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# The Belmore Road Precinct – Biodiversity Assessment

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**CKDI Bringelly Pty Ltd atf**

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## DOCUMENT TRACKING

|                        |   |
|------------------------|---|
| <b>Project Name</b>    | The Belmore Road Precinct – Biodiversity Assessment |
| <b>Project Number</b>  | 21SYD - 18177                                       |
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| <b>Status</b>          | <b>Final</b>  |
| <b>Version Number</b>  | <b>5</b>  |
| <b>Last saved on</b>   | <b>29 June 2022</b>                                 |

This report should be cited as 'Eco Logical Australia 2022. *The Belmore Road Precinct – Biodiversity and Riparian Land Assessment*. Prepared for CKDI Bringelly Pty Ltd asf.'

## ACKNOWLEDGEMENTS

This document has been prepared by Eco Logical Australia Pty Ltd with support from CKDI Bringelly Pty Ltd asf.

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Template 2.8.1

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## Abbreviations

| Abbreviation | Description   |
|--------------|---|
| AHCVV        | Additional High Conservation Value Vegetation – vegetation meeting the requirements for ENV that was not mapped in the Growth Centres Conservation Plan |
| BC Act       | <i>Biodiversity Conservation Act 2016</i>   |
| CEEC         | Critically Endangered Ecological Community  |
| DAWE         | Department of Agriculture, Water and the Environment (previously DotEE)   |
| DCP          | Development Control Plan  |
| DotEE        | Department of the Environment and Energy (now DAWE)   |
| DPIE         | Department of Planning, Industry and Environment  |
| ELA          | Eco Logical Australia Pty Ltd   |
| ENV          | Existing Native Vegetation, as defined in the Growth Centres Conservation Plan  |
| EP&A Act     | <i>NSW Environmental Planning and Assessment Act 1979</i>   |
| EPBC Act     | <i>Commonwealth Environment Protection and Biodiversity Conservation Act 1999</i>   |
| IPC & AES    | Ian Perkins Consultancy Services and Aquila Ecological Surveys  |
| MNES         | Matters of National Environmental Significance  |
| NPWS         | NSW National Parks and Wildlife Service   |
| OEH          | NSW Office of Environment and Heritage (known now as DPIE)  |
| TSC Act      | <i>Threatened Species Conservation Act 1995</i>   |
| TSSC         | Threatened Species Scientific Committee   |

## Executive Summary

Eco Logical Australia Pty Ltd (ELA) was engaged by CKDI Bringelly Pty Ltd atf (CKDI) to undertake a Biodiversity Assessment for Precinct Planning of the Belmore Road Precinct. The aim of this report is to identify key ecological constraints to assist design of an Indicative Layout Plan.

Biodiversity Certification of the Growth Centres Conservation Plan identifies a regional offsets package, effectively facilitating the strategic loss of ecological values on ‘certified lands’ without triggering further assessment under the former *Threatened Species Conservation Act 1995* (TSC Act). This strategic loss is offset through the retention and management of areas of higher ecological value across the Growth Centres and through a levy that will be used to protect and manage areas of high ecological value outside of the Growth Centres. A Strategic Assessment under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) was approved by the Commonwealth (Department of Sustainability, Environment, Water, Population and Communities (SEWPaC)). Therefore, provided development proceeds in accordance with the Growth Centres Biodiversity Certification Order, the assessment and approval of threatened species and endangered ecological communities under Commonwealth legislation is not required.

The site was found to contain a number of significant environmental features, including Cumberland Plain Woodland (a critically endangered ecological community under both the BC Act and EPBC Act), River-Flat Eucalypt Forest (an endangered ecological community under the BC Act) and habitat features associated with potential habitat for a number of threatened flora and fauna species.

Approximately 34.55 ha of vegetation in the precinct was identified in the Draft Growth Centres Conservation Plan 2007. Desktop assessment and field survey validated 24.98 ha of previously identified ENV and identified 33.87 ha of Additional High Conservation Value Vegetation (AHCVV).

The Belmore Road Precinct is mostly biodiversity certified. Under the Draft Growth Centres Conservation Plan, no ENV within the study area was counted towards achieving the 2000-hectare conservation outcome.

The vegetation on site does however have biodiversity value and Precinct Planning should consider opportunities to protect vegetation where possible, particularly where synergies with riparian protection and improved amenity can be achieved.

The Indicative Layout Plan (ILP) will protect 7.04 ha of validated ENV and 8.79 ha of validated AHCVV, through the protection of native vegetation within the proposed riparian corridor and local parks (excluding sporting fields).

# 1. Introduction

## 1.1 Description of the Project

Eco Logical Australia Pty Ltd (ELA) was engaged by CKDI Bringelly Pty Ltd atf (CKDI) to undertake a Biodiversity Assessment for Precinct Planning of the Belmore Road Precinct within the South-West Growth Centre.

The vision for the Belmore Road Precinct as stated by DPIE includes ‘...a Green Grid linking growing suburbs, rehabilitating waterways, and providing recreation and community areas. This Green Grid, along with the protection of key biodiversity areas, riparian corridors, and innovative integrated water cycle management will assist in the delivery of the GSC’s vision for a green, cool, parkland city’.

The aim of this assessment is to identify key ecological features and constraints of the site to inform the rezoning process, as well as to provide recommendations with respect to terrestrial and aquatic ecosystem management.

Specific objectives of this project are to:

- undertake a biodiversity assessment to inform the precinct planning process and development of the Indicative Layout Plan (ILP). This will involve identifying and assessing the existing ecological constraints within the Precinct. This will involve analysis of ecological values particularly regarding identifying areas of high, moderate, and low ecological value.
- ensure the statutory requirements for the protection, restoration and enhancement of threatened species, populations, ecological communities, and their habitats will be met.
- provide recommendations for achieving innovative and cost-effective management frameworks for ecological issues, which enable long term conservation and management while facilitating development outcomes for the Precinct identified in the South West Structure Plan.
- ensure the precinct planning is consistent with the terms of the Biodiversity Certification granted under the *State Environmental Planning Policy (Sydney Region Growth Centres) 2006*

(Sydney Region Growth Centres SEPP)<sup>1</sup>, which includes the Relevant Biodiversity Measures outlined in the Biodiversity Certification Order.

- ensure that precinct planning is consistent with the endorsed Sydney Growth Centres Strategic Assessment Program under the EPBC Act, including the Commitments for matters of national environmental significance protected under the EPBC Act.

## 1.2 Subject Site

Figure 1-1 illustrates the broad location of the precinct ('subject site'). The 'survey area' refers to the portion of the subject site that was field validated.

## 1.3 Methodology Overview

An overview of the methodology is provided below. For full details see Appendix B.

- Database search for threatened species, populations and ecological communities under the Biodiversity Conservation Act and Matters of National Environmental Significance (MNES) under the EPBC Act;
- Assessment of State and Federal statutory requirements;
- Field validation of Existing Native Vegetation (ENV), threatened species habitat condition mapping. Assessments include the identification of additional high conservation value vegetation (AHCVV);
- Assessment of biodiversity values and mapping including analysis and identification of ecological constraints; and
- Desktop assessment of subject site outside of the survey area
- Recommendations for the development.

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<sup>1</sup> Note the Sydney Region Growth Centres SEPP has not been repealed and replaced by the *State Environmental Planning Policy (Precincts – Western Parkland City) 2021* (Western Parkland City SEPP)



Figure 1-1: Subject site location

## 2. Statutory Framework

A substantial array of legislation, policies and guidelines apply to the assessment, planning and management of ecological issues within the subject site. This information was reviewed and used to identify priority issues and approaches for the subject site (refer to Appendix A for detailed review). Legislation and policies reviewed include:

### 2.1 International

- Japan – Australia Migratory Bird Agreement (JAMBA)
- China – Australia Migratory Bird Agreement (CAMBA)
- Republic of Korea – Australia Migratory Bird Agreement (ROKAMBA).

### 2.2 Commonwealth

- *Environment Protection & Biodiversity Conservation Act 1999* (EPBC Act).

### 2.3 State

- *Environmental Planning and Assessment Act 1979* (EP&A Act)
- *Biodiversity Conservation Act 2016* (BC Act)
- *Fisheries Management Act 1994* (FM Act)
- *Biosecurity Act 2015*
- *State Environmental Planning Policy (Sydney Region Growth Centres) 2006*<sup>1</sup>
- Growth Centres Development Code 2006
- (Draft) Growth Centres Conservation Plan 2007.

### 2.3.1 Biodiversity Certification

Key to the assessment and protection of biodiversity values in the Sydney Region Growth Centres is the Biodiversity Certification (under the BC Act) of the Sydney Region Growth Centres SEPP.<sup>1</sup>

The Biodiversity Certification has three main functions. It requires the protection of 2,000 ha of existing native vegetation with the Growth Centres; it allows for development to proceed without further biodiversity assessment at the Development Application (DA) stage on land that is 'biodiversity certified', and it establishes a funding mechanism for conservation outcomes outside of the Growth Centres.

To achieve the 2,000-ha protection target, each precinct must protect the 'existing native vegetation' on non-biodiversity certified land, or an equivalent amount on certified land.

The (Draft) Growth Centres Conservation Plan (2007) assessed native vegetation across the entire Growth Centres area (Figure 2-2) and identified ENV, defined as areas of indigenous trees (including mature and saplings) that:

- had 10 % or greater over-storey canopy cover present,
- were  $\geq 0.5$  ha in area, and
- were identified as "vegetation" on maps 4 and 5 of the (Draft) Growth Centres Conservation Plan, at the time the biodiversity certification order took effect, subject to condition 13.

The majority of the subject site is biodiversity certified as shown in Figure 2-1.

The ENV mapped within the precinct is shown in Figure 2-3. These figures show that there was no 'existing native vegetation on non-certified land' within the precinct and therefore no vegetation within the precinct contributes to the 2,000-ha target.

Clause 13 of the biodiversity-certification details the ground-truthing requirements for ENV; namely, if new information becomes available after the biodiversity certification order took effect that demonstrates that the vegetation within an area does not otherwise meet the definition of existing native vegetation, then for the purposes of conditions 7-8 and 11-12 only the area of validated existing native vegetation shall be considered.

### 2.3.2 EPBC Strategic Assessment

On 28 February 2012, the Commonwealth Minister for the Environment announced the program of development related activities within the Growth Centres that had been approved under the Growth Centres Strategic Assessment. (This was the second stage of the approval of the Strategic Assessment of the Growth Centres under the Commonwealth EPBC Act). Specifically,

*"All actions associated with the development of the Western Sydney Growth Centres as described in the Sydney Region Growth Centres Strategic Assessment Program Report (Nov 2010) have been assessed at the strategic level and approved in regard to their impact on the following matters of national environmental significance (MNES):*

- *World Heritage Properties*
- *National Heritage Places,*
- *Wetlands of International Importance,*

- *Listed threatened species, populations and communities, and*
- *Listed migratory species.”*

This approval essentially means that the Commonwealth is satisfied that the conservation and development outcomes that will be achieved through development of the Growth Centres Precincts will satisfy their requirements for environmental protection under the EPBC Act. Therefore, provided development activity proceeds in accordance with the Growth Centres requirements (such as the Biodiversity Certification Order, the Growth Centres SEPP and Development Control Plans (DCPs), Growth Centres Development Code etc), then there is no requirement to assess the impact of development activities on MNES and hence no requirement for referral of activities to the Commonwealth. The requirement for assessment and approval of threatened species and endangered ecological communities and the other MNES issues listed above under the EPBC Act has now been “turned off” by the approval of the Strategic Assessment.

### 2.3.3 Growth Centres Development Code 2006

The Growth Centres Development Code was produced by the Growth Centres Commission in 2006. The Development Code was produced to guide the planning and urban design in the North West and South West Growth Areas.

