NSW GOVERNMENT Planning & Environment

Narrabri Special Activation Precinct

Biodiversity Assessment Report

12 May 2023

Project No.: 0617761

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Signature Page

12 May 2023

Narrabri Special Activation Precinct

Biodiversity Assessment Report

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EXECUTIVE SUMMARY

This Biodiversity Assessment has been prepared for the Department of Planning and Environment (DPE) to support the development of the Narrabri Special Activation Precinct (SAP) Master Plan. It has been designed to test the structure plan that was developed as part of a series of Enquiry by Design Workshops and aims to establish the relevant specifications and requirements to assist in the development of the Master Plan.

A number of desktop sources were reviewed to identify ecological values that may occur within the Narrabri SAP area, as well as the surrounding investigation areas, the green loop, and the wider Narrabri Urban Investigation Area during Stage 1 of the project. The databases, baseline report and other key sources considered are listed in Appendix A.

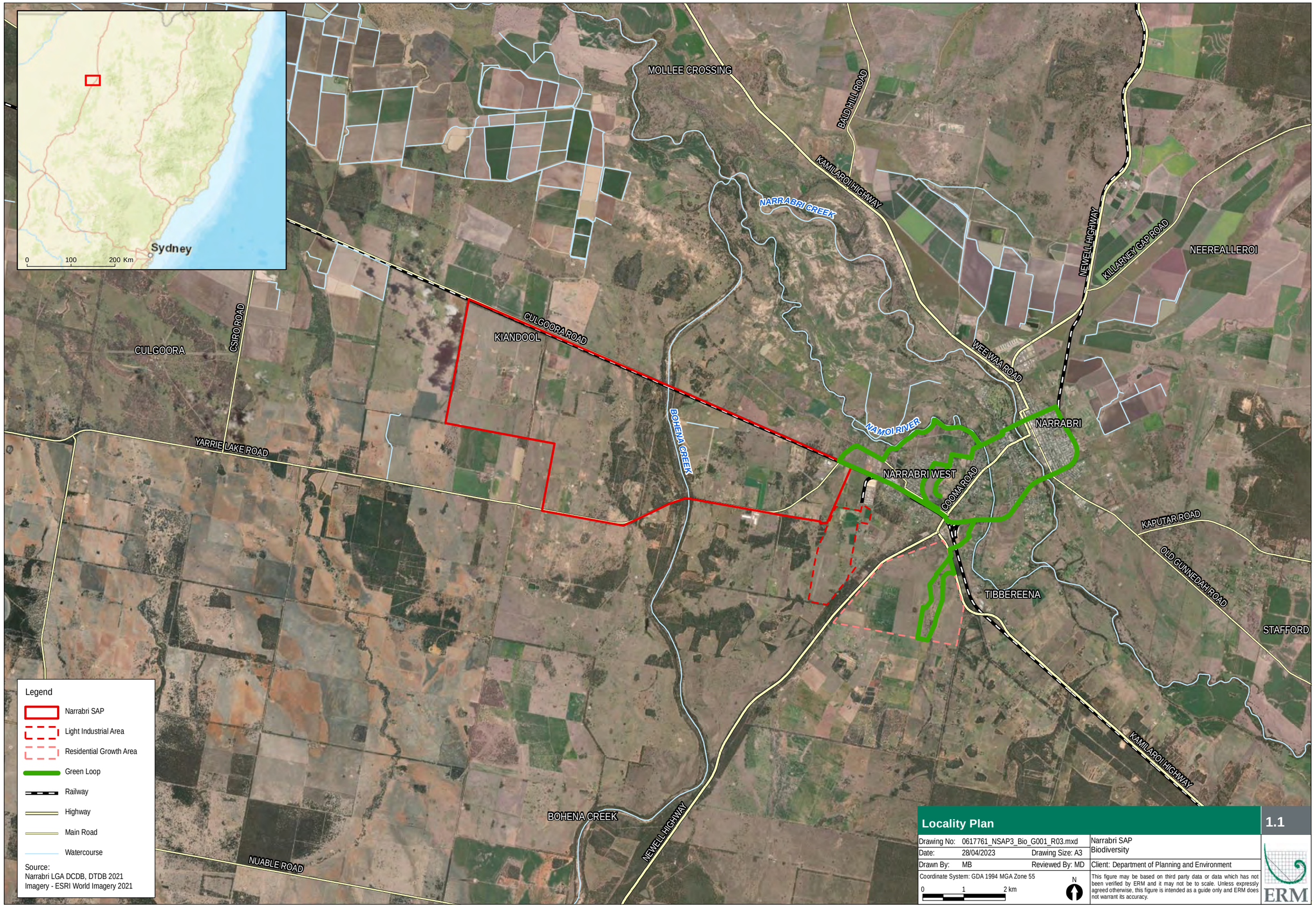
A desktop review was also completed to gain an understanding of the known or likely native vegetation communities and threatened ecological communities (TEC) within the Narrabri SAP and other investigation areas. A single field survey has been completed across a limited portion of the Narrabri SAP area, with some observations made from the boundaries of the residential growth area.

Field surveys were conducted within the Narrabri SAP area in September 2022 and February 2023 by BAM accredited Ecologists, botanical expert John Hunter and Claire Hewitt (ERM). Field survey included rapid vegetation assessments to develop a Plant Community Type (PCT) map, and also considered the condition of patches of native vegetation.

This biodiversity assessment of the Narrabri SAP, Residential Growth and Light Industrial Area, as well as considerations for the Green Loop have confirmed several significant biodiversity values to be considered in the development of the master plan. These include:

- Areas of endangered Brigalow TEC that is a SAII entity under the BC Act and a listed TEC under the EPBC Act within the Narrabri SAP and Residential Growth Area;
- Areas of endangered Poplar Box listed as Endangered under the EPBC Act within the Narrabri SAP. Area's ground-truthed that meet key characteristic requirements (as stated by EPBC) determine it as a Threatened Ecological Community (TEC), within the Narrabri SAP;
- Areas of Carbeen Endangered Ecological Community (EEC) that is protected under the NSW BC Act as an endangered community located on Bohena Creek;
- The Bohena Creek riparian corridor containing high quality native vegetation communities;
- Areas of moderate and high-quality native vegetation; and
- Local corridors and linkages within the Narrabri SAP and Residential Growth areas, that include connectivity through the Green Loop area to Narrabri Creek and the wider landscape.

The areas of assessed biodiversity conservation values are shown in Figure E.1 and Figure E.2 below.



Locality Plan

1.1

Drawing No:	0617761_NSAP3_Bio_G001_R03.mxd		Narrabri SAP Biodiversity
Date:	28/04/2023	Drawing Size: A3	
Drawn By:	MB	Reviewed By: MD	Client: Department of Planning and Environment

