3. Existing environment

3.1 Landscape context

The site occurs in the central Hunter Valley, between the towns of Singleton and Camberwell and follows the existing rail line at Nundah Bank.

The study area consists of gently rolling hills. Historically a grazing area, the area is now an extensive coal mining area and the site is bounded by mining leases including active open cut coal mining, revegetation areas for the mines, sedimentation dams and land leased for grazing.

The rail corridor is highly modified as a result of the rail construction and in several locations the rail has been relocated from its historic location. The soil profile and landscape has thus been highly modified as a result of mining activities, the construction of the rail line in its original location as well as current location.

A summary of the site locality is provided in Table 3-1.

Table 3-1 Site locality

Criteria	Location
Council	Singleton
Bioregion	Sydney Basin
Catchment Management Area (CMA)	Hunter/Central Rivers CMA Hunter Sub-catchment
Botanical Subdivision	North Coast
Mitchell landscape	Central Hunter foothills
Noxious weed control area	Upper Hunter County Council

3.1.1 Bioregion

The study area is within the Sydney Basin bioregion. This region covers approximately 3,624,008 hectares (4.53% of NSW). The bioregion is on the coast and extends from just north of Batemans Bay to Nelson Bay on the central coast, and almost as far west as Mudgee. As well as Sydney itself, the Sydney Basin bioregion encompasses the towns of Wollongong, Nowra, Newcastle, Cessnock, Muswellbrook and Blue Mountains towns such as Katoomba and Mt Victoria.

It includes a significant proportion of the catchments of the Hawkesbury-Nepean, Hunter and Shoalhaven river systems, all of the smaller catchments of Lake Macquarie, Lake Illawarra, Hacking, Georges and Parramatta Rivers, and smaller portions of the headwaters of the Clyde and Macquarie rivers.

The Sydney Basin bioregion has the third highest area of conservation-oriented tenures of the NSW bioregions, with conservation areas occupying about 1,384,418.33 hectares (equivalent to 38.2% of the bioregion). This includes the Greater Blue Mountains, which is one of four World Heritage areas within NSW.

It is a highly variable region with variation in geology, topography and climate resulting in one of the most species diverse areas in Australia.

The study area is within the Hunter subregion, characterised by:

- Rolling hills, wide valleys, with a meandering river system on a wide flood plain and river terraces.
- A complex of Permian shales, sandstones, conglomerates, volcanics and coal measures, bounded on the north by the Hunter Thrust fault and on the south by cliffs of Narrabeen Sandstone.
- A variety of harsh texture contrast soils on slopes and deep sandy loam alluvium on the valley floors.
- Dunes on the southern tributaries of the Hunter and deep sands in dunes on the barrier, saline, organic muds in the estuary.
- Soil salinity commonly occurs on some bedrocks in the upper catchment.
- Streams that are brackish or saline at low flow.
- Numerous small swamps in upper catchment, extensive estuarine swamps behind the coastal barrier of beach and dunes.
- A variety of vegetation types including:
    - rainforest brush in the lower valley
    - forest and open woodland of white box, forest red gum, narrow-leaved ironbark, grey box, grey gum spotted gum, rough-barked apple and extensive of stands of swamp oak in upper reaches and foothills
    - river oak and river red gum along the streams
    - coastal dune vegetation of blackbutt, smooth-barked apple, coast banksias and swamp mahogany
    - mangroves, salt marsh and freshwater reed swamps in the estuary (NSW National Parks and Wildlife Service 2003).

3.1.2 Mitchell landscapes

Landscapes (Mitchell) of NSW (NSW National Parks and Wildlife Service 2002) outlines a system of ecosystem classification mapped at the 1:250,000 scale, based on a combination of soils, topography and vegetation.

The site falls entirely within the Central Hunter foothills landscape. This landscape consists of undulating lowlands, rounded to steep hills with rock outcrop on ridges on Permian lithic sandstone, conglomerate, shale and coal. The elevation is generally 40 to 300 m with a few higher peaks. The local relief is generally 30 to 120 m.

Soils typically consist of:

- red-brown to yellow brown harsh texture-contrast soils on slopes
- dark coloured clays in valleys
- limited accumulations of sand and gravel in streams.

Vegetation in this landscape typically consists of woodlands to open forest of *Corymbia maculata, Eucalyptus tereticornis, Eucalyptus crebra, Eucalyptus sideroxylon, Eucalyptus albens, Eucalyptus dawsonii* and *Angophora floribunda* with an understorey of grasses such as *Austrodanthonia* spp. and *Themeda triandra* (NSW National Parks and Wildlife Service 2002).

This landscape has been 79% cleared (NSW Department of Environment and Conservation 2005). Under the *Environmental Outcomes Methods of the Native Vegetation Ac*t (NSW Department of Natural Resources 2005), a landscape that is greater than 70% cleared is considered to be over-cleared and thus a priority for conservation.

