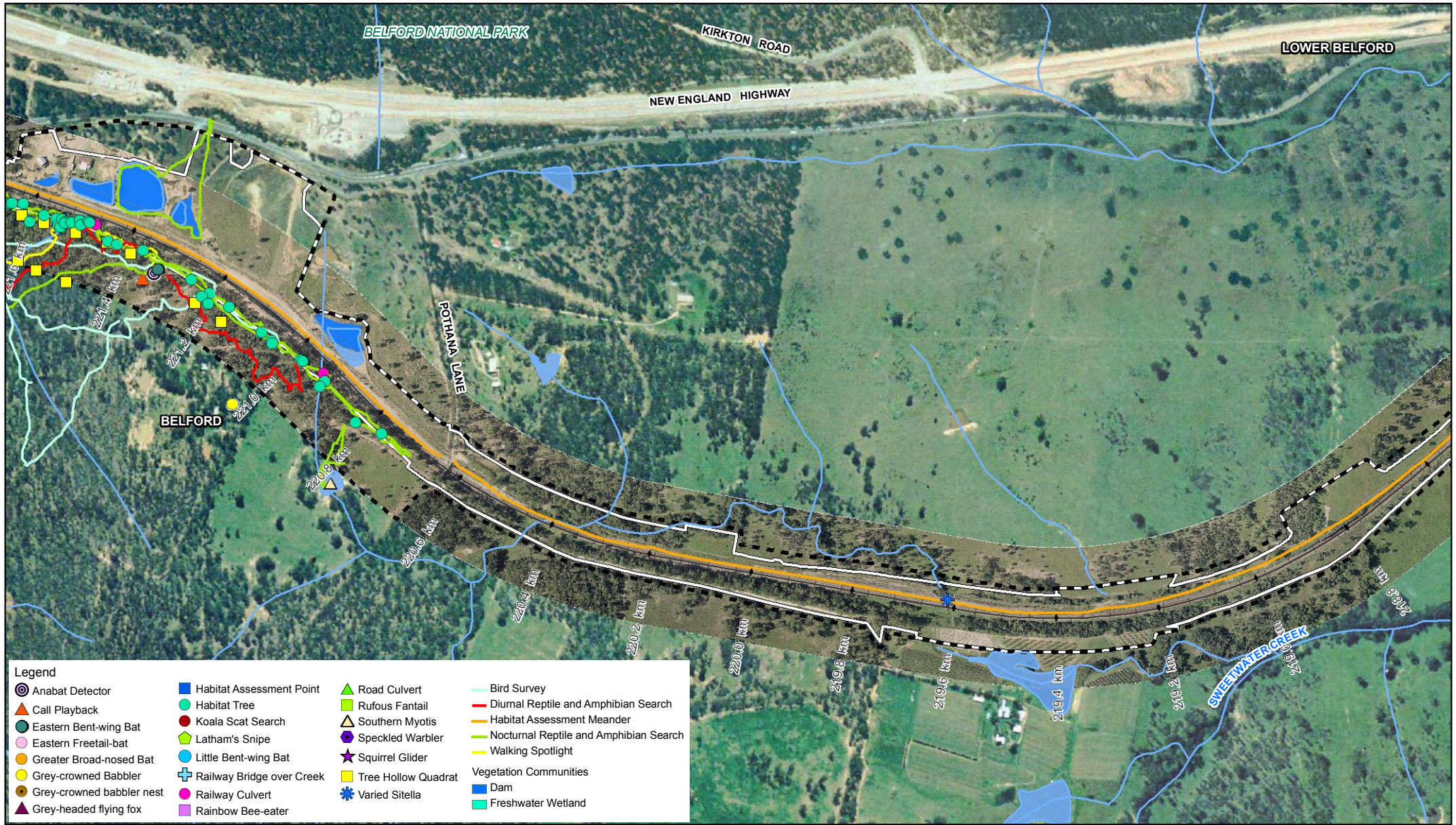
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Survey Effort and  
Threatened Species Location

Figure 4a

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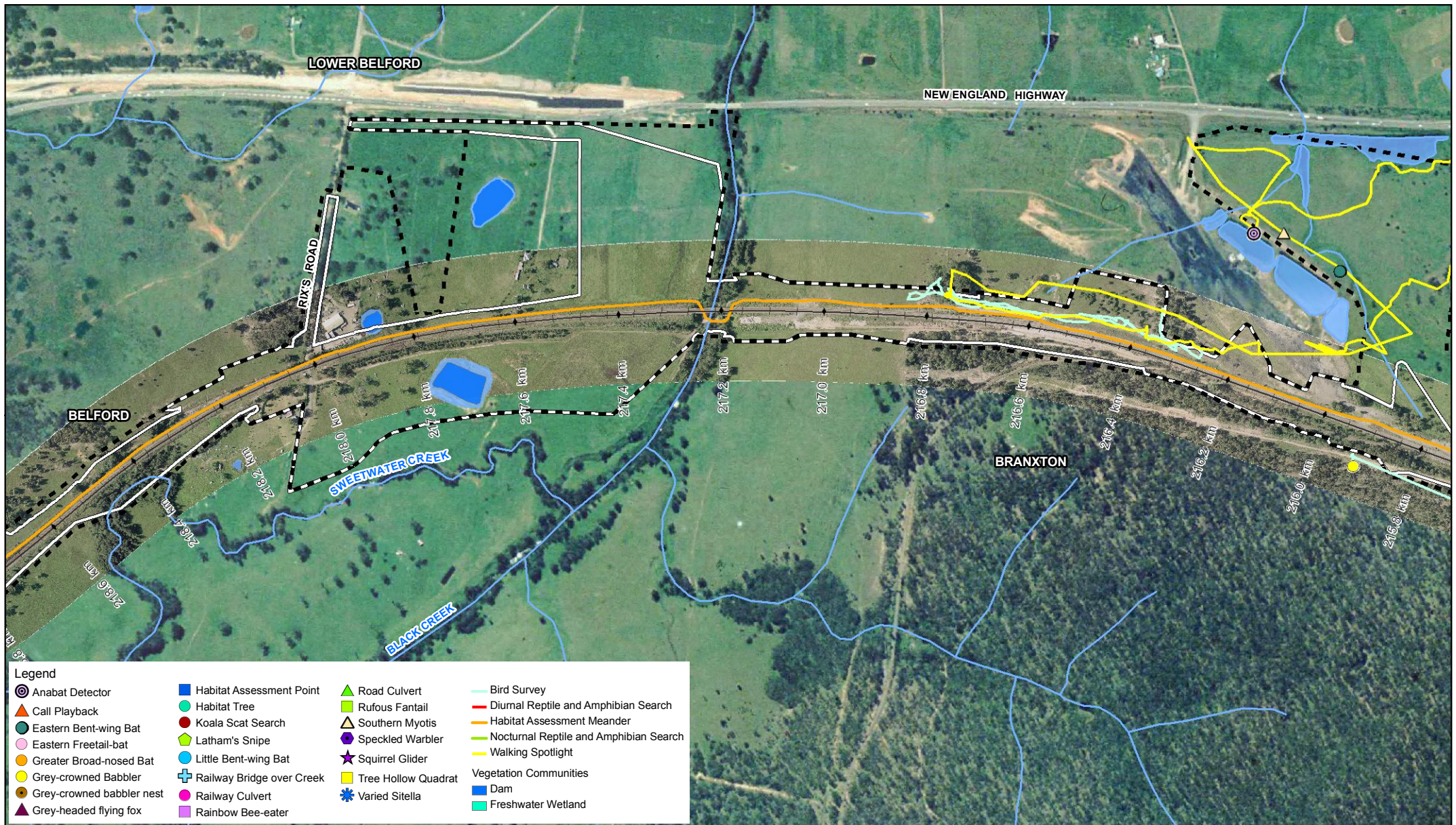
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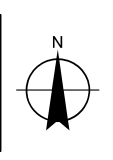
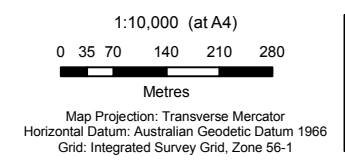
Survey Effort and  
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Figure 4b

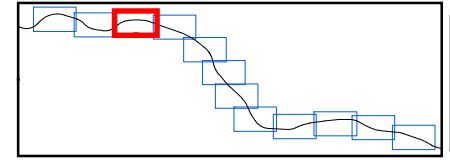
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Legend			



LEGEND	
	Revised Investigation Area
	Existing Railway
	Revised Construction Impact Zone
	Watercourse
	Watercourse Area



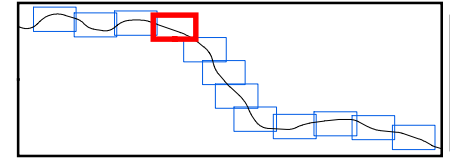
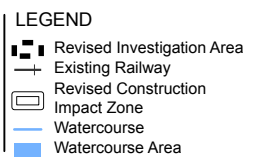
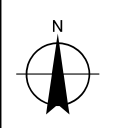
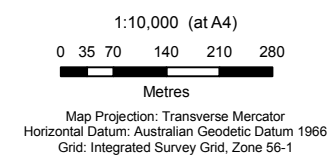
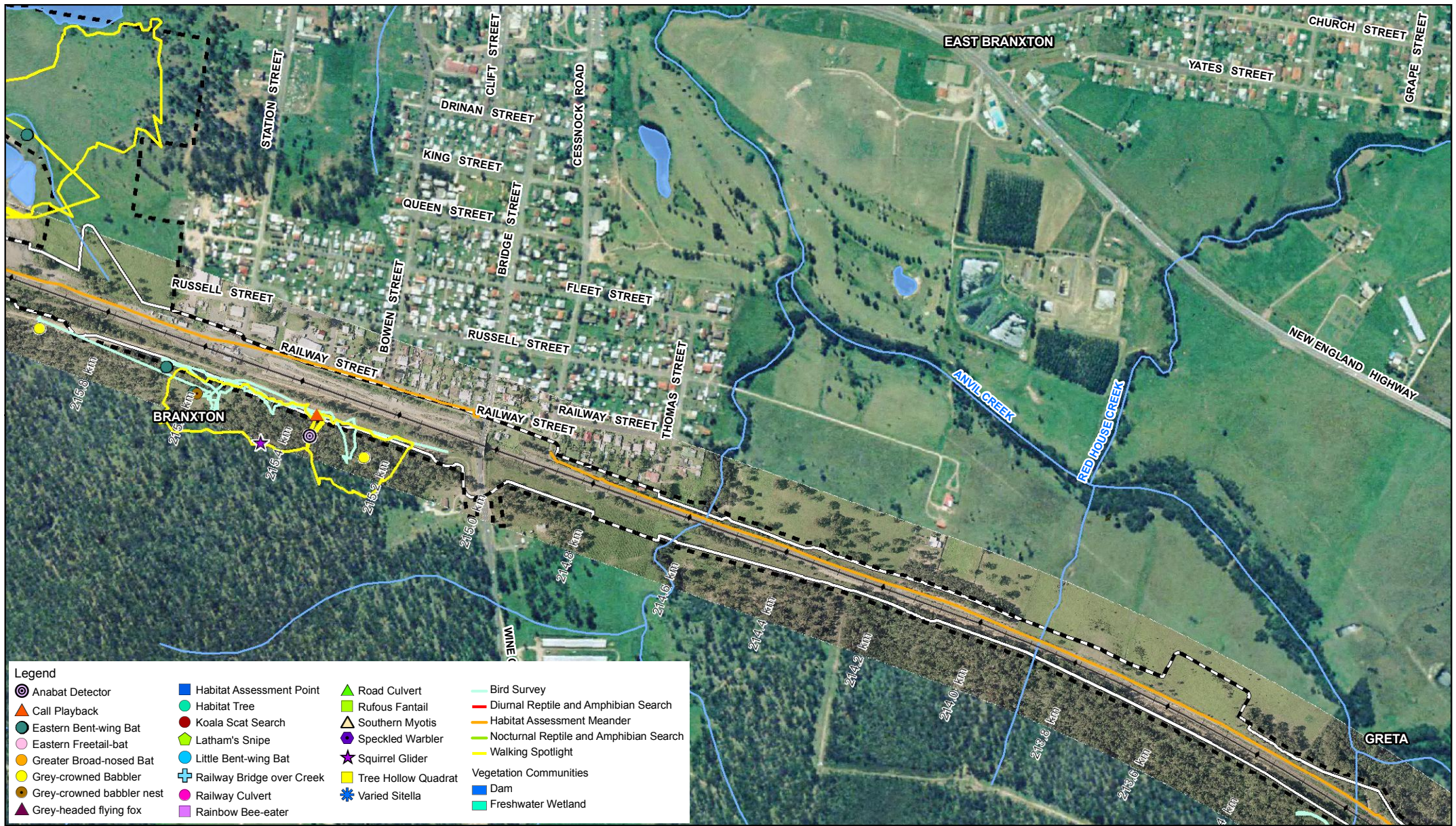
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Survey Effort and  
Threatened Species Location

Figure 4c

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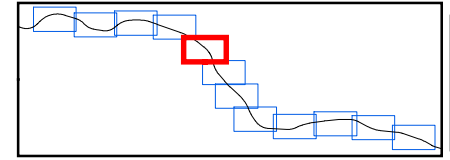
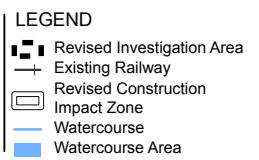
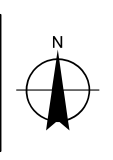
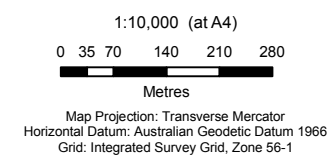
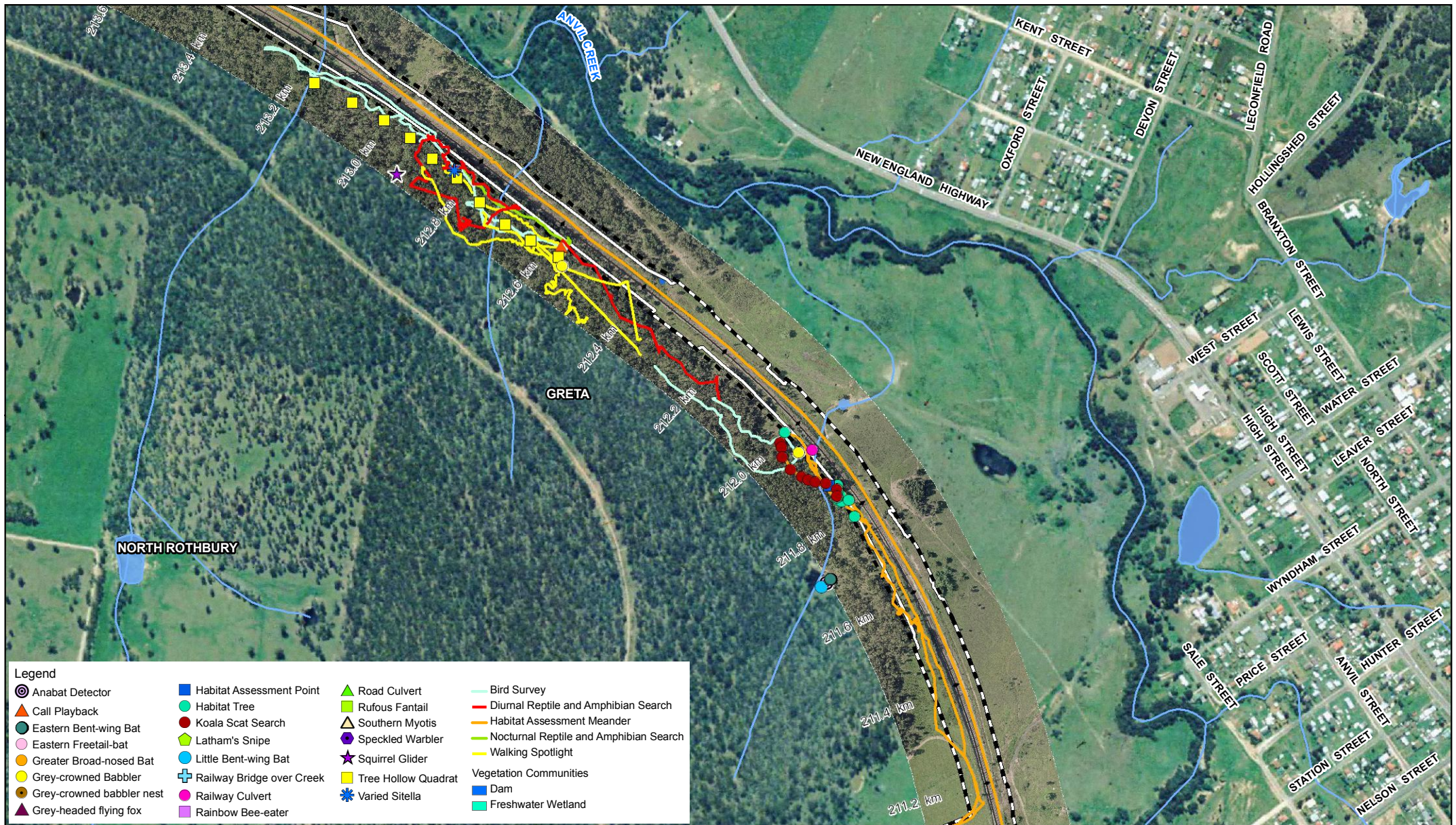
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Survey Effort and  
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Figure 4d