Coordinate System: GDA 1994 MGA Zone 55

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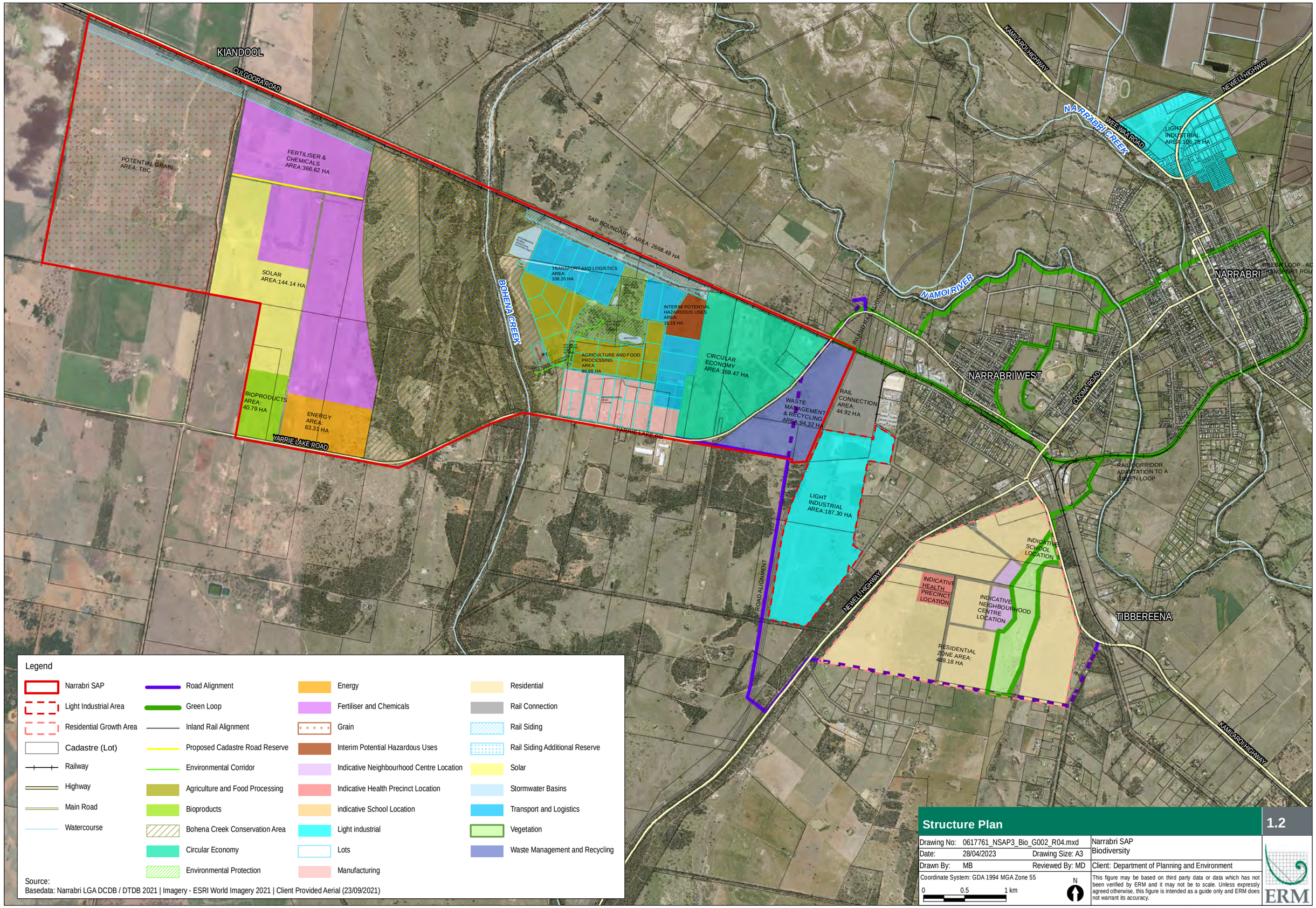

Legend

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- Vegetation
- Waste Management and Recycling

Source:
Basedata: Narrabri LGA DCDB / DTDB 2021 | Imagery - ESRI World Imagery 2021 | Client Provided Aerial (23/09/2021)

Structure Plan

1.2

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In addition to these known areas of constraint that have been addressed, the areas of native vegetation are also likely to support threated species identified in the baseline assessment (Appendix A). The areas of mapped high and moderate quality native vegetation should also be considered potential habitat for these species.

The current draft master plan for the Narrabri SAP has responded to these constraints through land use planning decisions that have protected and retained some of the significant biodiversity values, including:

- Proposed conservation zones to protect the majority of the largest patches of Brigalow TEC.
- Additional conservation zones extend from the Brigalow TEC patch to the south-west providing a connection from the TEC to Bohena Creek.
- Proposed conservation zones in the Residential Growth area along the existing drainage line. Consideration to extend this zone to protect the patch of Brigalow TEC to the west of the drainage line would also be of value.

Key specifications and requirements to assist in the development of the Master Plan are provided in Table E.1-1.

Table E.1-1 Proposed Performance Criteria – Biodiversity

Performance Criteria No.	Performance Criteria Description
1	Avoid all areas of mapped very high biodiversity constraint, including: ■ Threatened Ecological Communities, including all patches of Brigalow. ■ Identified habitat areas for confirmed threatened flora and fauna species that are serious and irreversible entities. These areas must be protected using an appropriate conservation zoning in any amendment to the LEP.
2	Identify and map all native vegetation and threatened species habitat across Narrabri SAP. All high and medium conservation value vegetation should be avoided.
3	Any native vegetation and threatened species habitat that cannot be avoided must be offset in accordance with the *Biodiversity Conservation Act 2016*.
4	Riparian corridors along Bohena Creek to be protected and enhanced, with provision for a minimum 100 m buffer (measured from the top of the bank) on either side and all riparian vegetation to be protected in a conservation zone.
5	The riparian corridor along the drainage line within the residential growth area to be protected and enhanced through the provision of a minimum 20m buffer (measured from the top of bank) on either side to be protected in a conservation or environmental management zoning.
6	The detailed layout and design of the urban residential area must include for the provision of local parks and recreation areas that utilise vegetation and habitats in the SAP.
7	Any revegetation works proposed along the Green Loop area must include the use of locally occurring flora species.

CONTENTS

List of Tables

List of Figures

ACRONYMS AND ABBREVIATIONS

Name	Description
ALA	Atlas of Living Australia
AOBV	Area of Outstanding Biodiversity Value
ARKS	Areas of Regional Koala Significance
BAM	Biodiversity Assessment Method
BC Act	*Biodiversity Conservation Act 2016*
Biodiversity and Conservation SEPP	State Environmental Planning Policy (Biodiversity and Conservation) 2021
BOS	Biodiversity Offset Scheme
BOSET	Biodiversity Offsets Scheme Entry Threshold
CKPoM	Comprehensive Koala Plan of Management
DCS	Department of Customer Service
DoEE	Department of Environment and Energy
DPE	Department of Planning and Environment
EECs	Endangered Ecological Community. EEC is a category of Threatened Ecological Community.
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
ERM	Environmental Resources Management Australia Pty Ltd
Fisheries Act	*Fisheries Management Act 1994*
IBAs	Important Bird and Biodiversity Areas
IUCN	International Union for Conservation of Nature
KHSM	Koala Habitat Suitability Model
LGA	Local Government Area
LLS Act	*Local Land Services Act 2013*
MNES	Matter of National Environmental Significance
MSES	Matter of State Environmental Significance
NP&W Act	*National Parks and Wildlife Act 1974*
NSW TSSC	NSW Threatened Species Scientific Committee
OEH	NSW Office of Environment and Heritage
PCT	Plant Community Type

Name	Description
PMST	Protected Matters Search Tool
Precincts - Regional SEPP	State Environmental Planning Policy - Precincts - Regional) 2021
SAII	Serious and Irreversible Impacts
SEPP	State Environmental Planning Policy
SAP	Special Activation Precinct
SAP Investigation Area	This is the focus of investigation for the Narrabri SAP
SCA	State Conservation Area
SOS	Save our Species
SPRAT	Species Profile and Threats Database
TEC	Threatened Ecological Community. In Australia three categories exist for listing threatened ecological communities: critically endangered, endangered, and vulnerable.
Urban Investigation Area	10km radius of the centre of Narrabri to support additional housing, infrastructure and community and social needs, and the transport network required to support an increasing population. Total area of 31,488 ha.
WONS	Weeds of National Significance

ACKNOWLEDGEMENT OF COUNTRY

We acknowledge country and pay respects to the Gomeroi/Gamilaroi/Gamilaraay/Kamilaroi people as the Traditional Owners and Custodians of the land and waters on which the Narrabri Special Activation Precinct is located on.

We recognise their continued connection to Country and that this connection can be seen through stories of place and cultural practices such as art, songs, dances, storytelling and caring for the natural and cultural landscape of the area.

We also recognise the continuing living culture of Aboriginal people, and the significance of Narrabri in that living culture. We recognise the contemporary stories of displacement and the cultural significance of Narrabri in the continued journey of self-determination in Australia.

1. INTRODUCTION

Environmental Resources Management Australia Pty Ltd (ERM) has been engaged by the Department of Planning and Environment (DPE) to undertake a program of environmental and heritage studies to support the development of the Narrabri Special Activation Precinct (SAP) Master Plan.

This Biodiversity Assessment Report has been designed to test the structure plan that was developed as part of a series of Enquiry by Design Workshops and aims to establish the relevant specifications and requirements to assist in the development of the Master Plan. This document is for design purposes only and has not been prepared to support any development application process.

1.1 Project Background

The New South Wales (NSW) Government, through its introduction of the Special Activation Precincts (SAPs) has identified six distinctive areas throughout regional NSW to bring together planning and investment to stimulate economic growth across a range of industries including freight and logistics, manufacturing, waste management and recycling, energy generation and agricultural and food processing activities. The planning and creation of these areas is partially facilitated and funded through the $4.2 billion Snowy Hydro Legacy Fund.

The establishment of SAPs is a joint NSW Government Agency initiative by the Department of Regional Growth NSW, Department of Planning and Environment (DPE) and the Regional Growth NSW Development Corporation (RGDC) as part of the 20-Year Economic Vision for Regional NSW. DPE is responsible for preparing the planning framework whereas the Department of Regional NSW manages each precinct.