The Development Code includes objectives and provisions that support the retention of as much native vegetation, habitat and riparian areas within the precinct through incorporation into land use planning outcomes such as lower density development in these areas, subdivision patterns, road design, local parks, and other areas required to be set aside for community uses without adversely affecting the development yield of areas.

As a requirement under the Development Code, the Belmore Road Precinct will need to demonstrate how the biodiversity and other values of areas identified by the SEPP will be protected, maintained and enhanced.

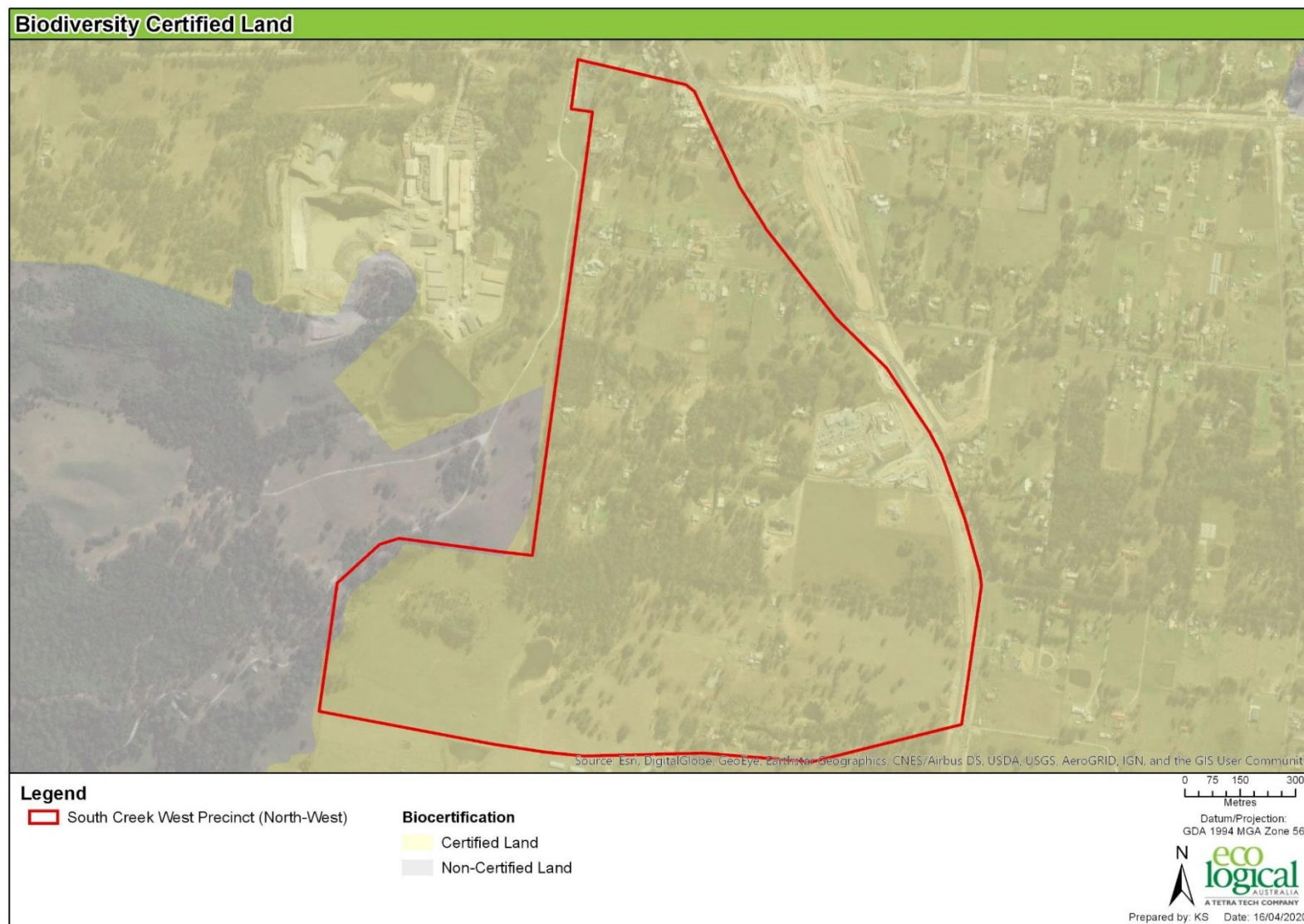


Figure 2-1: Biodiversity Certification in the subject site

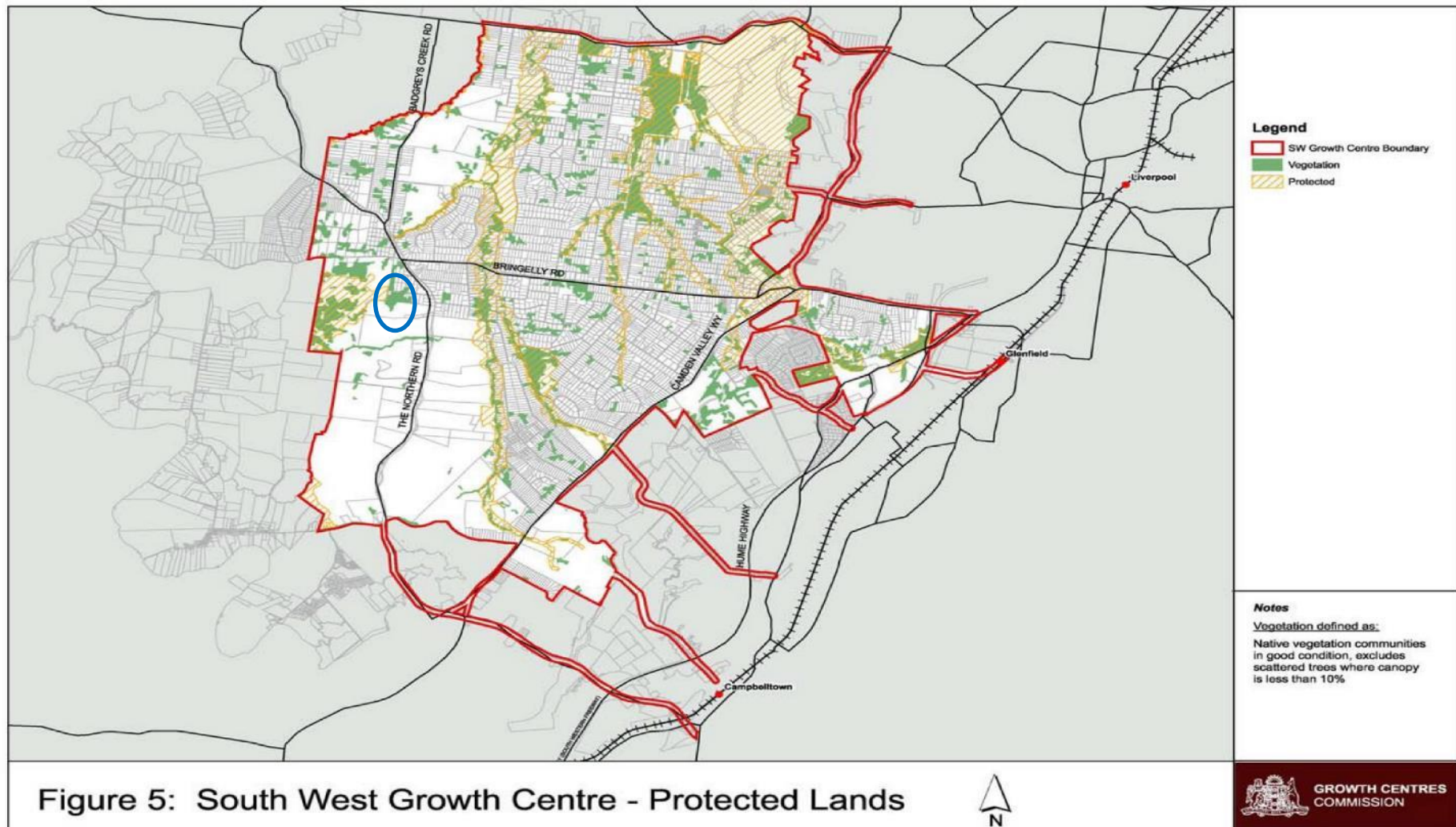


Figure 2-2: South West Growth Area Protected Lands from Draft Growth Centres Conservation Plan (Growth Centres Commission 2007)

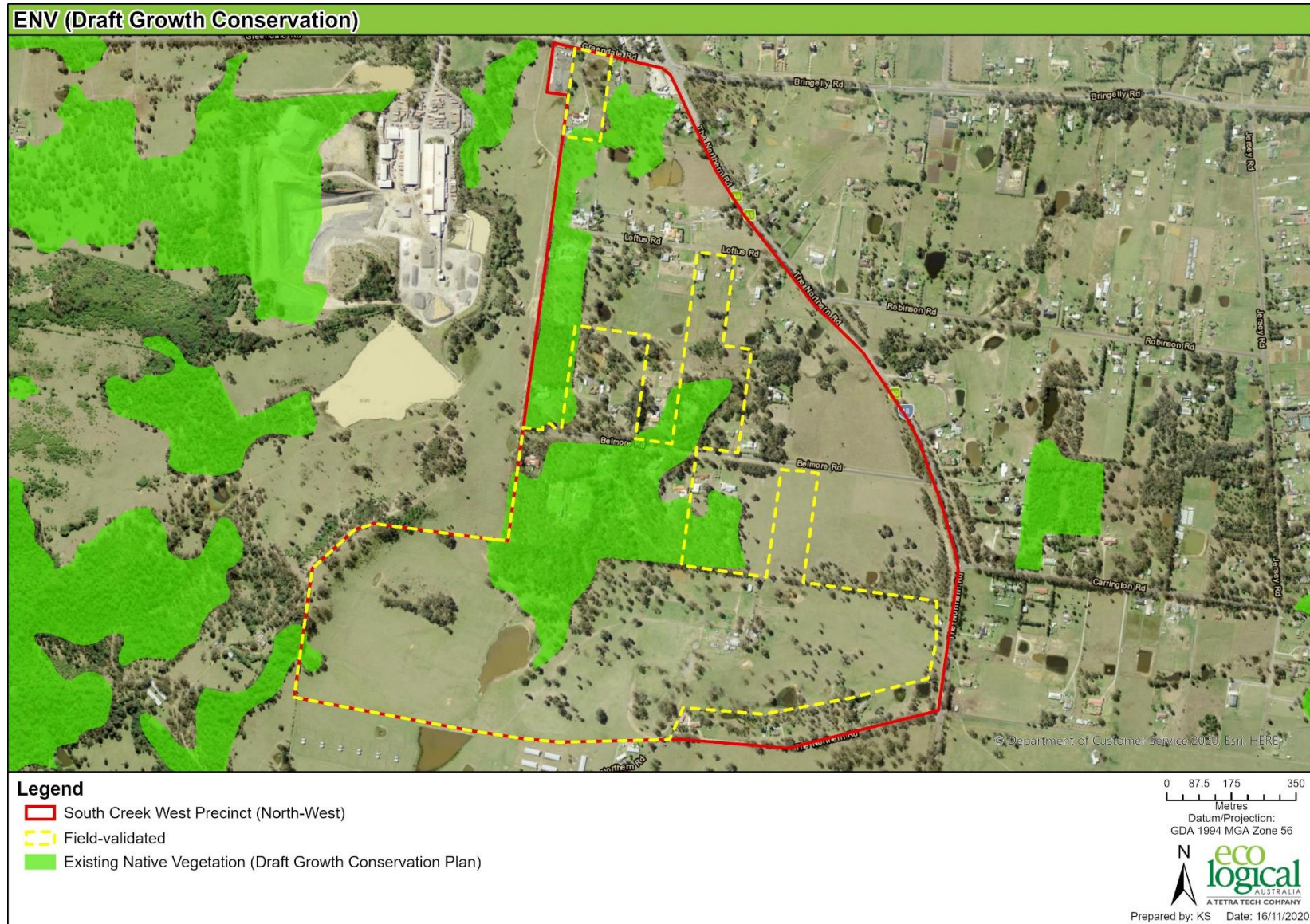


Figure 2-3: ENV as per Figure 5 of the Growth Centres Conservation Plan within the subject site

## 3. Methods

### 3.1 Literature Review

A desktop literature review was undertaken by ELA to determine the location and extent of previous surveys, identify the constraints within the subject site and evaluate the presence of any threatened species, populations and ecological communities listed under the BC Act and the Commonwealth EPBC Act that could potentially occur within the subject site. The following documentation and mapping were reviewed:

- Aerial photography of the subject site
- NSW Atlas of Wildlife Database (5 km radius)
- EPBC Act online Protected Matters Search Tool (5 km radius)
- Native Vegetation Maps of the Cumberland Plain – Interpretation Guidelines (DECC, 2000b)
- Draft 'Growth Centres Conservation Plan' prepared by Eco Logical Australia (2007) for NSW Growth Centres Commission
- Office of Environment and Heritage (2013) vegetation mapping.

