29 May 2014

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FLORA AND FAUNA ASSESSMENT, OLD WALLGROVE ROAD UPGRADE

Dear Chris,

The purpose of this letter is to provide a flora and fauna assessment of the proposed upgrade to a section of Old Wallgrove Road, Eastern Creek.

Our analysis has been based on literature reviews, database analysis and a site inspection carried out in May 2014. This letter contains the following:

- Appendix A - report on the flora and fauna values of the subject site;
- Appendix B – figures;
- Appendix C - site photographs; and
- Appendix D - assessments of significance.

The key findings of our assessment are summarised below:

- A limited number of remnant trees and the margins of remnant Cumberland Plain Woodland patches will be removed for the road upgrade;
- Planted areas and exotic grassland will also be removed;
- The threatened fauna habitats that would be affected by the road works represent poor quality habitat for threatened flora species and occasional foraging habitat for most threatened fauna expected to occur over the subject site from time to time;
- The majority of the woodland patches in the vicinity of the subject site would remain and, provided that control measures were implemented

during construction, the road upgrade is not expected to significantly affect these areas.

Please do not hesitate to contact me if you have questions regarding this assessment.

Yours sincerely

Dr David Robertson
Director
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Appendix A

Old Wallgrove Road Upgrade: Flora and Fauna Assessment

A.1 Introduction

A.1.1 Purpose

Cumberland Ecology has been requested by Mackenzie Group to undertake a flora and fauna assessment of the proposed upgrade to a section of Old Wallgrove Road, Eastern Creek (hereafter referred to as the 'subject site') (see **Figure 1** in **Appendix B**).

The purpose of this letter report is to:

- Describe the vegetation communities within the subject site and map any occurrences of threatened ecological communities (TECs);
- Assess the likelihood of occurrence of threatened species or threatened populations within the subject site; and
- Assess the potential impacts of the proposed upgrade on threatened species, threatened populations and TECs.

Note that threatened species, populations and TECs referred to in this assessment are those listed under the NSW *Threatened Species Act 1995* (TSC Act) and Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

A.1.2 Background

i. Location

The subject site is located between the intersection with the Erskine Park Link Road at the north, and the intersection with the Oakdale Estate Access Road to the south (near Burley Road), Eastern Creek (see **Figure 1** of **Appendix B**). The subject site forms part of the Oakdale Estate within the Western Sydney Employment Hub that is located within the Fairfield and Penrith Local Government Areas (LGAs). The subject site extends to the north of this area into Blacktown LGA. The subject site is currently surrounding by industrial development, a substation and cleared grasslands. A Sydney Catchment Authority (SCA) pipeline runs east-west through the subject site.

ii. Context

The existing section of Old Wallgrove Road between the recently completed Erskine Park Link Road and the Oakdale Estate, is a rural road comprising a variable width pavement from 7 to 8 metres (m) with flush shoulders and table drains. This section of road is approximately 1600 m in length. The road is unlit and is in a poor condition with numerous pavement failures along the stretch of road (AT&L, 2014).

As part of the Concept Approval for the Oakdale Estate, a section of Old Wallgrove Road was temporarily upgraded to provide additional road width to cater for additional heavy traffic. Since the completion of these roadworks in 2011, the pavement has deteriorated and potholes have

developed (AT&L, 2014). In recognition of the need to rehabilitate Old Wallgrove Road and in consideration of the Goodman Property Services (Goodman) proposal to develop the remainder of the Oakdale Estate (which necessitates consideration of the required road connection), the Road and Maritime Services (RMS) has requested that Old Wallgrove Road be permanently upgraded (AT&L, 2014).

iii. Project Description

In conjunction with a State Significant Development at the Oakdale Estate, Goodman is upgrading Old Wallgrove Road on behalf of the Department of Planning and Environment (DPE) and Blacktown Council. In broad terms the proposed project includes the upgrade and reconstruction of the portion of the road occurring within the subject site, which will ultimately support further development south of the SCA pipeline. This will entail utilisation of the existing road reserve, following the existing road carriageway and upgrading to a four lane two way carriageway with kerb and gutter and a centre painted median.

AT&L are preparing the road design and project managing the delivery of the upgrade on behalf of Goodman. AT&L have been commissioned to develop and design the proposed permanent upgrade solution of Old Wallgrove Road. It is expected detailed design will commence during May 2014 with completion of construction documentation targeted for August 2014. Construction is expected to commence in October 2014 with completion targeted for June 2015.

A.2 Methodology

A.2.1 Scope of Assessment

The scope of this assessment focuses on the area contained within the subject site (i.e. the limits of impact for the road widening works), although some reference to adjacent vegetation is made to assist in assessing the predicted impacts.

A.2.2 Database Analysis

Database analysis was conducted for the locality using both the NSW Office of Environment and Heritage (OEH) Atlas of NSW Wildlife Database (OEH, 2014) and the Commonwealth Department of the Environment (DoE) Protected Matters Search Tool (DoE, 2014) to determine the types of threatened species and ecological communities that may occur within the subject site. The Atlas of NSW Wildlife search recovered records of threatened flora and fauna species and endangered ecological communities listed under the TSC Act within a 5 km radius of the subject site (the locality). The EPBC Protected Matters Search Tool revealed threatened species, and other Matters of National Environmental Significance as listed under the EPBC Act that are known, or with potential, to occur within the locality of the subject site.

Other databases consulted during this assessment included:

- OEH Vegetation Types Database;
- OEH Critical Habitat register;

- OEH Threatened Species Profiles; and
- DoE Community and Species Profile and Threats Database.

A.2.3 Literature Review

A review of ecological literature relevant to the project was undertaken as part of this assessment to evaluate the flora and fauna values associated with the subject site and locality (5km radius from the subject site). The results of these assessments provide an overview of the ecology of the locality, particularly in relation to the occurrence of TECs and threatened species. Key documents reviewed for this ecological assessment include:

- AT&L (2014) Oakdale Central Development, Regional Link Roads. Old Wallgrove Road Upgrade - Road Design Report, R002-rev3. AT&L, St Leonards;
- Cumberland Ecology (2013) Re: Preliminary Grassland Assessment for Oakdale Central (13097 - Let3);
- Aurecon (2012) Ecological Assessment Report: Old Wallgrove Road Widening (Roberts Road - M7 Motorway), Eastern Creek;
- Parsons Brinkerhoff (2010) Erskine Park Link Road - terrestrial ecology assessment update for Ropes Creek realignment;
- Cumberland Ecology (2007) Ecological Assessment: Oakdale Concept Plan; and
- NPWS (NSW) (2002) Native Vegetation Maps of the Cumberland Plain Western Sydney.

A.2.4 Imagery Interpretation

Aerial photographs and Google© Maps 'Street View' function of the subject site were analysed in conjunction with the database analysis and literature review. The extent of vegetation and surrounding land uses were examined using these tools.

A.2.5 Site Survey

A survey of the subject site was conducted on the 28th May 2014 by an ecologist to verify the results of the desktop assessment. As part of the site survey, the entire length of the subject site was traversed and each patch of vegetation examined.

Searches were undertaken for threatened flora species and notes were recorded on the condition of any threatened fauna habitat present. In particular, searches at the bases of suitable habitat trees (including Forest Red Gum, *Eucalyptus tereticornis*) were undertaken.

A.2.6 Limitations

The flora survey was conducted during one site visit in May 2014. Growing conditions in the vicinity of the survey area had been suitable to enable adequate production of features to

enable identification to be made of most plants to species level at the time of the survey and accurate assessment of the subject site's conservation significance.