In November 2020, Narrabri was declared the sixth and final SAP investigation area, enabled by its strong reputation and location within Australia's highest productive grain region as well as its strong transportation linkages including existing road and rail connections and the future Inland Rail. To facilitate the planning within this precinct DPE has engaged ERM to prepare a series of technical studies within Narrabri SAP investigation area.

As part of the master planning process and to inform this technical study two Enquiry by Design (EbD) workshops were organised. A preliminary EbD was held on the 29th and 30th of March 2022 to develop three initial land use scenarios. Following an interdisciplinary assessment of the three scenarios, a final EbD workshop was held between 5th and 8th of September 2022 to study the interdisciplinary constraints of the three scenarios and identify and develop a preferred land use Structure Plan. This report assesses the land use Structure Plan refined during the final EbD workshop from a biodiversity risk perspective only.

Narrabri township is located within the Narrabri Shire local government area (LGA), 530 km northwest of Sydney. As of 2021 census, the population of Narrabri township was 6,898 persons with 16% identifying as Aboriginal and/or Torres Strait Island Peoples.

The township lies at the junction of the Newell and Kamilaroi highways and has direct rail connection to the Port of Newcastle via the Walgett branch of the Main North line. Once completed, Narrabri will also have a direct connection to the new Inland Rail route which will connect Melbourne to Brisbane via new and upgraded track.

1.2 Structure Plan

The investigation area for the Narrabri SAP, refined at the Final EbD covers an area of approximately 2,668.49 ha. It is located to the west of the existing township and incorporates two areas separated by an environmental buffer zone. This investigation area is being utilised as a basis for all technical

studies, however, will not necessarily form the final SAP boundary which may change throughout the master planning process.

The Structure Plan describes the preferred land use scenario and the sequencing and/or staging of development and includes the following key considerations:

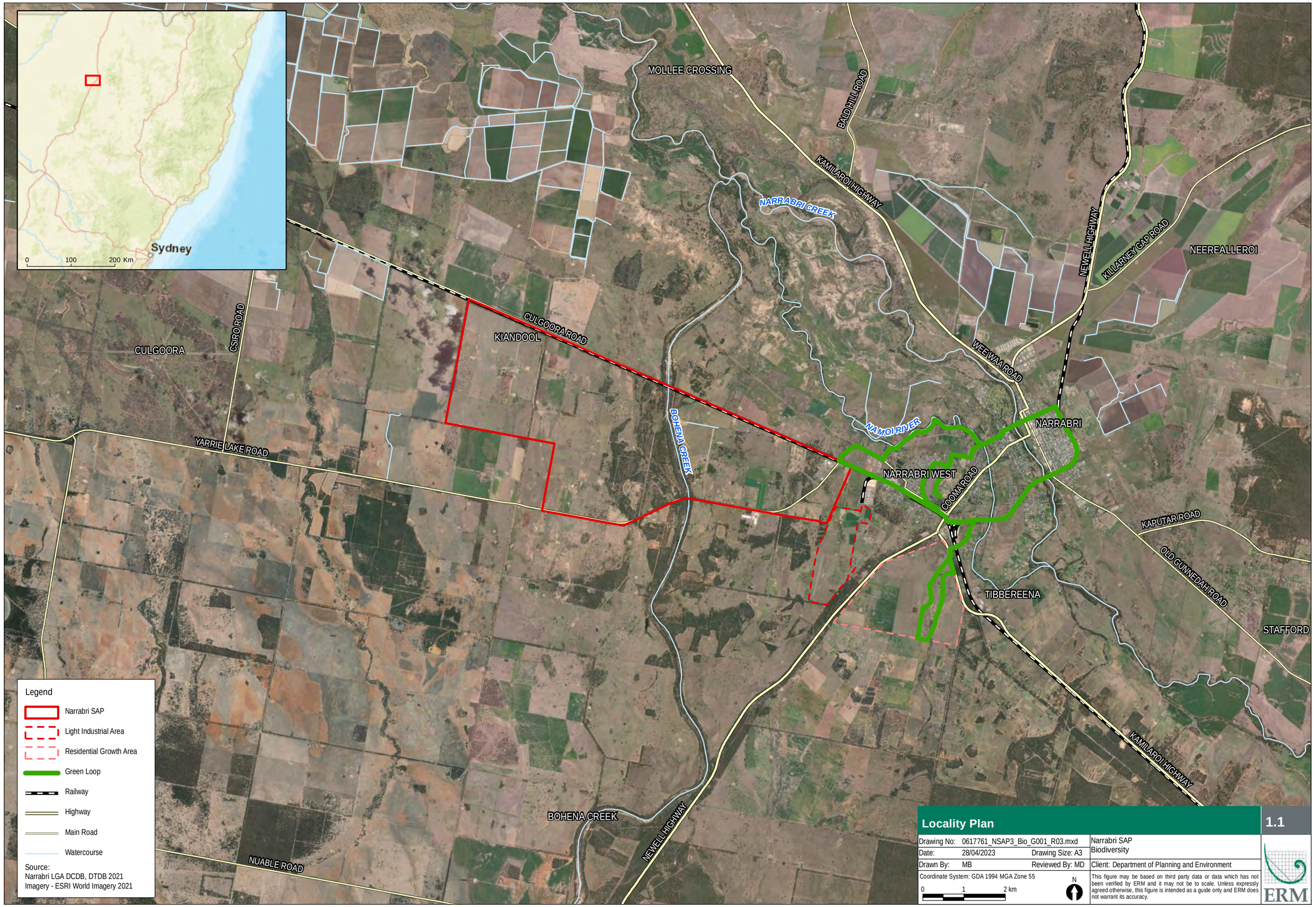
- The relation between the Inland Port and the Narrabri SAP;
- The relationship and interactions between the Narrabri SAP and the existing Narrabri Town Centre; and
- The provision of a residential growth area associated infrastructure for a new residential area, and the relationship between the new residential area and the SAP.

The Narrabri SAP Structure Plan is summarised in Figure 1.2 below. The investigation area for the Narrabri SAP is defined as the red outline on Figure 1.2 below and forms the focus of this technical study. Additional areas outside the Narrabri SAP boundaries but within the place making proposal of the Narrabri SAP are also shown within the Structure Plan and includes a residential growth area, light industrial uses and recreational/open-space use (Green Loop).

1.3 Narrabri Strategic Significance and Local Context

Narrabri township is located within the Narrabri Shire local government area (LGA), approximately 530 km northwest of Sydney, as shown in Figure 1.1. As of 2021 census, the population of Narrabri township was 6,898 persons with 16% identifying as Aboriginal and/or Torres Strait Island Peoples.

The township lies at the junction of the Newell and Kamilaroi highways and has direct rail connection to the Port of Newcastle via the Walgett branch of the Main North line. Once completed, Narrabri will also have a direct connection to the new Inland Rail route which will connect Melbourne to Brisbane via new and upgraded track.



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1.4 Structure Plan

The Narrabri SAP Structure Plan preferred land use scenario is summarised in Figure 1.2 below. The area investigated for the Narrabri SAP, finalised at the Final EbD covers an area of approximately 2668.49 ha. It is located to the west of the existing township and incorporates two areas separated by an environmental buffer zone. This investigation area is being utilised as a basis for all technical studies, however, will not necessarily form the final SAP boundary which may change throughout the master planning process.

The Structure Plan describes the preferred land use scenario and the sequencing and/or staging of development and includes the following key elements:

- The relationship between the Inland Port and the Narrabri SAP;
- The relationship and interactions between the Narrabri SAP and the existing Narrabri Town Centre; and
- The provision of a residential growth area associated infrastructure for new residential area, and the relationship between the new residential area and the SAP.

The Narrabri SAP Structure Plan with proposed land uses is summarised in Figure 1.2. The investigation area for the Narrabri SAP is defined as the red outline on Figure 1.2 below and forms the basis of the boundary for this technical study report. Additional areas outside the Narrabri SAP but within the place making proposal of the Narrabri SAP are shown including the residential growth area, light industrial uses and recreational/open-space use (Green Loop). These areas outside the SAP are not considered as part of this technical study, however recommendations for next steps and planning considerations have been included.

1.5 Master Planning

The master planning process for the SAPs involves the engagement of a range of technical experts to investigate the study area and prepare technical studies (such as this report) specifically designed and scoped for each SAP.

A master planning process for the Precinct is being undertaken by the DPE or Narrabri through an iterative process that will explore a number of planning options for the precinct across a range of technical disciplines.

The technical reports will ultimately inform the development of planning controls for the Narrabri SAP to guide the Precinct's development. These controls will be contained in the master plan, State Environmental Planning Policy (Precincts-Regional SEPP) and delivery plan, and will relate to matters such as amenity, environmental performance, and infrastructure provision.