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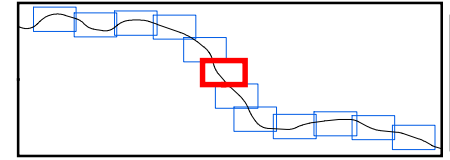
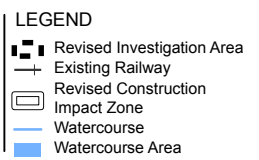
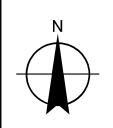
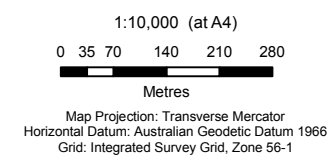
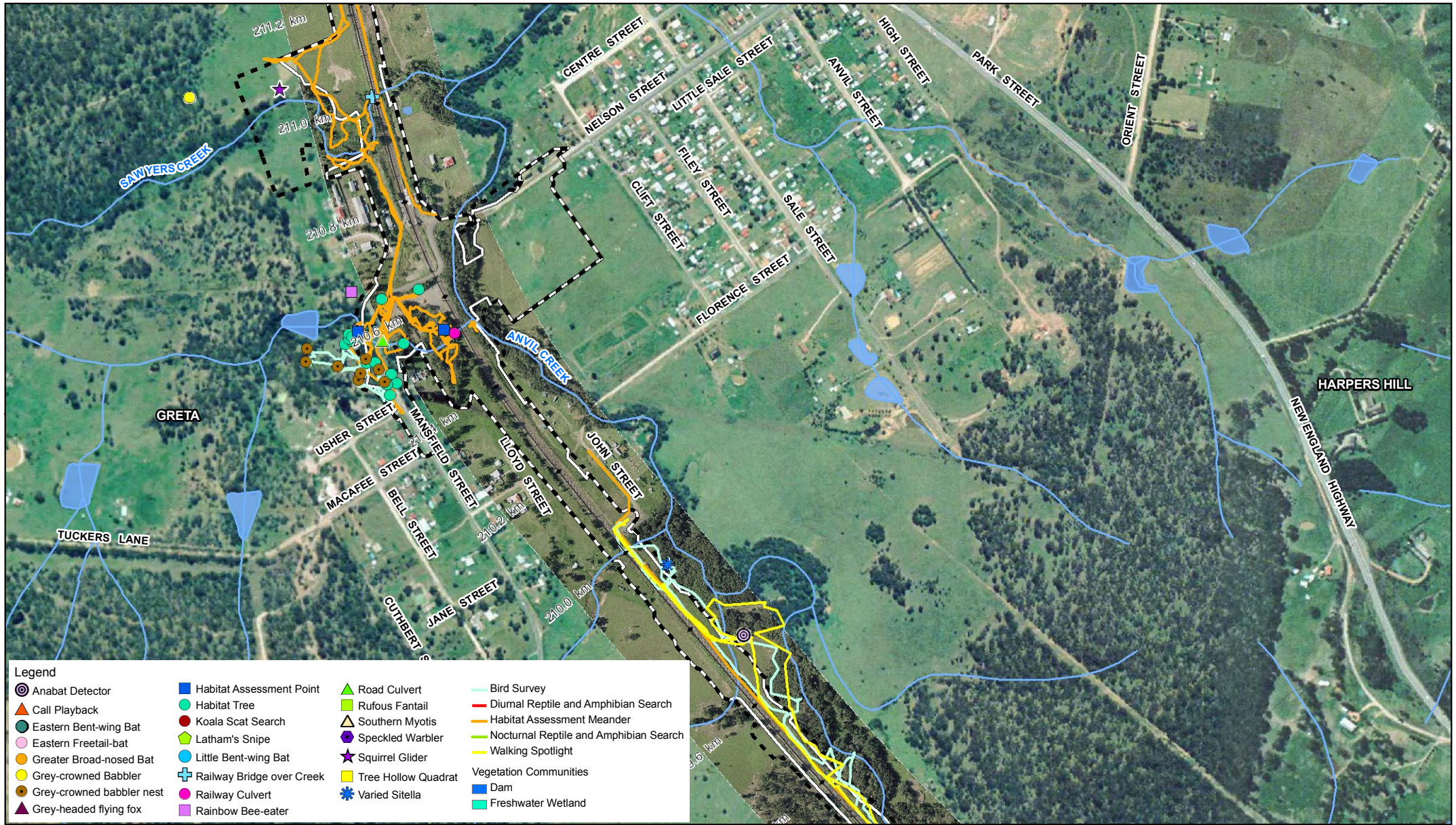
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Survey Effort and  
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Figure 4e

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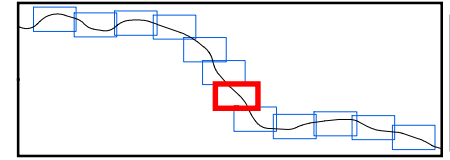
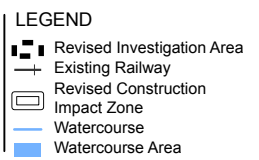
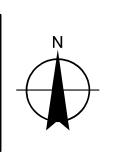
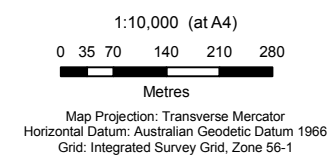
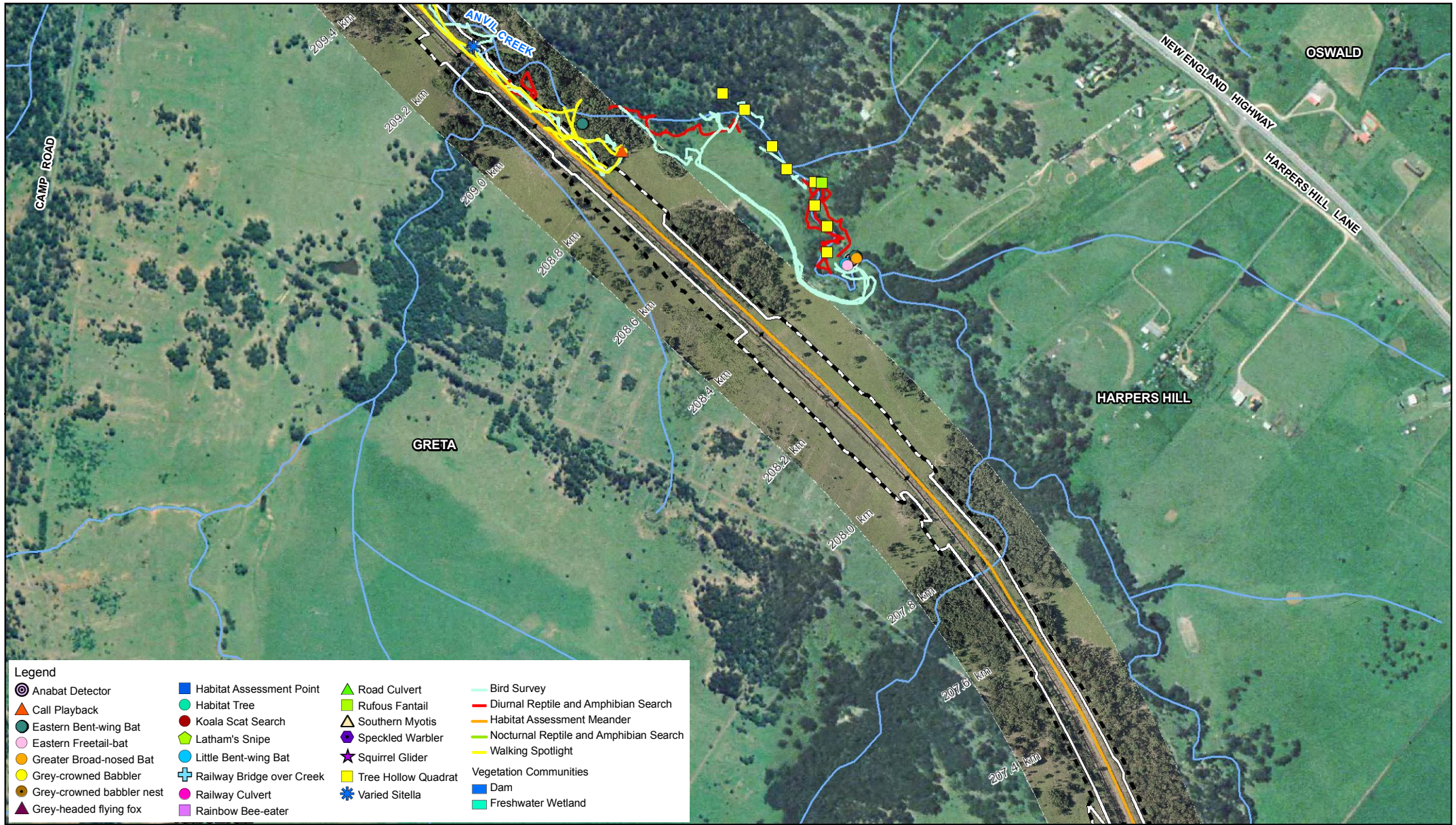


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Figure 4f



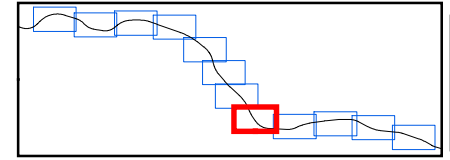
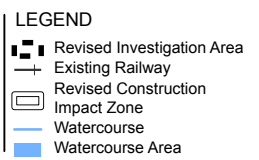
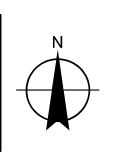
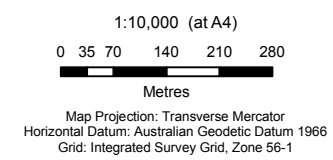
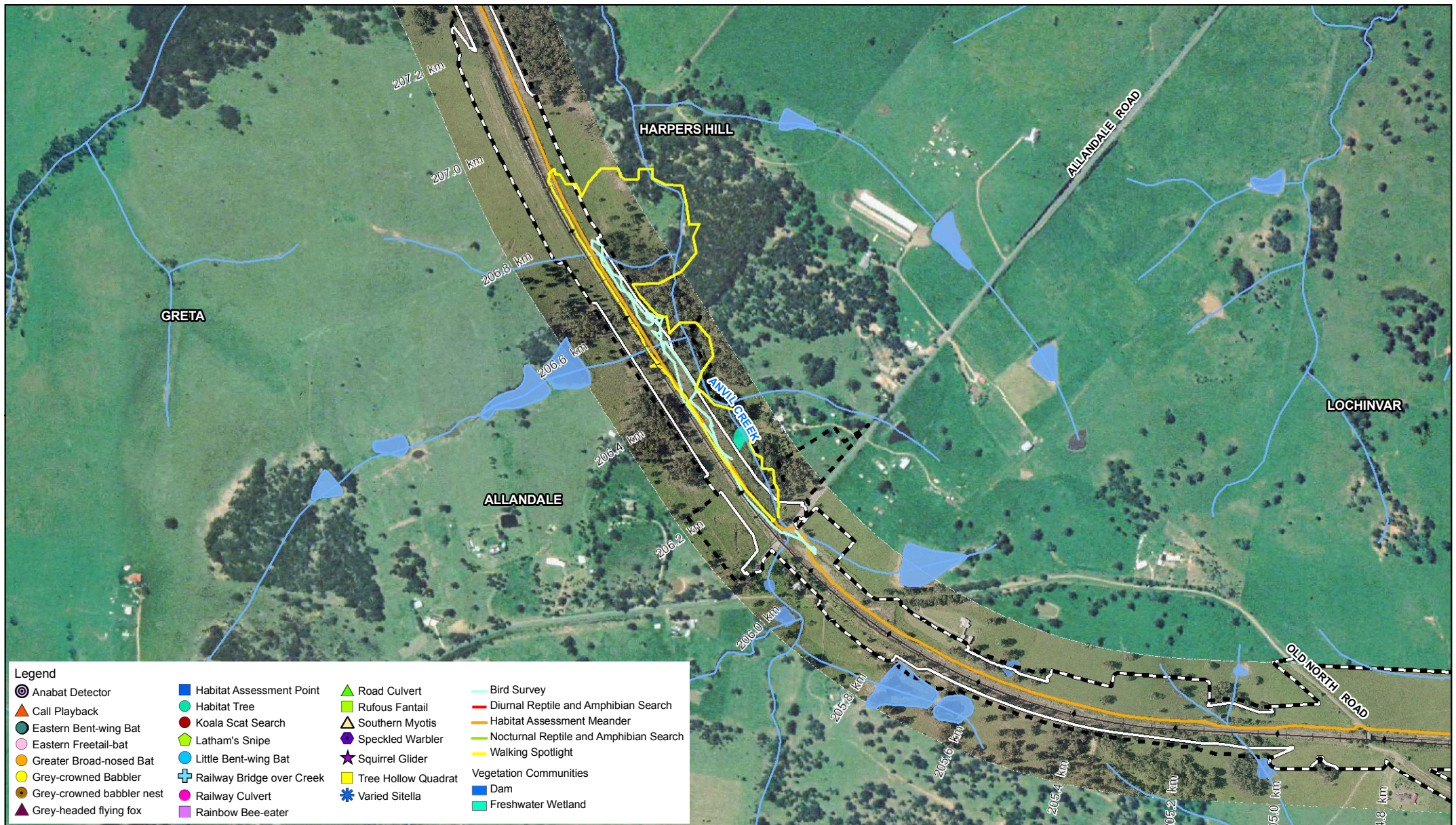
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Date | August 2010

Survey Effort and  
Threatened Species Location

Figure 4g

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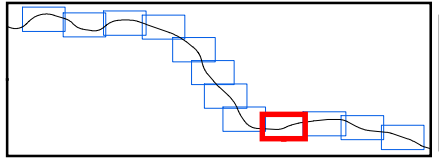
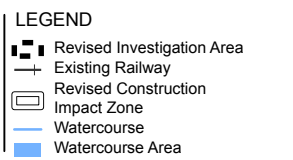
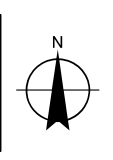
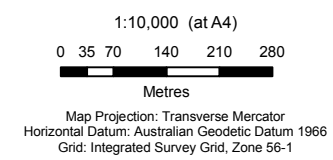
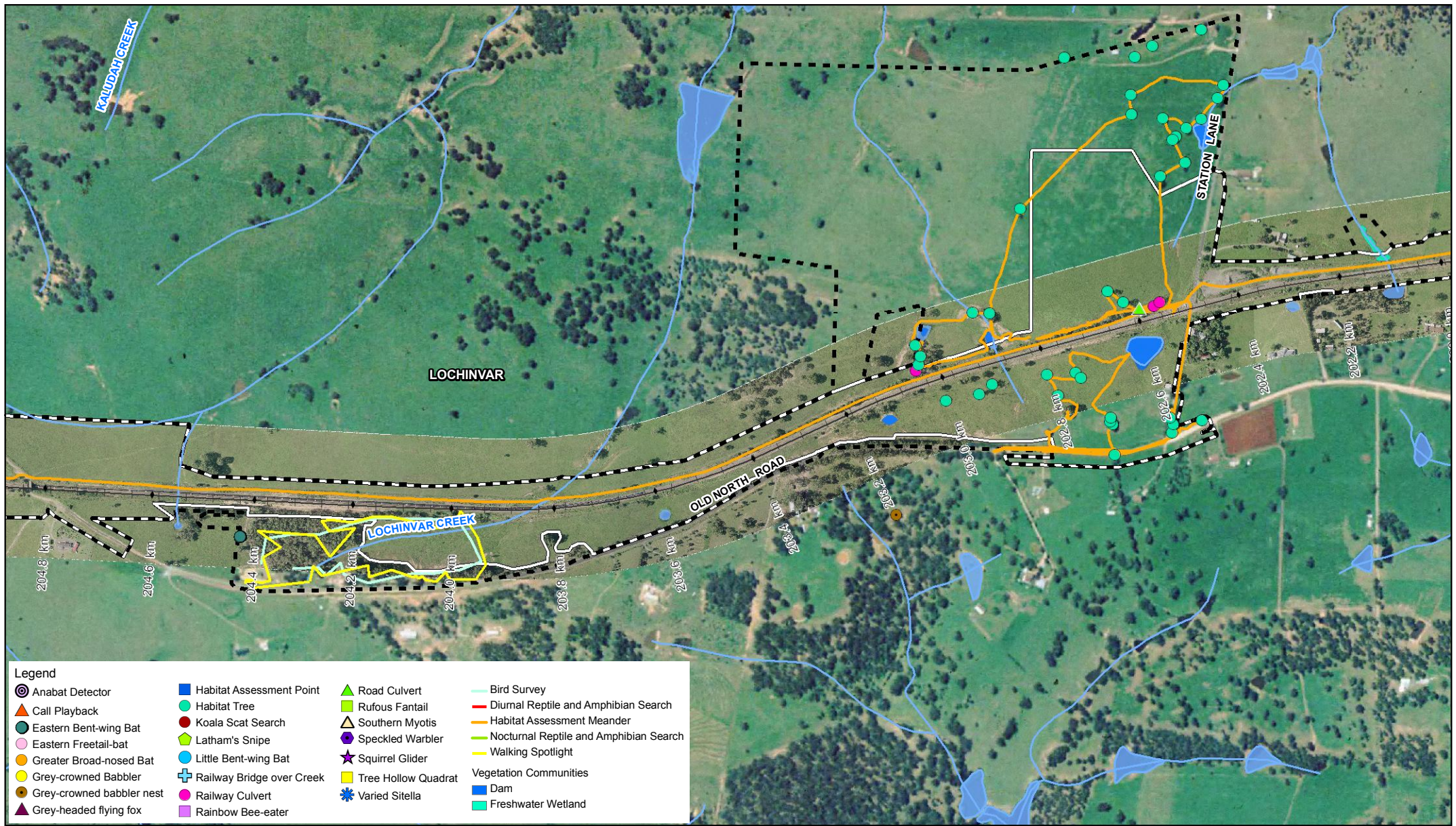
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Survey Effort and  
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Figure 4h