3.1.3 Surrounding land uses

The surrounding land has been extensively cleared. Immediately adjacent to the subject site is the existing railway line. The surrounding area consists of open cut coal mining as well as areas of stock grazing.

3.2 Vegetation communities

The majority of the vegetation within the site has been previously cleared and extensively modified as a result of:

- historic and current grazing
- rail construction in the current and former locations
- open cut coal mining and associated works.

Where the landscape and soil profile haven't been significantly modified the original vegetation is regenerating from a soil stored seed bank. There is some regeneration in areas where the soil profile has been disturbed/removed through dispersal of seeds from isolated mature trees and colonising species (such as *Acacia* spp.) as well as planting undertaken by the mines.

The site contains five distinct vegetation types (Figure 3-1):

- Central Hunter Spotted Gum – Ironbark – Grey Box:
  - Forest – covering approximately 8.75 ha.
  - Derived grassland (native grassland formed as a result of clearing and/or ongoing grazing) – covering approximately 13.37 ha.
- Aquatic vegetation along drainage lines and dams – covering approximately 0.26 ha.

- Weed dominated areas – covering 40.99 ha.
- Plantation (rehabilitation following mining) covering 0.64 ha.

3.2.1 Central Hunter Spotted Gum – Ironbark – Grey Box Forest and derived grassland

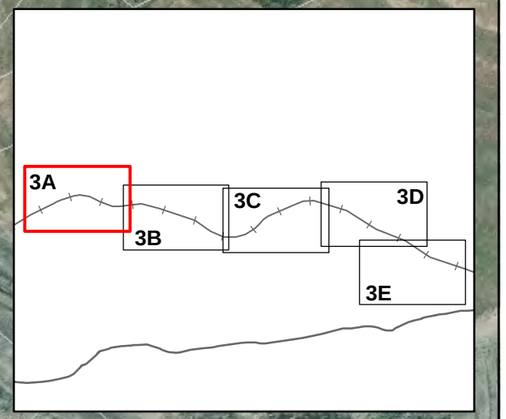
Vegetation mapping of the study area identified the presence of Central Hunter Spotted Gum – Ironbark – Grey Box Forest within the study area (Peake 2005). This was confirmed during the site surveys (Photograph 3-1 and 3-2) and covers 45.24 ha. The vegetation characteristics of this community are summarised in Table 3-2.

Table 3-2 Summary of characteristics of Central Hunter Spotted Gum – Ironbark – Grey Box Forest

Central Hunter Spotted Gum – Ironbark – Grey Box Forest			
Conservation significance	Listed as an Endangered ecological community under the TSC Act.		
Condition	The majority of this community has been previously cleared, occurs as small patches and is subject to ongoing disturbance from grazing or edge effects from mining and the railway. Two condition classes were observed: ▪ Moderate-generally low weed cover and including regenerating eucalypts (covering 8.75 ha). ▪ Poor-derived grassland areas were in poor condition with low species diversity and lacking canopy species. In some areas, limited regeneration of canopy and colonising species was evident (particularly of *Eucalyptus crebra*). Covering 13.37 ha.		
Strata	**Height range (m)**	**Foliage cover (%)**	**Dominant species**
Canopy	10-18	8	*Corymbia maculata, Eucalyptus crebra, Eucalyptus moluccana* (generally absent in derived grassland areas)
Shrub stratum	0.5-2	4	*Acacia amblygona, Acacia falcata* (generally absent in derived grassland areas)
Ground cover	0-0.5	70	*Cymbopogon refractus, Aristida vagans, Dichondra repens, Cheilanthes sieberi, Senecio madagascariensis**

To Camberwell

To Singleton



MIDDLE FALBROOK ROAD

Vegetation Communities

- Aquatic Vegetation
- Central Hunter Ironbark - Spotted Gum - Grey Box Forest
- Derived Grassland
- Plantation
- Swamp Oak
- Weed Dominated