No targeted fauna surveys were undertaken for this assessment, which relied on database analysis and a fauna habitat assessment. The data produced by the database analysis and fauna habitat assessment is intended to be indicative of the types of species that could occur on the subject site.

A.3 Desktop Results

A.3.1 Vegetation Communities

i. Vegetation Mapping within the Subject Site

The subject site has been mapped as part of broad scale mapping of the Cumberland Plain undertaken by NPWS (NSW) (2002). This mapping indicates that a small patch of Shale Plains Woodland occurs in the northern portion of the subject site (see **Figure 2** in **Appendix B**). Shale Plain Woodlands forms a component of the critically endangered ecological community (CEEC) Cumberland Plain Woodland listed under both the TSC Act and EPBC Act.

Within the Aurecon report (2012), this patch of vegetation has been classified as Cumberland Dry Sclerophyll Forest and not aligned with any TEC. The descriptions provided within the report indicates that the vegetation is largely comprises of native vegetation; however a shrub and grassy understorey is not present.

The modified portions of the subject site have not been aligned within any vegetation communities within both the NPWS (NSW) (2002) and Aurecon (2012) reports. Cumberland Ecology (2007) noted that vegetation within a nearby pipeline corridor and the existing road reserve along Old Wallgrove Road consisted mainly of exotic grasses.

ii. TECs Identified within the Locality

A number of TECs have been identified in the locality of the subject site. **Table 1** lists the native vegetation communities mapped by NPWS (NSW) (2002) within the locality.

Table 1 TECs identified within the locality of the subject site (NPWS (NSW) (2002))

Vegetation Community	TSC Act	EPBC Act
Shale Plains Woodland	CEEC - Cumberland Plain Woodland in the Sydney Basin Bioregion	CEEC - Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest
Shale Hills Woodland	CEEC - Cumberland Plain Woodland in the Sydney Basin Bioregion	CEEC - Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest

Table 1 TECs identified within the locality of the subject site (NPWS (NSW) (2002))

Vegetation Community	TSC Act	EPBC Act
Shale/Gravel Transition Forest	EEC - Shale gravel Transition Forest in the Sydney Basin Bioregion	CEEC - Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest
Alluvial Woodland	EEC - River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	Not listed.

The EPBC Protected Matters Search Tool also identified an additional CEEC, namely 'Western Sydney Dry Rainforest and Moist Woodland on Shale', that may occur within the locality of the subject site. This community is also listed as an EEC under the TSC Act as 'Western Sydney Dry Rainforest in the Sydney Basin Bioregion'.

A.3.2 Threatened Flora Species

Database records indicate the occurrence of a number of threatened flora species within the locality of the subject site. The locations of threatened flora species records held in the Atlas of NSW Wildlife database are shown on **Figure 3** in **Appendix B**. The habitat requirements of each of these species are provided in **Table 2**. Many of these species occur in woodland habitats, particularly Cumberland Plain Woodland; however one species *Grevillea juniperina subsp. juniperina* is known to occur in roadside verges. There is the potential for a number of the species listed in **Table 2** to occur within the subject site.

Table 2 Threatened flora species recorded in the locality of the subject site

Scientific Name	Common Name	TSC Act Status	EPBC Act Status	Habitat Requirements
Acacia pubescens	Downy Wattle	V	V	Occurs on alluviums, shales and at the intergrade between shales and sandstones. Occurs in open woodland and forest, in a variety of plant communities, including Cooks River/Castlereagh Ironbark Forest, Shale/Gravel Transition Forest and Cumberland Plain Woodland.
Dillwynia tenuifolia		V		May be locally abundant particularly within scrubby/dry heath areas within Castlereagh Ironbark Forest and Shale Gravel Transition

Table 2 Threatened flora species recorded in the locality of the subject site

Scientific Name	Common Name	TSC Act Status	EPBC Act Status	Habitat Requirements
				Forest on tertiary alluvium or laterised clays. *Eucalyptus fibrosa* is usually the dominant canopy species.
Grevillea juniperina subsp. juniperina	Juniper-leaved Grevillea	V		Grows on reddish clay to sandy soils derived from Wianamatta Shale and Tertiary alluvium (often with shale influence), typically containing lateritic gravels. Recorded from Cumberland Plain Woodland, Castlereagh Ironbark Woodland, Castlereagh Scribbly Gum Woodland and Shale/Gravel Transition Forest.
Hypsela sessiliflora		E	Ex	Currently known from only two adjacent sites on a single private property at Erskine Park. Known to grow in damp places, on the Cumberland Plain, including freshwater wetland, grassland/alluvial woodland and an alluvial woodland/shale plains woodland (Cumberland Plain Woodland) ecotone.
Marsdenia virdiflora subsp. virdiflora		EP		Recent records are from Prospect, Bankstown, Smithfield, Cabramatta Creek and St Marys. Grows in vine thickets and open shale woodland.
Pimelea spicata	Spiked Rice-flower	E	E	In both the Cumberland Plain and Illawarra environments this species is found on well-structured clay soils. On the Cumberland Plain sites it is associated with Grey Box communities (particularly Cumberland Plain Woodland variants and Moist Shale Woodland) and in areas of ironbark.
Pultenaea parviflora		E	V	May be locally abundant, particularly within scrubby/dry heath areas within Castlereagh Ironbark Forest and Shale Gravel Transition Forest on tertiary alluvium or laterised clays. *Eucalyptus fibrosa* is usually the dominant canopy species. Often found in association with other threatened species such as *Dillwynia tenuifolia*, *Grevillea juniperina*, *Micromyrtus minutiflora* and *Persoonia nutans*.

TSC Act Status / EPBC Act Status: V = Vulnerable, E = Endangered, EP = Endangered Population, CE = Critically Endangered

A.3.3 Threatened Fauna Species

Database records indicate the occurrence of a number of threatened fauna species within the locality of the subject site. The locations of threatened fauna species records held in the Atlas of NSW Wildlife database are shown on **Figure 4** in **Appendix B**.

The habitat requirements of each of these species are provided in **Table 3**.

Table 3 Threatened flora species recorded in the locality of the subject site

Scientific Name	Common Name	TSC Act Status	EPBC Act Status	Habitat Requirements
Birds				
Daphoenositta chrysoptera	Varied Sittella	V		Inhabits eucalypt forests and woodlands, especially those containing rough-barked species and mature smooth-barked gums with dead branches, mallee and *Acacia* woodland.
Anthochaera phrygia	Regent Honeyeater	CE	E	Inhabits dry open forest and woodland, particularly Box-Ironbark woodland, and riparian forests of River Sheoak. Feeds on the nectar from a wide range of eucalypts and mistletoes. Key eucalypt species include Mugga Ironbark, Yellow Box, Blakely's Red Gum, White Box and Swamp Mahogany.
Lophoictinia isura	Square-tailed Kite	V		Found in a variety of timbered habitats including dry woodlands and open forests. Shows a particular preference for timbered watercourses.
Hieraaetus morphnoides	Little Eagle	V		Occupies open eucalypt forest, woodland or open woodland. Nests in tall living trees within a remnant patch.
Tyto novaehollandiae	Masked Owl	V		Lives in dry eucalypt forests and woodlands from sea level to 1100 m. A forest owl, but often hunts along the edges of forests, including roadsides.
Gastropods				
Meridolum corneovirens	Cumberland Plain Land Snail	E		Primarily inhabits Cumberland Plain Woodland. Lives under litter of bark, leaves and logs, or shelters in loose soil around grass clumps. Occasionally shelters under rubbish.
Mammals				