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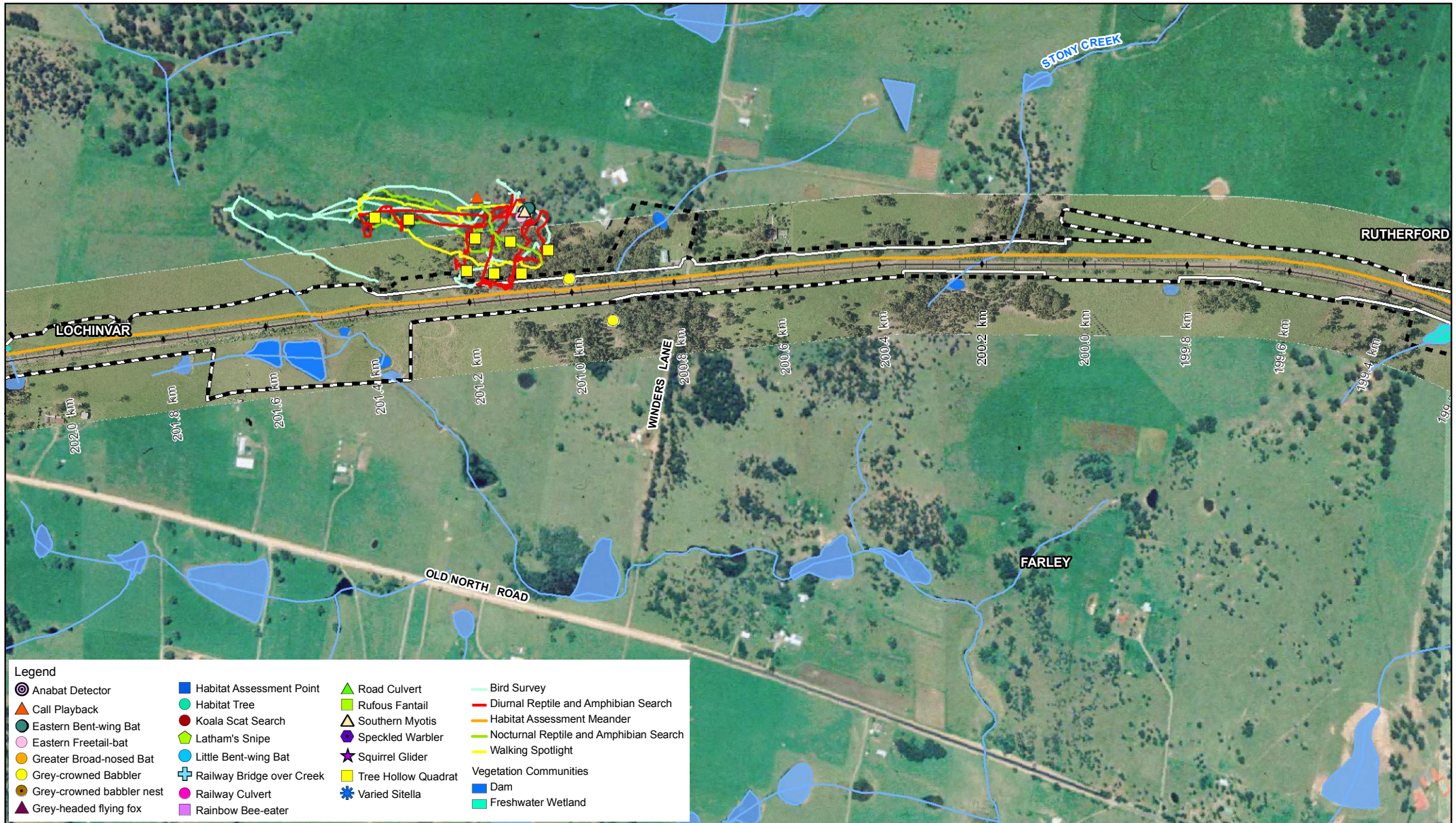


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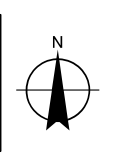
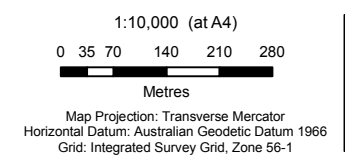
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Revision | A  
Date | August 2010

Survey Effort and  
Threatened Species Location **Figure 4i**

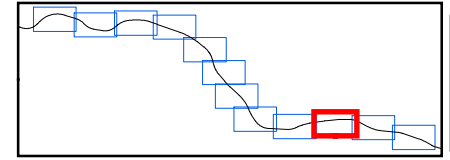
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Legend			
⊙ Anabat Detector	■ Habitat Assessment Point	▲ Road Culvert	— Bird Survey
▲ Call Playback	● Habitat Tree	■ Rufous Fantail	— Diurnal Reptile and Amphibian Search
● Eastern Bent-wing Bat	● Koala Scat Search	▲ Southern Myotis	— Habitat Assessment Meander
● Eastern Freetail-bat	● Latham's Snipe	● Speckled Warbler	— Nocturnal Reptile and Amphibian Search
● Greater Broad-nosed Bat	● Little Bent-wing Bat	★ Squirrel Glider	— Walking Spotlight
● Grey-crowned Babbler	⊕ Railway Bridge over Creek	■ Tree Hollow Quadrat	■ Vegetation Communities
● Grey-crowned babbler nest	● Railway Culvert	★ Varied Sitella	■ Dam
▲ Grey-headed flying fox	■ Rainbow Bee-eater		■ Freshwater Wetland



LEGEND	
■	Revised Investigation Area
+	Existing Railway
□	Revised Construction Impact Zone
—	Watercourse
■	Watercourse Area

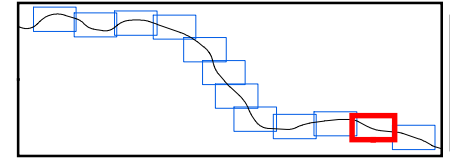
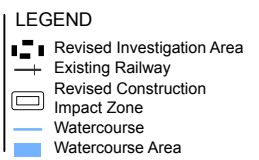
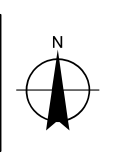
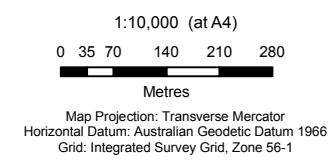
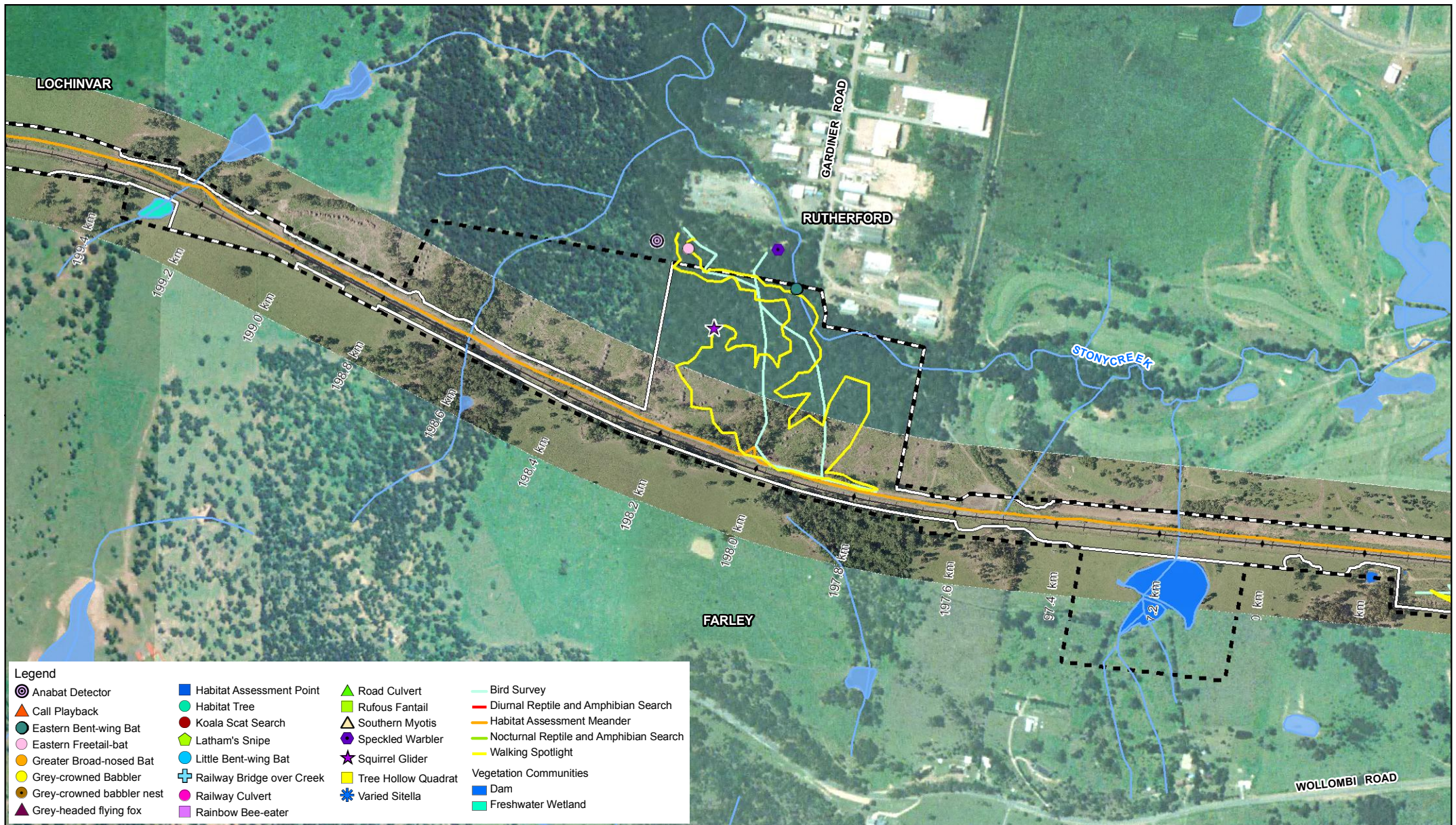


Maitland to Minimbah Third Track  
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Survey Effort and  
 Threatened Species Location **Figure 4j**

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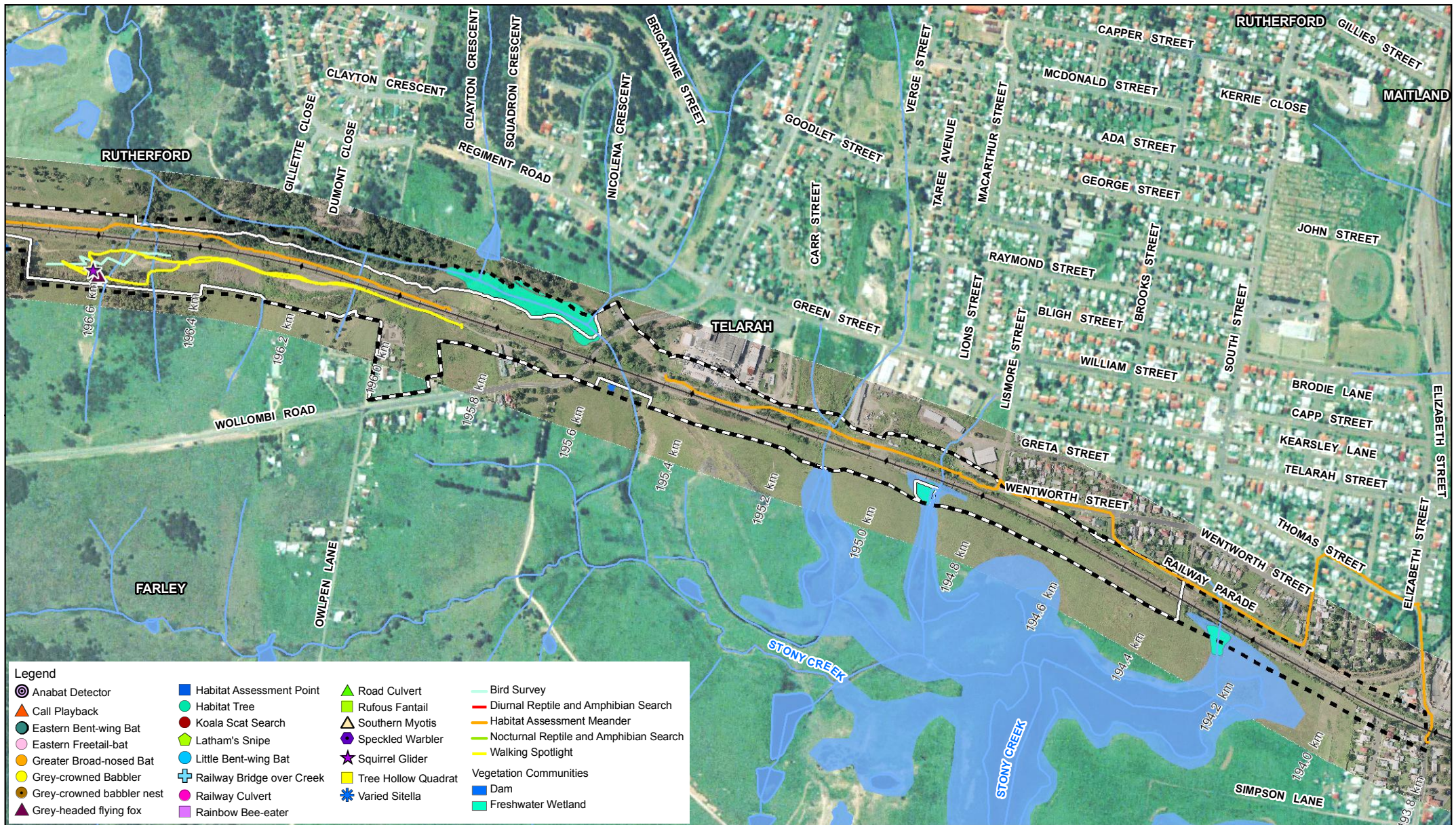


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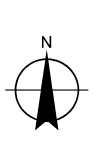
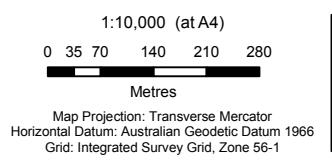
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Survey Effort and  
Threatened Species Location

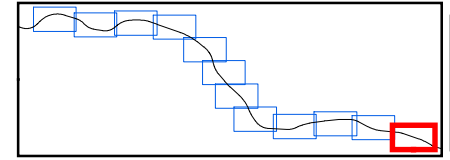
Figure 4k



Legend			
⊙ Anabat Detector	■ Habitat Assessment Point	▲ Road Culvert	— Bird Survey
▲ Call Playback	● Habitat Tree	■ Rufous Fantail	— Diurnal Reptile and Amphibian Search
● Eastern Bent-wing Bat	● Koala Scat Search	▲ Southern Myotis	— Habitat Assessment Meander
● Eastern Freetail-bat	● Latham's Snipe	● Speckled Warbler	— Nocturnal Reptile and Amphibian Search
● Greater Broad-nosed Bat	● Little Bent-wing Bat	★ Squirrel Glider	— Walking Spotlight
● Grey-crowned Babbler	⊕ Railway Bridge over Creek	■ Tree Hollow Quadrat	— Vegetation Communities
● Grey-crowned babbler nest	● Railway Culvert	★ Varied Sitella	■ Dam
● Grey-headed flying fox	■ Rainbow Bee-eater		■ Freshwater Wetland



LEGEND	
⊕	Revised Investigation Area
—	Existing Railway
⊕	Revised Construction Impact Zone
—	Watercourse
■	Watercourse Area



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Survey Effort and Threatened Species Location **Figure 4I**

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#### **4.4 Fauna Survey Limitations**

The following limitations may have influenced the detectability of threatened or non-threatened fauna species at the investigation area:

##### **4.4.1 Weather Conditions**

The weather conditions during the surveys may have affected the detectability of some species (for example some frog species require warm thunderstorm nights to be detectable). The weather during the survey was characterised by cool nights and days typical of winter. The weather was too cool for some amphibian and many reptile species.