A3 Original

0 50 100 200

Meters

GDA 1994 MGA Zone 56

- Study Area
- Subject Site
- Cadastre
- Hollow Bearing Tree

ARTC
Nundah Bank
Proposed Third Track

Job Number	2110501B
Revision	A1
Date	08.02.2011
Scale	1:5,000

Vegetation Communities and Hollow Bearing Trees Figure 3A

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A3 Original

0 50 100 200

Meters

GDA 1994 MGA Zone 56

N

Hollow Bearing Tree

Proposed Third Track Alignment

Subject Site

Study Area

Cadastre

ARTC
Nundah Bank
Proposed Third Track

Job Number	2110501B
Revision	A1
Date	08.02.2011
Scale	1:5,000

Vegetation Communities and Hollow Bearing Trees Figure 3B

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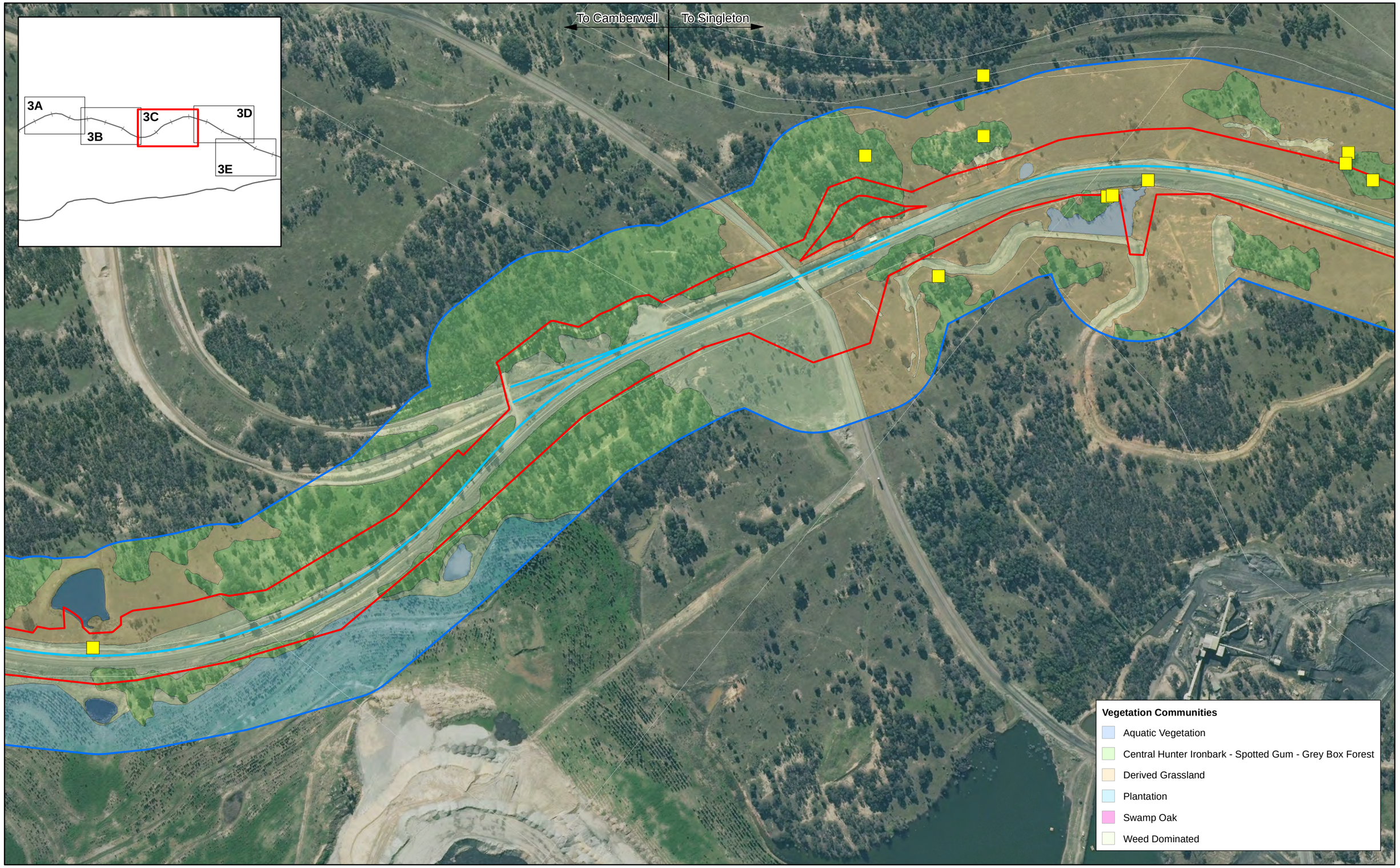

A3 Original

0 50 100 200

Meters

GDA 1994 MGA Zone 56

Hollow Bearing Tree

Proposed Third Track Alignment

Subject Site

Study Area

Cadastre

ARTC
Nundah Bank
Proposed Third Track

Job Number	2110501B
Revision	A1
Date	08.02.2011
Scale	1:5,000

Vegetation Communities and Hollow Bearing Trees Figure 3C

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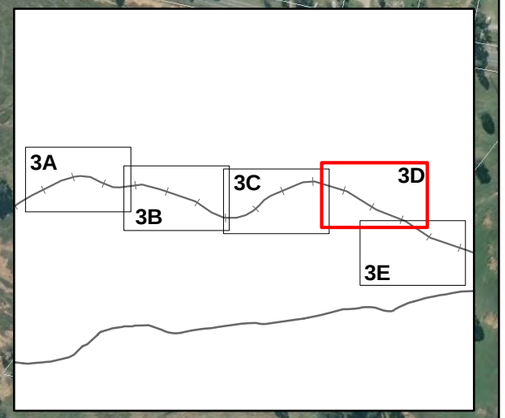
To Camberwell