Table 3 Threatened flora species recorded in the locality of the subject site

Scientific Name	Common Name	TSC Act Status	EPBC Act Status	Habitat Requirements
Phascolarctos cinereus	Koala	V	V	Inhabit eucalypt woodlands and forests.
Miniopterus schreibersii oceanensis	Eastern Bentwing-bat	V		Caves are the primary roosting habitat, but also use derelict mines, storm-water tunnels, buildings and other man-made structures. Hunt in forested areas, catching moths and other flying insects above the tree tops.
Falsistrellus tasmaniensis	Eastern False Pipistrelle	V		Prefers moist habitats, with trees taller than 20 m. Generally roosts in eucalypt hollows, but has also been found under loose bark on trees or in buildings. Hunts beetles, moths, weevils and other flying insects above or just below the tree canopy.
Mormopterus norfolkensis	Eastern Freetail-bat	V		Occur in dry sclerophyll forest, woodland, swamp forests and mangrove forests. Roost mainly in tree hollows but will also roost under bark or in man-made structures.
Scoteanax rueppellii	Greater Broad-nosed Bat	V		Utilises a variety of habitats from woodland through to moist and dry eucalypt forest and rainforest, though it is most commonly found in tall wet forest. Usually roosts in tree hollows. Forages along creek and river corridors.
Myotis macropus	Southern Myotis	V		Generally roosts close to water in caves, mine shafts, hollow-bearing trees, storm water channels, buildings, under bridges and in dense foliage. Forage over streams and pools.
Pteropus poliocephalus	Grey-headed Flying-fox	V	V	Occur in subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps as well as urban gardens and cultivated fruit crops. Feed on the nectar and pollen of native trees, in particular *Eucalyptus, Melaleuca* and *Banksia*, and fruits of rainforest trees and vines.

TSC Act Status / EPBC Act Status: V = Vulnerable, E = Endangered, CE= Critically Endangered

A.4 Field Results

A.4.1 Vegetation Communities

The subject site is largely cleared of native vegetation. Fragmented patches of vegetation and occasional isolated remnant trees occur along the length of the existing Old Wallgrove Road but are largely adjacent to the subject site (**Figure 5**).

The isolated remnant trees that occur within the subject site are consistent with the historical occurrence of Cumberland Plain Woodland, as these trees comprise the community dominants, including Forest Red Gum (*Eucalyptus tereticornis*) and Grey Box (*Eucalyptus moluccana*). These remnant trees occur above an exotic and mown understorey dominated by Rhodes Grass (*Chloris gayana*). These trees no longer conform to the EPBC Act and TSC Act descriptions of the CEEC Cumberland Plain Woodland.

The patches of vegetation that occur within and adjacent to the subject site are comprised of:

- Narrow rows or small groves of planted local (possible) and non-local native canopy trees (**Photograph 1** in **Appendix C**);
- Larger landscaped areas containing a planted mix of local (possible) and non-local native canopy trees (**Photograph 2** in **Appendix C**);
- A plantation of Forest Red Gum (*Eucalyptus tereticornis*) to the north of the subject site;
- Small and highly fragmented remnant patches of Cumberland Plain Woodland. The tree species recorded include one or a mix of the following: Forest Red Gum (*Eucalyptus tereticornis*), Grey Box (*Eucalyptus moluccana*), Narrow-leaved Ironbark (*Eucalyptus crebra*) and Spotted Gum (*Corymbia maculata*). The understorey is sparsely shrubby. The ground cover component is variable but is largely exotic and shows evidence of regular mowing (**Photograph 3** and **Photograph 4** in **Appendix C**); and
- A relatively large remnant patch of Cumberland Plain Woodland that occurs to the immediate east of the northern section of the subject site. This patch contains a moderately diverse native understorey. The remnant patch becomes increasingly weedy as it approaches the road verge (**Photograph 5** in **Appendix C**).

i. Cumberland Plain Woodland

The patches Cumberland Plain Woodland that occur within and adjacent to the subject site are largely degraded or are regenerating. These remnant patches, although degraded, contain the characteristic canopy tree species described in the Final Determination and Listing Advice for Cumberland Plain Woodland, namely Forest Red Gum (*Eucalyptus tereticornis*), Grey Box (*Eucalyptus moluccana*), Narrow-leaved Ironbark (*Eucalyptus crebra*) and Spotted Gum (*Corymbia maculata*).

The understorey is highly variable and most patches are dominated by exotic perennial grasses including Rhodes Grass (*Chloris gayana*), Paspalum (*Paspalum dilatatum*), Kikuyu (*Pennisetum clandestinum*) and Pigeon Grass (*Setaria parviflora*); exotic dicots such as Cobbler's Pegs (*Bidens pilosa*) and Farmer's Friend (*Sida rhombifolia*); and exotic pasture forbs and weeds, such as Medic Burr (*Medicago polymorpha*), Fire Weed (*Senecio madagascariensis*) and Spear Thistle (*Cirsium vulgare*).

In the larger patches of Cumberland Plain Woodland outside of the subject site, the understorey contains characteristic native shrubs species such as *Daviesia ulicifolia, Pultenaea microphylla*, *Bursaria spinosa* and *Dillwynia sieberi*; and characteristic ground cover species including Kidney Weed (*Dichondra repens*), Weeping Meadow Grass (*Microlaena stipoides*) and *Brunoniella australis.* However, the understorey becomes increasingly exotic as the patch approaches the existing road verge and the subject site limits.

The majority of areas of Cumberland Plain Woodland within the subject site do not conform to the EPBC Act listing because the understorey is more than 50% exotic, are less than 5 ha in size and are isolated from other native vegetation, and do not contain at least one tree per hectare that has a diameter at breast height greater than 80 cm or a hollow. However, these areas still conform to the TSC Act listing, despite their degraded condition.

Only one patch of Cumberland Plain Woodland is large enough and retains sufficient native species diversity in the understorey to meet the EPBC Act listing.

ii. Grassland

The grassland throughout the subject site is exotic and is dominated by Rhodes Grass (*Chloris gayana*). The vegetation within these areas has been disturbed by existing and adjoining land uses. The There is the potential for some areas of grassland to have been derived from Cumberland Plain Woodland, particularly in areas located in close proximity to woodland patches. Within the southern-most extent of the subject site, the original Cumberland Plain soil profile appears to be relatively intact and supports grassland containing native forbs and grasses derived from Cumberland Plain Woodland. Notwithstanding, the proportion of the understorey cover in these areas is still predominantly exotic (60% projective foliage cover attributable to exotic species) and occurs adjacent to landscaped plantings (**Photograph 6** in **Appendix C**). Therefore, the grassland areas within the subject site are not considered to conform to Cumberland Plain Woodland Derived Native Grassland that is protected under the TSC Act.

A.4.2 Threatened Species

No threatened flora species were recorded during the site survey.

The habitats available for the threatened flora species identified as having potential to occur within the subject site are likely to be confined to remnant woodland patches outside of the subject site where the understorey is relatively protected from exotic perennial grass incursions and regular mowing. These threatened species are unlikely to occur in the exotic grassland

areas due to the prevalence of Rhodes Grass (*Chloris gayana*), which is a very competitive species, and landscaping areas recorded within the subject site.

No threatened fauna were recorded during the site survey.

The habitats for threatened fauna within the subject site provide only limited foraging, nesting and/or roosting habitat for some of the threatened fauna species known from the locality. Habitat utilisation by these species is likely to primarily be confined to woodland patches outside of the subject site.