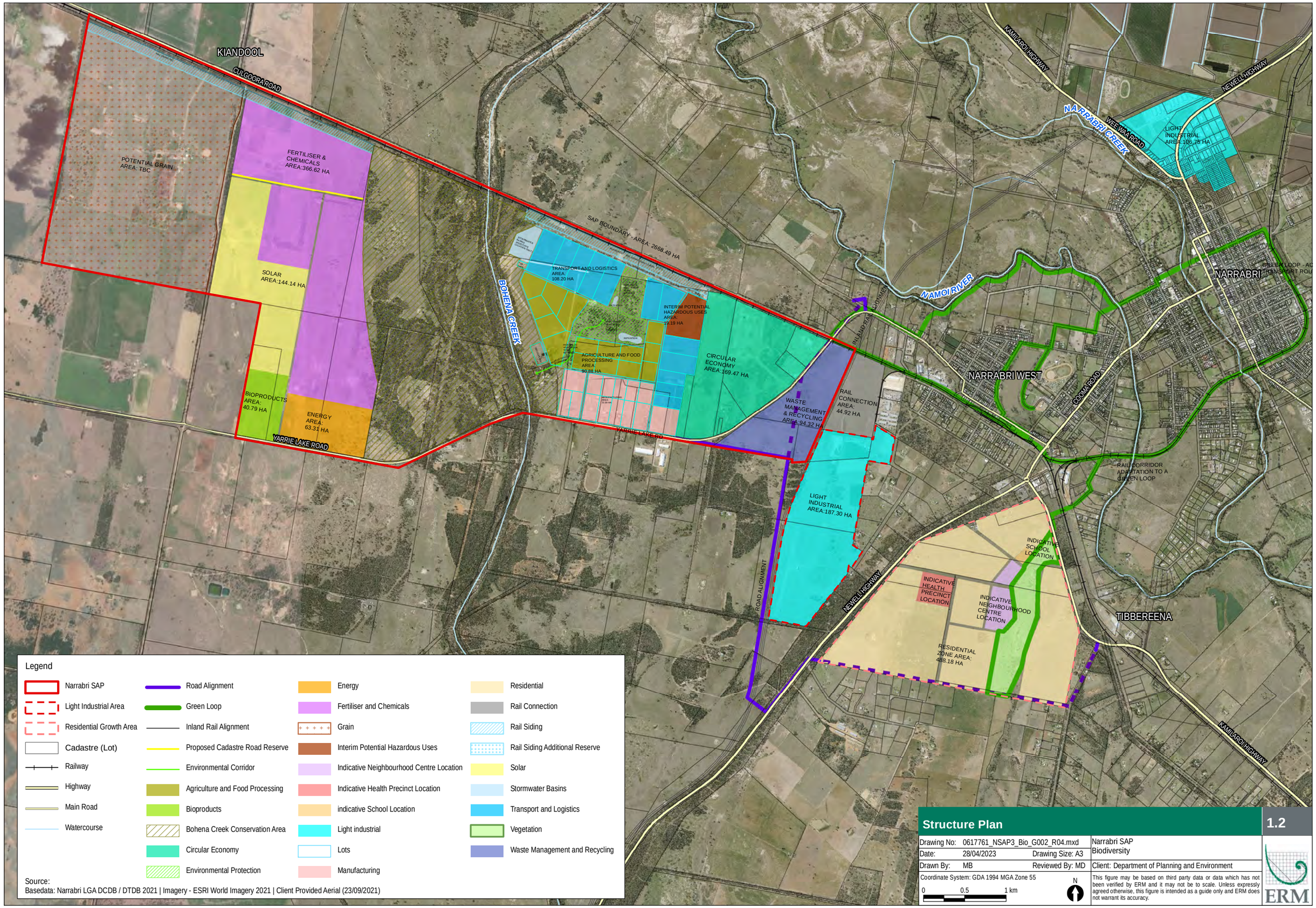
1.6 Purpose of this Report

The objective of this report is to build on the analysis undertaken within the Stage 1 Biodiversity Baseline Assessment and the Stage 2 Biodiversity Scenario Analysis to further refine the understanding of the biodiversity constraints and opportunities within the Narrabri SAP investigation area (as defined in Figure 1.1) in the context of the land use Structure Plan (as defined in Figure 1.2 as proposed following the final EbD workshop in September 2022.

This report presents the results from an initial desktop baseline assessment, with some additional field data from a rapid vegetation assessment completed in September 2022 and February 2023covered a large proportion of the SAP and residential lands. This report has been used to identify known significant features under the Biodiversity Conservation Act 2016 (BC Act) that need to be considered as part of the master planning process, to inform future detailed assessments and approvals.

The BC Act establishes a regulatory framework for assessing and offsetting biodiversity impacts on proposed developments, as well as the process for seeking biocertification of a precinct or area. For the Narrabri SAP, biocertification would involve identifying significant biodiversity values and constraints across the project area, identifying where and how impacts to these features are avoided and minimised, quantifying impacts and calculating the offsets requirements. Biocertification can also propose areas where offsets can be delivered within the master plan area, or alternatively, required offset credits can be sourced through other means, such as the credit supply market.

The application of the Biodiversity Assessment Method (BAM) and the potential for strategic biodiversity certification will be assessed as the SAP project progresses. This report presents an initial analysis of the significant biodiversity features that would need to be considered as part of a biocertification or development assessment process under the BC Act.



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Structure Plan

1.2

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2. TESTING CRITERIA AND METHODOLOGY

A number of desktop sources were reviewed to identify ecological values that may occur within the Narrabri SAP area. An overall Urban Investigation Area was established with a 10km buffer surrounding the Narrabri township. This desktop review was for the Baseline Assessment Report submitted during Stage 1 of project (summary of the findings can be found in Appendix A). The objective was to identify and describe key biodiversity values, both flora and fauna, within the Narrabri region. The databases and other key sources considered are listed in Appendix A.

Desktop searches were conducted across a wider Urban Investigation Area, during the first stages of the Narrabri SAP project. A search area containing the Urban Investigation Area which included a 10km buffer around the town of Narrabri, with a minimum 10 km buffer applied, was used for the database searches. The Urban Investigation Area was an irregular shape and, as such, a bounding rectangle was used (and buffered) for database searches requiring coordinate inputs. As a result, records may be further than 10 km from the Urban Investigation Area boundary at some locations. The Protected Matters Search Tool (PMST) and BioNet results were cross-checked using Atlas of Living Australia (ALA) database locations of records in the context of the actual Urban Investigation Area boundary.

A desktop review was also completed to gain an understanding of the known or likely native vegetation communities and threatened ecological communities (TEC) within the Narrabri SAP and other investigation areas. A single field survey has been completed across a limited portion of the Narrabri SAP area, with some observations made from the boundaries of the residential growth area.