To Singleton



Vegetation Communities

- Aquatic Vegetation
- Central Hunter Ironbark - Spotted Gum - Grey Box Forest
- Derived Grassland
- Weed Dominated

A3 Original

0 50 100 200

Meters

GDA 1994 MGA Zone 56

- Hollow Bearing Tree
- Proposed Third Track Alignment
- Subject Site
- Study Area
- Cadastre

ARTC
Nundah Bank
Proposed Third Track

Job Number	2110501B
Revision	A1
Date	08.02.2011
Scale	1:5,000

Vegetation Communities and Hollow Bearing Trees Figure 3D

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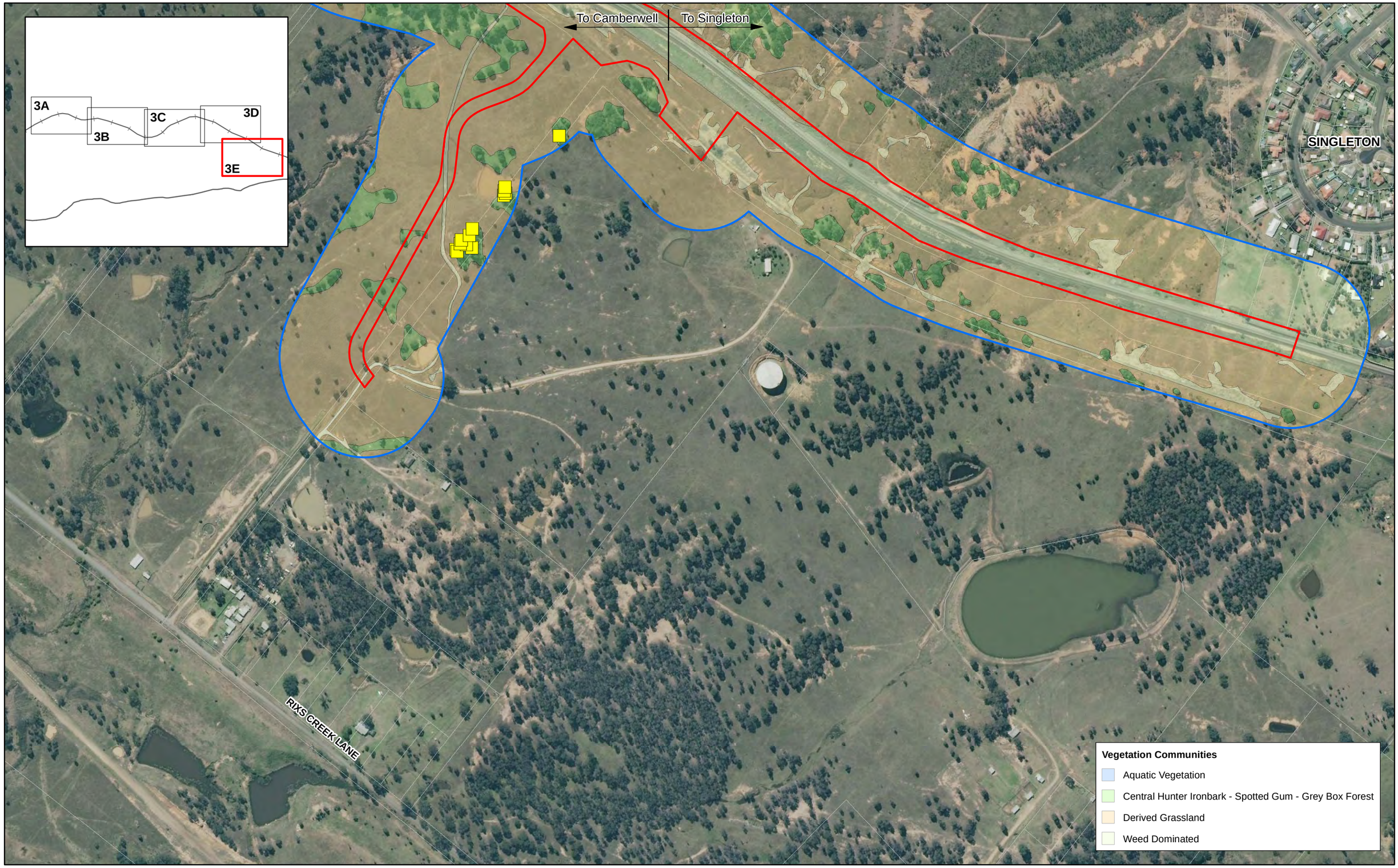

A3 Original

0 50 100 200

Meters

GDA 1994 MGA Zone 56

N

Hollow Bearing Tree

Subject Site

Study Area

Cadastre

UHVA

ARTC

ARTC
Nundah Bank
Proposed Third Track

Job Number	2110501B
Revision	A1
Date	08.02.2011
Scale	1:5,000

Vegetation Communities and Hollow Bearing Trees Figure 3E

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Photograph 3-1 Central Hunter Spotted Gum – Ironbark – Grey Box Forest

Photograph 3-2 Central Hunter Spotted Gum – Ironbark – Grey Box derived grassland

A comparison of the quadrat data against biometric benchmark data (NSW Department of Environment and Conservation 2007) suggests that within the study area, this community was degraded with many of the vegetation characteristics below benchmark condition (Table 3-3).