### 3.2 Desktop Assessment

The northern portion of the subject site was not field validated. Where land access was not available, the OEH 2013 Vegetation map was updated based on aerial photo interpretation. Vegetation mapping was edited to removed portions mapped over buildings.

A desktop assessment was conducted to determine the following:

- Potential vegetation communities
- Potential for patches of vegetation to meet the definition of AHCVV or ENV
- Potential threatened species habitat
- Potential constraints and recovery potential

### 3.3 Field Survey

Where accessible, vegetation was ground-truthed over one day by two ecologists in March 2020 and again in October 2020. The survey area is shown in Figure 1-1 as 'Field-validated'. A basic floristic survey of the precinct was undertaken to confirm the vegetation communities present, including their condition and extent. This survey included classification of native vegetation communities in accordance with the DPIE profiles (2020b) and the Commonwealth conservation and listing advice (where relevant).

A detailed methodology can be found in Appendix B.

## 4. Results

### 4.1 Vegetation Communities

Two vegetation communities were identified within the subject site through desktop assessment and field survey:

- Cumberland Plain Woodland in the Sydney Basin Bioregion / Cumberland Plain Shale Woodlands and Shale Gravel Transition Forest
- River Flat Eucalypt Forest.

The northern portion of the site has been subdivided and settled in rural lots. Whilst a native tree canopy characteristic of Cumberland Plain Woodland exists throughout, the vegetation has generally been under-scrubbed and cleared.

The southern portion of the site has been managed as agricultural land with large cleared areas and exotic pasture, which has reduced the structural and species diversity of some areas of remaining vegetation. Some large portions of the site are comprised of remnant patches of Cumberland Plain Woodland.

Figure 4-4 illustrates the extent of each vegetation community within the subject site as well as vegetation that has been cleared. The characteristics of each vegetation community, conservation significance and ecological condition are summarised below.

#### 4.1.1 Cumberland Plain Woodland

Cumberland Plain Woodland in the Sydney Basin Bioregion is a critically endangered ecological community under the BC Act and part of the CEEC listed under the EPBC Act.

Cumberland Plain Woodland is an open eucalypt woodland with an open shrub layer and grassy ground cover and is commonly found on clay-loam soils derived from the Wianamatta shale. This community is restricted to the Cumberland Plain in the Sydney region and typically contains *Eucalyptus moluccana* (Grey Box), *E. tereticornis* (Forest Red Gum), with *E. crebra* (Narrow-leaved Ironbark), *E. eugenioides* (Thin-leaved Stringybark) and *Corymbia maculata* (Spotted Gum) occurring less frequently. The midstorey is comprised of *Bursaria spinosa* (Blackthorn). Typical groundcover species include *Dichondra repens* (Kidney Weed), *Aristida vagans* (Threeawn Speargrass), *Microlaena stipoides* var. *stipoides* (Weeping Grass), *Themeda triandra* (Kangaroo Grass), *Brunoniella australis* (Blue Trumpet), *Desmodium varians* (Slender Tick-trefoil), *Opercularia diphylla*, *Wahlenbergia gracilis* (Sprawling Bluebell) and *Dichelachne micrantha* (Shorthair Plumegrass).

Desktop assessment identified Cumberland Plain Woodland throughout the subject site.

Cumberland Plain Woodland within the survey area was observed in three conditions, each detailed in Table 4-1 below.

**Table 4-1: Different conditions of Cumberland Plain Woodland identified within survey area.**

| Condition                     | Description  | BC Act | EPBC Act and Justification <sup>#</sup>  |
|-------------------------------|--|--------|--|
| Moderate (EPBC Act)           | One patch of Cumberland Plain Woodland in moderate condition was present near the southern and western boundary of the survey area (Figure 4-1). Cumberland Plain Woodland in this condition contained an assemblage of native species, including a canopy dominated by <i>Eucalyptus tereticornis</i> (Forest Red Gum) and <i>Eucalyptus moluccana</i> (Grey Box). The midstorey included <i>Bursaria spinosa</i> (Blackthorn), <i>Lycium ferocissimum</i> (African Boxthorn) and <i>Olea europaea</i> subsp. <i>cuspidata</i> (African Olive), or absent. The groundcover was dominated by native species including <i>Microlaena stipoides</i> (Weeping Grass), <i>Aristida vagans</i> (Three-awn Speargrass), <i>Glycine tabacina</i> and <i>Einadia nutans</i> (Climbing Saltbush).   | CEEC   | No – Cumberland Plain Woodland in poor condition did not meet condition thresholds because < 30% of the perennial understorey vegetation cover** is made up of native species.   |
| BC Act and potential EPBC Act | Three patches of Cumberland Plain Woodland in this condition were identified within the southern half of the survey area (Figure 4-1). These patches were characterised by a canopy dominated by <i>Eucalyptus tereticornis</i> (Forest Red Gum) and <i>Eucalyptus moluccana</i> (Grey Box). The midstorey was dominated by <i>Olea europaea</i> subsp. <i>cuspidata</i> (African Olive) and scattered occurrences of <i>Bursaria spinosa</i> . The groundcover was dominated by native species including <i>Paspalidium distans</i> , <i>Sporobolus creber</i> (Western Rat-tail Grass), <i>Glycine tabacina</i> and <i>Einadia nutans</i> (Climbing Saltbush).   | CEEC   | Possible. Plots would need to be completed to determine whether the groundcover would consistently meet 30% native groundcover.  |
| Poor (BC Act)                 | Cumberland Plain Woodland in poor (BC Act) condition was scattered throughout the survey area (Figure 4-1). Cumberland Plain Woodland in this condition contained an assemblage of canopy and occasional midstorey species like that of the ecological community in good (BC Act) condition. However, Cumberland Plain Woodland in poor (BC Act) condition was characterised by the dominance of exotic groundcover species including <i>Cenchrus clandestinus</i> (Kikuyu Grass), <i>Chenopodium album</i> (Fat Hen) and <i>Chloris gayana</i> (Rhodes Grass). Native species were also present in the groundcover, including <i>Einadia polygonoides</i> , <i>Portulaca oleracea</i> (Pigweed) and <i>Glycine tabacina</i> . Rural lots containing poor condition Cumberland Plain Woodland also contained a mix of planted native and exotic horticultural species, including <i>Callistemon citrinus</i> (Crimson Bottlebrush), <i>Strelitzia</i> sp. (Bird of Paradise) and <i>Agave americana</i> (Century Plant). | CEEC   | No – Cumberland Plain Woodland in poor condition did not meet condition thresholds because < 30% of the perennial understorey vegetation cover** is made up of native species. It is noted that this patch adjoins the Moderate (EPBC Act) patch of CPW. In accordance with the EPBC Act Condition Thresholds, this patch should then be considered as Moderate (EPBC Act) condition. However, there was a distinct difference in condition between these two patches and joining the two together would decrease the overall conditions, such that the entire patch would not be considered to meet the EPBC Act condition threshold. |

CEEC = CRITICALLY ENDANGERED ECOLOGICAL COMMUNITY.

<sup>#</sup> BASED ON KEY DIAGNOSTIC FEATURES AND CONDITION THRESHOLDS (TSCC 2009).

\* A PATCH IS DEFINED AS A DISCRETE AND CONTINUOUS AREA THAT COMPRISES THE ECOLOGICAL COMMUNITY.

\*\* PERENNIAL UNDERSTOREY VEGETATION COVER INCLUDES VASCULAR PLANT SPECIES OF THE GROUND AND SHRUB LAYERS WITH A LIFECYCLE OF MORE THAN TWO GROWING SEASONS. COVER EXCLUDES ANNUALS, CRYPTOGAMS, LEAF LITTER OR EXPOSED SOIL.



**Figure 4-1: Moderate condition Cumberland Plain Woodland within the survey area**



**Figure 4-2: BC Act and potential EPBC Act Cumberland Plain Woodland within the survey area (background) exotic pasture (foreground)**



**Figure 4-3: Poor condition Cumberland Plain Woodland within the survey area**

#### 4.1.2 River-Flat Eucalypt Forest

River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions is listed as an endangered ecological community under the BC Act. In 2016, River-Flat Eucalypt Forest was nominated for listing as a threatened ecological community under the EPBC Act as Coastal floodplain eucalypt forest of eastern Australia. Conservation Advice for this species has been drafted, public consultation closed in August 2019, and the nomination is currently being assessed.

The canopy of this ecological community is typically comprised of *Eucalyptus tereticornis* (Forest Red Gum), *E. amplifolia* (Cabbage Gum) and *Angophora floribunda* (Rough-barked Apple) (DPIE 2020b). The mid-storey contains *Acacia parramattensis* subsp. *parramattensis* (Parramatta Wattle), *Casuarina glauca* (Swamp Oak) and *Melaleuca linariifolia* (Flax-leaved Paperbark). Common groundcover species include *Microlaena stipoides* (Weeping Grass), *Oplismenus aemulus* (Basket Grass), *Dichondra spp.*, *Entolasia marginata* (Bordered Panic), *Solanum prinophyllum* (Forest Nightshade), *Pratia purpurascens* (Whiteroot), *Echinopogon ovatus* (Forest Hedgehog Grass), *Desmodium gunnii* (Slender Tick Trefoil), *Commelina cyanea*, *Veronica plebeia* (Creeping Speedwell).

Desktop assessment identified River-Flat Eucalypt Forest throughout the northern portion of the subject site.

#### 4.1.3 Exotic Cover

This vegetation occurred in cleared/open grassed areas and primarily consisted of exotic pasture grasses including *Paspalum dilatatum* (Paspalum), *Cenchrus clandestinus* (Kikuyu) and *Setaria parviflora* (Pigeon Grass). Exotic cover does not form part of a native ecological community.