2.1 Field Survey Methodology

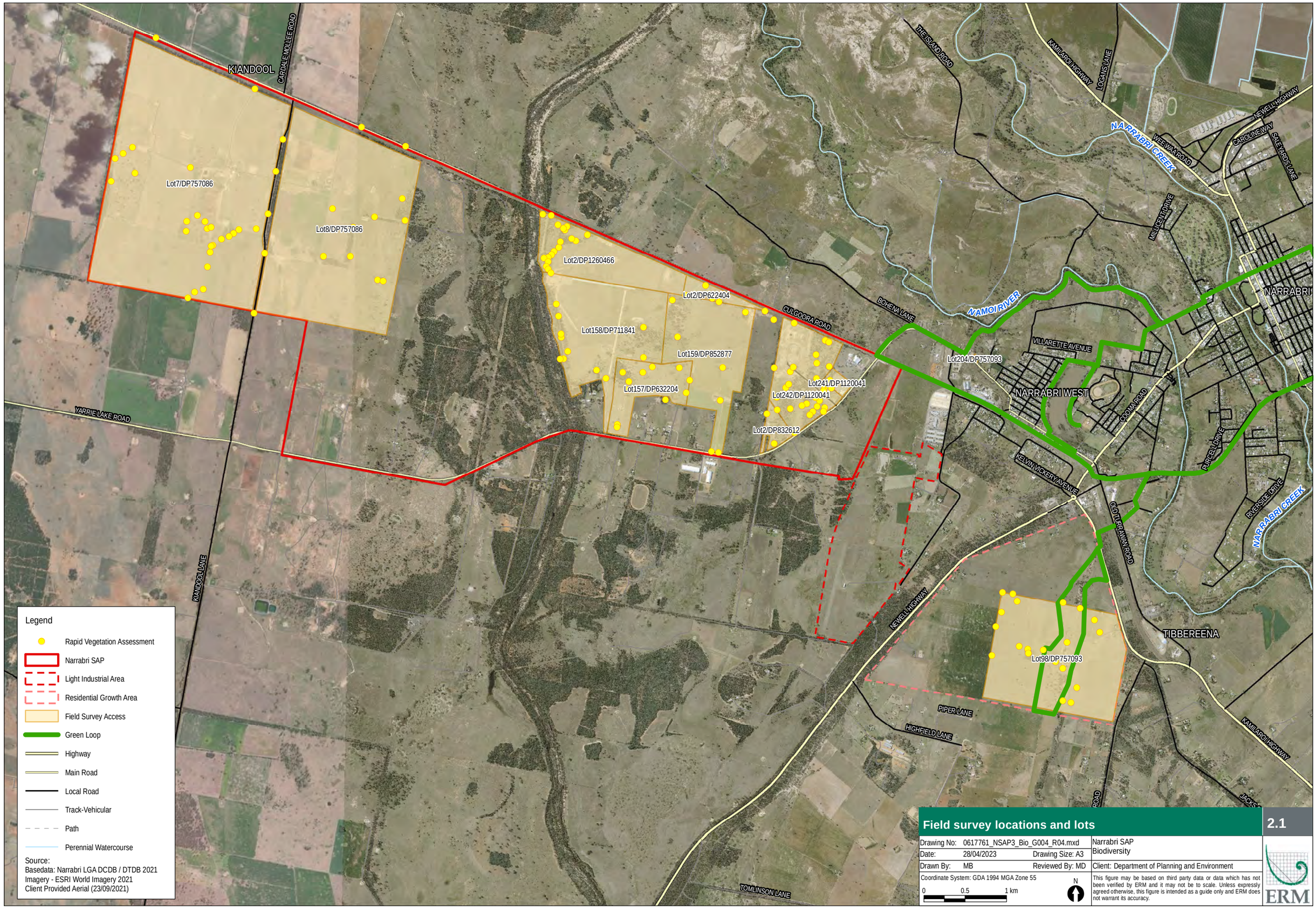
Field surveys were undertaken within the Narrabri SAP area by Ecologists Dr John Hunter and Claire Hewitt (ERM). Survey locations are shown in Figure 2.1.

The temperature ranged between 5.2 and 23.9, and 12.4 and 35 degrees centigrade in the September and February survey periods respectively. The maximum wind speed was 26 kilometres per hour in the September survey period and 44 kilometres per hour in February. No precipitation was recorded in the September survey period and 10.6 mm was recorded within the area for February (Commonwealth of Australia, Bureau of Meteorology, 2022). Heavy rainfall and flooding prior to the September survey period rendered many areas within the Project Site inaccessible and leading to a reduced survey.

Field survey in February utilised BAM to assess whether identified plant community types (PCT) meet threatened ecological community (TEC) criteria under the *Biodiversity Conservation Act 2016* (BC Act) and the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), to undertake targeted survey for candidate threatened species, and assessment of other biodiversity values and landscape context.

Rapid assessment, using random meandering through vegetation communities and identifying the dominant canopy, mid-stratum, lower stratum, and groundcover vegetation, was used to identify PCTs and their likely association with TECs.

A field-verified vegetation map was prepared using the results of the rapid assessment points and aerial photo interpretation. For this report the field verified PCT map covers the majority of the Narrabri SAP and the residential growth area. Details of associated TECs are also provided and whether they are likely to meet criteria for TEC listing under the BC Act and / or the EPBC Act.



Field survey locations and lots

2.1

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2.2 Identification of Known Biodiversity Conservation Values

To provide context on the value of the mapped biodiversity features, the Narrabri SAP has parts of known high biodiversity values that must be considered in the planning process. Key criteria that have been applied in this assessment to determine the preliminary conservation values (based on desktop review of available data rapid vegetation points and BAM plots) include:

- Conservation status under the BC Act and EPBC Act, as well as condition of the vegetation community;
- Patch size and connectivity to existing conservation reserves; and
- Occurrence within identified habitat corridor.

Based on these criteria in Table 2-1 the following areas and features have been identified as having biodiversity conservation values. The following criteria have been applied;

Table 2-1 Key Biodiversity Conservation Values

Biodiversity Conservation Value	Features
Very high	■ Areas mapped on the Biodiversity Values Map ■ Existing Conservation Reserves ■ Areas of desktop mapped and field-verified Threatened Ecological Communities in high or moderate condition. High or moderate condition is defined as having an intact canopy and does not include derived native grassland communities
High	■ Woodland PCTs and native riparian vegetation that are not TECs.
Medium	■ Remaining areas of native vegetation including derived native grassland ■ Habitat linkages over cleared land; ■ Paddock trees recorded as Class 2 or Class 3 (following appendix B of BAM 2020) that require biodiversity offsets at an ecosystem credit level (not mapped at this scale). ■ Vegetated habitat corridors and linkages
Low	■ Disturbed cleared lands and exotic plantations. ■ Land that would meet the definition of Category 1 – exempt under the Local Land Services Act 2013

Areas mapped and classified as having very high biodiversity value should be completely avoided, and measures to improve or enhance the values of these areas considered as part of the Master Plan. For example, areas of threatened ecological communities (TECs) and riparian vegetation close to Bohena Creek must be retained and protected.

Areas of high and medium biodiversity constraint should also be avoided as much as practicable, and opportunities to improve and enhance these areas considered. The Master Plan should protect the north-south corridor of large patches of vegetation that connects Bohena Creek in the south to the northern end of the SAP investigation areas.

2.3 Land Categorisation Criteria

The following Table 2-2 outlines the various criteria that allow for the categorisation of areas of land according to the LLS Act.

Table 2-2 Land categories and criteria that applies to each category.

Land category	Criteria
Category 1 **Exempt Land**	■ Land cleared of native vegetation as of 1 January 1990 or lawfully cleared after 1 January 1990 ■ Low conservation grasslands • Land containing only low conservation groundcover (not being grasslands) ■ Native vegetation identified as regrowth in a Property Vegetation Plan (PVP) under the repealed Native Vegetation Act 2003 only where the PVP specifies a regrowth date. ■ Land bio-certified under the Biodiversity Conservation Act 2016
Category 2 **Regulated Land**	■ Land not cleared as of 1 January 1990 or unlawfully cleared after 1 January 1990 ■ Native vegetation grown with the assistance of public funds (but clearing under the Land Management Code is not permitted on such land while the agreement providing the funds is in force) ■ Land that was subject to a Private Native Forestry property vegetation plan (PVP) that is no longer in force. ■ Grasslands that are neither low nor high conservation grasslands ■ Travelling Stock Reserves, apart from Travelling Stock Reserves in the Western Division
Category 2 **Vulnerable Regulated Land**	■ Steep or highly erodible land ■ Protected riparian areas. ■ Land susceptible to erosion, or land that is otherwise environmentally sensitive

Land category	Criteria
Category 2 **Sensitive Regulated Land**	■ Land subject to a private land conservation agreement as set aside under the *Land Management (Native Vegetation) Code 2018* ■ Land subject to a biocertification conservation measure ■ Land comprising an offset under a Property Vegetation Plan or set aside under a code under the *Native Vegetation Act 2003* ■ Coastal wetlands and littoral rainforests (*Coastal Management Act 2016*) ■ High conservation grasslands ■ Core Koala habitat identified in a plan of management (Koala Habitat Protection State Environmental Planning Policy) ■ Critically endangered plants and critically endangered ecological communities ■ Ramsar wetlands listed under the *Environment Protection and Biodiversity Conservation Act 1999* ■ Land subject to remedial action or conservation measures under the *Biodiversity Conservation Act 2016* ■ Land subject to a property, trust, or conservation agreement ■ Land recommended for listing as an Area of Outstanding Biodiversity Value ■ Land subject to a Private Native Forestry Plan or Private Native Forestry PVP that is in force. ■ Conservation Areas under the Southern Mallee Land Use Agreement ■ Native vegetation that must be retained under the *Plantation and Reafforestation Act 1999* ■ Land subject to a condition of development consent requiring the land to be set aside for conservation purposes under the *Environmental Planning and Assessment Act 1979* ■ Rainforest and old-growth forest
Excluded land	■ Land that is not subject to the LLS Act, such as National Parks, State Forests, and urban areas (subject to the Vegetation SEPP).

2.4 Assumptions and Limitations

The desktop and field assessment undertaken provides an overview of the ecological values that exist within the Narrabri SAP and residential growth area.

The absence of a species from a database list or observational studies does not confirm its absence from the Narrabri SAP or residential investigation area. The lack of existing records from databases is more likely to be reflective of targeted sampling effort, as opposed to the absence of threatening processes and species. To overcome these limitations, detailed surveys, and assessment in accordance with the BAM will be undertaken during future phases, with field surveys to be planned in accordance with survey timeframes for target species.