Table 3-3 Comparison of Central Hunter Spotted Gum – Ironbark – Grey Box Forest quadrat data against vegetation benchmark data

Site	Plant species richness	Native overstorey (% cover)	Native mid-storey cover (% cover)	Native groundcover (% cover)			Number of trees with hollows	Length of fallen timber
				grasses	shrubs	other		
Benchmark[1]	**38**	**15-40**	**4-40**	**30-60**	**3-15**	**10-25**	**1.2**	**10**
A	22	3*	3	55	1	14	0	9
B	32	20	2	27	2	23	0	8
C	37	10	3	28	2	6	0	2
D	26	5	2	20	1	8	0	12
E	39	3*	10	35	10	10	0	14
F	32	3*	25	20	10	5	0	7

Notes: 1) benchmark data for equivalent community in Hunter Central Rivers CMA (Vegetation Type: Grey Ironbark - Spotted Gum - Grey Box open forest on hills of the Hunter Valley, Sydney Basin; Keith Formation: Dry sclerophyll forests (shrub/grass sub-formation); Keith Class: Hunter-Macleay Dry Sclerophyll Forests); source (Keith 2004); Red font indicates results below benchmark value; * indicates, less than 25% of lower benchmark value.

3.2.2 Aquatic vegetation

There were several artificial dams along the route created as a result of mining or agricultural activities. Many had dead stags indicating that these areas were once forest vegetation (Photograph 3-3). The vegetation characteristics of this community are summarised in Table 3-4.

Table 3-4 Summary of characteristics of aquatic vegetation

Aquatic vegetation			
Conservation significance	Low. Not consistent with a native vegetation community.		
Condition	Poor		
Strata	**Height range (median height) (in m)**	**Foliage cover (%)**	**Dominant species**
Ground cover	0-1.5 (0.8)	90%	*Juncus acutus*, Chloris gayana*, Typha sp., Senecio madagascariensis*, Juncus spp.*

Photograph 3-3 Aquatic vegetation

3.2.3 Weed dominated areas

Weed dominated vegetation is the most common vegetation within the rail corridor, covering 40.99 ha, equivalent to 64% of the subject site. This vegetation is not consistent with a native vegetation community and is unlikely to regenerate due to modification of soil profile (Photograph 3-4). The vegetation characteristics of this community are summarised in Table 3-5.

Table 3-5 Summary of characteristics of Weed dominated areas

Weed dominated			
Conservation significance	Low. Not consistent with a native vegetation community.		
Condition	Low- had less than 25% of benchmark canopy cover and has less than 50% native ground cover. Unlikely to regenerate due to disturbance of soil profile and native seedbank. Native species recorded were colonising species are likely to have germinated as a result of wind-dispersed seed.		
Strata	**Height range (median height) (in m)**	**Foliage cover (%)**	**Dominant species**
Canopy	1-10 (4)	<1%	*Eucalyptus crebra*
Shrub stratum	0.3-2 (0.5)	<1%	*Acacia amblygona, Acacia falcata*
Ground cover	0-1.5 (1)	90%	*Chloris gayana*, Melinis repens*, Hyparrhenia hirta*, Cirsium vulgare*, Foeniculum vulgare*, Ricinus communis*, Hardenbergia violaceae*

Photograph 3-4 Weed dominated areas

3.2.4 Plantations

Plantations cover approximately 0.64 ha of the subject site. These areas consist of planting undertaken by the mines following completion of mining activities. Although the plantings generally consist of *Eucalyptus* spp., this vegetation is not consistent with a native vegetation community. Planted species included *Eucalyptus maculata*, *Eucalyptus tereticornis, Allocasuarina littoralis* and *Acacia saligna**. The ground cover was dominated by introduced species. The vegetation characteristics of this community are summarised in Table 3-6.

Table 3-6 Summary of characteristics of plantations

Plantations			
Conservation significance	Low. Not consistent with a native vegetation community.		
Condition	Low- Unlikely to regenerate due to disturbance of soil profile and native seedbank. Native species recorded were planted.		
Strata	**Height range (median height) (in m)**	**Foliage cover (%)**	**Dominant species**
Canopy	3-10 (6)	<10%	*Eucalyptus maculata*, *Eucalyptus tereticornis, Allocasuarina littoralis*

Plantations			
Shrub stratum	2-5 (3)	<1%	*Acacia saligna**
Ground cover	0-1.5 (1)	90%	*Chloris gayana*, Melinis repens*, Hyparrhenia hirta**

3.3 Species of plant recorded

A total of 226 species of plant was recorded in the study area of which 167 species (74%) were native (Appendix A).