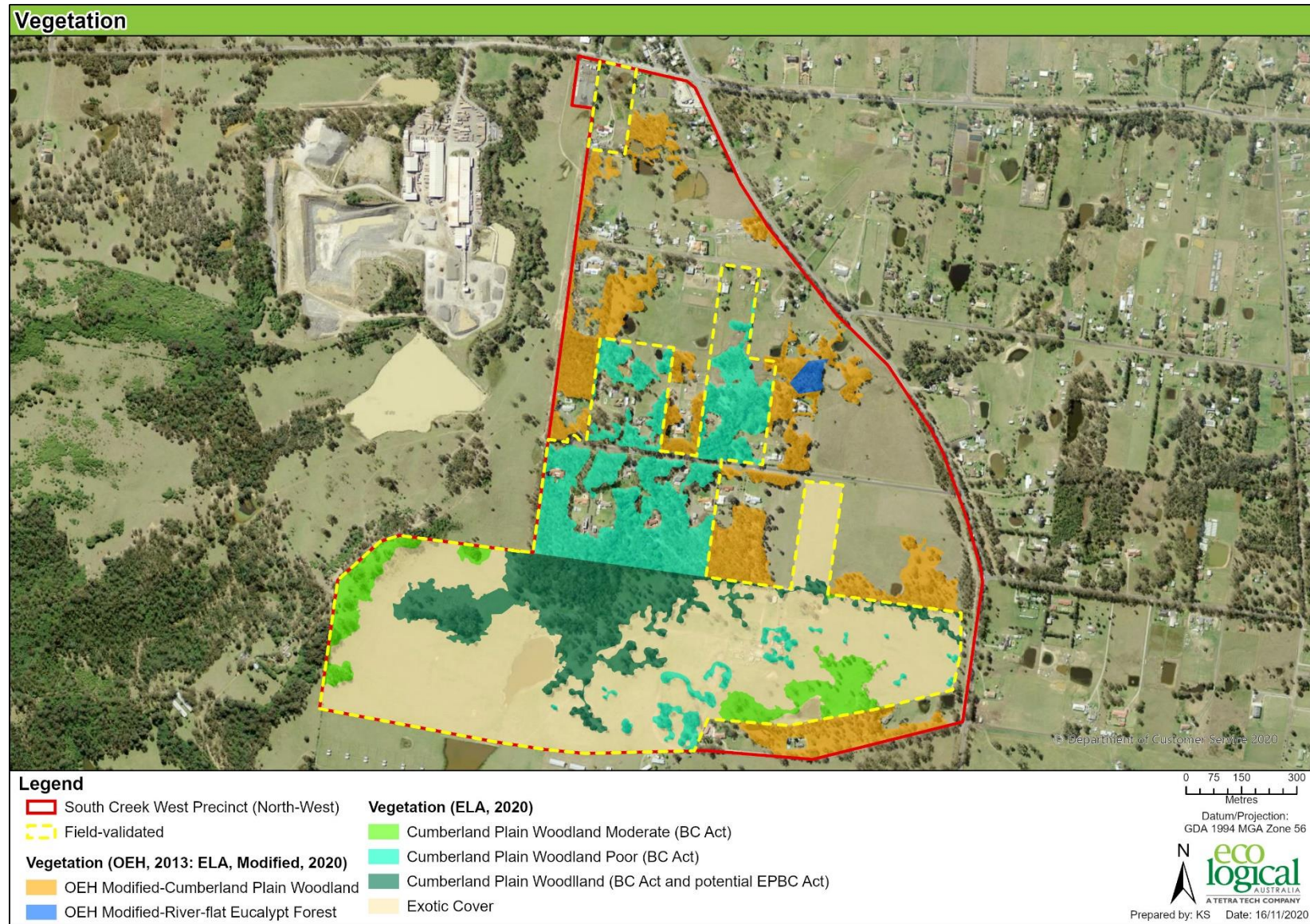


Figure 4-4: Vegetation communities and condition (as assessed during field survey)

#### 4.1.4 Vegetation Community and Condition Assessment Area Calculations

Area calculations of each vegetation community within the subject site are provided in Table 4-2 and Figure 4-4. The vegetation on site is dominated by Cumberland Plain Woodland and cleared land. The subject site contains 64.07 ha of Cumberland Plain Woodland and 0.6 ha of River-Flat Eucalypt Forest. This patch would need further assessment using vegetation integrity plots to determine whether it meets EPBC Act condition.

**Table 4-2: Validated vegetation communities present in the subject site**

| Vegetation Community       | Condition                     | Area (ha)    |
|----------------------------|-------------------------------|--------------|
| Cumberland Plain Woodland  | BC Act and potential EPBC Act | 15.66        |
| Cumberland Plain Woodland  | Moderate (BC Act)             | 6.82         |
| Cumberland Plain Woodland  | Poor (BC Act)                 | 19.60        |
| Cumberland Plain Woodland  | Desktop Assessment            | 21.98        |
| <b>Total</b>               |                               | <b>64.07</b> |
| River-Flat Eucalypt Forest | Desktop Assessment            | 0.60         |
| <b>Total</b>               |                               | <b>64.67</b> |

#### 4.2 Validated ENV Area Calculations and Identification of any Further AHCVV

Desktop aerial photo analysis and field survey was undertaken to validate the extent of the mapped 'Existing Native Vegetation' to confirm whether it still existed. This process resulted in the following classifications:

- Validated Existing Native Vegetation
- Additional High Conservation Value Vegetation: Vegetation which meets criteria a) and b) of the definition of ENV (i.e. a 10% of greater canopy cover and a patch size of greater than 0.5 ha) but was not mapped in the original conservation plan. This is a combination of mapping inaccuracies in the original mapping or changes to the condition and size of the vegetation on site since the Conservation Plan map production.

As the entire site is currently biodiversity certified, the 'existing native vegetation on the site was not counted as a contribution to the 2,000-ha target for the Growth Centres. Areas of ENV and AHCVV within the subject site are presented in Table 4-3 and Figure 4-5.

**Table 4-3: Amount of ENV and AHCVV in subject site (ha)**

|  | Certified Land | Non-Certified Land | Total |
|--|----------------|--------------------|-------|
| Mapped ENV in Draft Conservation Plan    | 36.13          | 0                  | 36.13 |
| Validated ENV in Draft Conservation Plan | 24.98          | 0                  | 24.98 |
| Additional Native Vegetation (AHCVV)     | 33.87          | 0                  | 33.87 |

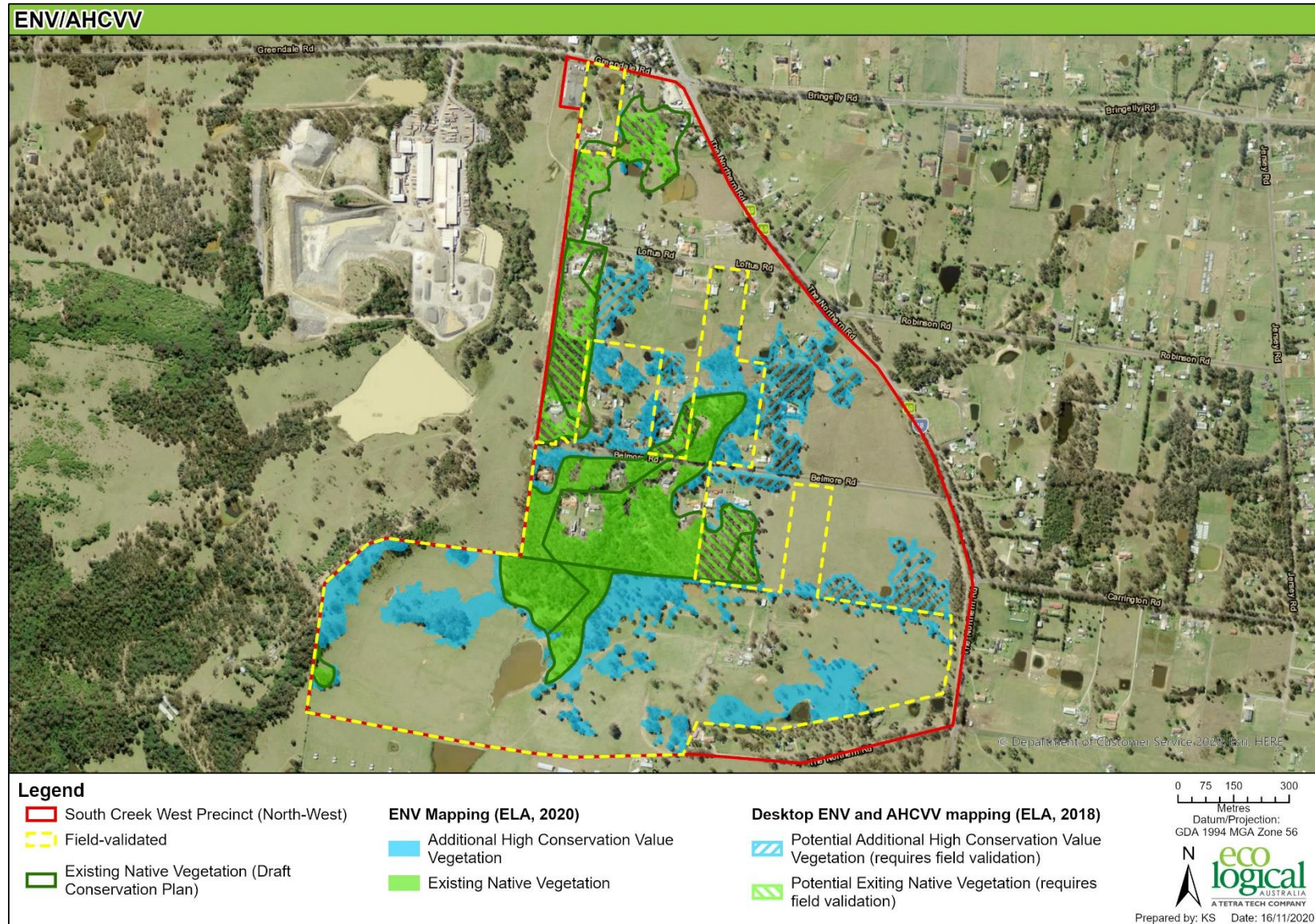


Figure 4-5: ENV and AHCVV within the subject site.

### 4.3 Recovery Potential

Recovery potential relates to the ability of the land to be managed for an improvement in the condition of the remnant vegetation and to increase linkages (wildlife corridor) between extant stands of vegetation. Identifying areas of recovery potential is consistent with the aims of the BC Act; to protect and encourage the recovery of threatened species, populations and communities listed under the Act.

With appropriate management actions, areas identified as having a moderate recovery potential would improve the condition of threatened species habitat and ecosystem connectivity within the precinct. Management actions would need to be on-going and facilitate the natural regeneration of the overstorey and/or regeneration of native species (grasses, herbs, and forbs) in the seed bank.

Three classes of recovery potential have been identified within the precinct which has been informed by the assessments (desktop and field) conducted in this report. Where land access was not available, the OEH 2013 Vegetation map was used to inform classification. The four classes are shown in Figure 4-6 and are described below:

- High Recovery Potential – native vegetation mapped as areas that meet the definition of ENV or AHCVV which generally have native canopy cover of greater than 10% and contained native species in each structural layer
- Moderate Recovery Potential – other areas of native vegetation with some canopy, less structural complexity and a higher level of weed infestation or ongoing disturbance
- Low Recovery Potential – areas which show some potential for natural regeneration. Some native species present in some structural layers, very high level of weed infestations, not all structural layers present
- Very Low Recovery Potential – all other areas including cleared and heavily cultivated and/or pasture improved areas.

Area calculations of each recovery potential class within the subject site are presented in Table 4-4.