3. BIODIVERSITY VALUES WITHIN THE NARRABRI SAP

The Narrabri SAP is in the Pilliga Outwash Interim Biogeographic Regionalisation for Australia (IBRA) subregion, within the Brigalow Belt South Bioregion. The Project site predominantly occurs within the Coghill Alluvial plains NSW (Mitchell) Landscape.

The known biodiversity values within the Narrabri SAP area have been described from a combination of desktop and field results.

3.1 Land Category Assessment

As part of the desktop and field investigations, a preliminary land category assessment has been completed to identify areas of land within the Narrabri SAP that would meet the definition of Category 1 – exempt land, as defined by the *Local Land Services Act 2013* (LLS Act) (Figure 3.1).

Rural land zoned RU1-4 and RU6 in NSW is categorised under the *Local Land Services Act 2013* (LLS Act) into three main categories:

- Category 1 (exempt land)
- Category 2 (regulated land, vulnerable regulated land, or sensitive regulated land), and
- Excluded land.

The main purpose of land categorisation under the LLS Act is to govern clearing of vegetation associated with agricultural activities in rural areas. Clearing of vegetation within Category 1 (exempt land) does not require assessment or offsetting under the BAM. In practice, this means that native vegetation within Category 1 is not included in any area clearing calculations when determining whether the Biodiversity Offset Scheme (BOS) applies to a proposal.

Areas of planted vegetation, non-native vegetation, and infrastructure (dams, tracks, roads, buildings, the landfill site) were identified and mapped as PCT 0 (non-native vegetation) as no native vegetation values were present in these areas. Areas that had been highly modified for intensive agriculture, such as cropping, were identified as Category 1 – exempt land.

All other remaining areas have been classified and mapped as Category 2 – regulated vegetation, as they contain native vegetation. These areas have been assigned a biodiversity value that has been considered in the assessment of the master plan.

3.2 Plant Community Types

Vegetation within the Narrabri SAP has been mapped and classified using a combination of desktop and field sources. PCTs confirmed within the Narrabri SAP are listed in Table 3-1 and shown on Figure 3.1 and Figure 3.2. Details of associated TECs are also provided and whether they are likely to meet criteria for TEC listing under the BC Act and / or the EPBC Act. A total of seven PCTs have been verified as occurring within the area of the Narrabri SAP that was subject to field verification, with an additional four PCTs mapped outside the field-verified area.

Table 3-1 Field-verified Plant Community Types in the Narrabri SAP

Plant Community Type (PCT) ID	PCT Name	Threatened Ecological Community (TEC) Association	Notes
35	Brigalow - Belah open forest / woodland on alluvial often gilgaied clay from Pilliga Scrub to Goondiwindi, Brigalow Belt South Bioregion	Listed BC Act (critically endangered): Artesian Springs Ecological Community in the Great Artesian Basin (Part) Listed BC Act (endangered): Brigalow within the Brigalow Belt South, Nandewar, and Darling Riverine Plains Bioregions (Part) Listed EPBC Act (endangered): Brigalow (*Acacia harpophylla* dominant and co-dominant) (Part)	Field survey confirmed areas of high and moderate quality of this PCT conforms to Listed BC Act (endangered) and Listed EPBC Act (endangered) Brigalow TECs PCT 35 does not conform to the Artesian Springs Ecological Community in the Great Artesian Basin TEC
52	Queensland Bluegrass - Mitchell Grass Grassland on cracking clay floodplains and alluvial plains mainly the north-eastern Darling Riverine Plains Bioregion	Listed BC Act (Endangered) Native Vegetation on Cracking Clay Soils of the Liverpool Plains (Part) Listed EPBC Act (Critically Endangered) Natural grasslands on basalt and fine-textured alluvial plains of northern New South Wales and southern Queensland	Only a small patch, 1.85ha, in the middle of the Residential Growth area. Patch of vegetation was in poor condition.
71	Carbeen - White Cypress Pine - River Red Gum - bloodwood tall woodland on sandy loam alluvial and eolian soils in the northern Brigalow Belt South Bioregion and Darling Riverine Plains Bioregion	BC Act (endangered): Carbeen Open Forest Community in the Darling Riverine Plains and Brigalow Belt South Bioregions (Part)	Not listed as occurring in Pilliga Outwash IBRA sub- region but best match for description species description (dominated by (Carbeen (Corymbia tessellaris), lithology (alluvial sand) and landform (alluvial plain).

Plant Community Type (PCT) ID	PCT Name	Threatened Ecological Community (TEC) Association	Notes
88	Pilliga Box - White Cypress Pine - Buloke shrubby woodland in the Brigalow Belt South Bioregion	EPBC Act (endangered): Poplar Box Grassy Woodland on Alluvial Plains (Part)	PCT highly modified within proposed SAP area. Mainly cleared. Doesn't conform to EPBC TEC description as PCT in Narrabri SAP study area does not contain Poplar Box (these areas have been mapped as PCT 397).
206	Dirty Gum - White Cypress Pine tall woodland of alluvial sand (sand monkeys) in the Darling Riverine Plains Bioregion and Brigalow Belt South Bioregion	No associated TEC	Described as occurring on alluvial sand or 'sand monkeys' – areas of PCT at Narrabri SAP site fit this description.
397	Poplar Box - White Cypress Pine shrub grass tall woodland of the Pilliga - Warialda region, Brigalow Belt South Bioregion	EPBC Act (endangered): Poplar Box Grassy Woodland on Alluvial Plains (Part)	Lithology (alluvial loams and clays), landform pattern (alluvial plain) and species description match PCT description.
399	Red gum - Rough-barked Apple +/- tea tree sandy creek woodland (wetland) in the Pilliga – Goonoo sandstone forests, Brigalow Belt South Bioregion	No associated TEC	Occurring on stagnant alluvial plain. Dominated by red gums including Dirty Gum (*Eucalyptus chloroclada*), Blakely's Red Gum (*Eucalyptus blakelyi*). Rough-barked Apple (*Angophora floribunda*), White Cypress Pine, Belah (*Casuarina cristata*) growing on adjoining sandy valley flats.
418	White Cypress Pine - Silver-leaved Ironbark - Wilga shrub grass woodland of the Narrabri-Yetman region, Brigalow Belt South Bioregion	No associated TEC	This is a reasonable canopy species match for the small patch of vegetation near the Hedges' property. The canopy species (*E. albens* & *E. melanophloia*) were possibly planted.

The State Vegetation Type Map (SVTM) has been used as the best desktop resource to map native vegetation across the balance of the investigation areas that have not been subject to field validation. Additional PCTs that have been identified within the Narrabri SAP are provided in Table 3-2 with their location mapped on Figure 3.1 and Figure 3.2.

Table 3-2 Additional desktop Plant Community Types (SVTM, version C1.1.M1)

Plant Community Type (PCT) ID	PCT Name	Threatened Ecological Community (TEC) Association
53	Shallow freshwater wetland sedgeland in depressions on floodplains on inland alluvial plains and floodplains	Artesian Springs Ecological Community in the Great Artesian Basin (Part)
78	River Red Gum riparian tall woodland / open forest wetland in the Nandewar Bioregion and Brigalow Belt South Bioregion	No associated TEC
398	Narrow-leaved Ironbark - White Cypress Pine - Buloke tall open forest on lower slopes and flats in the Pilliga Scrub and surrounding forests in the central north Brigalow Belt South Bioregion	No associated TEC

PCTs that were field verified across the Narrabri SAP were identified as high, moderate, low, and poor condition (Table 3-3)

High condition areas contained good structural form, diverse and representative native vegetation, low numbers of non-native species and lacked evidence of grazing impacts.

Moderate condition areas were similar to high condition areas but were modified through grazing impacts by livestock and / or contained a higher percentage of non-native vegetation.

Low condition areas contained few or no native canopy species representative of the PCT, however they have been modified through grazing impacts and non-native vegetation was present. In most locations assessed, these PCTs that were in a low condition lacked any canopy species and would be considered a derived grassland community.