##### **4.4.2 Survey Timing**

The field surveys were undertaken during June and July, or mid winter. Spring and summer migrant species were not detectable, as were many species that are active during warmer months of the year but undetectable during cold months (such as many reptile and amphibian species). As a precautionary measure to counter the potential limitation of survey timing, all threatened species with potential to occur within the study area have been addressed in the impact assessment section of this report (**Section 6.1**).

##### **4.4.3 Level of Survey Effort**

Not all survey methods at the preferred level of survey effort could be undertaken and as a result some species may not have been detected. As a precautionary measure to counter the reduced survey effort, all threatened species with potential to occur within the study area have been addressed in the impact assessment section of this report (**Section 6.1**).

##### **4.4.4 Access Restrictions**

Access restrictions prevented access to some parts of the investigation area. Species occurring solely within those areas were not recorded. As a precautionary measure to counter the restricted access to some areas, all threatened species with potential to occur within the study area have been assessed in the impact assessment section of this report (**Section 6.1**).

## 5.0 RESULTS

A total of 77 fauna species were recorded within the study area, comprising 5 frogs, 1 reptile, 55 birds, and 16 mammals. (**Appendix 1**). Eight threatened species listed on the TSC Act including one species also listed on the EPBC Act and (**Table 8**), and four introduced species were recorded (**Appendix 1**).

**Table 8. Threatened and/or Migratory Species identified during Field Surveys**

Scientific Name	Common Name
<b>Vulnerable Species – TSC Act</b>	
<i>Pomatostomus temporalis</i>	Grey-crowned babbler
<i>Petaurus norfolcensis</i>	Squirrel glider
<i>Mormopterus norfolkensis</i>	Eastern freetail-bat
<i>Miniopterus schreibersii oceanensis</i>	Eastern bent-wing bat
<i>Myotis macropus</i>	Large-footed or southern myotis
<i>Daphoenositta chrysoptera</i>	Varied sittella
<i>Pyrrholaemus sagittatus</i>	Speckled warbler
<i>Pteropus poliocephalus</i>	Grey-headed flying-fox
<b>Vulnerable species – EPBC Act</b>	
<i>Pteropus poliocephalus</i>	Grey-headed flying-fox

### 5.1 Threatened Fauna Species

Eight threatened fauna species on the TSC Act were recorded during field surveys. One species, the Grey-headed flying fox, is also listed as vulnerable on the EPBC Act. General locations of threatened fauna species can be seen in **Figure 4**.

- Squirrel Glider (Vulnerable)

The squirrel glider was recorded during spotlighting at survey sites S2, S3, and S14. A single individual was spotted at S2 and at S14 and a pair was spotted at S3.

- Grey-crowned Babbler (Vulnerable)

The grey-crowned babbler was recorded at survey sites S11 and S14, either from the identification of groups of birds (four to seven birds) or from the presence of nests/dormitories.

- Eastern Freetail-bat (Vulnerable)

The Eastern freetail-bat was recorded on Anabat detectors at survey site S3. The echolocation calls were identified at the Definite identification level.

- Eastern Bent-wing Bat (Vulnerable)

The eastern bent-wing bat was identified at survey sites S14, S3, S16 and S7-S10 via Anabat detectors. At all sites the echolocation calls were identified at the Definite identification level.

- Large-footed Myotis (Vulnerable)

The large-footed myotis was identified at survey site S16 and S3 on an Anabat detector. At survey site S3 and S16 the echolocation calls were identified at the Probable level of identification.

- Grey-headed flying fox (Vulnerable TSC Act, Vulnerable EPBC Act)

The Grey-headed flying fox was identified during spotlighting survey at site S2 only. The animal appeared to be feeding in a flowering iron bark in close proximity to a squirrel glider.

- Varied Sittella (Vulnerable)

The varied sittella was recorded at survey sites S10-S7. The distinctive call of the varied sittella was recorded during bird surveys and a small flock of individuals was observed foraging in a Casuarina forest.

- Speckled Warbler (Vulnerable)

The speckled warbler was recorded during bird census at survey site S3, in open forest behind an industrial site in Rutherford.

A number of other threatened species have potential to occur on the investigation area, at least on an occasional basis, and are identified in **Section 6.1** of this report.

## 5.2 Migratory Species

No migratory species listed on the EPBC Act were recorded during field surveys.

A number of other migratory species have potential to occur in the investigation area, at least on an occasional basis, and are identified in **Section 6.1** of this report.

## 5.3 Non-threatened Species

A total of 69 non-threatened (protected or introduced) species were recorded during field surveys (**Appendix 1**). The 51 non-threatened birds recorded comprised all the bird groups typically recorded within the region. Water birds such as the Australian wood duck (*Chenonetta jubatta*), the Grey teal (*Anas gracilis*) and the Black swan (*Cygnus atratus*) were recorded at farm dams. Species requiring tall reeds at farm dams such as the purple swamphen (*Porphyrio porphyrio*) and Australian reed-warbler (*Acrocephalus australis*) were also recorded. Common woodland bird species were recorded such as the eastern rosella (*Platycercus eximius*), laughing kookaburra (*Dacelo novaeguineae*), striated pardalote (*Pardalotus striatus*) and yellow thornbill (*Acanthiza nana*). One introduced bird species, the common myna (*Acridotheres tristis*) were recorded.

Two non-flying non-threatened mammal species were recorded, including the eastern grey kangaroo (*Macropus giganteus*) and red-necked wallaby (*Macropus rufogriseus*). Three introduced mammal species were recorded, the fox (*Vulpes vulpes*) the house mouse (*Mus musculus*) and rabbit (*Oryctolagus cuniculus*). Six flying non-threatened mammal species were recorded including two wattled bats (*Chalinolobus* spp.) and two forest bats (*Vespadelus* spp.) (**Appendix 1**).





Five non-threatened frog species were recorded including the common eastern froglet (*Crinia signifera*) and two tree frogs (*Litoria* spp.) (**Appendix 1**). One non-threatened reptile species, the wood gecko (*Diplodactylus vittatus*) was recorded (**Appendix 1**).

#### 5.4 Fauna Habitat Features

Five main types of habitat were recorded within the investigation area. They were:

- Remnant woodland vegetation.
- Open pasture paddocks.
- Creek lines and associated riparian vegetation.
- Farm dams.
- Drainage culverts and bridges.

**Table 9. Habitat Description of Survey Sites**

Site No	General Area	Habitat	Site image
S2	Rutherford Wollombi Rd	Disturbed site, small patch of remnant red gum open forest woodland and spotted gum iron bark open forest.	
S3	Rutherford, Kyle St Industrial Area	Remnant forest behind industrial estate. Spotted gum iron bark open forest.	
S4	Southern side of Northern Rail line, Old North Rd Station Lane	Predominately cleared, grazed area, some scattered spotted gum iron bark forest persists.	
S5a	Allendale Rd, Allendale	Woodland ranging from spotted gum iron bark to with some swamp oak riparian and remnant red gum open forest. Dense to patchy with cleared paddocks.	

S7a	East of Greta, Access via John St	Swamp oak riparian forest ranging from dense to patchy.	
S8	East of Greta, Access via John St	Swamp oak riparian forest ranging from dense to patchy.	
S10	East of Greta, Access via John St	Swamp oak riparian forest ranging from dense to patchy.	
S11	Southern side of Northern Railway Greta, Mansfield St	Small patch of red gum open forest. Little to no understory.	
S14	South of Branxton off Wine Country Drive	Open spotted gum iron bark forest. Immature to some mature trees, little understory development.	
S16	New England Hwy approximately 1.2km east	Predominately open pasture with some dams, small remnant spotted gum iron bark forest.	

### 5.4.1 Open Forest Vegetation

Remnant open forests occurred at a large number of locations along the investigation area. Spotted gum iron bark open forest was the dominant vegetation type at survey sites S2, S3, S4, S5a, S14 and S16. Swamp oak riparian forest was dominant at survey sites S7a, S8 and S10. Red gum open forest was dominant vegetation type at survey site S11.

#### **5.4.2 Open Pasture Paddocks**

Open pasture paddocks were dominated by pasture and weed species. At the time of the field survey grasses were typically less than 0.5 metres in height. Ground cover was entirely grass cover with no significant areas of rock, log or soil cover.

#### **5.4.3 Farm Dams**

These have been assessed as part of the original Environmental Assessment dated Dec 2009.

#### **5.4.4 Drainage Culverts and Bridges**

These have been assessed as part of the original Environmental Assessment dated Dec 2009.

## 6.0 IMPACT ASSESSMENT

### 6.1 Determination of Local Threatened Fauna as Subject Species

**Section 3.2** and **5.1** identified 75 threatened and/or migratory fauna species previously recorded or likely to occur in the study locality (within 10km). Subject species within this report are defined as threatened and/or migratory species listed on the TSC Act and/or the EPBC Act known or considered likely to occur in the habitats present within the study area. Following a habitat assessment and non-trapping field survey of the investigation area (**Section 4.0**) **Table 10** identifies the likelihood of each species or population occurring in the investigation area and being classified as subject species. The species that will be assessed in this supplementary report are species that are additional to what was previously assessed in the Fauna Impact Assessment dated Dec 2009.

**Table 10. An Assessment of the likelihood of 60 Threatened and/or Migratory Fauna Species and two Endangered Fauna Populations occurring within the Investigation area**

Common Name and Status	Record Source		Preferred Habitat* and Comments	Habitat Available		
	Most Recent Record	Number Recorded Within 10 km		Breeding	Shelter	Foraging
<b><i>SPECIES KNOWN TO OCCUR (Recorded during field surveys)</i></b>						
Grey-headed flying fox ( <i>Pteropus poliocephalus</i> ) V – TSC Act V – EPBC Act	2010	44	Regularly occurs along the eastern coastal plain through NSW. Roosts in camps, usually in dense riparian habitats. At dusk disperses in search of the preferred food source, mainly Eucalypt nectar and pollen, and rainforest fruits. Occurs in subtropical and temperate rainforest, tall sclerophyll forests and woodlands, heaths and swamps as well as urban gardens and planted fruit crops. May travel up to 50 km each night in search of food.  The grey-headed flying fox may occur in any area with suitable flowering eucalypt trees. A known camp occurs at nearby Singleton. The species is likely to occur in the investigation area when eucalypt species are flowering.	N	Y	Y
	Ecotone 2008					
	EPBC modelling – foraging, feeding or related behaviour known to occur within area.					
Grey-crowned babbler ( <i>Pomatostomus temporalis temporalis</i> ) V – TSC Act	2009	94	Open eucalypt woodlands with a grassy groundcover and sparse, tall shrub layer. May also be observed along streams in cleared areas and grassy road verges. Raucous groups of 2-13 individuals foraging for insects in all substrates. Groups build several dome shaped and football sized stick nests which are used year round for roosting and during the breeding season for nesting. Nests are typically located in shrubs or regenerating eucalypts, or less frequently in the outer lower branches of large eucalypt trees. Breeding generally occurs between July and February. Territories range from one to 50 hectares, averaging 10 ha, and are defended year-round.  Recorded during field surveys.	Y	Y	Y

Common Name and Status	Record Source		Preferred Habitat* and Comments	Habitat Available		
	Most Recent Record	Number Recorded Within 10 km		Breeding	Shelter	Foraging
Varied sittella ( <i>Daphoenositta chrysoptera</i> ) V – TSC Act	2010	8	Occur in eucalypt forest, woodland, mallee, farm trees, shelter belts, roadside trees and parks and gardens. Occur in most treed habitats except rainforest. Recorded during field surveys.	Y	Y	Y
Squirrel glider ( <i>Petaurus norfolcensis</i> ) V – TSC Act	2009	54	Usually inhabits dry open sclerophyll forest and woodlands, but has also been observed in moist regenerating forest and moist gullies. Forages on acacia gum, eucalypt sap, nectar, honeydew and manna, invertebrates and pollen, utilising areas with an abundance of flowering eucalypts and tall shrubs (such as banksias). Acacia species are the preferred sap feeding trees. This species requires an abundance of suitably sized hollow-bearing trees for den sites. Recorded during field surveys.	Y	Y	Y
Speckled warbler ( <i>Pyrholaemus sagittatus</i> ) V – TSC Act	2008	17	The speckled warbler lives in a wide range of <i>Eucalyptus</i> dominated communities that have a grassy understorey, often on rocky ridges or in gullies. Typical habitat would include scattered native tussock grasses, a sparse shrub layer, some eucalypt regrowth and an open canopy. Large, relatively undisturbed remnants are required for the species to persist in an area. The diet consists of seeds and insects, with most foraging taking place on the ground around tussocks and under bushes and trees. Pairs are sedentary and occupy a breeding territory of about ten hectares, with a slightly larger home-range when not breeding. Recorded during field surveys.	Y	Y	Y
Eastern freetail-bat ( <i>Mormopterus norfolkensis</i> ) V – TSC Act	2009	37	The habitat preference of this species is unclear. It has been predominantly recorded in dry eucalypt forest and woodland, but has been recorded in moist and edge environments. The wing morphology indicates that this species is adapted to the more open habitats. This species primarily roosts in tree hollows, although the roofs of buildings are also used. Recorded during field surveys.	Y	Y	Y
Eastern bentwing-bat ( <i>Miniopterus schreibersii oceanensis</i> ) V – TSC Act	2009	57	Forages within a variety of habitat types including moist and dry eucalypt forest, woodland, rainforest, heath and open environments, including urban areas. Reliant on suitable roosting/breeding habitat in caves and mine tunnels, though will also roost in stormwater channels, road culverts and other comparable structures (including buildings). Estimated nightly foraging range of 20 kilometres. Recorded during field surveys.	N	N	Y

Common Name and Status	Record Source		Preferred Habitat* and Comments	Habitat Available		
	Most Recent Record	Number Recorded Within 10 km		Breeding	Shelter	Foraging
Large-footed myotis ( <i>Myotis macropus</i> ) V – TSC Act	2009	16	Habitats adjacent to large bodies of water for hunting aquatic insects. Usually forages over streams or pools, catching insects and small fish by raking its feet across the water surface. Roosts in caves, mines, tunnels, bridges, culverts and dense foliage. Recorded during field surveys.	Y	Y	Y
<b><i>SPECIES LIKELY TO OCCUR</i></b>						
			<i>NONE</i>			
<b><i>SPECIES THAT MAY OCCUR</i></b>						
Freckled Duck ( <i>Stictonetta naevosa</i> ) V – TSC Act	1985	4	The Freckled Duck is found primarily in the south east and south west of Australia, occurring as a vagrant elsewhere. It breeds in large temporary swamps created by floods in the Bulloo and Lake Eyre Basins and the Murray Darling System. The Freckled Duck prefers permanent fresh water swamps and creeks with heavy growth of cumbungi (bullrushes), lignum or tea-tree. During drier times, the Freckled Duck moves from ephemeral (not permanent) breeding swamps to more permanent waters such as lakes, reservoirs, farm dams and sewerage ponds. They generally rest in dense cover. There is potential habitat in the study area in the form of dams and permanent water sources however none have been recorded in the vicinity of the study area and none have been recorded during field surveys.	N	Y	Y
<b><i>SPECIES UNLIKELY TO OCCUR</i></b>						
Magpie goose V – TSC Act	1978	1	The Magpie goose is seen in floodplains and wet grasslands. Some individuals, mostly younger birds, may be seen at quite long distances inland. The Magpie Goose is widespread throughout coastal northern and eastern Australia. It can be seen from Fitzroy River, Western Australia, through northern Australia to Rockhampton, Queensland, and has been extending its range into coastal New South Wales to the Clarence River and further south. No magpie geese were recorded during field surveys. There is no preferred habitat within the study area.	N	N	N
Comb-crested jacana ( <i>Irediparra gallinacean</i> ) V – TSC Act	1991	1	The Comb-crested Jacana occurs on freshwater wetlands in northern and eastern Australia, mainly in coastal and sub coastal regions, from the north-eastern Kimberley Division of Western Australia to Cape York Peninsula then south along the east coast to the Hunter region of NSW, with stragglers recorded in south-eastern NSW (possibly in response to unfavourable conditions further north). No comb-crested jacanas were recorded during field surveys. There is no preferred habitat within the study area.	N	N	Y