**Table 4-4: Area of different recovery potential classes identified within the subject site.**

| Recovery potential class | Area (ha) |
|--------------------------|-----------|
| High                     | 45.05     |
| Moderate                 | 21.02     |
| Low                      | 1.49      |
| Very Low                 | 119.75    |

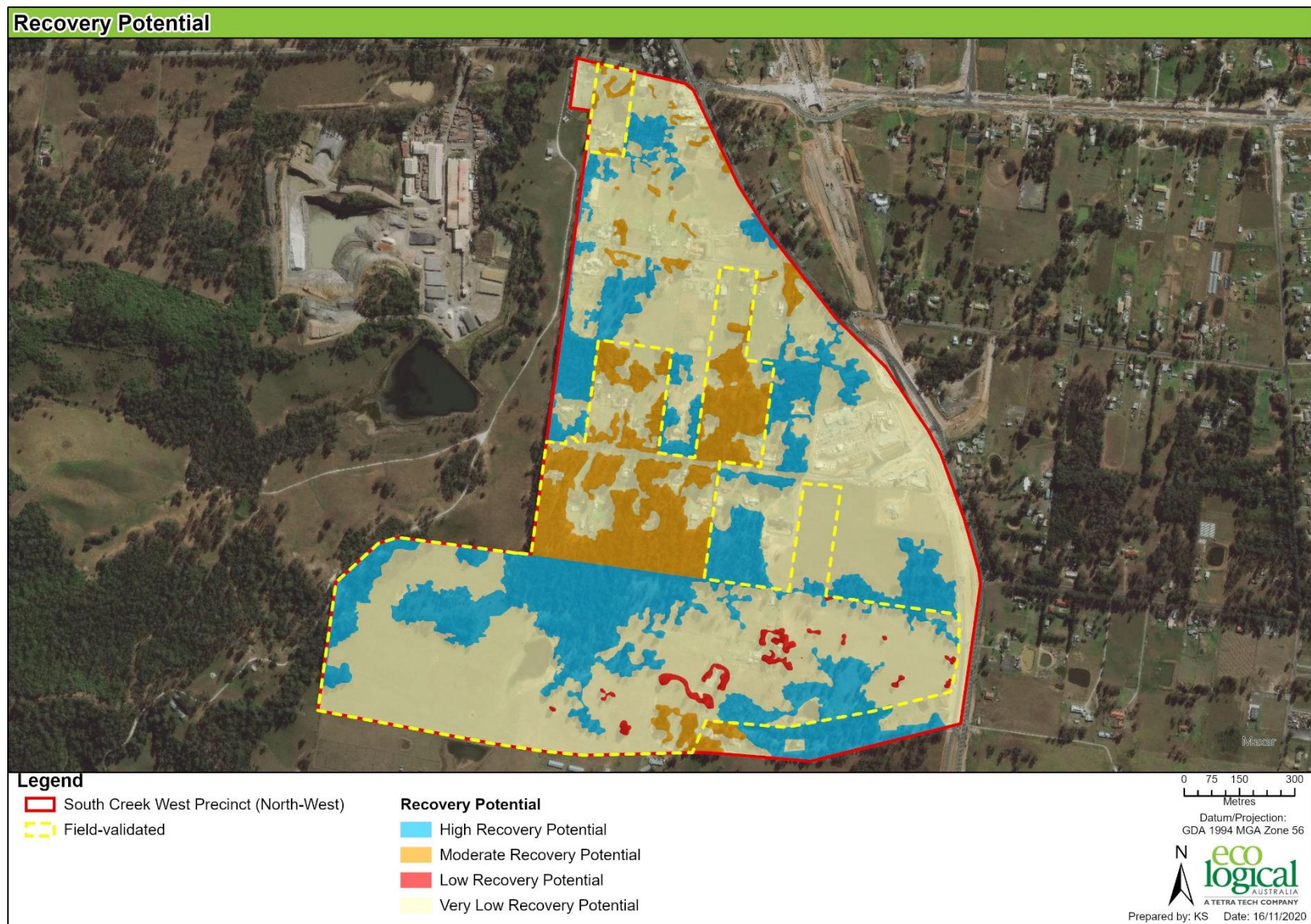


Figure 4-6: Recovery potential

#### 4.4 Ecological Constraints Assessment

An ecological constraint ranking was derived applying an amended methodology that has been used elsewhere in Western Sydney (see Appendix B of this report). This method combines size, condition, connectivity and recovery potential into a single ecological constraint value. The results of this analysis are in Table 4-5 and Figure 4-7. The majority of vegetation is ranked as having high biodiversity value by virtue of it being Endangered or Critically Endangered Ecological Community. These constraints are based on ecological values and do not take account of the Biodiversity Certification Order which shows that the site is partially biodiversity certified under the BC Act.

Broadly the rankings are as follows:

- High constraint = high ecological value, relatively large areas of good quality, well connected vegetation;
- Moderate constraint = moderate ecological value, smaller areas of good quality vegetation or large areas of poorer quality vegetation;
- Low constraint = low ecological value, areas infested with weeds and exotics, with a low recovery potential or completely cleared or developed.

**Table 4-5: Constraints summary within the subject site**

| Ecological constraint | Area (ha) |
|-----------------------|-----------|
| High                  | 62.66     |
| Moderate              | 5.26      |
| Low                   | 119.39    |

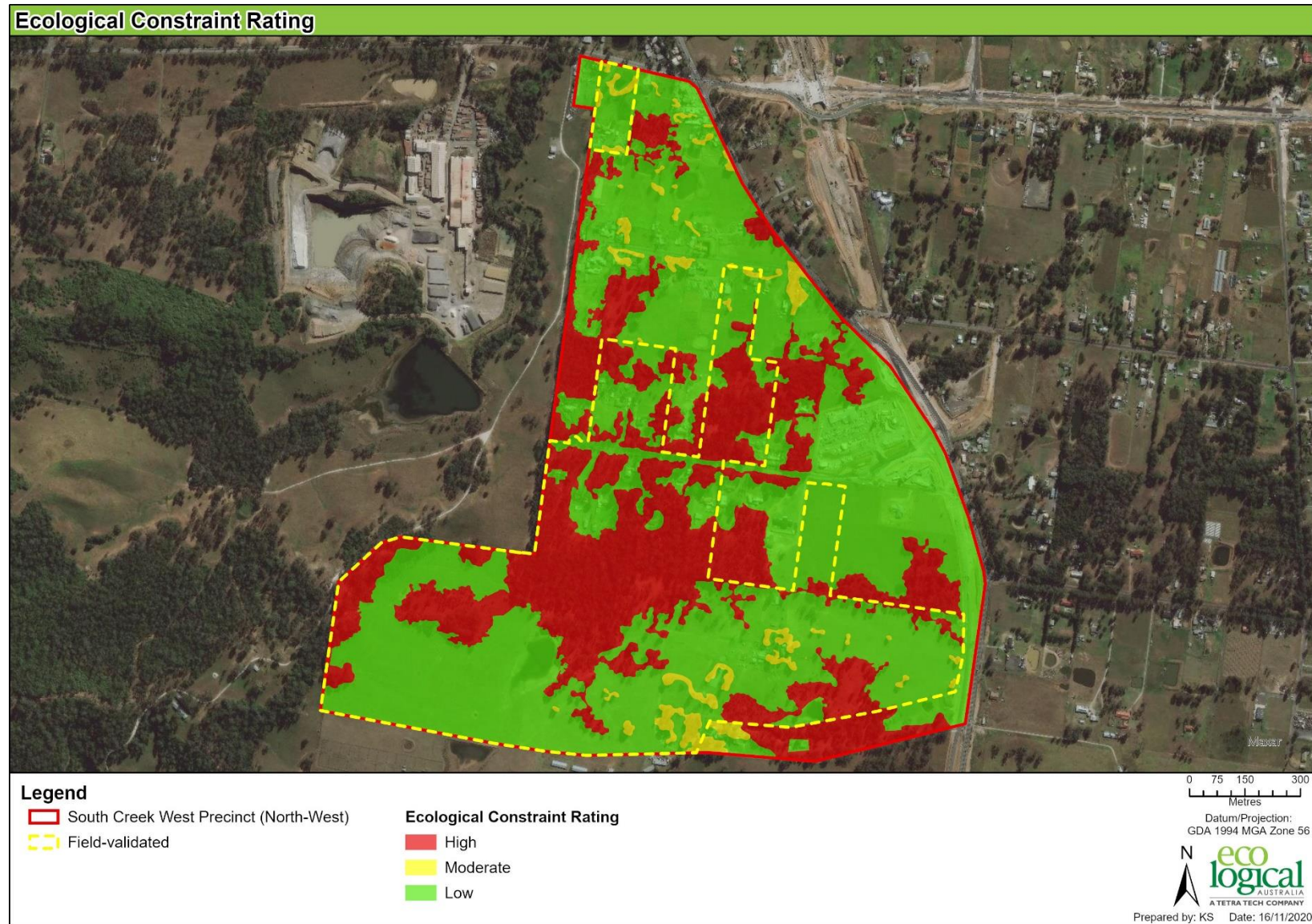


Figure 4-7: Ecological constraints analysis

## 4.5 Threatened Species Habitat

The following threatened flora species are associated with Cumberland Plain Woodland and were therefore identified as having the potential to occur within the subject site (Table 4-6):

- *Grevillea juniperina* subsp. *juniperina* (Juniper-leaved Grevillea), listed as vulnerable under the BC Act
- *Marsdenia viridiflora* subsp. *viridiflora* (Native Pear), listed as an endangered population under the BC Act
- *Pimelea spicata* (Spiked Rice-flower), listed as endangered under the BC Act and EPBC Act.

Habitat features for several threatened fauna species were identified within the survey area during field survey. These species have also been recorded within 5 km of the subject site (DPIE 2020a). The species and the habitat features relevant to them are presented in Table 4-6 and Figure 4-8.

**Table 4-6: Threatened fauna species likely or with the potential to occur in the subject site.**

| Scientific name                        | Common name                     | BC Act Status | EPBC Act Status | Habitat features   |
|--|---------------------------------|---------------|-----------------|--|
| <i>Artamus cyanopterus cyanopterus</i> | Dusky Woodswallow               | V             | -               | The subject site contained open eucalypt woodland and farmland adjoining woodland.   |
| <i>Daphoenositta chrysoptera</i>       | Varied Sittella                 | V             | -               | The subject site contained open eucalypt woodland.   |
| <i>Glossopsitta pusilla</i>            | Little Lorikeet                 | V             | -               | The subject site contained open eucalypt woodland and riparian areas.  |
| <i>Haliaeetus leucogaster</i>          | White-bellied Sea-Eagle         | V             | -               | The subject site contained open eucalypt woodland and riparian areas.  |
| <i>Hieraaetus morphnoides</i>          | Little Eagle                    | V             | -               | The subject site contained open eucalypt woodland and riparian areas.  |
| <i>Lathamus discolor</i>               | Swift Parrot                    | E             | CE              | Native canopy in the survey area was dominated by <i>Eucalyptus tereticornis</i> , a favoured feed tree of this species. . |
| <i>Meridolum corneovirens</i>          | Cumberland Plain Land Snail     | E             | -               | Leaf litter was present at the base of trees within Cumberland Plain Woodland.   |
| <i>Micronomus norfolkensis</i>         | Eastern Coastal Free-tailed Bat | V             | -               | The survey area contained hollow bearing trees and intact sections of native vegetation.                                   |
| <i>Miniopterus orianae oceanensis</i>  | Large Bent-winged Bat           | V             | -               | The subject site contained intact sections of native vegetation.   |
| <i>Myotis macropus</i>                 | Southern Myotis                 | V             | -               | The survey area contained hollow bearing trees and intact sections of native vegetation.                                   |
| <i>Ninox strenua</i>                   | Powerful Owl                    | V             | -               | The subject site contained intact sections of native vegetation.   |
| <i>Phascolarctos cinereus</i>          | Koala                           | V             | V               | The survey area contained favoured feed tree species <i>Eucalyptus tereticornis</i> and <i>Angophora floribunda</i> .      |

| Scientific name  | Common name                   | BC Act Status | EPBC Act Status | Habitat features  |
|--|-------------------------------|---------------|-----------------|---|
| <i>Pteropus poliocephalus</i>  | Grey-headed Flying-fox        | V             | V               | The subject site contained intact sections of native vegetation.                          |
| <i>Saccolaimus flaviventris</i>  | Yellow-bellied Sheathtail-bat | V             | -               | The subject site contained hollow bearing trees and intact sections of native vegetation. |
| <i>Scoteanax rueppellii</i>  | Greater Broad-nosed Bat       | V             | -               | The subject site contained hollow bearing trees and intact sections of native vegetation. |
| <i>V = vulnerable, E = endangered, CE = critically endangered, - = Not Listed.</i> |                               |               |                 |   |



Figure 4-8: Threatened species habitat and habitat features in the survey area

## 5. Recommendations for Indicative Layout Plan

### 5.1 Recommendations for Consistency with the Biodiversity Certification Order

No vegetation in this precinct counted towards the 2,000-ha target for the Growth Centres. However, the precinct does contain Cumberland Plain Woodland and River-Flat Eucalypt Forest in varying conditions, the protection of which would enhance biodiversity outcomes within the precinct and the broader growth centres. The precinct contains a total of 33.87 ha of native vegetation that meets the definition of AHCVV and 24.98 ha of previously mapped ENV therefore, providing containing 58.85 ha of native vegetation.