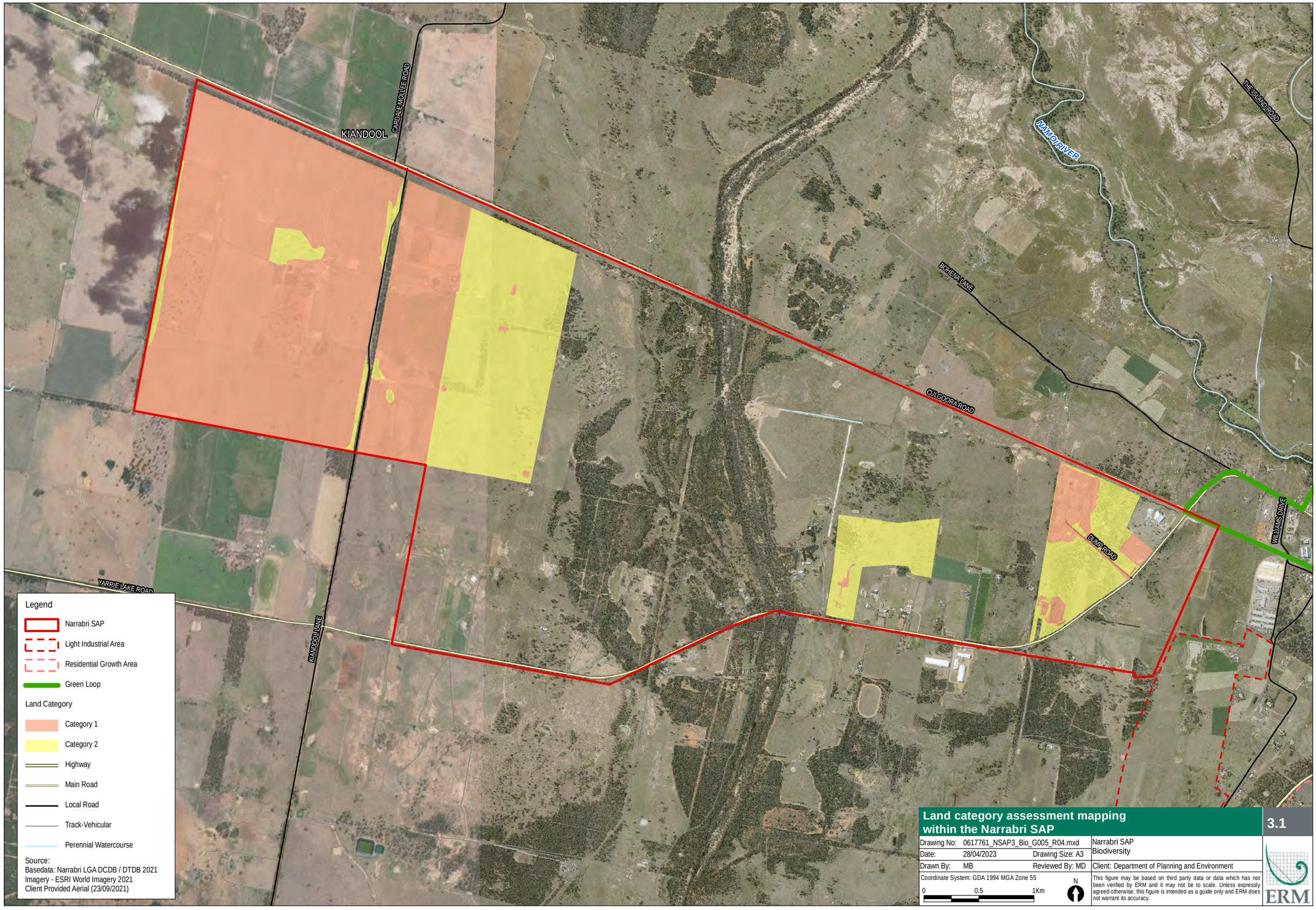
Within portions of the Narrabri SAP and Residential Growth Area that were subject to field verification, the majority of the areas contain vegetation that has been assessed to be in a low or poor condition. This includes 659 ha or 77% of the field verified vegetation communities. This highlights the ecological degradation of the wider area, due to previous clearing and agricultural land uses.

The remaining 23% or 197ha of native vegetation across the field-verified area exists in a few large patches and several smaller, fragmented patches dispersed across the Narrabri SAP and residential growth area. The larger patches of vegetation are areas of medium, high, and very high constraint associated with the Bohena Creek corridor, areas of Brigalow and Carbeen TEC and areas of eucalypt woodland.

Table 3-3 Condition states and areas of field verified PCTs in the Narrabri SAP

PCT	Description and condition	Area (hectares)
0	Infrastructure (includes tracks, dams, buildings, landfill site etc.)	91.0
	Non-native vegetation	698.4
	Planted vegetation	43.5
35	Brigalow - Belah open forest / woodland on alluvial often gilgaied clay from Pilliga Scrub to Goondiwindi, Brigalow Belt South Bioregion	
	Moderate	75.1
	Low	24.2
	Poor	424
71	Carbeen - White Cypress Pine - River Red Gum - bloodwood tall woodland on sandy loam alluvial and eolian soils in the northern Brigalow Belt South Bioregion and Darling Riverine Plains Bioregion	
	High	12.6
	Poor	4
52	Queensland Bluegrass - Mitchell Grass Grassland on cracking clay floodplains and alluvial plains mainly the north-eastern Darling Riverine Plains Bioregion	
	Poor	1.9
56	Poplar Box - Belah woodland on clay-loam soils on alluvial plains of north-central NSW	
	High	0.5
88	Pilliga Box - White Cypress Pine - Buloke shrubby woodland in the Brigalow Belt South Bioregion	
	Moderate	15.1
	Low	11.1
	Poor	6.1
206	Dirty Gum - White Cypress Pine tall woodland of alluvial sand (sand monkeys) in the Darling Riverine Plains Bioregion and Brigalow Belt South Bioregion	
	Moderate	53.3
	Poor	53

PCT	Description and condition	Area (hectares)
397	Poplar Box - White Cypress Pine shrub grass tall woodland of the Pilliga - Warialda region, Brigalow Belt South Bioregion	
	Moderate	32.9
	Poor	131.1
399	Red gum - Rough-barked Apple +/- tea tree sandy creek woodland (wetland) in the Pilliga - Goonoo sandstone forests, Brigalow Belt South Bioregion	
	High	3.0
	Moderate	4.0
	Low	1.7
	Poor	1.5
418	White Cypress Pine - Silver-leaved Ironbark - Wilga shrub grass woodland of the Narrabri-Yetman region, Brigalow Belt South Bioregion	
	Moderate	0.3
	TOTAL	**1688.3**



Land category assessment mapping within the Narrabri SAP

3.1

Drawing No:	0617761_NSAP3_Bio_G005_R04.mxd		Narrabri SAP Biodiversity
Date:	28/04/2023	Drawing Size: A3	
Drawn By:	MB	Reviewed By: MD	Client: Department of Planning and Environment

Coordinate System: GDA 1994 MGA Zone 55

0 0.5 1Km

N

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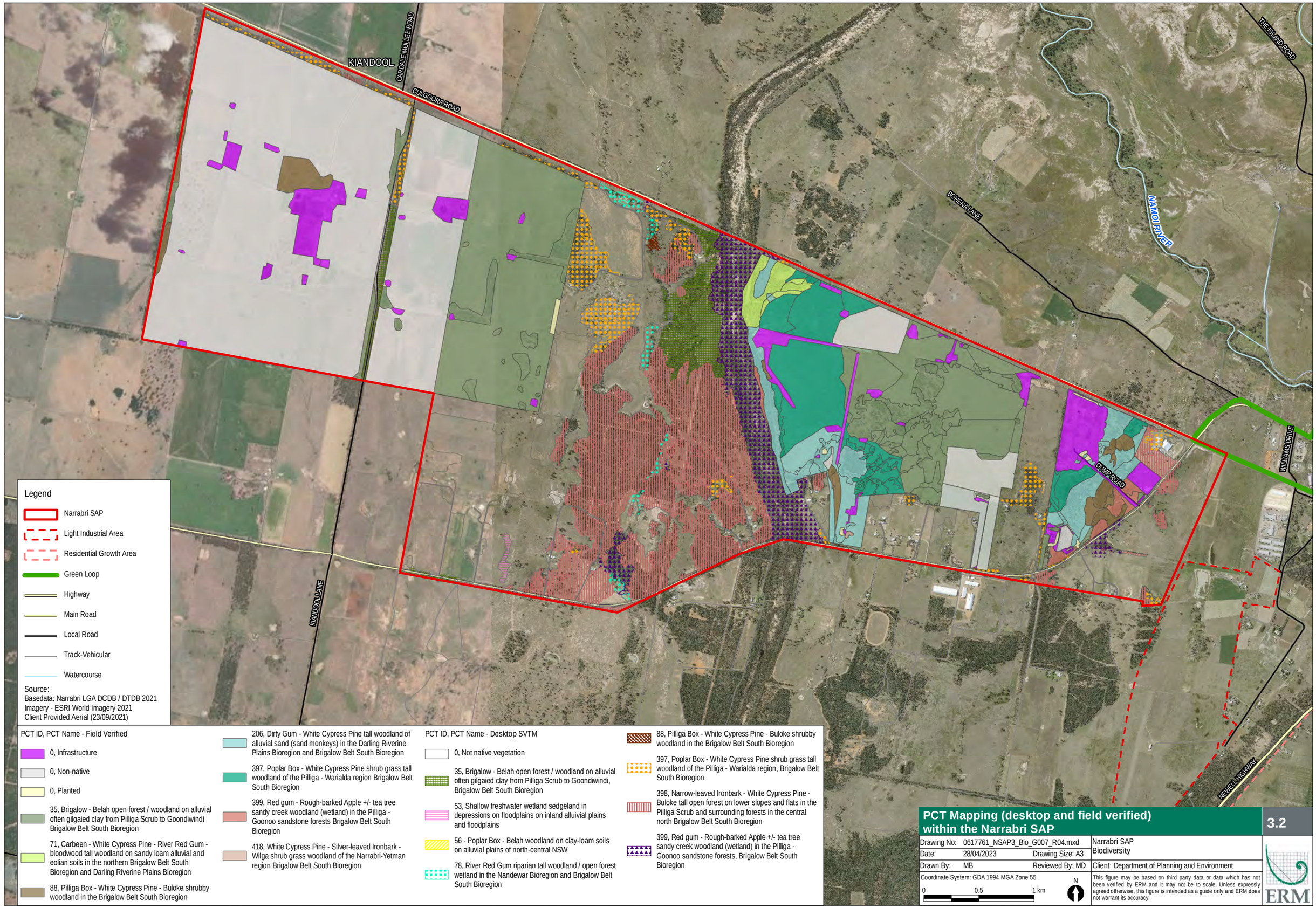

