

## 4. Native vegetation

The extent of native vegetation within the study area was determined using Section 5 of the Biobanking Assessment Methodology 2014 (OEH 2014).

### 4.1 Background review

A review of regional vegetation mapping by NPWS (2002) and Tozer et al. (2010) was undertaken to inform the site investigation.

NPWS (2002) shows two vegetation communities within the study area (Figure 6), with Shale Sandstone Transition Forest (High Sandstone Influence) mapped along the eastern boundary and in the south-western corner. However, a large portion of the study area is mapped as Unclassified Vegetation.

Tozer et al. (2010) shows three vegetation communities within the study area (Figure 7). Sydney Hinterland Transition Woodland is mapped across the central portion of the study area, with Hinterland Sandstone Gully Forest mapped at the downstream extent of Megarritys Creek. A small area of Cumberland Shale Sandstone Forest is mapped in the south-western corner of the study area.

Detailed mapping of vegetation within the study area was undertaken for this assessment. Methodology is outlined in Section 4.2 and results presented in Section 4.3.

### 4.2 Methods

### 4.2.1 Site investigation

Initial investigations of the study area were undertaken by Hayes Environmental (2012) between 2009 and 2012. Additional flora assessment, for the purposes of this assessment, was undertaken on 2 April 2015, with additional flora surveys undertaken on the 1 May 2015 and 6 May 2015.

Flora surveys undertaken for this assessment included mapping of vegetation communities within the study area. Vegetation mapping was conducted using hand-held (uncorrected) tablet units (Samsung Galaxy Tab 3) using the ArcGIS Collector application and aerial photo interpretation. Mapping of point data or tracks was conducted using hand-held (uncorrected) GPS units (GDA94) and aerial photo interpretation. The accuracy of this mapping is therefore subject to the accuracy of the GPS units (generally ± 5 metres) and dependent on the limitations of aerial photo rectification and registration. Mapping has been produced using a GIS. Electronic GIS files containing the relevant flora and fauna spatial data are available to incorporate into design concept plans. However this mapping may not be sufficiently precise for detailed design purposes.

Delineation of vegetation community boundaries was undertaken using random meander transects, with boundaries defined against the vegetation community definitions of Tozer et al. (2010), as this was deemed the most reliable and relevant to the study area, along with the final determination (NSW Scientific Committee 2014) and conservation advice (Threatened Species Scientific Committee 2014) for the Shale Sandstone Transition Forest CEEC. Identification of vegetation communities within the study area was confirmed using the methodology outlined in Appendix 3 of Tozer et al. (2010), with species composition of plots compared with the positive diagnostic species for a shortlist of vegetation communities.

General classification of native vegetation in NSW used in this report is based on the classification system in Keith (2004) which uses three groupings of vegetation: vegetation formation, vegetation class and vegetation



type, with vegetation type the finest grouping. The grouping referred to in this report is vegetation type. PCTs were identified using the NSW Vegetation Information System (VIS): Classification Version 2.1.

PCTs were stratified into Vegetation Zones based on condition (low or moderate/good) and ancillary code. Initial mapping of PCTs within the study area included stratification based on weed cover and areas of regeneration; however, these stratification units were dropped, as the Vegetation Zones defined were too small (less than 0.1 hectares) to allow the completion of 20 metre by 50 metre plot and transect surveys.

Following stratification of Vegetation Zones, site value was assessed using plot and transect survey data, as per the methodology outlined in Section 5 of the NSW Biobanking Assessment Methodology (OEH 2014). Plot and transect surveys included:

- A 20 metre x 50 metre quadrat and 50 m transect for assessment of site attributes.
- A 20 metre x 20 metre quadrat, nested within the quadrat outlined above, for full floristic survey to determine native plant species richness.

The minimum number of plots/transects per Vegetation Zone was determined using Table 3 of OEH (2014). A total of eight plots/transects were completed within the study area (Figure 8).

A list of flora species was compiled for each vegetation type. Records of all flora species will be submitted to OEH for incorporation into the Atlas of NSW Wildlife.

### 4.3 Results

### 4.3.1 Vegetation description

The study area supports 10.83 hectares of native vegetation, with varying level of disturbance dependent on location within the study area (Figure 8).

Areas mapped as cleared land along the eastern boundary of the study area contained large areas of exotic grasses, dominated by African Love Grass *Eragrostis curvula* with sporadic occurrences of Kangaroo Grass *Themeda australis*. These areas are not discussed further within this report.