Riparian habitat throughout the site was predominantly good and included areas of Cumberland Plain Woodland, therefore it is recommended that riparian zones be improved throughout the precinct. Riparian habitat and proposed management strategies is further discussed within the Belmore Road Precinct Riparian Assessment (ELA, 2022).

Table 5-1 outlines the amount of validated ENV and AHCVV that will be protected through the proposed ILP, as depicted in Figure 5-1.

**Table 5-1: Amount of native vegetation proposed to be protected in ILP**

|                 | Within Precinct (ha) | Protected within Riparian Corridor (ha) | Protected within Local Parks (ha) | Percentage Retained |
|-----------------|----------------------|---|-----------------------------------|---------------------|
| Validated ENV   | 24.98                | 4.92                                    | 2.12                              | 28.18%              |
| Validated AHCVV | 33.87                | 5.33                                    | 3.46                              | 25.95%              |
| <b>TOTAL</b>    | <b>58.85</b>         | <b>10.25</b>                            | <b>5.58</b>                       | <b>26.90%</b>       |

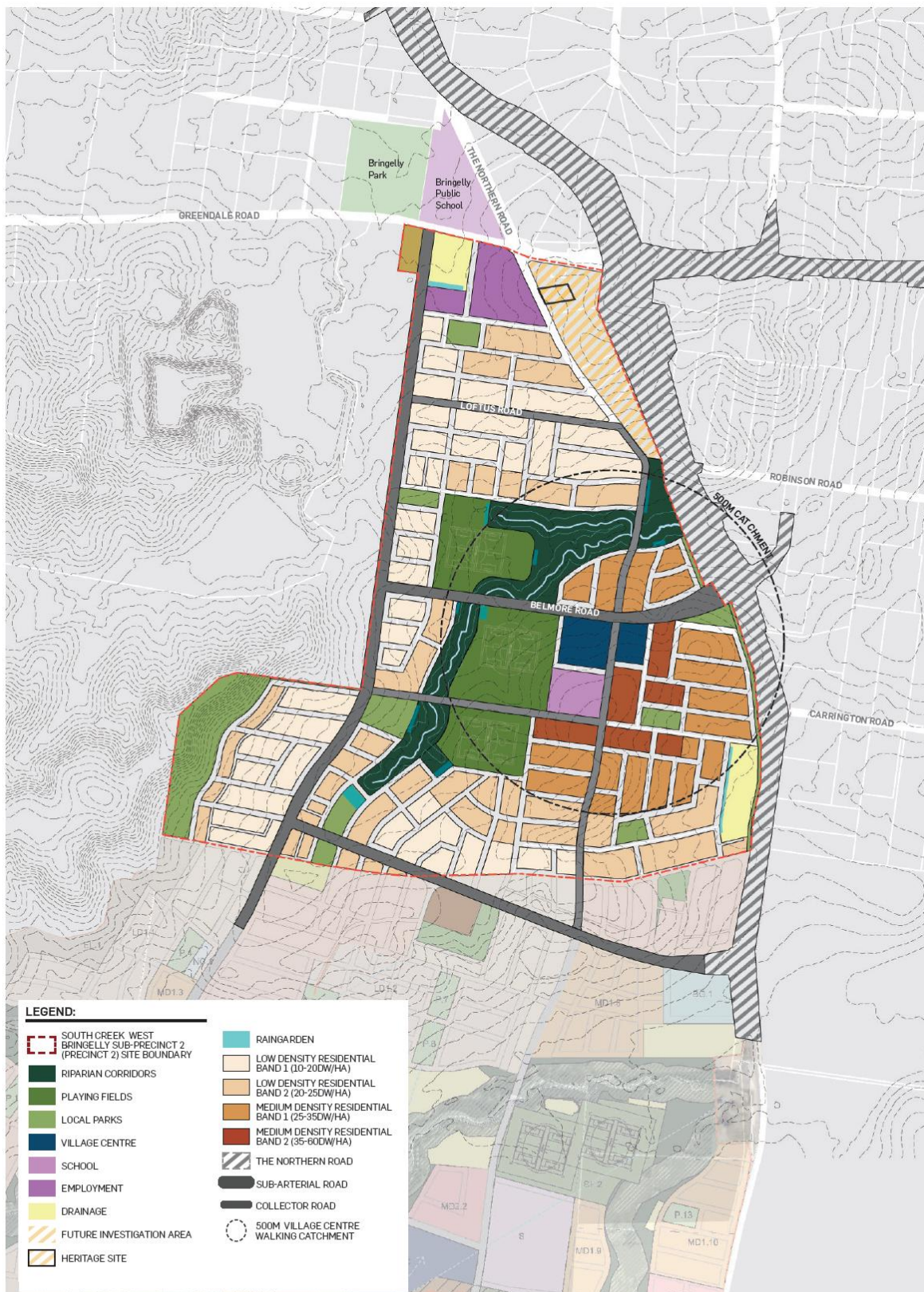
### 5.2 Zoning, Ownership and Management

Areas of ENV that are to be protected have generally been zoned E2 in other Precinct Plans. In some instances, the Precinct Plan has allowed ENV to be protected via a Recreation zone or an Infrastructure zone, however this has generally been where they were also placed in public ownership and conservation of the ENV was a clear priority for the site. The permissible uses within the E2 zone are shown below.

**Table 5-2: Potential Environmental Zones**

| Zone                          | Permitted without consent | Permitted with consent   | Prohibited   |
|-------------------------------|---------------------------|--|--|
| E2 Environmental Conservation | Nil                       | Drainage; Environmental protection works; Flood mitigation works; Information and education facilities; Kiosks; Recreation areas; Roads; Signage; Waterbodies (artificial) | Earthworks; facilities; Environmental protection works; Information and education facilities; Kiosks; Recreation areas; Roads; Signage; Waterbodies (artificial); Business premises; Hotel or motel accommodation; Industries; Multi dwelling housing; Recreation facilities (major); Residential flat buildings; Restricted premises; Retail premises; Seniors housing; Service stations; Warehouse or distribution centres; Any development not specified in item 2 or 3 |

To ensure biodiversity values are maintained in the areas to be zoned E2 (or similar) management of the vegetation for a minimum five years is recommended. This allows for weeding, planting and maintenance in accordance with a Vegetation Management Plan.



## SOUTH CREEK WEST - BRINGELLY SUB-PRECINCT 2 PRECINCT 2 REVISED FINAL ILP

DATE: 14.06.2022  
JOB NO: P0030401  
DWG NO: -  
REV: B

1:10,000 @ A3

0 100 200 300 400 500

Figure 5-1: Proposed ILP (Urbis, 2022)

## 6. Conclusion

The aim of this report is to identify key ecological constraints to assist design of an ILP. The site was found to contain a number of significant environmental features, including Cumberland Plain Woodland (a critically endangered ecological community under both the BC Act and EPBC Act) and habitat features associated with potential habitat for a number of threatened flora and fauna species.

Approximately 34.55 ha of vegetation in the precinct was identified for protection in the Draft Growth Centres Conservation Plan 2007. Desktop assessment and field survey validated 24.98 ha of previously identified ENV and identified 33.87 ha of Additional High Conservation Value Vegetation.

The majority of the Belmore Road Precinct is biodiversity certified. A small portion within the south-west of the site is non-certified however, did not contain any vegetation identified for protection in the Draft Growth Centres Conservation Plan 2007. Therefore, the Belmore Road Precinct is not obligated to retain any areas of ENV. The precinct, however, contains a total of 33.87 ha of native vegetation that meets the definition of AHCVV and 24.98 ha of previously mapped ENV therefore, providing opportunity to provide biodiversity outcomes beyond what was anticipated by the biodiversity certification by protecting native vegetation in riparian areas and their adjoining lands where possible.

The ILP will protect 8.04 ha of validated ENV and 8.79 ha of validated AHCVV, through the protection of native vegetation within the proposed riparian corridor and local parks (excluding sporting fields).

## Appendix A - Detailed Statutory Framework

### Commonwealth legislation

#### *Environment Protection & Biodiversity Conservation Act 1999*

The Commonwealth *Environment Protection & Biodiversity Conservation Act 1999* (EPBC Act) establishes a process for assessing the environmental impact of activities and developments where ‘matters of national environmental significance’ (MNES) may be affected. The *EPBC Act* lists endangered ecological communities, threatened and migratory species that have the potential to occur, or are known to occur on a site.

The approval of both stages of the strategic assessment occurred on the 28<sup>th</sup> February 2012. This approval essentially means that the Commonwealth is satisfied that the conservation and development outcomes that will be achieved through development of the Growth Centres Precincts will satisfy their requirements for environmental protection under the EPBC Act. So that, provided development activity proceeds in accordance with the Growth Centres requirements (such as the Biodiversity Certification Order, the Growth Centres SEPP and DCPs, Growth Centres Development Code etc) then there is **no requirement** to assess the impact of development activities on matters of National Environmental Significance (NES) and hence **no requirement** for referral of activities to the Commonwealth Department of the Environment and Energy (DotEE). The requirement for assessment and approval of threatened species and endangered ecological communities under the EPBC Act has now been “turned off” by the approval of the Strategic Assessment.

### State legislation

#### *Environmental Planning and Assessment Act 1979 (EP&A Act)*

The NSW *Environmental Planning and Assessment Act 1979* (EP&A Act) is the principal planning legislation for the state, providing a framework for the overall environmental planning and assessment of development proposals. Various legislative instruments are integrated with EP&A Act and have been reviewed separately.

In determining a development application, the consent authority is required to take into consideration the matters listed under Section 79C of the EP&A Act that are relevant to the application. Key considerations include:

- Any environmental planning instrument, including drafts
- The likely impacts of the development
- The suitability of the site for the development
- Any submissions made in accordance with the EP&A Act or regulations
- The public interest

#### *Biodiversity Conservation Act 2016 (BC Act)*

In November 2016 the NSW parliament passed the *Biodiversity Conservation Act 2016* (BC Act). This new legislation repealed the *Threatened Species Conservation Act 1995* (TSC Act) and took effect 25 August 2017. Among other things, the BC Act introduces new requirements for biodiversity assessment

and requires proponents to offset significant biodiversity impacts through the purchase and retirement of biodiversity credits. The government has recently exhibited regulations that provide further detail on the changes as well as establish the transitional arrangements.

Similar to the TSC Act, the BC Act aims to protect and encourage the recovery of threatened species, populations and communities listed under the Act. The BC Act is integrated with the EP&A Act and requires consideration of whether a development (Part 4 of the EP&A Act 1974) or an activity (Part 5 of the EP&A Act) is likely to significantly affect threatened species, populations and ecological communities or their habitat.