Of the 59 exotic species of plant recorded, four are listed under the *Noxious Weeds Act 1993* for the Upper Hunter County Council noxious weed control area (includes Singleton Local Government Area) (see Table 3-7). Other highly invasive species occurred abundantly within the rail corridor and included: *Chloris gayana*, Melinis repens*, Hyparrhenia hirta*, Cirsium vulgare*, Foeniculum vulgare** and *Ricinus communis*.*

Table 3-7 Noxious weeds within the study area

Scientific Name	Common Name	*Noxious Weeds Act 1993* control class[1]	Weeds of National Significance.
Romulea rosea	Onion Grass	5	
Lantana camara	Lantana	5	Yes
Opuntia stricta	Prickly Pear	4	
Opuntia aurantiaca	Prickly Pear (Tiger Pear)	4	

Notes 1) Control Categories under the *Noxious Weeds Act 1993*: Class 4: The growth and spread of the plant must be controlled according to the measures specified in a management plan published by the local control authority. Class 5: The requirements in the *Noxious Weeds Act 1993* for a notifiable weed must be complied with.

3.4 Fauna habitats

The suitability, size and configuration of the fauna habitats correlated broadly with the vegetation communities, as summarised in Table 3-8. These areas provided habitat for a range of birds, mammals and herpetofauna, and were in moderate to poor condition.

Habitat features recorded in the study area generally include those associated with Dry Open Forest, Aquatic habitats and Cleared land. The habitats and species associations are discussed in Sections 3.4.1 to 3.4.3. Specific habitat attributes of each community type are described in further detail in Table 3-9.

Table 3-8 Fauna habitat with corresponding vegetation description

Fauna habitat description	Corresponding vegetation community (Section 3.1.4 to 3.1.6)
Dry open forest	Central Hunter Spotted Gum – Ironbark – Grey Box Forest and derived grassland
Aquatic habitat	Aquatic vegetation
Cleared land	Weed dominated areas

3.4.1 Dry open forest

Dry open forest occurred as stands of moderately to highly disturbed/fragmented vegetation (Photograph 3-5). The majority of this habitat occurred between chainage 246500 and 247800.

Tree hollows were generally scarce in this habitat, however, due to the role of remnant vegetation in providing connectivity amongst the surrounding fragmented landscape, this habitat was considered to have a moderate value to fauna.

Dry open forest in the study area consisted of canopy species including, *Corymbia maculata*, *Eucalyptus moluccana* and *Eucalyptus crebra.* Such canopy species provided a small number of tree hollows and stags suitable as nesting opportunities for birds, nesting dens for arboreal mammals and roosting habitat for microchiropteran bats (Figure 3-2). Although not observed to be flowering during field surveys, such canopy species would provide flowering resources for a range of nectivorous birds and mammals.

This habitat occurred with a sparse understory (Fabaceae) and ground cover of grasses and sedges. Leaf litter was generally observed to be scarce in this habitat, although it was recorded in parts at depth of 1-2 cm below some trees. An exception to this was survey site S4, which had a leaf litter depth of 1-2 cm with coverage of 70-85%. Decorticating bark and fallen timber was observed to be moderate to sparse throughout this habitat. Tree species including *Eucalyptus moluccana* and *Eucalyptus tereticornis* provided plentiful decorticating bark where present.

Mistletoe was observed to occur at a low density within the study area, generally not being recorded over much of the alignment. An exception to this was small areas in proximity to survey locations S2 and S3, which were observed to have a moderate amount of mistletoe.

Species observed in Dry Open Forest included the threat-listed Squirrel Glider, Rufous Whistler, Noisy Miner and White-winged Chough.

Photograph 3-5 Dry open forest at survey site S2

3.4.2 Aquatic habitat

The study area contained Aquatic habitat in the form of sixteen artificially constructed dams, which were likely created as a result of mining and agricultural activities (see Photographs 3-6 and 3-7). This habitat provided small areas of temporarily inundated dams, to large areas of permanent water. This habitat provided habitat for frogs and waterbirds, as well as providing a source of water for other vertebrate fauna. In total, six species of frog were observed to use this habitat in the study area; however, it is not likely that any Threatened frog (i.e. Green and Golden Bell Frog) would use such areas. A Key Threatening Process for the Green and Golden Bell Frog, Mosquito Fish, was observed to inhabit at least one of the large dams located along the alignment.

Species observed in Aquatic habitat included Grey Teal, Purple Swamphen, Black Swan, Eastern Great Egret, Spotted Grass Frog, Verreaux's Tree Frog and Broad-palmed Frog.