A.5 Impact Assessment

A.5.1 Direct Removal of Vegetation

The proposed project will require some land clearance to facilitate the widening of Old Wallgrove Road within the subject site. The desktop assessment and site survey results show that the majority of remnant vegetation in the vicinity of Old Wallgrove Road occurs outside of the subject site (i.e. the proposed limits of impact).

Within the subject site, the vegetation is largely exotic grassland, small occurrences of planted vegetation and remnant trees. Some individual trees on the margins of remnant patches of Cumberland Plain Woodland will require removal; however, the removal of these trees is unlikely to have a detrimental significant impact on the function and persistence of the woodland patch.

An assessment of the significance under the TSC Act for Cumberland Plain Woodland is presented in **Appendix D**. An assessment of the significance under the EPBC Act is also presented in **Appendix D**.

A.5.2 Direct Removal of Threatened Species Habitat

The proposed will remove very poor quality habitat for threatened flora species, as the subject site is dominated by exotic perennial grasses and is regularly mown. The proposed project is unlikely to have a significant impact on threatened flora species known from the locality.

The proposed project will remove small areas of foraging habitat for most threatened fauna species predicted to occur across the subject site from time to time. The proposed project is unlikely to have a significantly detrimental impact on most threatened fauna species, as these are highly mobile bird and bat species with large foraging ranges.

The proposed project will remove some habitat for the Cumberland Land Snail (*Meridolum corneovirens*); however, the majority of the Cumberland Land Snail habitat will be retained outside of the subject site within the adjacent woodland patches. The proposed project is unlikely to have a significant impact on the species. Nevertheless, an assessment of the significance of impacts of the project on Cumberland Land Snail is presented in **Appendix D**.

A.6 Recommendations and Mitigation Measures

Potential impacts to flora and fauna occurring in the construction phase that can be managed include: unnecessary vegetation removal, runoff, sedimentation, erosion and pollution. As the subject site is located adjacent to areas of Cumberland Plain Woodland, precautions need to be taken to minimise the impacts to these areas.

Unnecessary vegetation removal may occur if the boundaries of the subject site are not clearly defined. The clearance boundaries should be clearly marked to ensure no vegetation beyond these marks is removed.

During development, precautions should be taken to ensure that no sediment or pollution drains into adjoining areas. To prevent excess runoff flowing off the building site, barriers should be established to divert the flow of water away from the surrounding native woodland and into appropriate drainage systems. Silt traps should be established to prevent the impacts of sedimentation on the surrounding woodland. To reduce sedimentation on the construction site, erosion control measures need to be implemented. This may involve minimising the amount of exposed soils on the site at any given time. During development, precautions should be taken to ensure that no pollution escapes the construction site. Pollution traps and efficient removal of pollution to an offsite location would help to minimise pollution impacts.

Monitoring of the proposed mitigation measures should be undertaken through the construction process.

A.7 Conclusion

The proposed upgrade of Old Wallgrove Road involves the clearance of remnant native trees above an exotic understorey, planted areas and exotic grassland. It will also remove a few native trees from the margins of existing woodland patches that conform to the CEEC Cumberland Plain Woodland.

The Cumberland Plain Woodland patches that occur in the vicinity of the subject site is highly fragmented. In addition to this, the margins of the woodland patches that approach the existing road verge (and is contained within the subject site) is highly degraded and no longer supports a native understorey. For this reason, the proposed project is unlikely to have a significant detrimental impact on CEEC Cumberland Plain Woodland such that its local persistence and long-term survival in the wider locality is at risk.

Furthermore, the fauna habitats present within the subject site provide very poor quality habitat for threatened flora species and only marginal foraging habitat for threatened fauna species. The majority of habitat in the vicinity of the subject site will be retained outside of the subject site within the adjacent woodland patches. Thus, the proposed project is unlikely to have a significant detrimental impact on threatened species such that their local persistence is at risk.

Notwithstanding the above, it is recommended that the appropriate mitigation measures outlined above are implemented during construction to minimise unintended impacts on the surrounding remnant vegetation and potential threatened species habitat.

A.8 References

AT&L (2014). *Oakdale Central Development, Regional Link Roads*. Old Wallgrove Road Upgrade - Road Design Report, R002-rev3. AT&L, St Leonards.

Aurecon (2012). *Ecological Assessment Report: Old Wallgrove Road Widening (Roberts Road - M7 Motorway), Eastern Creek*. Aurecon Australia Pty Ltd, Neutral Bay.

Cumberland Ecology (2007). *Ecological Assessment - Oakdale Concept Plan. Prepared for Goodman International Limited*. Cumberland Ecology Pty. Ltd., Carlingford Court, NSW.

Cumberland Ecology (2013). *Re: Preliminary Grassland Assessment for Oakdale Central (13097 - Let3)*. Cumberland Ecology Pty Ltd, Carlingford Court.

DECCW (2010). *Approved Recovery Plan: Cumberland Plain Recovery Plan*.

DoE (2014). "EPBC Protected Matters Search Tool." from http://www.environment.gov.au/epbc/pmst/.

NSW NPWS (2002). *Native Vegetation Maps of the Cumberland Plain Western Sydney*. NSW National Parks and Wildlife Service, Sydney.

NSW Scientific Committee (2009). *Cumberland Plain Woodland in the Sydney Basin Bioregion - critically endangered ecological community listing*. Department of Environment, Climate Change and Water (NSW), Hurstville.

OEH (2013). *Cumberland Plain Land Snail - profile*. Office of Environment and Heritage, Hurstville.

OEH (2014). "Atlas of NSW Wildlife." 2014, from http://www.environment.nsw.gov.au/atlaspublicapp/UI_Modules/ATLAS_/AtlasSearch.aspx.