The schedules of the Act list species, populations and communities as endangered or vulnerable. New species, populations and communities are continually being added to the schedules of the BC Act. All developments, land use changes or activities need to be assessed to determine if they will have the potential to significantly impact on species, populations or communities listed under the Act.

Bio-certification was introduced under the TSC Act (s.126G) to confer certification on an environmental planning instrument if the Minister is satisfied that it will lead to the overall improvement or maintenance of biodiversity values – typically at a landscape scale. Under the new BC Act, existing biodiversity certified areas remain valid following the repealed TSC Act.

The effect of granting certification is that any development or activity requiring consent (Under Part 4 and 5 of the EP&A Act) is automatically ‘development that is not likely to significantly affect threatened species’. This certification removes the need to address threatened species considerations and the test of significance (s.7.3 of the BC Act), including the preparation of species impact statements (SIS) for Part 5 activities or triggering the Biodiversity Offset Scheme for Part 4 developments.

#### State Environmental Planning Policy (Sydney Region Growth Centres) 2006 (Growth Centres SEPP)<sup>1</sup>

The Growth Centres State Environmental Planning Policy (SEPP) (referred to as the ‘Growth Centres SEPP’) has been ‘bio-certified’ by order of the Minister for the Environment under s.126G of the *TSC Act*. Under the new BC Act, existing biodiversity certified areas remain valid following the repealed TSC Act. The mechanism for achieving this is outlined in the *Growth Centres Conservation Plan* (Eco Logical Australia, 2007) and the conditions for bio-certification are documented in the Ministers order for consent. Bio-certification negates the requirement for impact assessment under s.5A of the *Environmental Planning and Assessment Act, 1979* thus turning off the requirements for the test of significance.

The areas within the Newstead and Bringelly CSR Precincts that are non-certified are shown in Figure 2-1 of the report. The site contains three Threatened Ecological Communities (Cumberland Plain Woodland, River-flat Eucalypt Forest and Western Sydney Dry Rainforest).

Each precinct needs to be assessed against the conditions of the Biodiversity Conservation Order to ensure that the planned rezoning and subsequent development of the precinct complies. This is undertaken through the completion of a Biodiversity Certification Consistency Report.

#### Fisheries Management Act 1994 (FM Act)

The *Fisheries Management Act 1994* (FM Act) aims to conserve, develop and share the fishery resources of NSW for the benefit of present and future generations. The FM Act defines ‘fish’ as any marine,

estuarine or freshwater fish or other aquatic animal life at any stage of their life history. This includes insects, molluscs (e.g. oysters), crustaceans, echinoderms, and aquatic polychaetes (e.g. beachworms), but does not include whales, mammals, reptiles, birds, amphibians or species specifically excluded (e.g. some dragonflies are protected under the TSC Act instead of the FM Act). Under this act, if any activity occurs that will block fish passage, then a permit under this Act will be required.

### *Water Management Act 2000*

The NSW *Water Management Act 2000* has replaced the provisions of the *Rivers and Foreshores Improvement Act 1948*. The *Water Management Act 2000* and *Water Act 1912* control the extraction of water, the use of water, the construction of works such as dams and weirs and the carrying out of activities in or near water sources in New South Wales. 'Water sources' are defined very broadly and include any river, lake, estuary, place where water occurs naturally on or below the surface of the ground and coastal waters.

If a 'controlled activity' is proposed on 'waterfront land', an approval is required under the Water Management Act (s91). 'Controlled activities' include:

- the construction of buildings or carrying out of works;
- the removal of material or vegetation from land by excavation or any other means;
- the deposition of material on land by landfill or otherwise; or
- any activity that affects the quantity or flow of water in a water source.

'Waterfront land' is defined as the bed of any river or lake, and any land lying between the river or lake and a line drawn parallel to and forty metres (40m) inland from either the highest bank or shore (in relation to non-tidal waters) or the mean high-water mark (in relation to tidal waters). It is an offence to carry out a controlled activity on waterfront land except in accordance with an approval.

The riparian corridors that exist within Newstead and Bringelly CSR Precincts have been mapped according to their stream order.

### *Biosecurity Act 2015*

The *Noxious Weed Act 1993* was repealed and replaced with the *Biosecurity Act 2015*. Under the Biosecurity Act 2015 all plants are regulated with a general biosecurity duty to prevent, eliminate or minimise any biosecurity risk they may pose. Any person who deals with any plant, who knows (or ought to know) of any biosecurity risk, has a duty to ensure the risk is prevented, eliminated or minimised, so far as is reasonably practicable.

Specific legal requirements apply to State determined priorities under the Greater Sydney Regional Strategic Weed Management Plan 2017-2022. Weeds listed as 'other weeds of regional concern' warrant resources for local control or management programs and are a priority to keep out of the region. Inclusion in this list may assist Local Control Authorities and/or land managers to prioritise action in certain circumstances where it can be demonstrated the weed poses a threat to the environment, human health, agriculture etc.

### *Rural Fires Act 1997*

The objectives of the NSW *Rural Fires Act 1997* (RF Act) are to provide for:

- The prevention, mitigation and suppression of fires
- Coordination of bushfire fighting and prevention
- Protection of people and property from fires
- Protection of the environment.

Section 100B of the RF Act provides for the Commissioner to issue a bushfire safety authority for subdivision of bushfire prone land that could lawfully be used for residential or rural residential purposes or for development of bushfire prone land for a special fire protection purpose.

A Bushfire Safety Authority permits development to the extent that it complies with bushfire protection standards. Application for a Bushfire Safety Authority must be lodged as part of the development application process and must demonstrate compliance with the Planning for Bushfire Protection Guidelines (RFS 2006).

The RF Act also outlines the responsibilities of landowners to manage their land for bushfire protection and provides a mechanism for the approval of hazard reduction works, through the issue of a bushfire hazard reduction certificate.

#### *Rural Fires and Environmental Assessment Legislation Amendment Act 2002*

The NSW *Rural Fires and Environmental Assessment Legislation Amendment Act 2002* amends the RF Act and the EP&A Act with respect to bushfire prone lands, bushfire hazards and bushfire emergencies.

#### *Planning for Bushfire Protection 2006*

This guide (Planning for Bushfire Protection: a Guide for Councils, Planners, Fire Authorities, Developers and Home Owners, NSW Rural Fire Service 2006) is the key bushfire planning document for the state. The document identifies requirements and strategies for new developments to help protect from bushfire hazards. It details the location and depth of asset protection zones, fire trails and perimeter roads, water supply and building standards in bushfire risk areas. This document is given legal force through the *Rural Fires and Environmental Assessment Legislation Amendment Act 2002*.

### State Environmental Planning Policy No.19 – Bushland in Urban Areas<sup>2</sup>

The Bushland in Urban Areas SEPP aims to protect and preserve bushland within selected local government areas. The policy recognises the recreational, educational, and scientific significance of such bushland and aims to protect the flora, fauna, significant geological features, landforms and archaeological relics in such areas. It encourages management to protect and enhance the quality of the bushland and facilitate public enjoyment, compatible with its conservation. The policy states that a person shall not disturb bushland zoned or reserved for public open space purposes without the consent of the council.

### Growth Centres Development Code 2006

The Growth Centres Development Code was produced by the Growth Centres Commission in 2006. The Development Code was produced to guide the planning and urban design in the North West and South West Growth Areas.

The Development Code includes objectives and provisions that support the retention of as much native vegetation, habitat and riparian areas within the precinct through incorporation into land use planning outcomes such as lower density development in these areas, subdivision patterns, road design, local parks, and other areas required to be set aside for community uses without adversely affecting the development yield of areas.

As a requirement under the Development Code, the Newstead and Bringelly CSR Precincts will need to demonstrate how the biodiversity and other values of areas identified by the SEPP will be protected, maintained and enhanced. Key issues will include boundary management (e.g. buffers to surrounding development), bush fire and water sensitive urban design (WSUD) (GCC 2006).

### Growth Centres Conservation Plan 2007

Under the Growth Centres Conservation Plan (January 2007), the vegetation within Newstead and Bringelly CSR Precincts have been identified as 'Lower Long-Term Management Viability (LMV)' and approximately 103.68 ha of ENV was originally mapped.

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<sup>2</sup> Note the Bushland in Urban Areas SEPP has now been repealed and replaced by the *State Environmental Planning Policy (Biodiversity and Conservation) 2021* (Biodiversity and Conservation SEPP)

## Appendix B Methodology

### B1 Field Survey

Field survey was conducted by ELA ecologists Alex Gorey and Carolina Mora. The survey area was traversed using the random meander method (Cropper 2003) and focused on the following:

- Classification of vegetation not previously mapped as ENV
- Identification of additional high conservation value vegetation (AHCVV),
- Identification of condition of native vegetation
- An assessment of habitat significance for threatened flora and fauna species
- Hollow bearing tree (HBT) identification
- Incidental sightings of flora and fauna.

When vegetation community boundaries differed to those previously mapped or were not previously mapped, they were documented using digital maps. Floristic summaries were composed for areas of vegetation not previously mapped to determine the type of native vegetation community (where applicable) and to assess the condition of the vegetation. Occurrences of Cumberland Plain Woodland were assessed against the EPBC Act listing advice.

The presence of threatened fauna species identified as having potential to occur in the survey area was determined through a habitat assessment. Where important habitat features, such as hollow bearing trees, rocky outcrops, deep leaf litter, waterways or abandoned buildings were observed, their location was noted. Hollow bearing trees, where present were marked spatially using a handheld GPS unit.

#### Survey limitations

This assessment was not intended to provide an inventory of all species present across the survey area but instead an overall assessment of its ecological values. The survey was conducted with an emphasis on threatened species, threatened ecological communities and key fauna habitat features. It is important to note that some species may not have been detected within the survey area during the inspection as they may be cryptic or seasonal and only detectable during flowering or during breeding. In this case the likelihood of their occurrence has been assessed based on the presence of potential habitat.

The field survey was undertaken using hand-held GPS units. It should be noted that these units can have errors in accuracy of up to 20 m (subject to availability of satellites on the day).

### B2 Recovery potential

Using information collected in the field ‘recovery potential’ is determined for each area of vegetation. This is defined as “the anticipated capacity of (an) area to recover to a state representative of its condition prior to the most recent disturbance event” (IPC & AES 2002). Table 6-1 outlines the decision rules used in this step, resulting in a ranking of High, Moderate, Low or Very Low recovery potential for each vegetation remnant.