Common Name and Status	Record Source		Preferred Habitat* and Comments	Habitat Available		
	Most Recent Record	Number Recorded Within 10 km		Breeding	Shelter	Foraging
Little curlew ( <i>Numenius minutus</i> ) M – EPBC Act	1991	2	The Little Curlew is widespread in the north of Australia and scattered elsewhere. It is an irregular visitor to New Zealand and Tasmania. It breeds in Siberia and is seen on passage through Mongolia, China, Japan, Indonesia and New Guinea. No little curlews were recorded during field surveys. There is no preferred habitat within the study area.	N	N	N
Marsh sandpiper ( <i>Tringa stagnatilis</i> ) M – EPBC Act	1992	4	The Marsh Sandpiper is common across the far north of Australia though more scattered on other coastal areas and sparse inland. No marsh sandpipers were recorded during field surveys. There is no preferred habitat within the study area.	N	N	N
Pectoral sandpiper ( <i>Calidris melanotos</i> ) M – EPBC Act	1986	4	It is a very long-distance migrant breeding in the boggy tundra of northeast Asia and North America. The American and most of the Asian birds winter in South America, but some Asian breeders winter in southern and Australia and New Zealand. On migration and in winter, the Pectoral Sandpiper is typically found in freshwater habitats. No pectoral sandpipers were recorded during field surveys. There is no preferred habitat within the study area.	N	N	N
Himalayan cuckoo ( <i>Cuculus saturatus</i> )	1992	2	This species is widespread, breeding in the Himalayas from northern Pakistan through Nepal and northern India to South-East Asia, southern China, Taiwan and Hainan. Birds migrate through South-East Asia and winter in Indonesia and the Philippines. No Himalayan cuckoos were recorded during field surveys. There is no preferred habitat within the study area.	N	N	N
Osprey ( <i>Pandion haliaetus</i> ) V – TSC Act M – EPBC Act	1992	1	The Osprey is cosmopolitan, being found in many coastal and lake areas of the world. In Australia, it is found on the north and east coast from Broome to the south coast of New South Wales. No Osprey's were recorded during field surveys. There is no preferred habitat within the study area.	N	N	N
Little tern ( <i>Sterna albifrons</i> ) E – TSC Act M – EPBC Act	1983	1	Migrating from eastern Asia, the Little Tern is found on the north, east and south-east Australian coasts, from Shark Bay in Western Australia to the Gulf of St Vincent in South Australia. In NSW, it arrives from September to November, occurring mainly north of Sydney, with smaller numbers found south to Victoria. It breeds in spring and summer along the entire east coast from Tasmania to northern Queensland, and is seen until May, with only occasional birds seen in winter months. No little terns were recorded during field surveys. There is no preferred habitat within the study area.	N	N	N

Common Name and Status	Record Source		Preferred Habitat* and Comments	Habitat Available		
	Most Recent Record	Number Recorded Within 10 km		Breeding	Shelter	Foraging
Wood sandpiper ( <i>Tringa glareola</i> ) M – EPBC Act	1986	3	Wood Sandpipers are more numerous in the north than the south of Australia and are also found in New Guinea, Africa, the Indian subcontinent and South-east Asia. They breed widely across the north of Europe and Asia, mostly in Scandinavia, Baltic countries and Russia. They are the most abundant migratory wader in non-coastal areas of Asia. No Wood sandpipers were recorded during field surveys. There is no preferred habitat within the study area.	N	N	N
Sharp-tailed sandpiper ( <i>Calidris acuminata</i> ) M – EPBC Act	1996	22	The Sharp-tailed Sandpiper is a summer migrant from Arctic Siberia, being found on wetlands throughout Australia. It is also found in Indonesia, Papua New Guinea, the Solomon Islands, New Caledonia and New Zealand. It is a vagrant to India, Europe, western North America, Fiji and other parts of the central Pacific region. No Sharp-tailed sandpipers were recorded during field surveys. There is no preferred habitat within the study area.	N	N	N
Red-necked stint ( <i>Calidris ruficollis</i> ) M – EPBC Act	1996	3	The Red-necked Stint breeds in north-eastern Siberia and northern and western Alaska. It follows the the East Asian-Australasian Flyway to spend the southern summer months in Australia. It is found widely in Australia, except in the arid inland. No red-necked stints were recorded during field surveys. There is no preferred habitat within the study area.	N	N	N
Freckled Duck ( <i>Stictonetta naevosa</i> ) V – TSC Act	1985	4	The Freckled Duck is found primarily in the south east and south west of Australia, occurring as a vagrant elsewhere. It breeds in large temporary swamps created by floods in the Bulloo and Lake Eyre Basins and the Murray Darling System. The Freckled Duck prefers permanent fresh water swamps and creeks with heavy growth of cumbungi (bullrushes), lignum or tea-tree. During drier times, the Freckled Duck moves from ephemeral (not permanent) breeding swamps to more permanent waters such as lakes, reservoirs, farm dams and sewerage ponds. They generally rest in dense cover. There is potential habitat in the study area in the form of dams and permanent water sources however none have been recorded in the vicinity of the study area, none have been recorded during field surveys.	N	Y	Y

Common Name and Status	Record Source		Preferred Habitat* and Comments	Habitat Available		
	Most Recent Record	Number Recorded Within 10 km		Breeding	Shelter	Foraging
Common greenshank ( <i>Tringa nebularia</i> ) M – EPBC Act	1990	4	The Common Greenshank breeds in the Palaearctic regions and is widespread in Africa, Coastal Asia, the Indian subcontinent, the Philippines and southern New Guinea. They are common throughout Australia in the summer. No common greenshanks were recorded during field surveys. There is no preferred habitat within the study area.	N	N	N
Curlew sandpiper ( <i>Calidris ferruginea</i> ) M – EPBC Act	1983	19	The Curlew Sandpiper is a common summer migrant from north-eastern Siberia and Alaska, found in many Australian coastal sites and may also be seen inland in suitable habitats. It is most common in the far south-east and north-west of Australia. It is also found in Africa, across southern Asia to Indonesia and New Guinea, and in New Zealand. No curlew sandpipers were recorded during field surveys. There is no preferred habitat within the study area.	N	N	N
White-winged black tern ( <i>Chlidonipterus leuco</i> ) M – EPBC Act	1988	1	Breeds in eastern Europe, tropical Africa and central Asia. Visits fresh swamps and brackish estuaries around the north coast of Australia. The white-winged black tern is a vagrant species elsewhere. No white-winged black terns were recorded during field surveys. There is no preferred habitat within the study area.	N	N	N

\*Compiled from: Australian Museum Fact Sheets, Barrett 2003, Churchill 1998, Cogger 1995, CSIRO 2006, Garnett 2000, Morcombe 2004 and Strahan 2002.

N – No suitable habitat, Y – Suitable habitat present to some extent.

## 6.2 Threatened and/or Migratory Species to be assessed

The following nine statutory-listed species (note that some species are protected under both the TSC Act and the EPBC Act) are known or considered to have potential to occur within the additional investigation areas.

**Table 11. Threatened and or Migratory Species to be Assessed**

Species (common name)	Legislation	Status
Grey-headed flying fox	<i>TSC Act</i>	<i>Vulnerable</i>
Grey-crowned babbler	<i>TSC Act</i>	<i>Vulnerable</i>
Varied sittella	<i>TSC Act</i>	<i>Vulnerable</i>
Speckled warbler	<i>TSC Act</i>	<i>Vulnerable</i>
Eastern free tail	<i>TSC Act</i>	<i>Vulnerable</i>
Eastern bentwing	<i>TSC Act</i>	<i>Vulnerable</i>
Large-footed myotis	<i>TSC Act</i>	<i>Vulnerable</i>
Squirrel glider	<i>TSC Act</i>	<i>Vulnerable</i>
Freckled duck	<i>TSC Act</i>	<i>Vulnerable</i>
Grey-headed flying fox	<i>EPBC Act</i>	<i>Vulnerable</i>

The likely level of impact on the threatened and/or migratory species listed above from the Project will be undertaken in **Section 6.5** of this report.

## 6.3 Overview of Potential Impacts Associated with the Project

A description of the Project is provided in Section 7.8 of the Environmental Assessment prepared by the Hunter 8 Alliance, and the modifications to the project are described in Chapter 5 of the Submissions Report.

### 6.3.1 Environmental Risk and Impact Assessment

A detailed Environmental Risk and Impact Assessment (Risk Assessment) was conducted as part of the Environmental Assessment process to evaluate the potential impacts that the Project could have on a wide range of environmental, social and economic assets and beneficial uses, which has contributed to help form the conclusions of this study.

### 6.3.2 Vegetation Removal

Since the Environmental Assessment was undertaken, design modifications have resulted in changes to the Project. These changes have resulted in some areas included in the construction impact zone in the Environmental Assessment now not requiring clearance, and the additional investigation areas now being included within the revised construction impact zone. The revised construction impact zone has resulted in an overall increase in the vegetation clearing totals that were outlined in the Flora and Aquatic Ecological Assessment (Appendix E of the Environmental Assessment).

The removal or modification of additional areas of vegetation from the investigation area is outlined in **Table 12**. Lot 1 DP 1127199 or survey site S3 has been excluded from this table as it is an area that has been approved for clearing by Maitland Council as part of separate development consent.

Further description of the vegetation communities and areas to be disturbed can be found in the Flora and Aquatic Ecological Assessment prepared by the Hunter 8 Alliance for the Project.

**Table 12. Areas of Vegetation Communities that will be Removed or Modified**

Description	Hectares
Spotted Gum Ironbark forest	14.1
Red Gum open forest	22.8
Swamp Oak riparian forest	17.5
Grey Box Spotted Gum Ironbark open forest	11.3
Freshwater wetland	0.5
Hakea scrub	1.0
Plantation	1.4
Open pastureland	204.7

The removal of vegetation would result in a decreased potential foraging area and a reduction in potential roosting and nesting sites for woodland, grassland, wetland and farm dam species. The removal of vegetation would also increase the level of local habitat fragmentation by a small degree and increase the potential impacts of edge effects by a similar degree. Where vegetation will be removed, remaining woodland remnants would decrease in size by a small degree and the resulting change in ratio of edge to area of remnant would increase edge effects.

Removal of riparian vegetation would result in larger increases in the degree of fragmentation and edge effects of riparian habitat areas due to the relatively narrow and linear nature of such habitats within the study locality.

### 6.3.3 Construction and Operational Potential Impacts

In addition to vegetation removal, during the construction of the Project construction activities and associated vehicle/machinery movements would be likely to result in an increase in the degree of noise, dust and vibration impacts on local species. The impact of potential increases in noise, dust and vibration on fauna species is likely to be secondary to the potential impacts associated with the removal of vegetation. However potential increases in noise, dust and vibration may cause some individuals to move out of the local area or to abandon nesting attempts.

The completion of the Project would result in an effective doubling of the rail traffic within the investigation area. The increase in the number of trains would be likely to result in an increased number of collisions with fauna species. A small number of grey kangaroo carcasses were recorded within the investigation area. The number of fauna species hit by trains would be likely to increase in a proportional manner to the increase in train movements.

## 6.4 NSW State Legislative Requirements

See EA report dated Dec 2009

### 6.4.1.1 Director-General's Requirements

See EA report dated Dec 2009

### 6.4.1.2 Threatened Species Assessment under Part 3A of the EP&A Act

In accordance with the Department of Planning (DoP) Director-General's requirements the following assessment addresses the potential effects of the Project on threatened fauna species or their habitats according to Appendix 3 of the *Draft Guidelines for Threatened Species Assessment* under Part 3A of the Environmental Planning and Assessment Act 1979 (DECC & DPI, 2005). Threatened fauna species known or with potential to occur within the study area are in **Section 6.2**. For the purposes of this report, where appropriate, the subject species have been grouped according to similar behavioural characteristics or habitat requirements.

#### a) How is the proposal likely to affect the lifecycle of a threatened species and/or endangered population?

- Grey-headed Flying-fox (*Pteropus poliocephalus*) – Vulnerable

One grey-headed flying-fox was recorded during field surveys. Grey-headed flying-foxes forage over large areas (up to 50 km from their roosts). Under the draft Grey-headed flying fox recovery plan (DECCW 2009) three vegetation communities have been identified within the investigation area that are recognised as foraging habitat critical to the survival of the grey-headed flying fox. No breeding or shelter habitat, critical to the lifecycle of this species, in the form of a flying-fox camp occurred in the study area.

The proposal would result in the clearing or modification of vegetation comprising foraging tree species that are identified as critical to the survival of the grey-headed flying fox in the draft recovery plan. However the clearing of vegetation for this project, being within a number of small discrete areas spread out over approximately 30km of railway corridor, and the abundance of similar foraging habitat within the Project locality (10km) indicates that the Project would be unlikely to have an adverse affect on the life cycle of the grey-headed flying-fox.

- Speckled Warbler (*Pyrrholaemus saggitatus*) - Vulnerable
- Grey-crowned Babbler (*Pomatostomus temporalis temporalis*) – Vulnerable
- Varied Sittella (*Daphoenositta chrysoptera*) – Vulnerable

The grey-crowned babbler, varied sittella and speckled warbler were recorded during field surveys. These bird species forage and nest in woodland areas. The loss of potential foraging and nesting trees during clearing activities is unlikely to affect the lifecycles of the above bird species due to the small areas of vegetation to be removed from the woodland remnants along the investigation area. The life cycles of these non-hollow dependent woodland bird species would be unlikely to be significantly affected by the Project.

- Squirrel Glider (*Petaurus norfolcensis*) - Vulnerable

The squirrel glider was recorded during field surveys. The area of woodland habitat that would be removed for the Project would not significantly reduce the amount of potentially suitable foraging and denning woodland habitat in the investigation area or study locality for the squirrel glider.

Suitably sized tree hollows occur in the investigation area for the squirrel glider and there is the potential for individual squirrel gliders to perish during the tree felling process (even if a tree felling protocol is implemented). If the local population was small, then the loss of a few individuals may disrupt the life cycle of the species, however since the local population is likely to extend well beyond the study area, the Project would be unlikely to negatively affect the life cycle of the squirrel glider.

- Eastern freetail-bat (*Mormopterus norfolkensis*) – Vulnerable

The eastern freetail-bat was recorded during field surveys. The area of woodland habitat that would be removed for the Project would not significantly reduce the amount of potentially suitable foraging and roosting woodland habitat in the investigation area or study locality for hollow-roosting bats. Suitably sized tree hollows occur in the investigation area for hollow-roosting bats and there is the potential for individuals to perish during the tree felling process (even if a tree felling protocol is implemented). If the local population was small, then the loss of a few individuals may disrupt the life cycle of the species, however since the local population is likely to extend well beyond the study area, the Project would be unlikely to negatively affect the life cycle of this species or other hollow-roosting micro-bats.

- Eastern bentwing-bat (*Miniopterus schreibersii oceanensis*) – Vulnerable

The eastern bentwing-bat was recorded during field surveys. No roosting or breeding habitat in the form of tunnels or caves occurred in the investigation area. Possible short-term roosting sites occur within culverts and bridges under the railway line. The additional investigation area provides potential foraging habitat for cave-roosting bats. The area of woodland habitat that would be removed for the Project would not significantly reduce the amount of potentially suitable woodland habitat in the study area or study locality for cave-roosting bats. There is some potential that possible roost sites within culverts and bridges may be disturbed during construction. The Project would be unlikely to have an adverse affect on the life cycle of cave-roosting bats.

- Large-footed Myotis (*Myotis macropus*) - Vulnerable

The large-footed myotis was recorded during field surveys. An area of farm dams would be removed for the Project and would be unlikely to significantly reduce the amount of potentially suitable foraging habitat in the study area or study locality for the southern myotis. Suitably sized tree hollows occur in the investigation area for the southern myotis and there is the potential for individuals to perish during the tree felling process. The species more commonly roosts in caves, mines, bridges and abandoned fairy martin nests. If the local population was small, then the loss of a few individuals may disrupt the life cycle of the species, however since the bats foraging over the study area are likely to be also roosting and foraging off site, the Project would be unlikely to negatively affect the life cycle of the large-footed myotis.

- Freckled duck (*Stictonetta naevosa*) - Vulnerable – TSC Act

No freckled ducks were recorded during surveys carried out in September 2009, or the recent field surveys in June/July 2010. Freckled ducks breed predominately in the Murray-Darling Basin and in coastal areas of south central Western Australia. The freckled duck has been recorded within 10km of the study site and there is suitable habitat within the area, however any freckled ducks visiting the area would only be vagrants thus it is unlikely that the proposal would have an adverse affect on the lifecycle of the freckled duck.

**b) How is the proposal likely to affect the habitat of a threatened species, endangered population or endangered ecological community?**

The Project would result in the removal or modification of areas of woodland vegetation from the investigation area. **Table 12** above lists the area of each vegetation community that would be removed or modified by the Project.

The loss of the areas of woodland is unlikely to affect species' ability to move within the landscape due to the presence of woodland areas adjacent to most areas of woodland to be removed from the investigation area. The ecological integrity/security of surrounding habitat would be unlikely to be affected by the removal of the areas of areas of woodland from the investigation area.

Due to the availability of similar farm dam and grazing paddock habitat within the study locality, these areas within the investigation area that would be removed are of low importance to the long-term survival of the threatened species, populations and ecological communities in the locality.

**c) Does the proposal affect any threatened species or endangered population that are at the limit of its known distribution?**

None of the threatened species in this assessment are at the limit of their known distribution in the investigation area or study locality.

**d) How is the proposal likely to affect current disturbance regimes?**

Current disturbance regimes within the study area include:

- Stock grazing
- Railway traffic (trains and service vehicles)
- Land clearing
- Fire
- Weed invasion
- Human presence

The level of stock grazing adjacent to the existing two tracks would not be expected to change if the third track is constructed.

The addition of the third track would increase the number and frequency of trains and service vehicles within the railway corridor and would likely result in an increase number of collisions between trains and fauna species. Increases in railway traffic would also likely increase the potential impacts from increases in noise and vibration from passing trains. Such impacts would be likely to be minor on fauna species.

The construction of the third track would result in further land clearing within the study locality but at the same time result in the protection of other areas of woodland within the region through the implementation of a Compensatory Habitat Strategy by ARTC.