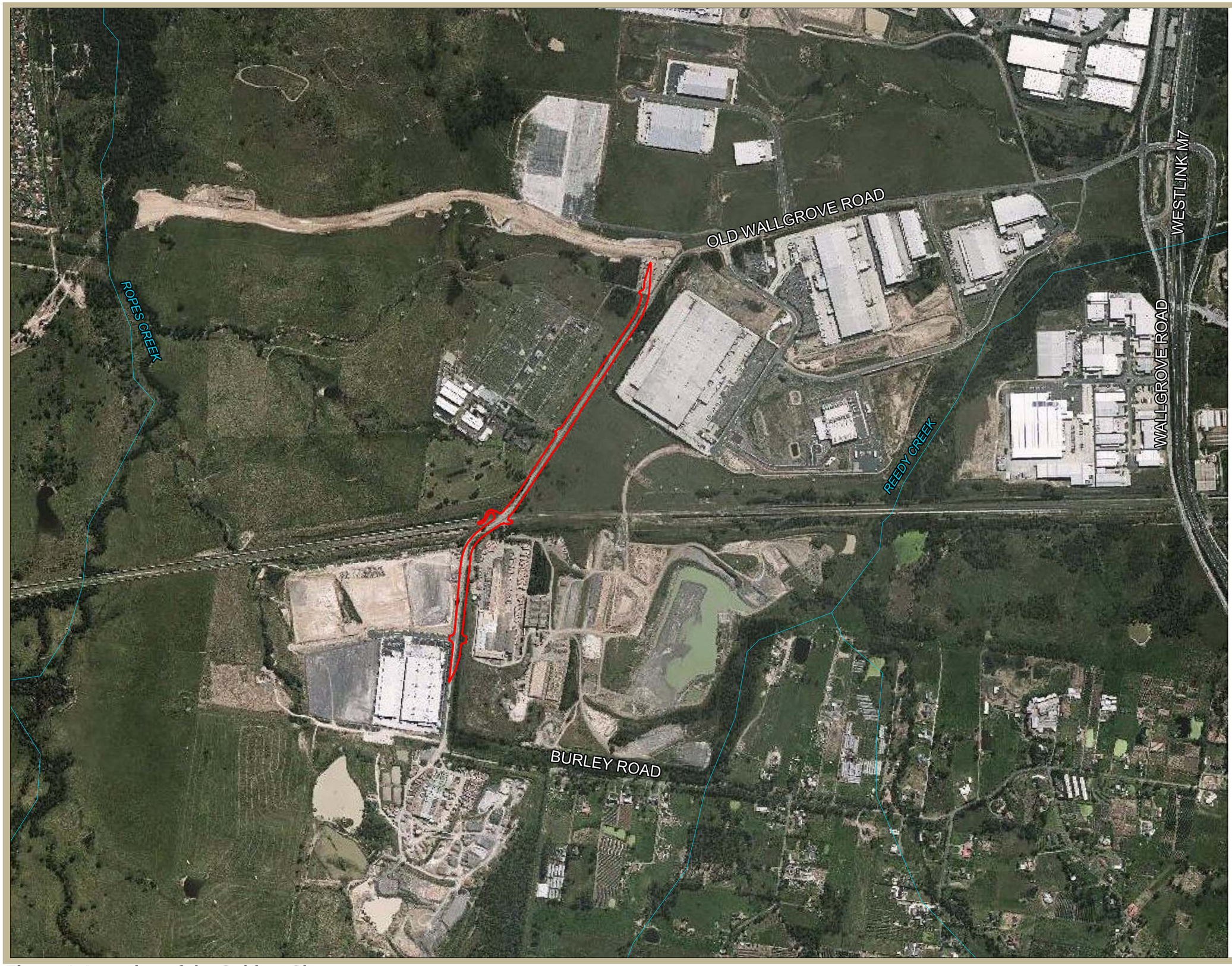
Parsons Brinckerhoff (2010). *Erskine Park Link Road - terrestrial ecology assessment update for Ropes Creek realignment*. Parsons Brinckerhoff Australia Pty Limited, Sydney.

Threatened Species Scientific Committee (2008). "Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest." *Advice to the Minister for the Environment, Heritage and the Arts from the Threatened Species Scientific Committee (the Committee) on an Amendment to the List of Threatened Ecological Communities under the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)*, from http://www.environment.gov.au/biodiversity/threatened/communities/pubs/112-listing-advice.pdf.

Appendix B

Figures

Coordinate System: MGA Zone 56 (GDA 94)



Legend

- Subject Site
- Waterway

Grid North

Image Source:
SIXMaps 23-04-2013

Data Source:
© Copyright Commonwealth of Australia
(Geoscience Australia) 2006

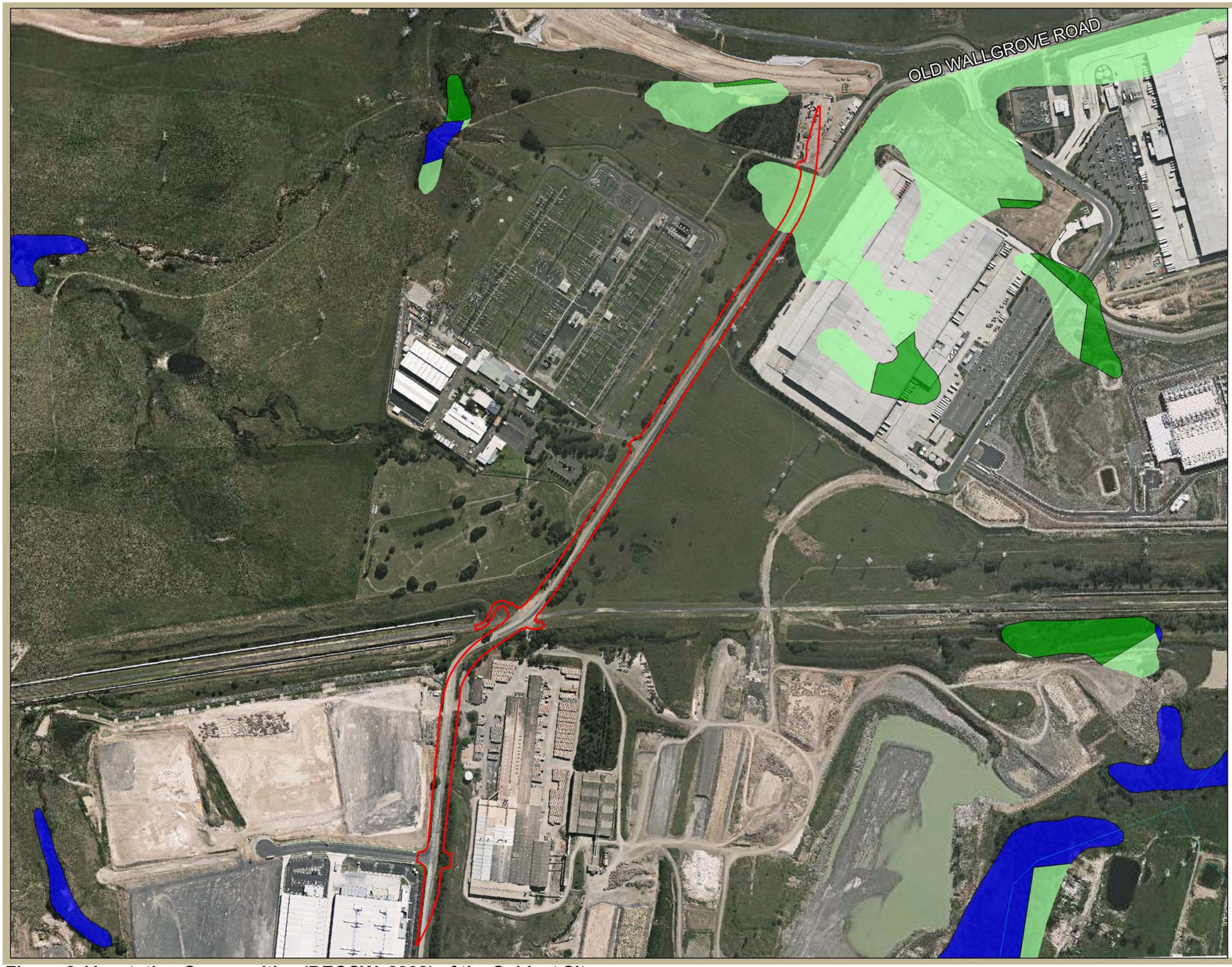
CUMBERLAND ECOLOGY

I:\...\14063\Figures\Letter 3\20140529\Figure 1. Location

Figure 1. Location of the Subject Site

250 0 250 500 750 1000m

Coordinate System: MGA Zone 56 (GDA 94)



Legend

- Subject Site
- Waterway

Vegetation Community (DECCW, 2008)

- Shale Plains Woodland
- Shale Hills Woodland
- Shale/Gravel Transition Forest
- Alluvial Woodland

N
Grid North

Image Source:
SIXMaps 23-04-2013

Data Source:
DECCW (2008), Native Vegetation of the Cumberland Plain.