While a number of dams occurred in the study area, most drainage lines have been modified as a result of coal mine operations, agricultural practices and existing rail infrastructure. However, Station Creek, which (in the study area) runs perpendicular to Middle Falbrook Road, has the potential to be affected by the proposal. Station Creek was classed as Class 3 Minimal Fish Habitat (Fairfull & Witheridge 2003).

Photograph 3-6 Aquatic habitat at chainage 246329

Photograph 3-7 Aquatic habitat at chainage 246329

3.4.3 Cleared land

Cleared Land areas provided limited habitat for fauna and essentially occurred as maintained easements (Photograph 3-4). This habitat was either cleared or had scattered trees with a managed understorey, effectively removing ground cover and understory habitat which provides both foraging resources and shelter. Cleared land lacked a range of habitat features such as tree hollows of varying size classes, leaf litter, fallen timber and moderate shrub layer that would support potentially a diverse fauna. The condition of this habitat was considered poor due to the removal of microhabitat structures through clearing and maintenance practices.

3.5 Fauna microhabitats

Table 3-9 describes fauna microhabitats that were recorded during habitat assessments in each fauna stratification unit.

Table 3-9 Fauna microhabitats

Microhabitat attributes	Fauna habitat stratification		
	Dry open forest	Aquatic habitat	Cleared Land
Upper canopy	Upper canopy to 14 m consisting of *Eucalyptus moluccana*, *Corymbia maculata*, *Eucalyptus crebra* and *Eucalyptus tereticornis.* An average crown cover across this habitat was estimated at up to 70%. Mistletoe was observed to occur at a low density within this habitat, generally not being recorded over much of the alignment. However, survey site S3 contained 16 mistletoe plants, which were observed to parasitise *Eucalyptus moluccana.*	Absent	Generally absent, however emergent individuals of *Eucalyptus moluccana* and *Eucalyptus crebra.*
Shrub layer	Open understorey was recorded throughout this habitat with a sparse shrub layer of *Acacia* spp.	Absent	Generally absent due to clearing and current management practices.
Grasses, herbs, forbs, sedges and rushes	A moderate ground cover of grasses, herbs and sedges was recorded over much of this habitat. Species included *Cymbopogon refractus, Aristida vagans, Dichondra repens, Cheilanthes sieberi, Senecio madagascariensis*.*	Dominant emergent species included *Juncus acutus*, Chloris gayana*, Typha sp., Senecio madagascariensis*, Juncus spp.*	Ground cover composition was generally dominated by exotic species.
Leaf litter	A leaf litter of <1 cm was recorded over much of this habitat, although it was observed at a depth of up to 3 cm below some trees. Survey site S4 recorded a leaf litter at 1-2 cm, with a percent cover up to 80 %.	Generally absent. However, some leaf litter present at the ecotone with Dry open forest.	Generally absent
Fallen timber	Although fallen timber was generally sparse throughout the study area, a moderate amount of fallen timber was recorded in this habitat at four of the five habitat assessment site, including survey site S1, S2, S3. These sites contained up to 33 m of fallen timber ranging from 10 to 40 cm DBH. Decorticating bark was recorded from *Eucalyptus moluccana* and *Eucalyptus tereticornis*, where they occurred along the alignment.	Generally absent	Generally absent

Microhabitat attributes	Fauna habitat stratification		
	Dry open forest	Aquatic habitat	Cleared Land
Tree hollows and stags	A total of 42 hollow trees were recorded in the study area, with 139 hollows observed (Appendix G). Hollow trees occurred across this habitat and cleared land.	Absent	Although tree hollows were scarce in the study area, a total of 42 hollow trees were recorded, with 139 hollows observed (Appendix G). Hollow trees occurred across this habitat and dry open forest.
Rocks and rock shelves	Generally absent. However, survey site S4 contained partially to deeply imbedded rocks in one small area on the upper slopes. Survey sites S3 and S4 contained boulders in the dry drainage lines that dissected them, while survey site S1 contained two dumped rock piles.	Generally absent	Generally absent
Drainage lines and water bodies	Generally absent	Several artificially constructed dams occurring along the alignment were likely created as a result of mining and agricultural activities. Water bodies ranged from periodically inundated dams to permanent dams.	Majority of artificially constructed dams (Aquatic habitat) occurred in this habitat.
Overall condition	Moderate–poor	Moderate–poor	Poor

3.5.1 Hollow tree resources

Twelve of the 36 Threatened fauna species that are considered to have potential habitat in the study area utilise hollow tree resources for breeding and roosting. While a complete hollow tree inventory was not completed in the study area, those hollow trees observed, were recorded to identify the number and type of tree hollow resources.