Areas adjacent to cleared land, in the eastern section of the study area, support open forest / woodland. These areas contained higher proportions of weeds than other areas.

Central and western sections of the study area supported open forest communities. Weed cover in these areas was generally low, with the exception of a high weed cover within Megarritys Creek and associated tributaries, where moisture and nutrient levels were elevated.

### 4.3.2 Plant community types

Site investigations, including determination of vegetation communities using the methodology outlined in Section 4.2.1, confirmed the presence of two vegetation communities mapped by Tozer et al. (2010) within the study area, with the distribution of these vegetation communities within the study area differing to that mapped by Tozer et al. (2010).

All areas of vegetation were assessed as being in moderate/good condition using the NSW Biobanking Assessment Methodology (OEH 2014), resulting in two Vegetation Zones within the study area. Vegetation zones identified within the study area, including the PCT, the vegetation formation and vegetation class (Keith 2004), their alignment with vegetation communities described by Tozer et al. (2010) and the area of each Vegetation Zone is described in Table 3.



Vegetation zone	Plant community type	Vegetation formation	Vegetation class	Vegetation community (Tozer et al. 2010)	Area (ha)
01	HN556 – Narrow-leaved Ironbark - Broad-leaved Ironbark - Grey Gum open forest of the edges of the Cumberland Plain, Sydney Basin	Dry Sclerophyll Forests (Shrub/grass subformation)	Cumberland Dry Sclerophyll Forests	Cumberland Shale Sandstone Transition Forest (GW p2)	3.26
02	HN564 – Red Bloodwood - Grey Gum woodland on the edges of the Cumberland Plain, Sydney Basin	Dry Sclerophyll Forests (Shrub/grass subformation)	Sydney Hinterland Dry Sclerophyll Forests	Sydney Hinterland Transition Woodland (DSF p146)	7.58

#### Table 3: Vegetation zones mapped within the study area

A detailed description of each Vegetation Zone is provided in Table 4 (Vegetation Zone 1) and Table 5 (Vegetation Zone 2).

## Table 4: Vegetation zone 1 - Narrow-leaved Ironbark - Broad-leaved Ironbark - Grey Gum open forest

Vegetation zone 1 – Narrow-leaved Ironbark - Broad-leaved Ironbark - Grey Gum open forest of the edges of the Cumberland Plain, Sydney Basin

PCT ID	1395
Biometric vegetation type ID	HN556 (ME021 within the Metropolitan CMA)
Common name	Narrow-leaved Ironbark - Broad-leaved Ironbark - Grey Gum open forest of the edges of the Cumberland Plain, Sydney Basin Bioregion
Condition	Moderate/good
Extent within study area	Approximately 3.26 ha of Narrow –leaved Ironbark – Broad-leaved Ironbark – Grey Gum open forest was recorded within the eastern section of the study area (Figure 8).
Description	This PCT occurs in areas containing underlying shale soils that varied in sand content (Douglas Partners 2013). The canopy, where intact, consisted of; Narrow-leaved Ironbark <i>Eucalyptus crebra</i> , Thin-leaved Stringybark <i>Eucalyptus eugenioides</i> , Grey Gum <i>Eucalyptus punctata</i> and Smooth-barked Apple <i>Angophora</i> <i>costata</i> . Red Ironbark <i>Eucalyptus fibrosa</i> and Forest Red Gum <i>Eucalyptus tereticornis</i> were also recorded as mature trees along the eastern boundary of the study area. Midstorey species and areas of densely regenerating trees contained; Sydney Green Wattle <i>Acacia parramattensis</i> , Hickory Wattle <i>Acacia implexa</i> , Coast Myall <i>Acacia binervia</i> and African Olive <i>Olea europaea</i> var. <i>cuspidata</i> . Groundcover