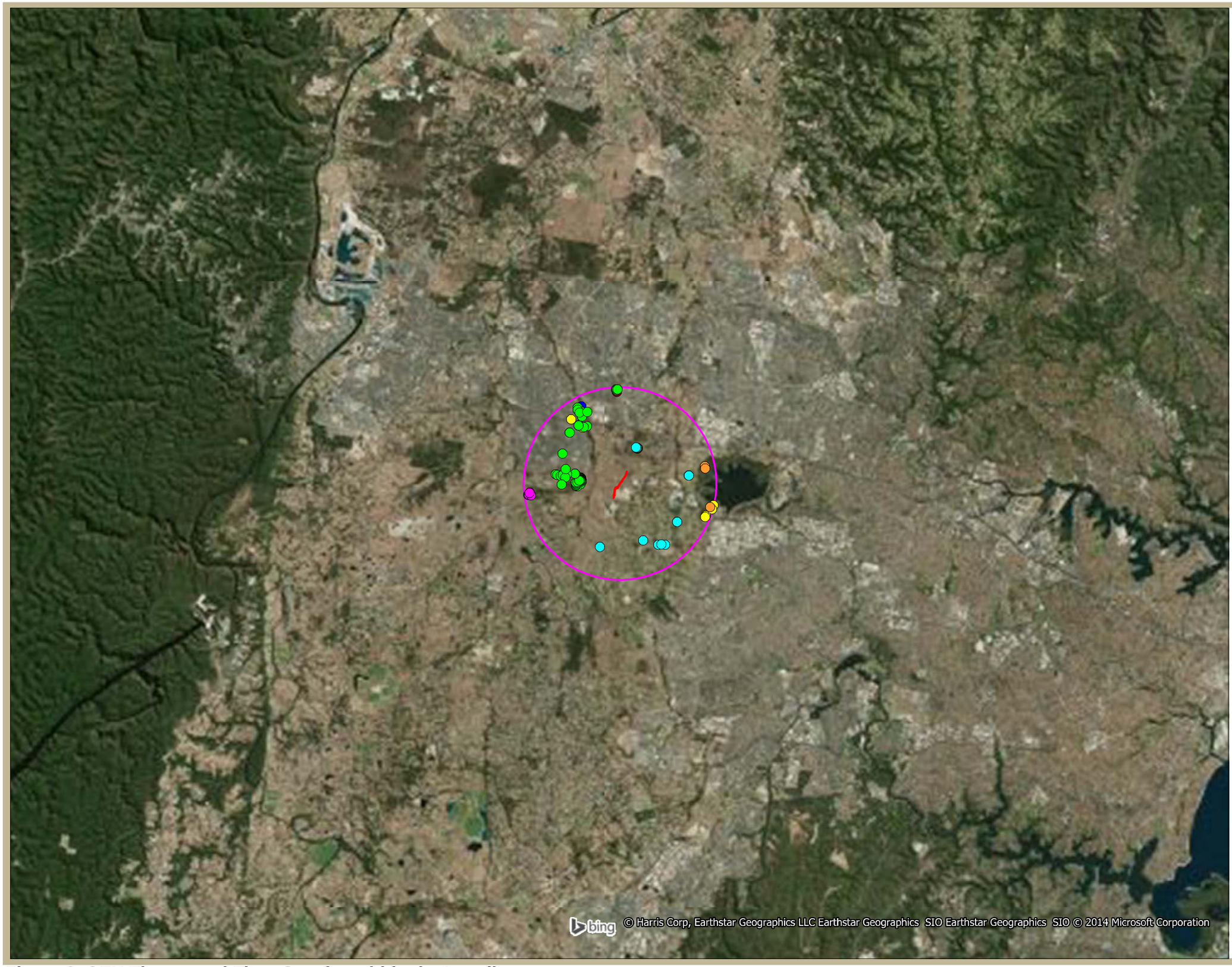
CUMBERLAND ECOLOGY

I:\...\14063\Figures\Letter 3\20140529\Figure 2. Vegetation_Subject Site

Figure 2. Vegetation Communities (DECCW, 2008) of the Subject Site

100 0 100 200 300 400m

Coordinate System: MGA Zone 56 (GDA 94)



Legend

- Subject Site
- Locality (5km radius)

Threatened Flora

- *Acacia pubescens*
- *Dillwynia tenuifolia*
- *Grevillea juniperina subsp. juniperina*
- *Hypsela sessiliflora*
- *Marsdenia viridiflora subsp. viridiflora*
- *Pimelea spicata*
- *Pultenaea parviflora*

Grid North

Data Source:
OEH Atlas accessed: 22/05/2014
Data shown at Scale:1:250,000
due to licencing restrictions

CUMBERLAND ECOLOGY

2.5 0 2.5 5 7.5 10km

I:\...\14063\Figures\Letter 3\20140529\Figure 3. Threatened Flora_Locality

Figure 3. OEH Threatened Flora Species within the Locality

Coordinate System: MGA Zone 56 (GDA 94)