The prevalence of wild fire would be unlikely to change significantly during the construction or operation of the Project; however the increased movements of people and vehicles within the investigation area during the construction phase could see a rise in the number of accidental fires.

The area and level of weed invasion would be unlikely to change due to the continuation of weed management and control strategies within the rail corridor by the Proponent.

An increased level of human activity across the investigation area would see a resulting increased level of wildlife disturbance.

**e) How is the proposal likely to affect habitat connectivity?**

The removal of areas of woodland from the investigation area would result in a minor increase in the degree of fragmentation, edge effects and isolation of surrounding woodland, as the remaining woodland area within the study locality reduces slightly, the ratio of edge to remaining woodland increases and remaining woodland areas become isolated from each other by a slightly larger distance. The removal of farm dams from the investigation area would result in an increase in the degree of fragmentation and isolation of surrounding farm dams as the remaining area of farm dams within the study locality reduces and remaining farm dams become isolated from each other by a larger distance.

**f) How is the proposal likely to affect critical habitat?**

No critical habitat is currently listed on the NSW TSC Act for the threatened species within the study locality.

**6.4.1.3 Conclusion to Part 3A Assessment for Threatened Fauna**

Following an assessment of the potential impacts of the Project (**Section 6.3**) it was found that the Project would be unlikely to significantly impact upon the nine threatened species identified with potential habitat in the investigation area and listed on the TSC Act.

The implementation of mitigation measures recommended in the final Terrestrial Fauna Impact Assessment report dated December 2009 and the development of a Compensatory Habitat Strategy, in consultation with DECCW, would further reduce the level of potential impact on threatened fauna species and their habitats.

#### 6.4.1.4 Assessment of Significance under Part 3A of the EP&A Act

While DECCW Agency Comments to the DoP DGRs are not strict requirements for assessment, they have been addressed here to satisfy DECCW recommendations. Of the two assessment tools identified in the DECCW comments that can be used by proponents for the purpose of assessment under Part 3A of the EP&A Act, the factors identified in the *Threatened Species Assessment Guidelines – The Assessment of Significance* (DECC 2007 and NSW DPI 2008) have been used to assess the level of impact on threatened fauna species. The factors combined are commonly referred to as a 7-part test.

Eight threatened fauna species were recorded within the investigation area during the field habitat assessment and targeted fauna survey. Based on a comparison of the habitat types present with the habitat requirements of other threatened species identified during the literature and database searches (**Section 2.0**), one other threatened fauna species on the TSC Act was identified with some potential to occur (**Section 6.1**). The potential impact of the Project on the eight threatened species listed on the TSC Act is assessed below via 7-part tests. Species sharing similar habitat requirements have been grouped together.

- (a) *In the case of a threatened species, whether the action proposed is likely to have an adverse affect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.*

- Grey-headed Flying-fox (*Pteropus poliocephalus*) – Vulnerable TSC Act

The grey-headed flying-fox was recorded during field surveys. Grey-headed flying-foxes forage over large areas (up to 50 km from their roosts). Under the draft Grey-headed flying fox recovery plan (DECCW 2009) three vegetation communities have been identified within the project area that are recognised as foraging habitat critical to the survival of the Grey-headed flying fox. The action proposed would result in the clearing of 48.2 ha of foraging habitat critical to the survival of the grey-headed flying fox. Due to the relatively linear nature of the investigation areas and the small size of the areas of forest and isolated farm trees that would be removed it is unlikely that the removal of such vegetation would significantly impact on the life cycle of the grey-headed flying-fox. No breeding or shelter habitat in the form of a flying-fox camp occurred in the study area. The Project would be unlikely to have an adverse affect on the life cycle of the grey-headed flying-fox such that a viable local population of the species would be likely to be placed at the risk of extinction.

- Speckled Warbler (*Pyrrholaemus saggitatus*) - Vulnerable

The speckled warbler was recorded during the field surveys. The area of woodland habitat to be removed for the Project would not significantly reduce the amount of potentially suitable woodland habitat in the investigation area or study locality for the speckled warbler. The Project is unlikely to have an adverse affect on the life cycle of the speckled warbler such that a viable population of the species would be likely to be placed at risk of extinction.

- Grey-crowned Babbler (*Pomatostomus temporalis temporalis*) – Vulnerable

The grey-crowned babbler was recorded during field survey and a number of nests were also recorded at survey sites. The grey-crowned babbler and its nest likely also occur at many of the smaller woodland remnants within the investigation area. The area of woodland habitat that would

be removed for the Project would not significantly reduce the amount of woodland habitat in the study area or study locality for the grey-crowned babbler, however a number of nests would be destroyed. As abandoned nests persist in trees for extended periods only a small proportion of nests within the investigation areas are likely to be active roosting or breeding nests. If clearing activities are undertaken during the breeding season of the grey-crowned babbler, individuals may perish during the clearing process. Even if clearing is undertaken during the breeding season the loss of a small number of individuals would be unlikely to affect the life cycle of the grey-crowned babbler such that a viable population of the species would be likely to be placed at risk of extinction.

- Varied Sittella (*Daphoenositta chrysoptera*) – Vulnerable

The varied sittella was recorded during field surveys. The area of woodland habitat that would be removed for the Project would not significantly reduce the amount of potentially suitable woodland habitat in the investigation area or study locality for the varied sittella. The Project would be unlikely to have an adverse affect on the life cycle of the varied sittella such that a viable population of the species would be likely to be placed at risk of extinction.

- Squirrel Glider (*Petaurus norfolcensis*) - Vulnerable

The squirrel glider was recorded during field surveys. The area of woodland habitat that would be removed for the Project would not significantly reduce the amount of potentially suitable foraging and denning woodland habitat in the investigation area or study locality for the squirrel glider. Suitably sized tree hollows occur in the investigation area for the squirrel glider and there is the potential for individual squirrel gliders to perish during the tree felling process. The loss of some individuals may disrupt the life cycle depending on the size of the local population. If the local population was small, then the loss of a few individuals may disrupt the life cycle of the species, however since the local population is likely to extend well beyond the study area, the Project would be unlikely to negatively affect the life cycle of the squirrel glider or place the species at risk of extinction.

- Eastern freetail-bat (*Mormopterus norfolkensis*) – Vulnerable

The eastern freetail-bat was recorded during field surveys. The area of woodland habitat that would be removed for the Project would not significantly reduce the amount of potentially suitable foraging and roosting woodland habitat in the investigation area or study locality for hollow-roosting bats. Suitably sized tree hollows occur in the investigation area for hollow-roosting bats and there is the potential for individuals to perish during the tree felling process. The loss of some individuals may disrupt life cycle depending on the size of the local population. If the local population was small, then the loss of a few individuals may disrupt the life cycle of the species, however since the local population is likely to extend well beyond the study area, the Project would be unlikely to negatively affect the life cycle of the species or other hollow-dependant micro-bats or place them at risk of extinction..

- Eastern bentwing-bat (*Miniopterus schreibersii oceanensis*) – Vulnerable

The eastern bentwing-bat was recorded during field surveys. No roosting or breeding habitat in the form of tunnels or caves occurred in the investigation area. Possible short-term roosting sites occur within culverts under the railway line in culverts and bridges. The investigation area provides potential foraging habitat for cave-roosting bats. The area of woodland habitat that would be

removed for the Project would not significantly reduce the amount of potentially suitable woodland habitat in the study area or study locality for cave-roosting bats. The Project would be unlikely to have an adverse affect on the life cycle of cave-roosting bats such that viable populations of the species would be likely to be placed at risk of extinction.

#### Large-footed Myotis (*Myotis macropus*) - Vulnerable

The area of water bodies and woodland habitat that would be removed or modified for the Project would not significantly reduce the amount of potentially suitable foraging and roosting habitat in the study area or study locality for the large-footed myotis. Suitably sized tree hollows occur in the investigation area for the large-footed myotis and there is the potential for individuals to perish during the tree felling process. The potential loss of some individuals may disrupt the life cycle depending on the size of the local population. The species more commonly roosts in caves, mines, bridges and abandoned fairy martin nests. If the local population was small, then the loss of a few individuals may disrupt the life cycle of the species, however since the bats foraging over the study area are likely to be also roosting and foraging off site, the Project would be unlikely to negatively affect the life cycle of the large-footed myotis.

- Freckled duck (*Stictonetta naevosa*) - Vulnerable – TSC Act

No freckled ducks were recorded during surveys carried out in September 2009, or the field surveys in June/July 2010. Freckled ducks breed predominately in the Murray-Darling Basin and in coastal areas of south central Western Australia. The freckled duck has been recorded within 10km of the project site and there is suitable habitat within the area, however any freckled ducks visiting the area would be at best vagrants, thus it is unlikely that the proposal would have an adverse affect such that a viable local population of the freckled duck would be likely to be placed at the risk of extinction.

- (b) *In the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species likely to be placed at risk of extinction.*

Not applicable, no endangered populations are known or likely to occur in the study locality.

- (c) *In the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:*
- (i) *is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or*
  - (ii) *is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.*

Endangered ecological communities and critically endangered ecological communities have been investigated as part of a separate flora assessment for the investigation area prepared by the Hunter 8 Alliance.

- (d) *In relation to the habitat of a threatened species, population or ecological community:*
- (i) *the extent to which habitat is likely to be removed or modified as a result of the action proposed, and*
  - (ii) *whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and*
  - (iii) *the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality.*

- Grey-headed Flying-fox (*Pteropus poliocephalus*) – Vulnerable TSC Act
- Large-footed Myotis (*Myotis macropus*) - Vulnerable
- Eastern bentwing-bat (*Miniopterus schreibersii oceanensis*) – Vulnerable
- Eastern freetail-bat (*Mormopterus norfolkensis*) – Vulnerable
- Squirrel Glider (*Petaurus norfolcensis*) - Vulnerable
- Varied Sittella (*Daphoenositta chrysoptera*) – Vulnerable
- Grey-crowned Babbler (*Pomatostomus temporalis temporalis*) – Vulnerable
- Speckled Warbler (*Pyrrholaemus saggitatus*) - Vulnerable
- Freckled duck (*Stictonetta naevosa*) - Vulnerable – TSC Act

(i) The Project would result in the removal or modification of areas of vegetation from the investigation area. **Table 12** above lists the area of each vegetation community that would be removed or modified by the Project. The modification of the Project would result in the removal of some farm dams and the re-alignment of approximately 100 metres of Sawyers Creek.

(ii) The removal of areas of woodland from the investigation area would result in a minor increase in the degree of fragmentation and isolation of surrounding woodland as the remaining woodland area within the study locality reduces slightly and remaining woodland areas become isolated from each other by a slightly larger distance. The removal of farm dams from the study area would result in an increase in the degree of fragmentation and isolation of farm dam habitat. The degree of fragmentation and isolation would increase as the remaining area of farm dams within the study locality reduces and remaining farm dams become isolated from each other by a larger distance.

(iii) The loss of the areas of woodland is unlikely to affect species' ability to move within the landscape due to the presence of woodland areas adjacent to most areas of woodland to be removed from the investigation area. The ecological integrity/security of surrounding habitat would be unlikely to be affected by the removal of areas of woodland from the investigation area. However the area of habitat that would be removed has a high level of long term importance for most species in the study locality as current and future developments within

the study locality and region result in a cumulative regional decline in the amount of available woodland habitat for fauna species.

Due to the availability of similar farm dam and grazing paddock habitat within the study locality, the areas of farm dam and grazing paddock habitat within the investigation area that would be removed is of low importance to the long-term survival of the species, populations and ecological communities in the locality.

(e) ***Whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly).***

No areas of designated critical habitat identified under the provisions of the *Threatened Species Conservation Act 1995* apply to the study area.

(f) ***Whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan.***

- Grey-headed Flying-fox (*Pteropus poliocephalus*) – Vulnerable TSC Act

Under the Draft National Recovery Plan for the Grey-headed Flying Fox (DECCW 2009) foraging habitat critical to the survival of the grey headed flying fox as defined in the recovery plan has been identified in the Project area. The removal of 48.2ha of foraging habitat critical to the survival of the grey-headed flying fox is not consistent with Action.1 or Action.2 of the draft national recovery plan:

*Action 1: Identify and protect foraging habitat critical to the survival of Grey-headed Flying foxes across their range.*

*Action 2: Enhance winter and spring foraging habitat for Grey-headed Flying-foxes.*

(g) ***Whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.***

To date, thirty-two (32) key threatening processes are listed on Schedule 3 of the TSC Act. Five are relevant to the Project and are discussed below.

### 1. Clearing of Native Vegetation

The Project would see the removal of woodland habitat. The removal of the woodland would increase the impact of the clearing of native vegetation key threatening process listed on Schedule 3 of the TSC Act.

### 2. Loss of Hollow-bearing Trees

The Project would result in the removal of hollow-bearing trees. The removal of hollow-bearing trees would increase the impact of the loss of hollow-bearing trees key threatening process listed on Schedule 3 of the TSC Act.

### 3. Removal of Dead Wood and Dead Trees

The Project would result in the removal of some dead standing trees and dead wood. Dead wood in the form of logs were uncommon but occurred in parts of the investigation area. The removal of dead wood and dead trees would increase the impact of the removal of dead wood and dead trees key threatening process listed on Schedule 3 of the TSC Act.

#### 4. Human-caused Climate Change

The Project may result in an exacerbation of human-caused climate change through the facilitation of an increased vehicle and train traffic load. The Project may contribute to human-caused climate change.

#### 5. Infection of Native Plants by *Phytophthora cinnamomi*

The potential introduction and/or spread of root rot fungus (*Phytophthora cinnamomi*) during earth works has the potential to significantly reduce the habitat quality of nearby existing and/or rehabilitated habitat areas. The Project may contribute to the infection of native plants by *Phytophthora cinnamomi*.

#### 6. Infection of frogs by amphibian chytrid causing the disease chytridiomycosis

The movement of water, soil or plant matter from wet areas or onto the investigation area during construction has the potential to spread chytrid fungus. The level of chytrid fungus prevalence on the investigation area and in the surrounding area is unknown but should not be assumed to be absent.

### **6.4.1.5 Seven-part Test Conclusions**

Following an assessment of the potential impacts of the Project (**Section 6.4**) it was found that the Project is unlikely to significantly impact upon the 9 threatened species identified with potential habitat in the investigation area and listed on the TSC Act. The implementation of mitigation measures recommended in Maitland to Minimbah Third Track Project Fauna Impact Assessment Final Report dated December 2009 and the development of a Compensatory Habitat Strategy, in consultation with DECCW, would further reduce the level of potential impact on threatened fauna species and their habitats and would effectively address Action 2 of the of the Draft National Recovery Plan for the Grey-headed Flying Fox.

### **6.5 Environment Protection & Biodiversity Conservation Act 1999 (EPBC Act)**

The EPBC Act was gazetted in 2000 and replaced several earlier Commonwealth statutes. This Act focuses Commonwealth interests on matters of national environmental significance (NES) including integrated biodiversity conservation and the management of important protected areas. The Act also establishes a streamlined environmental assessment and approvals process.

The matters of NES as identified in the Act which require assessment and approval to be addressed by the Commonwealth include:

- World Heritage properties
- National Heritage places
- RAMSAR wetlands

- Nationally threatened species and ecological communities (Part 13, Division 1, Subdivision A of the EPBC Act)
- Migratory species
- Commonwealth Marine areas
- Nuclear actions (including uranium mining)

The assessment and approval process applies to any action that has, will have or is likely to have a significant impact on a matter of NES. An 'action' is defined as a project, development, undertaking or an activity or series of activities.

With regard to fauna, the only matters of NES relevant to the study area are nationally listed threatened species and migratory species. Those species that occur or could potentially occur within the study area and are subject to assessment pursuant to the Act are as follows:

*Vulnerable Species*

- Grey-headed Flying-fox (*Pteropus poliocephalus*) – Vulnerable EPBC Act

The relevant criteria given in the administrative guidelines for the Act to determine whether the action will or is likely to have a significant impact on nationally threatened species' are as follows:

**Table 13. Assessment of Potential Impact on Species Listed Under the EPBC ACT 1999.**

<b>Significant Impact Criteria and Assessment</b>	
<b>Vulnerable Species</b> Grey-headed Flying Fox	
<b>An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:</b>	<i>a) lead to a long-term decrease in the size of an important population** of a species;</i>  No important populations of the grey-headed flying-fox were identified or are likely to occur in the investigation area. The loss of the 48.2ha of identified foraging habitat critical to the survival of the grey-headed flying fox is unlikely to lead to a long-term decrease in the size of an important population of the grey-headed flying-fox.
	<i>b) reduce the area of occupancy of an important population;</i>  No important populations of the grey-headed flying-fox occur within the investigation area. Thus there is unlikely to be reduction in the area of occupancy of an important population of this species.
	<i>c) fragment an existing important population into two or more populations;</i>  The Project would not fragment an existing important population of the grey-headed flying-fox into two or more populations. No important grey-headed flying-fox populations occur on or immediately adjacent to the investigation area.
	<i>d) adversely affect habitat critical to the survival of a species;</i>  The Project would result in the clearing of 48.2ha of identified foraging habitat critical to the survival of the grey-headed flying fox. Given the linear nature of the clearing and the small patches of woodland to be cleared it is unlikely that this clearing would adversely affect habitat critical to the survival of the grey-headed flying-fox.
	<i>e) disrupt the breeding cycle of an important population;</i>  No important populations of the grey-headed flying fox occur on or immediately adjacent to the investigation area. The Project would not disrupt the breeding cycle of an important population of the grey-headed flying-fox.
	<i>f) modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline;</i>  The small areas that make up the total of 48.2ha of foraging habitat critical to the survival of the grey-headed flying fox that would be lost as a result of the Project are unlikely to affect the grey-headed flying-fox to the extent that any of the species would be likely to decline.
	<i>g) result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat***;</i>  The Project is highly unlikely to result in an invasive species harmful to the grey-headed flying-fox becoming established within the investigation area.
	<i>h) introduce disease that may cause the species to decline; or</i>  It is highly unlikely that the Project would result in the introduction of a disease that may cause the grey-headed flying-fox to decline.
	<i>i) interfere substantially with the recovery of the species.</i>  The Project is unlikely to interfere substantially with recovery of the grey-headed flying fox.