Tree hollow sizes were based on visual estimates and categorised into size classes as per Section 2.4.2.8. The location of hollow-bearing trees within the study area was marked by a *Garmin GPSmap 76CSx*. Coordinates and hollow tree attributes are presented in Appendix G. Forty-two hollow-bearing trees were recorded in the study area with a total of 139 hollows (Figure 3-2).

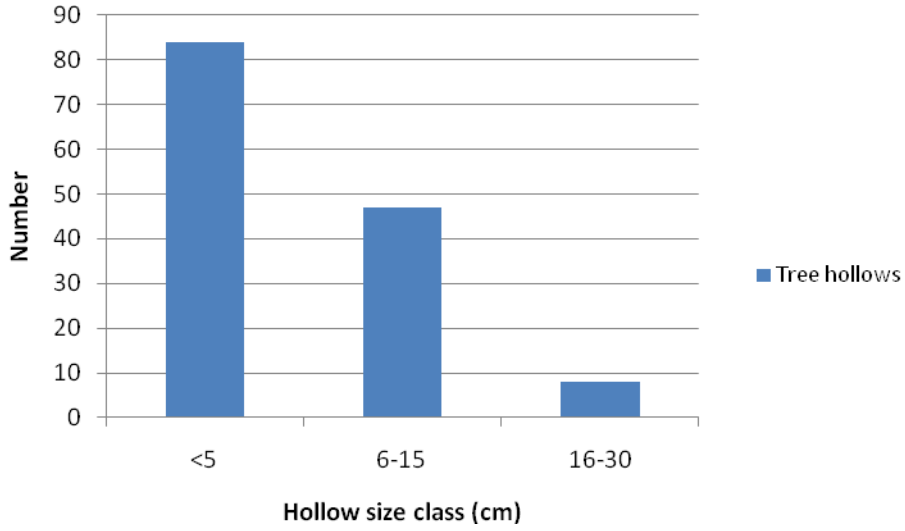

Figure 3-2 Tree hollows recorded in the study area

The size of the hollow entrance utilised varies for many species, whereby entrance size is related to the body length of individuals (Goldingay 2009). Small hollows (less than 5 cm) would be utilised by microchiropteran bats, medium hollows (6-15cm) by lorikeets and parrots, large hollows (greater than 16 cm) by owls. The majority of hollows within the study area are small (to medium) and there are few large hollows. As such the hollows within the study area are likely to provide habitat for small birds and mammals (for example, Squirrel Glider, microchiropteran bats and parrots).

While many attributes of tree hollows may be selected by hollow using species, such as hollow depth, entrance size and hollow type (Goldingay 2009), hollows are more likely to occur and be used by wildlife in large trees that are many decades or even centuries old (Goldingay 2009).

3.5.2 Feeding resources

Fauna occurring in the locality are likely to use a range of foraging resources. Flora provided a range of feeding resources for fauna in the study area; although at the time of survey, few of the sites showed significant flowering. The species within the study area provide important foraging resources and include a range of species that together would flower throughout the

year, with a peak through autumn to early spring (Table 3-10). Based on these flowering times, these flowering resources would support a range of species throughout the year including migratory species and Threatened species such as Squirrel Glider and microchiropteran bats.

Table 3-10 Flowering times of select plants in the study area

Species	No. of quadrats[1]	Flowering time[2]											
		J	F	M	A	M	J	J	A	S	O	N	D
Acacia amblygona	4							■	■	■	■		
Acacia falcata	2				■	■	■	■	■	■			
Acacia decora	1				■	■	■	■	■	■	■		
Acacia ulicifolia	1				■	■	■	■	■	■	■		
Angophora floribunda	1	■	■										
Corymbia maculata	3				■	■	■	■	■				
Eucalyptus crebra						■	■	■	■	■			
Eucalyptus tereticornis	1								■	■	■		
Eucalyptus moluccana	2		■	■									

Notes: 1: Vegetation quadrats, maximum of 6.

2: Flowering times from PlantNet (Royal Botanic Gardens 2006), Euclid (Brooker *et al.* 2002) and flowering time for honey (Somerville 2002).

3.6 Species of animal recorded

Seventy-nine vertebrate fauna species (Table 3-11 and Appendix B) were recorded during field surveys. The paucity of fauna recorded during surveys is likely due to the disturbed nature of much of the study area, the lack of flowering resources during the time of field surveys and the general timing of field surveys (i.e. winter). Four Threatened species of animal, Squirrel Glider, Grey-headed Flying-fox, Grey-crowned Babbler and Little Lorikeet, were recorded during field surveys (Appendix B). Four introduced species were also recorded during surveys, including Brown Hare, Rabbit, Common Myna and Mosquito Fish.

Table 3-11 Threatened species of animal

Group	Introduced	Native	Total
Birds	1	55	56
Mammals	2	11	13
Frogs	-	6	6
Reptiles	-	3	3
Fish	1	-	1
Total			79