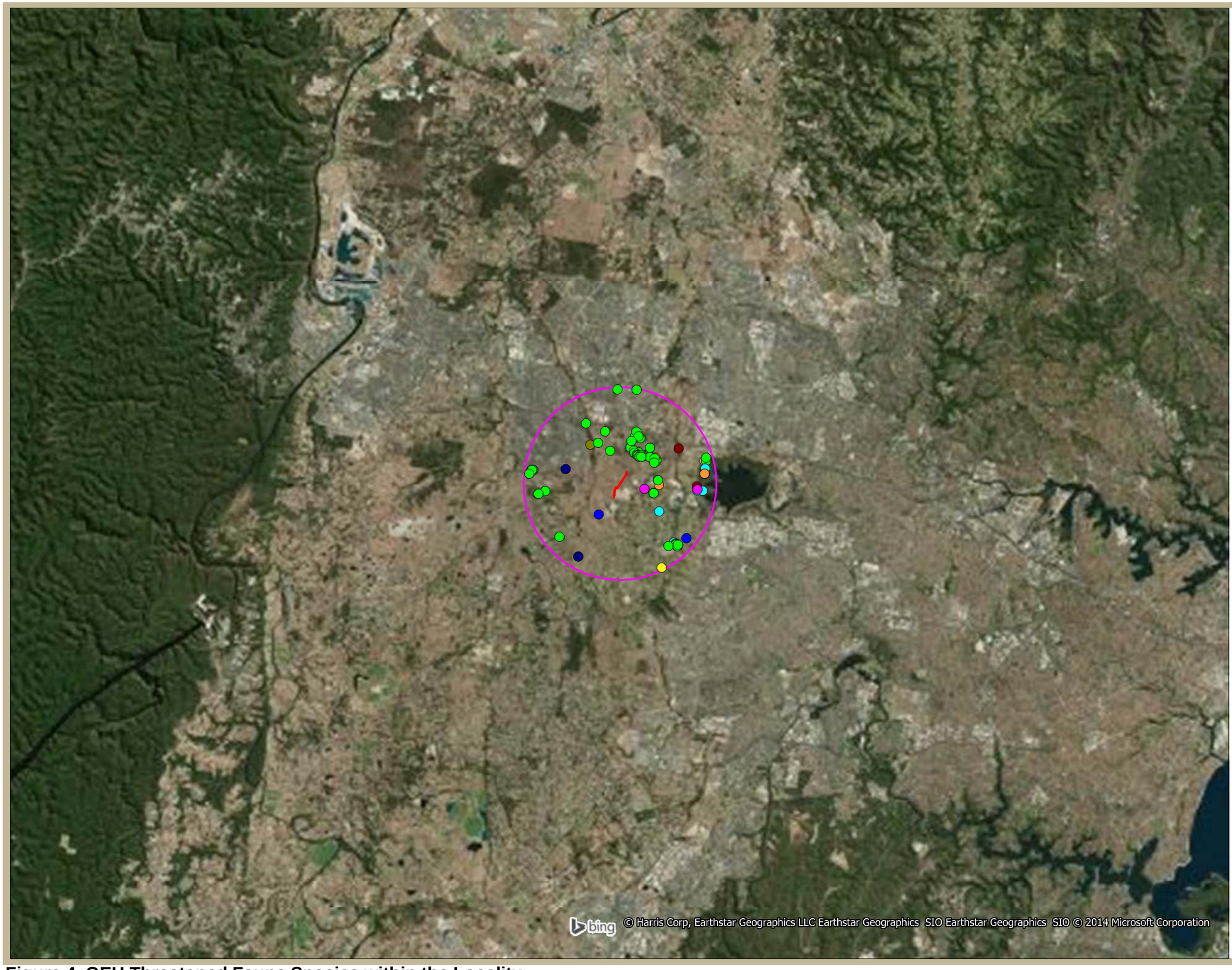
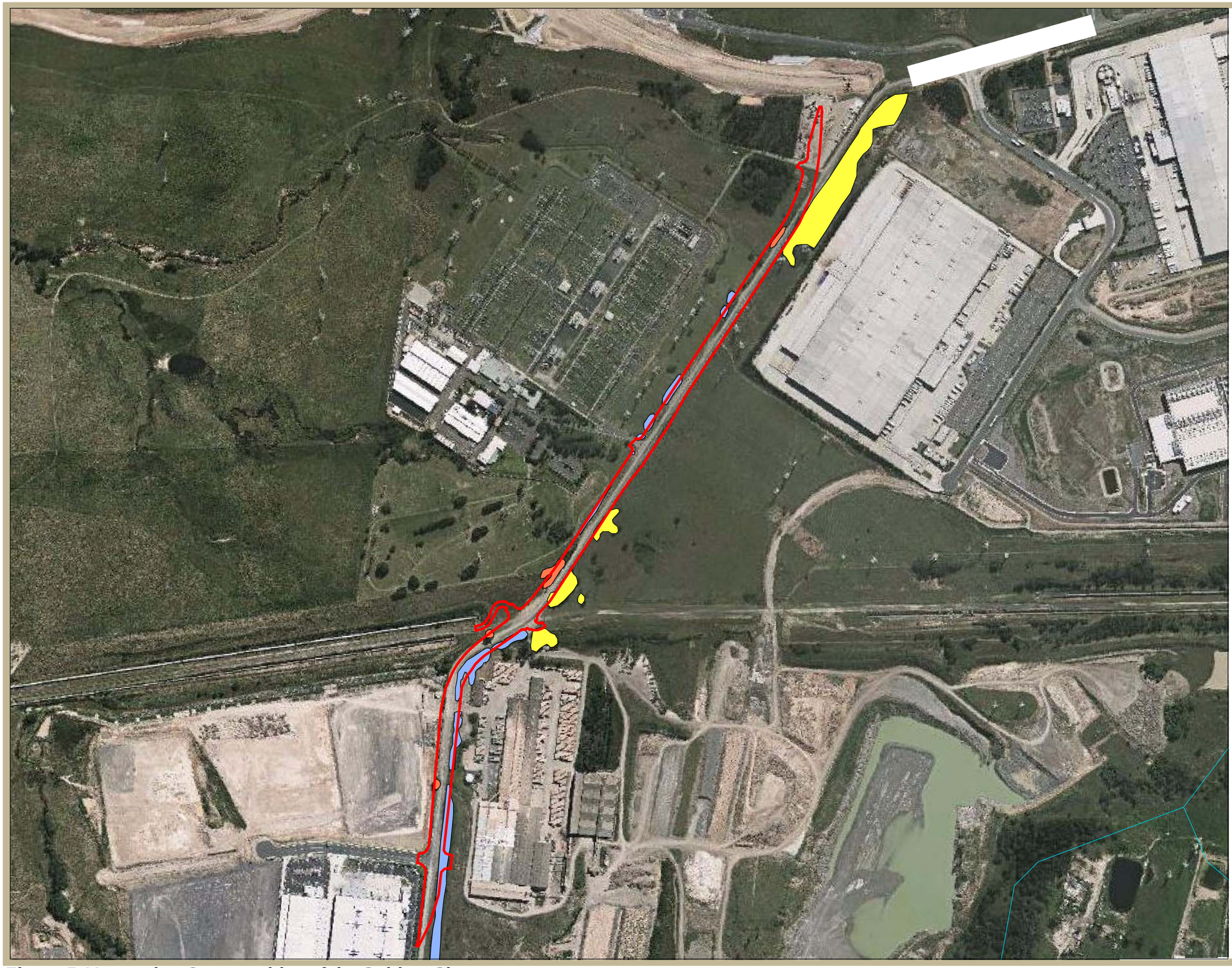


Figure 4. OEH Threatened Fauna Species within the Locality

Coordinate System: MGA Zone 56 (GDA 94)



Legend

- Subject Site
- Waterway

Vegetation Communities

- Cumberland Plain Woodland
- Cumberland Plain Woodland (remnant tree/s)
- Landscaped/Planted Natives

Image Source:
SIXMaps 23-04-2013

Data Source:
DECCW (2008), Native Vegetation of the Cumberland Plain.

CUMBERLAND ECOLOGY

100 0 100 200 300 400m

Figure 5. Vegetation Communities of the Subject Site

Appendix C

Site Photographs

Photograph 1 **Narrow strip of landscaping containing native local and non-local canopy trees. Understorey is mown.**

Photograph 2 **Larger area of landscaping containing native local and non-local canopy trees. Understorey is mown.**

Photograph 3 **Small patch of degraded Cumberland Plain Woodland with exotic understorey.**

Photograph 4 **Another small patch of degraded Cumberland Plain Woodland with exotic understorey.**

Photograph 5 **Cumberland Plain Woodland patch in northern section of subject site. Contains regenerating canopy trees. Note dominance of Rhodes Grass in foreground within the road verge.**

Photograph 6 **Grassland on roadside verge in southern extent of subject site. Contains native species derived from Cumberland Plain Woodland but is still >50% exotic.**

Appendix D

Assessments of Significance

D.1 Cumberland Plain Woodland

D.1.1 Legal Status

The ecological community was previously listed as nationally endangered under the name Cumberland Plain Woodlands. The community has since been uplisted from endangered to critically endangered under the *Environment Protection and Biodiversity Conservation Act 1999*. The community is under pressure from numerous threats, the main being clearing for development resulting in further fragmentation and loss of native vegetation (Threatened Species Scientific Committee, 2008).

In New South Wales the national ecological community is listed as two separate threatened ecological communities under the *Threatened Species Conservation Act 199*5: Cumberland Plain Woodland in the Sydney Basin Bioregion; and Shale-Gravel Transition Forest in the Sydney Basin Bioregion. Cumberland Plain Woodland in the Sydney Basin Bioregion was also uplisted from endangered to critically endangered under the *Threatened Species Conservation Act 199*5. However, Shale-Gravel Transition Forest in the Sydney Basin Bioregion remains listed as endangered.

D.1.2 Distribution

The Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest is endemic to New South Wales, specifically the area in and around western Sydney on clay soils derived from the Wianamatta Shale Group. It mostly occurs within the Cumberland subregion of the Sydney Basin bioregion (as defined by the Interim Biogeographic Regionalisation for Australia—IBRA v6.1), with some occurrences extending into neighbouring subregions.

Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest is is well adapted to fire and drought and typically receives between 700-900 mm annual rainfall.

Today all occurences are located in western Sydney in the Auburn, Bankstown, Baulkham Hills, Blacktown, Camden, Campbelltown, Fairfield, Hawkesbury, Holroyd, Liverpool, Parramatta, Penrith and Wollondilly local government areas (NSW Scientific Committee, 2009).

D.1.3 Floristics

The dominant canopy trees in the ecological community are Grey Box (*Eucalyptus moluccana*) and Forest Red Gum (*E. tereticornis*) with Spotted Gum (*Corymbia maculata*), Narrow-leaved Ironbark (*E. crebra*) and Thin-leaved Stringybark (*E. eugenioides*) occurring less frequently. The shrub layer is dominated by Blackthorn (*Bursaria spinosa*) with other shrubs such as *Acacia implexa* and *Indigofera australis*.

Grasses such as Kangaroo Grass (*Themeda australis*), Weeping Meadow Grass (*Microlaena stipoides var stipoides*) and herbs, such as Kidney Weed (*Dichondra repens*), Blue Trumpet (*Brunoniella australis*) and *Desmodium varians* are common through this community.

Various threatened species are found in the Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest, with one endemic to the Cumberland Plain region (Cumberland Land Snail, *Meridolum corneovirens*). Certain species are of higher conservation concern, including the Swift Parrot (*Lathamus discolor*), Regent Honeyeater (*Xanthomyza phrygia*), Spotted-tail Quoll (*Dasyurus maculatus maculatus*) and the Narrow-leaved Geebung (*Persoonia nutans*) (Threatened Species Scientific Committee, 2008).

Assessment of Significance – TSC Act

a) in the case of a threatened species, whether the action proposed is likely to have an adverse effect 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,

Not applicable to threatened communities.

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 is likely to be placed at risk of extinction,

Not applicable to threatened communities.

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

The action proposed is unlikely 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. The action proposed will remove isolated remnant trees and a limited number of additional trees from the margins of existing patches.

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,

The action proposed is unlikely 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. The remnant trees and individual trees at the margins of existing patches occur in a degraded state and will not affect the remaining patches outside of the subject site.

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

The action proposed will remove isolated remnant trees and a limited number of additional trees from the margins of existing patches.

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

The habitat already exists in a highly fragmented and isolated state and the action proposed will not substantially increase this.

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,

The habitat to be removed is not important to the long term survival of the ecological community in the locality.

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

No critical habitat for this community has been declared.

f) whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,

A recovery plan for the Cumberland Plain has been published (DECCW, 2010). The action proposed is not consistent with the objectives or actions of this recovery plan.

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.

The action proposed constitutes the key threatening process, 'clearing of native vegetation'; and has potential to exacerbate the key threatening process, 'invasion of native plant communities by exotic perennial grasses'.

Conclusion

The proposed action is not likely to have a significant detrimental impact on Cumberland Plain Woodland as it will only remove a few remnant trees over exotic understorey and a few trees from the margins of existing patches of woodland. The margins of the woodland are highly degraded and the trees to be removed occur over an exotic understorey.

Assessment of Significance – EPBC Act

Of the patches of modified Cumberland Plain Woodland identified during surveys, only one patch is of a large enough size to potentially conform to the EPBC Act listing of the community. This patch is located at the northern extent of the subject site, extending further east. As the larger extent of the patch was not surveyed in detail, it has been assumed that the understorey is of a high enough quality (>50% native groundcover) to conform. The portion of the patch that occurs within the subject site has a predominantly (85%) exotic groundcover.

An assessment of significance of impacts to this patch is provided below.

An action is likely to have a significant impact on a critically endangered or endangered ecological community if there is a real chance or possibility that it will:

• reduce the extent of an ecological community

The proposal includes the clearing of scattered regenerating trees and shrubs above a predominantly exotic ground stratum in the northern portion of the subject site.

• fragment or increase fragmentation of an ecological community, for example by clearing vegetation for roads or transmission lines

The habitat already exists in a highly fragmented and isolated state and the action proposed will not substantially increase this.

• adversely affect habitat critical to the survival of an ecological community

A small area of habitat above a predominantly exotic understorey will be cleared. The proposed action is not considered likely to adversely affect critical habitat for this community.

• modify or destroy abiotic (non-living) factors (such as water, nutrients, or soil) necessary for an ecological community's survival, including reduction of groundwater levels, or substantial alteration of surface water drainage patterns

The project is not considered to significantly modify or destroy abiotic factors necessary for the community's survival beyond current conditions.

• cause a substantial change in the species composition of an occurrence of an ecological community, including causing a decline or loss of functionally important species, for example through regular burning or flora or fauna harvesting

The proposed development has the potential to facilitate the introduction of weed species into the remaining portion of the patch. Implementation of mitigation measures will assist in minimising indirect impacts to this patch.

• cause a substantial reduction in the quality or integrity of an occurrence of an ecological community, including, but not limited to:

-- assisting invasive species, that are harmful to the listed ecological community, to become established, or

-- causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants into the ecological community which kill or inhibit the growth of species in the ecological community, or

-- interfere with the recovery of an ecological community.

The remaining patch of Cumberland Plain Woodland currently experiences impacts from weed invasion. It is not expected that the project will introduce fertilisers, herbicides or other chemicals or pollutants. Implementation of mitigation measures will assist in minimising indirect impacts to this patch.

The project is not considered likely to impact on the continued recovery of this remnant vegetation community.

D.2 Cumberland Land Snail

The Cumberland Land Snail is an endangered gastropod protected under *Threatened Species Conservation Act 1995*.

The Cumberland Land Snail occurs in Cumberland Plain Woodland of western Sydney. Its distribution ranges from Richmond and Windsor south to Picton and from Liverpool west to the Hawkesbury and Nepean Rivers (OEH, 2013).

It lives under leaf and bark litter, logs or around grass clumps or in loose soil. It feeds specifically on fungus and may burrow several centimetres into the ground to escape drought (OEH, 2013).

Assessment of Significance

h) in the case of a threatened species, whether the action proposed is likely to have an adverse effect 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,

The action proposed is not likely to have an adverse effect 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. Although some native remnant trees will be removed that comprise habitat for the species, remnant woodland outside of the subject site will not be affected by the action proposed.

i) 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 is likely to be placed at risk of extinction,

Not applicable.

j) in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

iii. 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

Not applicable to threatened species.

iv. 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,

Not applicable to threatened species.

k) in relation to the habitat of a threatened species, population or ecological community:

iv. the extent to which habitat is likely to be removed or modified as a result of the action proposed, and

The action proposed will remove isolated remnant trees and a limited number of additional trees from the margins of existing patches. Remnant woodland comprising habitat for the species exists outside of the subject site and will not be affected by the action proposed.

v. 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

The habitat already exists in a highly fragmented and isolated state and the action proposed will not substantially increase this.

vi. 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,

The habitat to be removed is not important to the long term survival of the ecological community in the locality.

l) whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly),

No critical habitat for this community has been declared.

m) whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,

No recovery plan exists for the Cumberland Land Snail.

n) 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.

The action proposed constitutes the key threatening process, ‘clearing of native vegetation’; and has potential to exacerbate the key threatening process, ‘invasion of native plant communities by exotic perennial grasses’.

Conclusion

The proposed action is not likely to have a significant detrimental impact on Cumberland Land Snail as it will only remove a few remnant trees over exotic understorey and a few trees from the margins of existing patches of woodland habitat. The remainder of the woodland habitat will be retained outside of the limits of the subject site.