<sup>^</sup> 'Habitat critical to the survival of a species or ecological community' refers to areas that are necessary:

- for activities such as foraging, breeding, roosting or dispersal
- for the long-term maintenance of the species or ecological community (including the maintenance of species essential to the survival of the species or ecological community, such as pollinators)
- to maintain genetic diversity and long term evolutionary development
- for the reintroduction of populations or recovery of the species or ecological community

*Such habitat may be, but is not limited to: habitat identified in a recovery plan for the species or ecological community as habitat critical for that species or ecological community; and/or habitat listed on the Register of Critical Habitat maintained by the Minister under the EPBC Act.*

*A 'population of a species' is defined under the EPBC Act as an occurrence of the species in a particular area. In relation to critically endangered, endangered or vulnerable threatened species, occurrences include but are not limited to:*

- a geographically distinct regional population, or collection of local populations or*
- a population, or collection of local populations, that occurs within a particular bioregion.*

*\* Introducing an invasive species into the habitat may result in that species becoming established. An invasive species may harm a critically endangered or endangered species by direct competition, modification of habitat, or predation.*

*\*\* An important population is one that is necessary for a species' long-term survival and recovery. This may include populations that are:*

- key source populations either for breeding or dispersal,*
- populations that are necessary for maintaining genetic diversity, and/or*
- populations that are near the limit of the species range.*

*\*\*\*Introducing an invasive species into the habitat may result in that species becoming established. An invasive species may harm a vulnerable species by direct competition, modification of habitat, or predation.*

*# An area of 'important habitat' for a migratory species is:*

- habitat utilised by a migratory species occasionally or periodically within a region that supports an ecologically significant proportion of the population of the species; and/or*
- habitat that is of critical importance to the species at particular life-cycle stages; and/or*
- habitat utilised by a migratory species which is at the limit of the species range; and/or*
- habitat within an area where the species is declining.*

*## Listed migratory species cover a broad range of species with different life cycles and population sizes. Therefore what is an 'ecologically significant proportion' of the population varies with the species (each circumstance will need to be evaluated). Some factors that should be considered include the species' population status, genetic distinctiveness and species specific behavioural patterns (for example, site fidelity and dispersal rates).*

*### 'Population', in relation to migratory species, means the entire population or any geographically separate part of the population of any species or lower taxon of wild animals, a significant proportion of whose members cyclically and predictably cross one or more national jurisdictional boundaries including Australia.*

### 6.5.1 Key Threatening Processes

Seventeen key threatening processes have been determined under the EPBC Act. Those that could be potentially relevant to the Project are discussed below:

- 1) Dieback caused by the root-rot fungus (*Phytophthora cinnamomi*): Infection of some species of native plants by this plant pathogen could occur in the investigation area if contaminated soil was inadvertently imported in fill or on machinery, tools, boots or clothing. Protocols should be established to prevent this from occurring.
- 2) Land Clearance: The clearing of woodland and grassland areas for the Project would contribute towards the key threatening process of land clearance.
- 3) Infection of amphibians with chytrid fungus resulting in chytridiomycosis: The movement of water, soil or plant matter from wet areas or onto the investigation area during construction has the potential to spread chytrid fungus. The level of chytrid fungus prevalence on the investigation area and in the surrounding area is unknown but should not be assumed to be absent.

- 4) Loss of terrestrial climatic habitat caused by anthropogenic emissions of greenhouse gases: As with any industrial activity, the Project during both its construction and operational phases is likely to result in an incremental contribution to the anthropogenic global emissions of greenhouse gases thus contributing to the overall loss of terrestrial climatic habitat for some threatened species on a global scale.

### 6.5.2 EPBC Significance Test Conclusion

The following EPBC Act listed threatened and/or migratory species were identified with potential habitat on the investigation area (**Section 6.1**).

#### *Vulnerable Species*

- Grey-headed flying-fox

Following an assessment of the potential impacts of the Project (**Section 6.4**) it was found that the Project is unlikely to significantly impact upon any local population of the one threatened species listed on the EPBC Act. The implementation of mitigation measures recommended in the original Environmental Assessment report, and the development of a Compensatory Habitat Strategy, in consultation with DECCW, would further reduce the level of potential impact on threatened and migratory fauna species and their habitats.

### 6.6 Impacts on Non-Listed Species and Communities

The removal of vegetation within the investigation area would result in a decreased potential foraging area and a reduction in potential roosting and nesting sites for woodland, grassland, wetland and farm dam species. The removal of vegetation would also increase the level of local habitat fragmentation by a small degree and increase the potential impacts of edge effects by a similar degree. Where vegetation will be removed, remaining woodland remnants would decrease in size by a small degree and the resulting change in ratio of edge to area of remnant would increase edge effects.

The loss of some areas of vegetation associated with the Project would decrease the extent of fauna habitat available within the investigation area. However given the relatively small area of habitat to be removed within a long investigation area and the availability of nearby similar or better quality habitat it is not expected that the removal of vegetation would greatly impact any of the non-listed fauna species.

In addition to vegetation removal, during the construction of the Project construction activities and associated vehicle/machinery movements would be likely to result in an increase in noise, dust and vibration impacts on local species. The impacts on fauna species is likely to be secondary to the potential impacts associated with the removal of vegetation. However potential increases in noise, dust and vibration may cause some individuals to move out of the local area or to abandon nesting attempts.

The completion of the Project would result in an effective doubling of the rail traffic within the investigation area. This increase would be likely to result in an increased number of collisions with fauna species. A small number of grey kangaroo carcasses were recorded within the investigation area. The number of fauna species hit by trains would be likely to increase in a proportional manner to the increase in train movements.

While the project would result in the removal of some vegetation, increases in fragmentation and isolation, increased train/fauna collisions, increased levels of noise, dust and vibration during construction, and increased levels of noise and vibration during operation, none of these impacts are likely to significantly impact on local fauna species or have an adverse impact on local biodiversity. The implementation of mitigation measures recommended in this report and the development of a Compensatory Habitat Strategy, in consultation with DECCW, would further reduce the level of potential impact on fauna species and biodiversity.

## **7.0 MITIGATION MEASURES**

For mitigation methods see Maitland to Minimbah Third Track Project Fauna Impact Assessment Final Report dated December 2009

## 8.0 CONCLUSIONS

### 8.1 Key Findings

Nine threatened species on the TSC Act (squirrel glider, grey-crowned babbler, varied sittella, speckled warbler, eastern freetail-bat, eastern bent-wing bat, grey-headed flying fox and large-footed myotis) and one species also listed on the EPBC Act (grey-headed flying fox), were identified in the investigation area during field surveys. Under the updated searches potential habitat for a further threatened species on the TSC Act (freckled duck) was identified within the investigation area. These species although many having previously been assessed as part of the final Terrestrial Fauna Impact Assessment report dated December 2009, have been reassessed as they were recorded within or in the vicinity of the additional areas surveyed in this report. Under the current proposed modifications of the project the results would be consistent with the final Terrestrial Fauna Impact Assessment report dated December 2009.

Following an assessment of the potential impacts of the Project (**Section 6.4**) via the Part 3A guidelines, it was found that the Project would result in the removal of 48.2ha of foraging habitat critical to survival of the grey-headed flying fox. However given the lineal and patchy nature of the clearing and the mitigation plans in the form of the Compensatory Habitat Strategy the Project would be unlikely to significantly impact upon the species identified with potential habitat in the investigation area and listed on the TSC Act.

Following an assessment of the potential impacts of the Project (**Section 6.5**) via the EPBC assessment guidelines, it was found that the Project would result in the removal of 48.2ha of foraging habitat critical to survival of the grey-headed flying fox. However given the lineal and patchy nature of the clearing and the mitigation plans in the form of the Compensatory Habitat Strategy the Project would be unlikely to significantly impact upon the threatened species identified with potential habitat in the investigation area and listed on the EPBC Act.

### 8.2 Key Thresholds

(Refer to Fauna Impact Assessment Final Report dated December 2009)

### 8.3 Conclusion

This Supplementary Terrestrial Fauna Ecological Assessment has been undertaken by Ecotone Ecological Consultants Pty Ltd, for the Hunter 8 Alliance on behalf of ARTC, as part of the Environmental Assessment, for the Maitland to Minimbah Third Track Project. This report has been prepared to address additional areas of habitat as part of modifications to the Proposal and to assess the existing terrestrial fauna ecology of the additional areas, the impacts of the Project, and to develop mitigation measures to minimise impacts of the Project if required.

The terrestrial fauna ecology survey and assessment has been prepared with consideration of the Draft Guidelines for Threatened Species Assessment under Part 3A of the Environmental Planning and Assessment Act 1979 (DEC and DPI, 2005) and the Threatened Biodiversity Survey and Assessment Guidelines for Developments and Activities (DEC 2004).

There is the potential for direct and indirect ecological impacts to occur as a result of the Project. While many of these impacts can be minimised through avoidance or management, there are some impacts that cannot be adequately mitigated on site. To address these impacts, ARTC would

implement a Compensatory Habitat Strategy, in consultation with DECCW, to further mitigate impacts and contribute to the maintenance and improvement of local and regional biodiversity values.

An assessment of the significance of impacts on threatened and/or migratory fauna species has been prepared in accordance with the assessment criteria identified in the Draft Guidelines for Threatened Species Assessment under Part 3A of the EP&A Act (DEC and DPI, 2005) and the Significant Impact Guidelines 1.1: Significant Impact Guidelines Matters of NES (DEH 2006). Based on the assessments, it is considered unlikely that the Project would result in impacts that would cause a local population of threatened fauna to become extinct. The implementation of mitigation measures recommended in the Terrestrial Fauna Impact Assessment report dated December 2009 and the development of a Compensatory Habitat Strategy, in consultation with DECCW, would further reduce the level of potential impact on the potential foraging habitat critical to the survival of the grey-headed flying fox.

## 9.0 REFERENCES

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**APPENDIX 1. FAUNA RECORDED WITHIN THE MINIMBAH THIRD TRACK STUDY AREA**Notes:

Species listed as ordered on the CSIRO List of Australian Vertebrates (CSIRO 2006).

**Bold** indicates a threatened species

V – Vulnerable species (TSC or EPBC Act)

E – Endangered species (TSC or EPBC Act)

M – Migratory (EPBC Act)

PD – Preliminary Determination (TSC Act)

U - indicates introduced species (not native to Australia)

## Observation types:

O	Observed	Z	In scat or pellet	H	Hair tube sample
W	Heard	S	Scat	N	Nest/roost
F	Tracks/scratches	Y	Skeletal remains	D	Definite identification
E	Bat echolocation call	P	Probable identification		

Family Name	Scientific name	Common name	Status (TSC)	Status (EPBC)	Observation type
<b>Birds</b>					
Acanthizidae	<i>Acanthiza lineata</i>	Striated thornbill	-	-	W
Acanthizidae	<i>Acanthiza nana</i>	Yellow thornbill	-	-	W
Acanthizidae	<i>Acanthiza pusilla</i>	Brown thornbill	-	-	W
<b>Acanthizidae</b>	<b><i>Pyrrholaemus sagittatus</i></b>	<b>Speckled warbler</b>	<b>V</b>	-	O
Acanthizidae	<i>Sericornis frontalis</i>	White-browed scrubwren	-	-	O/W
Accipitridae	<i>Haliastur sphenurus</i>	Whistling kite	-	-	O/AC
Alcedinidae	<i>Dacelo novaeguineae</i>	Laughing kookaburra	-	-	W
Anatidae	<i>Anas gracilis</i>	Grey teal	-	-	O
Anatidae	<i>Chenonetta jubata</i>	Australian wood duck	-	-	O
Anatidae	<i>Cygnus atratus</i>	Black swan	-	-	W/AC
Artamidae	<i>Cracticus nigrogularis</i>	Pied butcherbird	-	-	W
Artamidae	<i>Cracticus torquatus</i>	Grey butcherbird	-	-	W
Artamidae	<i>Gymnorhina tibicen</i>	Australian magpie	-	-	W
Artamidae	<i>Strepera graculina</i>	Pied currawong	-	-	W
Campephagidae	<i>Coracina novaehollandiae</i>	Black-faced cuckoo-shrike	-	-	O
Charadriidae	<i>Vanellus miles</i>	Masked lapwing	-	-	O/W
Columbidae	<i>Columba livia</i> *	Rock dove	-	-	O/AC
Columbidae	<i>Ocyphaps lophotes</i>	Crested pigeon	-	-	O
Corvidae	<i>Corvus coronoides</i>	Australian raven	-	-	W
Dicruridae	<i>Grallina cyanoleuca</i>	Australian magpie-lark	-	-	O
Dicruridae	<i>Rhipidura fuliginosa</i>	Grey fantail	-	-	O/W
Dicruridae	<i>Rhipidura leucophrys</i>	Willie wagtail	-	-	O/W
Estrildidae	<i>Neochmia temporalis</i>	Red-browed finch	-	-	O/W
Falconidae	<i>Falco berigora</i>	Brown falcon	-	-	O
Falconidae	<i>Falco longipennis</i>	Australian hobby	-	-	O

Hirundinidae	<i>Hirundo neoxena</i>	Welcome swallow	-	-	O
Maluridae	<i>Malurus cyaneus</i>	Superb fairy-wren	-	-	O/W
Meliphagidae	<i>Acanthorhynchus tenuirostris</i>	Eastern spinebill	-	-	W
Meliphagidae	<i>Entomyzon cyanotis</i>	Blue-faced honeyeater	-	-	OW
Meliphagidae	<i>Lichenostomus chrysops</i>	Yellow-faced honeyeater	-	-	W
Meliphagidae	<i>Lichenostomus penicillatus</i>	White-plumed honeyeater	-	-	O
Meliphagidae	<i>Manorina melanocephala</i>	Noisy miner	-	-	O/W
Meliphagidae	<i>Manorina melanophrys</i>	Bell miner	-	-	W
Meliphagidae	<i>Meliphaga lewinii</i>	Lewin's honeyeater	-	-	W
Meliphagidae	<i>Melithreptus brevirostris</i>	Brown-headed honeyeater	-	-	W
Meliphagidae	<i>Melithreptus lunatus</i>	White-naped honeyeater	-	-	W
<b>Neosittidae</b>	<b><i>Daphoensitta chrysotera</i></b>	<b>Varied sitella</b>	<b>V</b>	-	<b>O</b>
Pachycephalidae	<i>Colluricincla harmonica</i>	Grey shrike-thrush	-	-	W
Pachycephalidae	<i>Pachycephala pectoralis</i>	Golden whistler	-	-	W
Pardalotidae	<i>Pardalotus punctatus</i>	Spotted pardalote	-	-	W
Pardalotidae	<i>Pardalotus striatus</i>	Striated pardalote	-	-	W
Petroicidae	<i>Eopsaltria australis</i>	Eastern yellow robin	-	-	W
<b>Pomatostomidae</b>	<b><i>Pomatostomus temporalis</i></b>	<b>Grey-crowned babbler</b>	<b>V</b>	-	<b>OW</b>
Psittacidae	<i>Alisterus scapularis</i>	Australian king-parrot	-	-	OW
Psittacidae	<i>Cacatua galerita</i>	Sulphur-crested cockatoo	-	-	W
Psittacidae	<i>Eolophus roseicapillus</i>	Galah	-	-	W/AC
Psittacidae	<i>Glossopsitta pusilla</i>	Little lorikeet	-	-	W/AC
Psittacidae	<i>Platycercus eximius</i>	Eastern rosella	-	-	W
Psittacidae	<i>Psephotus haematonotus</i>	Red-rumped parrot	-	-	O/AC
Psittacidae	<i>Trichoglossus haematodus</i>	Rainbow lorikeet	-	-	OW
Rallidae	<i>Porphyrio porphyrio</i>	Purple swamphen	-	-	O
Sturnidae	<i>Acridotheres tristis</i> *	Common myna	U	-	W
Sylviidae	<i>Acrocephalus australis</i>	Australian reed-warbler	-	-	O
Zosteropidae	<i>Zosterops lateralis</i>	Silvereye	-	-	W
<b>Mammals</b>					
Canidae	<i>Vulpes vulpes</i> *	Fox	U	-	W
Leporidae	<i>Oryctolagus cuniculus</i>	Rabbit	U	-	O
<b>Petauridae</b>	<b><i>Petaurus norfolcensis</i></b>	<b>Squirrel glider</b>	<b>V</b>	-	<b>O</b>
Macropodidae	<i>Macropus giganteus</i>	Eastern grey kangaroo	-	-	O
Macropodidae	<i>Macropus rufogriseus</i>	Red-necked wallaby	-	-	O
<b>Molossidae</b>	<b><i>Mormopterus norfolkensis</i></b>	<b>East coast freetail bat</b>	<b>V</b>	-	<b>E/D</b>
Molossidae	<i>Mormopterus</i> sp. 2 (Adams et al)	Little freetail bat	-	-	E/P
Molossidae	<i>Tadarida australis</i>	White-striped freetail bat	-	-	W/AC
Muridae	<i>Mus musculus</i>	House mouse	U	-	O
Phalangeridae	<i>Trichosurus vulpecula</i>	Common brushtail possum	-	-	O