Vegetation zone 1 – Narrow-leaved Ironbark - Broad-leaved Ironbark - Grey Gum open forest of the edges of the Cumberland Plain, Sydney Basin		
	vegetation included species characteristic of both sandstone and shale influenced soils and included a significant proportion of weeds (see below - Condition). Commonly recorded species included; Three-awn Speargrass <i>Aristida vagans</i> , Rough Guinea Flower <i>Hibbertia aspera</i> , Kidney Weed <i>Dichondra repens</i> , <i>Gonocarpus</i> <i>tetragynus</i> , Weeping Grass <i>Microlaena stipoides</i> , Kangaroo Grass <i>Themeda australis</i> and <i>Pomax umbellata</i> .	
Survey effort	Three plots/transects were in this PCT (Figure 8).	
Disturbance	This Vegetation Zone shows moderate to high levels of disturbance, with varying weed cover and regeneration. Disturbance has resulted from clearing of vegetation and use of the study area by recreational vehicles and dumping of rubbish. A number of tracks occur within this Vegetation Zone. The midstorey included occasional African Olive <i>Olea europaea</i> subsp. <i>cuspidata</i> , whereas drainage lines tended to be invaded by Privet ( <i>Ligustrum ludicum</i> and <i>Ligustrum sinense</i> ). The groundcover in areas adjacent to exotic grassland contained a high proportion of weedy grasses, including; African Love Grass <i>Eragrostis curvula</i> , Paspalum <i>Paspalum dilatatum</i> , <i>Briza subaristata</i> and Pigeon Grass <i>Setaria parviflora</i> . Other common weeds included; Paddys Lucerne <i>Sida rhombifolia</i> and Plantain <i>Plantago lanceolata</i> . Blackberry <i>Rubus fruticosa</i> species aggregate was also commonly encountered, with an area of Madeira Vine <i>Anredra cordiifolia</i> noted along the eastern boundary. Some areas show significant regeneration, with some areas containing densely regenerating Acacia species.	
Species relied upon for identification of vegetation type and relative abundance	This community is adjacent to Red Bloodwood - Grey Gum woodland which also occurs in areas of transitional soils. As these PCTs share a number of species in common, preliminary vegetation mapping for this community was conducted using the co-occurrence of; Narrow-leaved Iron Bark, Grey Gum, Kidney Weed, Weeping Grass and <i>Pomax umbellata</i> .	
Justification of evidence used to identify a PCT	The landscape position (in areas of outcropping shale lenses), underlying soils (including podozolic soils) and geographic position (at the edge of the Cumberland Plain) are consistent with the vegetation description within Tozer et al. (2010). Three plots/transects were in this PCT. Floristic data was used to confirm the vegetation community identification, using the methodology outlined in Appendix 3 of Tozer et al. (2010), NSW Scientific Committee (2014) and Threatened Species Scientific Committee (2014).	
EEC Status	Both the PCT and (map unit p2) is included within the description for the CEEC, Shale Sandstone Transition Forest in the Sydney Basin Bioregion. Commonwealth EPBC Act: Critically Endangered Ecological Community NSW TSC Act: Critically Endangered Ecological Community	
Estimate of percent cleared value of PCT	80%	



Vegetation zone 1 – Narrow-leaved Ironbark - Broad-leaved Ironbark - Grey Gum open forest of the edges of the Cumberland Plain, Sydney Basin

Plate 1: Narrowleaved Ironbark -Broad-leaved Ironbark - Grey Gum open forest



#### Table 5: Vegetation zone 2 - Red Bloodwood - Grey Gum woodland

Vegetation zone 2 – Red Bloodwood - Grey Gum woodland on the edges of the Cumberland Plain, Sydney Basin Bioregion		
Plant community type ID	1081	
Biometric vegetation type ID	HN 564 (ME038 within in the Metropolitan CMA)	
Common name	Red Bloodwood - Grey Gum woodland on the edges of the Cumberland Plain, Sydney Basin Bioregion	
Condition	Moderate/good	
Extent within study area	Approximately 7.58 ha Red Bloodwood - Grey Gum woodland was recorded within the study area (Figure 8).	
Description	This PCT was most extensive across the study area, located in areas of plateau or upper gully slopes that were not as heavily influenced by shale soils, with outcropping sandstone. This PCT supports an open canopy that varies in height from 20 to 30 m tall, and includes; Smooth-barked Apple, Blackbutt <i>Eucalyptus</i> <i>pilularis</i> and Red Bloodwood <i>Corymbia gummifera</i> , with Thin-leaved Stringybark, Red Mahogany <i>Eucalyptus resinifera</i> and Mountain Mahogany <i>Eucalyputs notabilis</i> also noted as occasional species. A sparse subcanopy of; Yellow Bloodwood <i>Corimibia eximia</i> , Sydney Green Wattle <i>Acacia decurrens</i> , Forest Oak <i>Allocasuarina</i> <i>torulosa</i> and Turpentine <i>Syncarpia glomulifera</i> was present above a diverse	