Table 6-1: Recovery potential matrix (ELA 2003)

| Current condition and land use   | Past land use and disturbance  | Soil Condition   | Vegetation   | Recovery Potential |
|--|--|--|--|--------------------|
| Cleared (no woodland canopy). Includes <i>Bursaria</i> thickets in grassland | Recently cleared (<2 years)  | Unmodified or largely natural. Uncultivated.                             | Native dominated   | High               |
|  |  |  | Exotic dominated   | Moderate           |
|  |  | Modified. Heavily cultivated and/or pasture improved. Imported material. | Either   | Low                |
|  |  |  |  |                    |
|  | Historically cleared (>2 years) and consistently managed as cleared. | Unmodified or largely natural. Uncultivated.                             | Native dominated   | Moderate           |
|  |  |  | Exotic dominated   | Low                |
|  |  | Modified. Heavily cultivated and/or pasture improved. Imported material. | Either   | Very Low           |
|  |  |  |  |                    |
| Wooded/Native Canopy present or regenerating                                 | No recent clearing of understorey                                    |  | Native understorey relatively intact or in advanced state of regeneration. Native dominated.                                 | High               |
|  |  | Unmodified or largely natural. Uncultivated.                             | Native understorey significantly structurally modified, absent or largely absent. Includes areas dominated by African Olive. | Moderate           |
|  |  |  | Exotic dominated   | Low                |
|  |  | Moderately modified by long term grazing or mowing.                      | Native dominated   | Low                |
|  | Understorey patchily intact  | Modified. Heavily cultivated and/or pasture improved. Imported material. | Native understorey significantly structurally modified, absent or largely absent. Includes areas dominated by African Olive. | Very Low           |
|  |  |  | Native understorey present. Heavily weed invaded.  | Low                |
|  |  |  | Native dominated   | Moderate           |
|  |  | Disturbed  | Exotic dominated   | Low                |

| Current condition and land use | Past land use and disturbance   | Soil Condition   | Vegetation   | Recovery Potential |
|--------------------------------|---|--|--|--------------------|
|                                | Recent clearing of understorey and or native understorey significantly structurally modified due to existing land use (e.g. Mowing, grazing). | Unmodified or largely natural.   | Native dominated. If no vegetation present, assume native dominated. | High               |
|                                |   | Uncultivated.  | Exotic dominated   | Moderate           |
|                                |   | Modified. Heavily cultivated and/or pasture improved. Imported material. | Native dominated   | Low                |
|                                |   |  | Exotic dominated   | Very Low           |

### B3 Ecological constraints

An ecological constraints analysis based on a methodology previously used by ELA elsewhere in Western Sydney was applied across the survey area. An ecological constraints analysis is a stepped analysis of the environmental values of an area. It provides a combined measure of ecological values and is increasingly used as a basis for negotiations over locations, types and densities of land development. It includes measurement of:

- The legislative status of vegetation communities;
- the structural condition of vegetation remnants;
- type and severity of disturbance and associated recovery potential;
- connectivity between remnants on and off site;
- the size of the vegetation remnant; and
- the value of the remnant as threatened species habitat.

The steps involved in this type of ecological constraints analysis are illustrated in Appendix B. Vegetation mapping is combined with field survey work, threatened species assessment, recovery potential and the NPWS (2002) conservation significance assessment methodology to determine the relative level of ecological value or constraint across a site.

Information derived from the recovery potential, conservation significance and threatened species calculations are combined to determine ecological constraint. The process for combining this information is detailed on Table 6-6, Table 6-7 and Table 6-8.

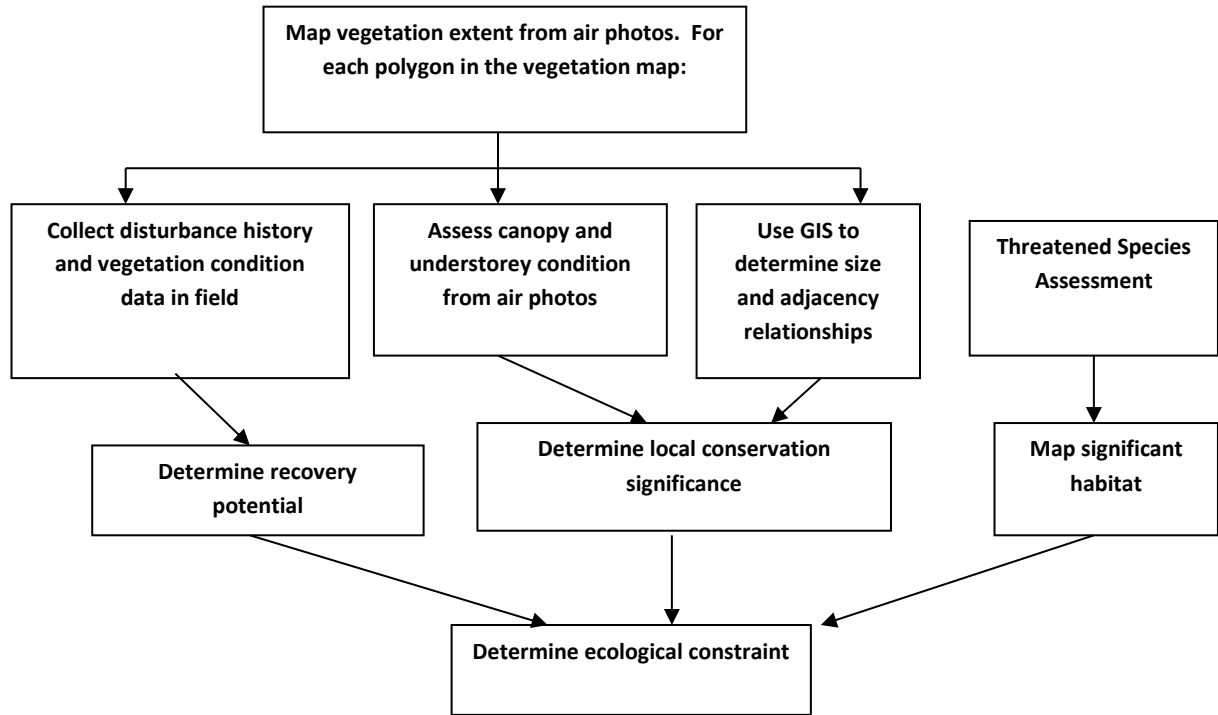


Figure 6-1: Ecological Constraints Flowchart

Table 6-2: Conservation significance matrix (NSW NPWS, 2002)

| Community type   | Condition code                                       | Patch size <sup>^</sup> | Connectivity           | Code | Conservation significance                               |
|--|--|-------------------------|------------------------|------|---|
| Endangered Ecological Community (Critically endangered) (CEEC) | ABC, TX or Txr                                       | Any                     | Any                    | C3   | Core  |
|  | Txu  | Any                     | Any                    | URT  | Urban remnant trees (critically endangered communities) |
| Endangered Ecological Community (EEC)                          | ABC (with Understorey in good or moderate condition) | > 10 ha                 | Any                    | C1   | Core  |
|  |  | < 10 ha                 | Adjacent to C1 or CEEC | C2   | Core  |
|  |  |                         | Adjacent to S1         | S2   | Support for core  |
|  | TX or Txr, ABC (with poor Understorey condition)     |                         | None                   | O    | Other remnant vegetation                                |
|  |  | Any                     | Adjacent to any Core   | S1   | Support for core  |
|  | Txu  | Any                     | Any                    | O    | Other remnant vegetation                                |

<sup>^</sup> Patch size is based on a 15m adjacency analysis

Table 6-3: Decision matrix step one

| Recovery Potential           |                  |          |          |          |          |
|------------------------------|------------------|----------|----------|----------|----------|
|                              |                  | High     | Moderate | Low      | Very Low |
| Conservation<br>Significance | Core             | High     | High     | High     | High     |
|                              | Support for core | High     | Moderate | Moderate | Low      |
|                              | Other            | Moderate | Moderate | Low      | Low      |
|                              |                  |          |          |          |          |

Table 6-4: Decision matrix step two

| Combined Recovery Potential and Conservation Significance (result of Table above) |                   |      |          |          |
|---|-------------------|------|----------|----------|
| Threatened Species Assessment   |                   | High | Moderate | Low      |
|   | Known (High)      | High | High     | High     |
|   | Likely (Moderate) | High | Moderate | Moderate |
|   | Nil (Low)         | High | Moderate | Low      |

Table 6-5: Recovery potential matrix (Eco Logical Australia, 2003)

| Current condition and land use  | Past land use and disturbance  | Soil Condition   | Vegetation   | Recovery Potential |
|---|--|--|--|--------------------|
| Cleared (no woodland canopy).<br>Includes <i>Bursaria</i> thickets in grassland | Recently cleared (<2 years)  | Unmodified or largely natural. Uncultivated.                             | Native dominated   | High               |
|   |  |  | Exotic dominated   | Moderate           |
|   |  | Modified. Heavily cultivated and/or pasture improved. Imported material. | Either   | Low                |
|   | Historically cleared (>2 years) and consistently managed as cleared. | Unmodified or largely natural. Uncultivated.                             | Native dominated   | Moderate           |
|   |  |  | Exotic dominated   | Low                |
|   |  | Modified. Heavily cultivated and/or pasture improved. Imported material. | Either   | Very Low           |
| Wooded/Native Canopy present or regenerating                                    | No recent clearing of understorey                                    | Unmodified or largely natural. Uncultivated.                             | Native understorey relatively intact or in advanced state of regeneration. Native dominated.                                 | High               |
|   |  |  | Native understorey significantly structurally modified, absent or largely absent. Includes areas dominated by African Olive. | Moderate           |
|   |  |  | Exotic dominated   | Low                |
|   |  | Moderately modified by long term grazing or mowing.                      | Native dominated   | Low                |
|   |  | Modified. Heavily cultivated and/or pasture improved. Imported material. | Native understorey significantly structurally modified, absent or largely absent. Includes areas dominated by African Olive. | Very Low           |
|   |  |  | Native understorey present. Heavily weed invaded.  | Low                |
|   | Understorey patchily intact  | Disturbed  | Native dominated   | Moderate           |
|   |  |  | Exotic dominated   | Low                |

| Current condition and land use | Past land use and disturbance   | Soil Condition   | Vegetation   | Recovery Potential |
|--------------------------------|---|--|--|--------------------|
|                                | Recent clearing of understorey and or native understorey significantly structurally modified due to existing land use (e.g. Mowing, grazing). | Unmodified or largely natural. Uncultivated.                             | Native dominated. If no vegetation present, assume native dominated. | High               |
|                                |   |  | Exotic dominated   | Moderate           |
|                                |   | Modified. Heavily cultivated and/or pasture improved. Imported material. | Native dominated   | Low                |
|                                |   |  | Exotic dominated   | Very Low           |

Table 6-6: Conservation significance matrix (NSW NPWS, 2002)

| Community type               |                                    | Condition code                                       | Patch size^ | Connectivity            | Code | Conservation significance                               |
|------------------------------|------------------------------------|--|-------------|-------------------------|------|---|
| Endangered Community (CEECE) | Ecological (Critically endangered) | ABC, TX or Txr                                       | Any         | Any                     | C3   | Core  |
|                              |                                    | Txu  | Any         | Any                     | URT  | Urban remnant trees (critically endangered communities) |
| Endangered Community (EEC)   | Ecological                         | ABC (with Understorey in good or moderate condition) | > 10 ha     | Any                     | C1   | Core  |
|                              |                                    |  | < 10 ha     | Adjacent to C1 or CEECE | C2   | Core  |
|                              |                                    |  |             | Adjacent to S1          | S2   | Support for core  |
|                              |                                    |  |             | None                    | O    | Other remnant vegetation                                |
|                              |                                    | TX or Txr, ABC (with poor Understorey condition)     | Any         | Adjacent to any Core    | S1   | Support for core  |
|                              |                                    |  |             | None                    | O    | Other remnant vegetation                                |
|                              |                                    | Txu  | Any         | Any                     | O    | Other remnant vegetation                                |

^ Patch size is based on a 15m adjacency analysis

**Table 6-7: Decision matrix step one**

| Recovery Potential           |                  |          |          |          |          |
|------------------------------|------------------|----------|----------|----------|----------|
|                              |                  | High     | Moderate | Low      | Very Low |
| Conservation<br>Significance | Core             | High     | High     | High     | High     |
|                              | Support for core | High     | Moderate | Moderate | Low      |
|                              | Other            | Moderate | Moderate | Low      | Low      |
|                              |                  |          |          |          |          |

**Table 6-8: Decision matrix step two**

| Combined Recovery Potential and Conservation Significance (result of Table above) |                   |      |          |          |
|---|-------------------|------|----------|----------|
| Threatened Species Assessment   |                   | High | Moderate | Low      |
|   | Known (High)      | High | High     | High     |
|   | Likely (Moderate) | High | Moderate | Moderate |
|   | Nil (Low)         | High | Moderate | Low      |