Pseudocheiridae	Pseudocheirus peregrinus	Common ringtail possum	-	-	O
<b>Pteropodidae</b>	<b>Pteropus poliocephalus</b>	<b>Grey-headed flying-fox</b>	<b>V</b>	<b>V</b>	<b>O</b>
Vespertilionidae	Chalinolobus gouldii	Gould's wattled bat	-	-	E/D
Vespertilionidae	Chalinolobus morio	Chocolate wattled bat	-	-	E/P
<b>Vespertilionidae</b>	<b>Miniopterus schreibersii oceanensis</b>	<b>Eastern bent-wing bat</b>	<b>V</b>	-	E/D
<b>Vespertilionidae</b>	<b>Myotis macropus</b>	<b>Southern myotis</b>	<b>V</b>	-	E/P
Vespertilionidae	Nyctophilus sp.	Long-eared bats	-	-	E/P
Vespertilionidae	Vespadelus vulturnus	Little forest bat	-	-	E/D
<b>Amphibians</b>					
Hylidae	Litoria peronii	Peron's tree frog	-	-	W
Hylidae	Litoria verreauxii	Verreaux's tree frog	-	-	W
Myobatrachidae	Crinia signifera	Common eastern toadlet	-	-	W
Myobatrachidae	Limnodynastes tasmaniensis	Spotted grass frog	-	-	O/W
Myobatrachidae	Uperoleia laevigata	Smooth toadlet	-	-	W
<b>Reptiles</b>					
Gekkonidae	Diplodactylus vittatus	Wood gecko	-	-	Y

**APPENDIX 2. EPBC PROTECTED MATTERS REPORT**

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Protected Matters Search Tool

You are here: [Environment Home](#) > [EPBC Act](#) > [Search](#)  
**EPBC Act Protected Matters Report**

29 June 2010 10:47

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected. Information on the coverage of this report and qualifications on data supporting this report are contained in the [caveat](#) at the end of the report.

You may wish to print this report for reference before moving to other pages or websites.

The Australian Natural Resources Atlas at <http://www.environment.gov.au/atlas> may provide further environmental information relevant to your selected area. Information about the EPBC Act including significance guidelines, forms and application process details can be found at <http://www.environment.gov.au/epbc/assessmentsapprovals/index.html>



This map may contain data which are

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**Search Type:** Line

**Buffer:** 10 km

**Coordinates:** -32.72822,151.5245, -32.72173,151.4482, -32.68932,151.385, -32.66292,151.3464, -  
32.65624,151.2744



**Report Contents:** [Summary](#)

[Details](#)

- [Matters of NES](#)
- [Other matters protected by the EPBC Act](#)
- [Extra Information](#)
- [Caveat](#)
- [Acknowledgments](#)

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**Summary**

**Matters of National Environmental Significance**

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance - see

<http://www.environment.gov.au/epbc/assessmentsapprovals/guidelines/index.html>.

**World Heritage Properties:** None

**National Heritage Places:** None

**Wetlands of International Significance:** 1  
(Ramsar Sites)

**Commonwealth Marine Areas:** None

**Threatened Ecological Communities:** 1

**Threatened Species:** 21

**Migratory Species:** 15

**Other Matters Protected by the EPBC Act**

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the

actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place and the heritage values of a place on the Register of the National Estate. Information on the new heritage laws can be found at <http://www.environment.gov.au/heritage/index.html>.

Please note that the current dataset on Commonwealth land is not complete. Further information on Commonwealth land would need to be obtained from relevant sources including Commonwealth agencies, local agencies, and land tenure maps.

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species. Information on EPBC Act permit requirements and application forms can be found at <http://www.environment.gov.au/epbc/permits/index.html>.

<b><u>Commonwealth Lands:</u></b>	6
<b>Commonwealth Heritage Places:</b>	None
<b><u>Places on the RNE:</u></b>	42
<b><u>Listed Marine Species:</u></b>	13
<b>Whales and Other Cetaceans:</b>	None
<b>Critical Habitats:</b>	None
<b>Commonwealth Reserves:</b>	None

#### Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

<b><u>State and Territory Reserves:</u></b>	1
<b>Other Commonwealth Reserves:</b>	None
<b><u>Regional Forest Agreements:</u></b>	1

#### Details

##### Matters of National Environmental Significance

Wetlands of International Significance [ [Dataset Information](#) ]  
(Ramsar Sites)

**HUNTER ESTUARY WETLANDS** Within same catchment as Ramsar site

Threatened Ecological Communities [ <a href="#">Dataset Information</a> ]	Status	Type of Presence
---	--------	------------------

<a href="#">White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland</a>	Critically Endangered	Community likely to occur within area
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Threatened Species [ <a href="#">Dataset Information</a> ]	Status	Type of Presence
--	--------	------------------

#### Birds

<a href="#"><i>Anthochaera phrygia</i></a> Regent Honeyeater	Endangered	Species or species habitat likely to occur within area
<a href="#"><i>Lathamus discolor</i></a> Swift Parrot	Endangered	Species or species habitat likely to occur within area
<a href="#"><i>Rostratula australis</i></a> Australian Painted Snipe	Vulnerable	Species or species habitat may occur within area
<b>Frogs</b>		
<a href="#"><i>Litoria aurea</i></a> Green and Golden Bell Frog	Vulnerable	Species or species habitat likely to occur within area
<a href="#"><i>Mixophyes balbus</i></a> Stuttering Frog, Southern Barred Frog (in Victoria)	Vulnerable	Species or species habitat likely to occur within area
<a href="#"><i>Mixophyes iteratus</i></a> Southern Barred Frog, Giant Barred Frog	Endangered	Species or species habitat likely to occur within area
<b>Mammals</b>		
<a href="#"><i>Chalinolobus dwyeri</i></a> Large-eared Pied Bat, Large Pied Bat	Vulnerable	Species or species habitat may occur within area
<a href="#"><i>Dasyurus maculatus maculatus (SE mainland population)</i></a> Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (southeastern mainland population)	Endangered	Species or species habitat may occur within area
<a href="#"><i>Petrogale penicillata</i></a> Brush-tailed Rock-wallaby	Vulnerable	Species or species habitat may occur within area
<a href="#"><i>Potorous tridactylus tridactylus</i></a> Long-nosed Potoroo (SE mainland)	Vulnerable	Species or species habitat may occur within area
<a href="#"><i>Pseudomys oralis</i></a> Hastings River Mouse	Endangered	Species or species habitat likely to occur within area
<a href="#"><i>Pteropus poliocephalus</i></a> Grey-headed Flying-fox	Vulnerable	Foraging, feeding or related behaviour known to occur within area
<b>Plants</b>		
<a href="#"><i>Angophora inopina</i></a>	Vulnerable	Species or species habitat likely to occur within area
<a href="#"><i>Cryptostylis hunteriana</i></a> Leafless Tongue-orchid	Vulnerable	Species or species habitat may occur within area
<a href="#"><i>Eucalyptus glaucina</i></a> Slaty Red Gum	Vulnerable	Species or species habitat likely to occur within area
<a href="#"><i>Eucalyptus parramattensis subsp. decadens</i></a> Earp's Gum, Earp's Dirty Gum	Vulnerable	Species or species habitat likely to occur within area
<a href="#"><i>Grevillea parviflora subsp. parviflora</i></a> Small-flower Grevillea	Vulnerable	Species or species habitat likely to occur within area
<a href="#"><i>Persoonia pauciflora</i></a> North Rothbury Persoonia	Critically Endangered	Species or species habitat known to occur within area
<a href="#"><i>Prasophyllum sp. Wybong (C.Phelps ORG 5269)</i></a> a leek-orchid	Critically Endangered	Species or species habitat may occur within area
<a href="#"><i>Prostanthera cineolifera</i></a>	Vulnerable	Species or species habitat likely to occur within area
<a href="#"><i>Tetratheca juncea</i></a> Black-eyed Susan	Vulnerable	Species or species habitat likely to occur within area
Migratory Species [ <a href="#">Dataset Information</a> ]	Status	Type of Presence

**Migratory Terrestrial Species****Birds**

<a href="#"><i>Haliaeetus leucogaster</i></a> White-bellied Sea-Eagle	Migratory	Species or species habitat likely to occur within area
<a href="#"><i>Hirundapus caudacutus</i></a> White-throated Needletail	Migratory	Species or species habitat may occur within area
<a href="#"><i>Merops ornatus</i></a> Rainbow Bee-eater	Migratory	Species or species habitat may occur within area
<a href="#"><i>Monarcha melanopsis</i></a> Black-faced Monarch	Migratory	Breeding may occur within area
<a href="#"><i>Monarcha trivirgatus</i></a> Spectacled Monarch	Migratory	Breeding likely to occur within area
<a href="#"><i>Myiagra cyanoleuca</i></a> Satin Flycatcher	Migratory	Breeding likely to occur within area
<a href="#"><i>Rhipidura rufifrons</i></a> Rufous Fantail	Migratory	Breeding may occur within area
<a href="#"><i>Xanthomyza phrygia</i></a> Regent Honeyeater	Migratory	Species or species habitat likely to occur within area

**Migratory Wetland Species****Birds**

<a href="#"><i>Ardea alba</i></a> Great Egret, White Egret	Migratory	Species or species habitat may occur within area
<a href="#"><i>Ardea ibis</i></a> Cattle Egret	Migratory	Species or species habitat may occur within area
<a href="#"><i>Gallinago hardwickii</i></a> Latham's Snipe, Japanese Snipe	Migratory	Species or species habitat may occur within area
<a href="#"><i>Rostratula benghalensis s. lat.</i></a> Painted Snipe	Migratory	Species or species habitat may occur within area

**Migratory Marine Birds**

<a href="#"><i>Apus pacificus</i></a> Fork-tailed Swift	Migratory	Species or species habitat may occur within area
<a href="#"><i>Ardea alba</i></a> Great Egret, White Egret	Migratory	Species or species habitat may occur within area
<a href="#"><i>Ardea ibis</i></a> Cattle Egret	Migratory	Species or species habitat may occur within area

**Other Matters Protected by the EPBC Act**Listed Marine Species [ [Dataset Information](#) ]**Birds**

	Status	Type of Presence
<a href="#"><i>Apus pacificus</i></a> Fork-tailed Swift	Listed - overfly marine area	Species or species habitat may occur within area
<a href="#"><i>Ardea alba</i></a> Great Egret, White Egret	Listed - overfly marine area	Species or species habitat may occur within area
<a href="#"><i>Ardea ibis</i></a>	Listed -	Species or species habitat may occur within

Cattle Egret	overfly marine area	area
<a href="#"><i>Gallinago hardwickii</i></a> Latham's Snipe, Japanese Snipe	Listed - overfly marine area	Species or species habitat may occur within area
<a href="#"><i>Haliaeetus leucogaster</i></a> White-bellied Sea-Eagle	Listed	Species or species habitat likely to occur within area
<a href="#"><i>Hirundapus caudacutus</i></a> White-throated Needletail	Listed - overfly marine area	Species or species habitat may occur within area
<a href="#"><i>Lathamus discolor</i></a> Swift Parrot	Listed - overfly marine area	Species or species habitat likely to occur within area
<a href="#"><i>Merops ornatus</i></a> Rainbow Bee-eater	Listed - overfly marine area	Species or species habitat may occur within area
<a href="#"><i>Monarcha melanopsis</i></a> Black-faced Monarch	Listed - overfly marine area	Breeding may occur within area
<a href="#"><i>Monarcha trivirgatus</i></a> Spectacled Monarch	Listed - overfly marine area	Breeding likely to occur within area
<a href="#"><i>Myiagra cyanoleuca</i></a> Satin Flycatcher	Listed - overfly marine area	Breeding likely to occur within area
<a href="#"><i>Rhipidura rufifrons</i></a> Rufous Fantail	Listed - overfly marine area	Breeding may occur within area
<a href="#"><i>Rostratula benghalensis s. lat.</i></a> Painted Snipe	Listed - overfly marine area	Species or species habitat may occur within area

Commonwealth Lands [ [Dataset Information](#) ]Communications, Information Technology and the Arts -  
Australian Postal CorporationCommunications, Information Technology and the Arts -  
Telstra Corporation Limited

Defence

Defence - Defence Housing Authority

Transport and Regional Services - Airservices Australia

Unknown

Places on the RNE [ [Dataset Information](#) ]  
Note that not all Indigenous sites may be listed.

**Historic**

[Aberglasslyn Homestead NSW](#)

[Branxton Courthouse \(former\) NSW](#)

[Brough House NSW](#)

[Burial Ground and Surrounds, Glebe Gully NSW](#)

[Cintra Gardens NSW](#)

[Cintra and Stables NSW](#)

[Dalwood and Surrounds NSW](#)

[Dunmore House NSW](#)

[East Maitland Courthouse Group NSW](#)

[East Maitland Police Station \(former\) NSW](#)

[East Maitland Post Office \(former\) NSW](#)

[Elderslie Road Bridge NSW](#)

[Fosters Farm and Outbuildings NSW](#)

[Glendon Homestead and Sites of Outbuildings NSW](#)

[Greta Courthouse \(former\) NSW](#)

[Grossmann House Group NSW](#)

[Grossmann House NSW](#)

[High School \(former\) & RJ Hinder Memorial Library NSW](#)

[Lands Board Office NSW](#)

[Maitland Courthouse NSW](#)

[Maitland Post Office NSW](#)

[Minimbah House NSW](#)

[Oldholme and Garden NSW](#)

[Police Station \(former\) and Residence NSW](#)

[Presbyterian Church Group NSW](#)

[Rose Inn \(former\) NSW](#)

[Roseneath NSW](#)

[St Mary the Virgin Anglican Church & Rectory NSW](#)

[St Pauls Anglican Church & Bell Tower NSW](#)

[St Pauls Anglican Church Group NSW](#)

[St Peters Anglican Church NSW](#)

[St Peters Anglican Parish Hall NSW](#)

[St Peters Curates Residence NSW](#)

[Technical College \(former\) NSW](#)

[The Family Hotel NSW](#)

[Walka Waterworks and Pumping Station NSW](#)

[Walli House Group NSW](#)

[Walli House and Outbuildings NSW](#)

**Natural**

[Allandale Area NSW](#)

[Davids Cutting NSW](#)

[Glendon Area NSW](#)

[Largs Raised Beach Geological Site NSW](#)

Extra Information

State and Territory Reserves [ [Dataset Information](#) ]

Werakata National Park, NSW

Regional Forest Agreements [ [Dataset Information](#) ]

Note that all RFA areas including those still under consideration have been included.

Lower North East NSW RFA, New South Wales

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**APPENDIX 3. PROJECT PERSONNEL AND RELEVANT LICENCES**

<b>REPORT COMPONENT</b>	<b>STUDY TEAM MEMBERS</b>	<b>QUALIFICATIONS</b>
Overall project management, fauna field surveys, habitat descriptions & impact assessment, report writing.	Brian Wilson, Adam Greenhalgh	B. Appl. Sci. Dip. Appl. Sci, B. Appl. Sci
Fauna field survey, Anabat file analysis. Fauna field survey	Narawan Williams,  Adam Greenhalgh, Peter Irish	TAFE Cert II (Conserv. & Land Mgt. Nat. Area Rest.) Dip. Appl. Sci, B. Appl. Sci B Sc

## Relevant licences held by Ecotone Ecological Consultants

<b>TYPE</b>	<b>FOR</b>	<b>LICENCE NO</b>	<b>NAME</b>	<b>DATE VALID TO</b>	<b>ORGANISATION</b>	<b>LOCATION</b>
Animal Research Authority	Vertebrate Fauna Surveys	08/8633	Brian Wilson	15-Nov-10	Animal care and ethics committee of the Director-General of NSW Agriculture	NSW
Certificate of Approval	Vertebrate Fauna Surveys	08/8633	Brian Wilson	15-Nov-11		
Licence to	Access NPWS Wildlife Atlas Data Base	CON93002	Brian Wilson	30-Jun-11	NSW Department of Environment and Climate Change and Water	
Scientific Licence	Harm/ trap/ release: protected fauna; pick/ hold: native flora	S10555	Brian Wilson Stefan Rose Jenny Lewis Amy Williams Narawan Williams Anne Williams Steven Cox	31-Dec-10		
	As above plus bat banding	S10556	Ray Williams	31-Dec-10		