Vegetation zone 2 – Red Bloodwood - Grey Gum woodland on the edges of the Cumberland Plain, Sydney Basin Bioregion		
	understorey. Understorey species included a mixture of shrubs and grasses including; Sydney Golden Wattle, <i>Davieia squarrosa</i> , <i>Grevillea mucronulata</i> , Rough Guinea Flower, <i>Lepidosperma laterale</i> , <i>Gonocarpus teaurioides</i> , Broad-leaved Geebung <i>Persoonia levis</i> , Narrow-leaved Geebung <i>Persoonia linearis</i> , Blue-flax Lily, Kangaroo Grass, Three-awn grass, <i>Austrostipa rudis</i> , Two-colour Panic <i>Panicum</i> <i>simile</i> , <i>Paspalidium distans</i> , Tufted Hedgehog Grass <i>Echinopogon caespitosus</i> and Brown's Lovegrass <i>Eragrostis brownii</i> .	
Survey effort	Five plots/transects were in this PCT (Figure 8).	
Disturbance	This Vegetation Zone show low levels of disturbance, with disturbance limited to tracks and some weed cover adjacent to cleared areas. Weeds present in this Vegetation Zone include African Love Grass and Pigeon Grass <i>Setaria parvifolia</i> .	
Species relied upon for identification of vegetation type and relative abundance	As this community shares a number of species with other vegetation communities recorded at the site, preliminary vegetation mapping for this community was conducted using the co-occurrence Smooth-barked Apple, Yellow Bloodwood, and areas where Turpentine occurred in higher proportion to what would be expected for Narrow –leaved Ironbark – Broad-leaved Ironbark – Grey Gum open forest PCT. Midstorey and groundcover species that were used to delineate vegetation mapping for this community also included; <i>Acacia trinervata, Grevillea mucronulata</i> , Hairpin Banksia <i>Banksia spinulosa</i> , Mountain Devil <i>Lambertia formosa, Hovea linearis</i> and <i>Lomandra glauca</i> .	
Justification of evidence used to identify a PCT	The landscape position (in transitional zones between shale caps and underlying sandstone), underlying soils (including loamy soils derived from Hawkesbury formation) and key differences in species composition (see above) conform with the vegetation description within Tozer et al. (2010). Five plots/transects were in this PCT. Floristic data was used to confirm the vegetation community identification, using the methodology outlined in Appendix 3 of Tozer et al. (2010).	
EEC Status	Commonwealth EPBC Act: Not listed NSW TSC Act: Not Listed	
Estimate of percent cleared value of PCT	40%	



Vegetation zone 2 – Red Bloodwood - Grey Gum woodland on the edges of the Cumberland Plain, Sydney Basin Bioregion

Plate 2: Red Bloodwood – Grey Gum woodland



#### 4.3.3 Site value scores

Plots and transect survey data was inputted into the Biobanking credit calculator to determine site value scores. Plot and transect survey data is presented in Appendix 1. Current site value for each Vegetation Zone is outlined in Table 6.

#### Table 6: Site value scores for all Vegetation Zones

Vegetation zone	РСТ	Site value score	Area
01	HN556 – Narrow-leaved Ironbark - Broad-leaved Ironbark - Grey Gum open forest of the edges of the Cumberland Plain, Sydney Basin	67.87	3.26
02	HN564 – Red Bloodwood - Grey Gum woodland on the edges of the Cumberland Plain, Sydney Basin	77.05	7.58



Kurrajong Kurmond 0 Blackheath Galstor vard Katoomba Lawson o Hazel Wallacia Oakda e Oak

### <u>Legend</u>

- Development
- 🔀 Offset
- Proposed drainage reserve

## Vegetation communities (NPWS 2002)

- 1, Shale Sandstone Transition Forest (Low Sandstone Influence)
- 2, Shale Sandstone TransitionForest (High Sandstone Influence)
- 33, Western Sandstone Gully Forest
- 9999, Unclassified Vegetation

# Figure 6: Native vegetation mapping, NPWS (2002)



Ballarat, Brisbane, Canberra, Melbourne, Newcastle, Sydney, Wangaratta & Wollongong

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