Legend

- Narrabri SAP
- Light Industrial Area
- Residential Growth Area
- Green Loop
- Highway
- Main Road
- Local Road
- Track-Vehicular
- Watercourse

Source:
Basedata: Narrabri LGA DCDB / DTDB 2021
Imagery - ESRI World Imagery 2021
Client Provided Aerial (23/09/2021)

PCT ID, PCT Name - Field Verified

- 0, Infrastructure
- 0, Non-native
- 0, Planted
- 35, Brigalow - Belah open forest / woodland on alluvial often gilgaied clay from Pilliga Scrub to Goondiwindi Brigalow Belt South Bioregion
- 71, Carbeen - White Cypress Pine - River Red Gum - bloodwood tall woodland on sandy loam alluvial and eolian soils in the northern Brigalow Belt South Bioregion and Darling Riverine Plains Bioregion
- 88, Pilliga Box - White Cypress Pine - Buloke shrubby woodland in the Brigalow Belt South Bioregion
- 206, Dirty Gum - White Cypress Pine tall woodland of alluvial sand (sand monkeys) in the Darling Riverine Plains Bioregion and Brigalow Belt South Bioregion
- 397, Poplar Box - White Cypress Pine shrub grass tall woodland of the Pilliga - Warialda region Brigalow Belt South Bioregion
- 399, Red gum - Rough-barked Apple +/- tea tree sandy creek woodland (wetland) in the Pilliga - Goonoo sandstone forests Brigalow Belt South Bioregion
- 418, White Cypress Pine - Silver-leaved Ironbark - Wilga shrub grass woodland of the Narrabri-Yetman region Brigalow Belt South Bioregion

PCT ID, PCT Name - Desktop SVTM

- 0, Not native vegetation
- 35, Brigalow - Belah open forest / woodland on alluvial often gilgaied clay from Pilliga Scrub to Goondiwindi, Brigalow Belt South Bioregion
- 53, Shallow freshwater wetland sedgeland in depressions on floodplains on inland alluvial plains and floodplains
- 56 - Poplar Box - Belah woodland on clay-loam soils on alluvial plains of north-central NSW
- 78, River Red Gum riparian tall woodland / open forest wetland in the Nandewar Bioregion and Brigalow Belt South Bioregion
- 88, Pilliga Box - White Cypress Pine - Buloke shrubby woodland in the Brigalow Belt South Bioregion
- 397, Poplar Box - White Cypress Pine shrub grass tall woodland of the Pilliga - Warialda region, Brigalow Belt South Bioregion
- 398, Narrow-leaved Ironbark - White Cypress Pine - Buloke tall open forest on lower slopes and flats in the Pilliga Scrub and surrounding forests in the central north Brigalow Belt South Bioregion
- 399, Red gum - Rough-barked Apple +/- tea tree sandy creek woodland (wetland) in the Pilliga - Goonoo sandstone forests, Brigalow Belt South Bioregion

PCT Mapping (desktop and field verified) within the Narrabri SAP

3.2

Drawing No:	0617761_NSAP3_Bio_G007_R04.mxd		Narrabri SAP Biodiversity
Date:	28/04/2023	Drawing Size: A3	
Drawn By:	MB	Reviewed By: MD	Client: Department of Planning and Environment

Coordinate System: GDA 1994 MGA Zone 55

0 0.5 1 km

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3.3 Known Threatened Flora within the Narrabri SAP

Due to no targeted surveys being undertaken as part of the preparation of this report and field surveys done only to verify PCT and broad condition classes only, the following is based upon database searches. With research undertaken one (1) threatened flora species was recorded within the Narrabri SAP. Records outside of twenty (20) years are discounted due to being classified as historic. A brief description of identified species and its associated PCT's are provided in Table 3-4.

Table 3-4 Listed Known Threatened Flora Species recorded within the Narrabri SAP

Scientific Name	Common Name	Status[1]		Record[2]	Description[3]	Associated PCT[3]
		EPBC Act	BC Act			
Lepidium monoplocoides	Winged Peppercress	E	E	9 Records (2017)	Erect annual herb or perennial forb, 15-20 cm high, with angular and striped stems roughened with small warts. Leaves narrow and linear, mostly 2-7 cm long. Flowers small, borne in elongated clusters, the petals minute or absent. Fruit a 2-celled, flattened circular pod on a spreading stalk, 5 mm long and about 4 mm wide, with pointed wings extending to a narrow notch at the tip.	88 (Piliga Box) and 397 (Poplar Box)

[1] Conservation status of each species under the EPBC Act and BC Act are defined as follows: CE=critically endangered species, E=endangered species, and V=vulnerable species.

[2] Record attained from ALA. Records outside of 20 years is classified as historic and discounted from this dataset, data generated 19/12/2022.

[3] PCT locations of endangered species was cross referenced with BioNet data and Narrabri SAP PCTs to determine associated PCTs for given species.

KIANDOOL
CARDALE MOLLEE ROAD
CULGOORA ROAD
THE ISLAND ROAD
KAMILAROI HIGHWAY
LOGANS LANE
NEWELL HIGHWAY
NARRABRI CREEK
WEEWAA ROAD
CAROLINE WAY
SALEYARDS LANE
OLD CEMETERY ROAD
MILLICENT DRIVE
MCDONALD LANE
NARRABRI
BOHEMIA LANE
NAMOI RIVER
VILLARETTE AVENUE
WILLIAMS DRIVE
NARRABRI WEST
COOMA ROAD
PURCELL DRIVE
RIVERSIDE DRIVE
KELVIN VICKERY AVENUE
OLD TURRAWAN ROAD
DUMP ROAD
YARRIE LAKE ROAD
KIANDOOL LANE
NEWELL HIGHWAY
TIBBEREENA
PIPER LANE
HIGHFIELD LANE
KAMILAROI HIGHWAY
TOMLINSON LANE

Legend

- Narrabri SAP
- Light Industrial Area
- Residential Growth Area
- Green Loop
- Highway
- Main Road
- Local Road
- Track-Vehicular
- Path
- Watercourse
- Winged Peppercress Habitat (Field Verified)
- Winged Peppercress Habitat (Desktop)

Source:
Basedata: Narrabri LGA DCDB / DTDB 2021
Imagery - ESRI World Imagery 2021
Client Provided Aerial (23/09/2021)

Winged Peppercress Habitat within Narrabri SAP

3.3

Drawing No:	0617761_NSAP3_Bio_G016_R02.mxd		Narrabri SAP Biodiversity
Date:	28/04/2023	Drawing Size: A3	
Drawn By:	MB	Reviewed By: MD	Client: Department of Planning and Environment

Coordinate System: GDA 1994 MGA Zone 55

0 0.5 1 km

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3.4 Known Threatened Fauna within the Narrabri SAP

Two (2) threatened fauna species was recorded within the Narrabri SAP. These records were based on database searches, records outside of twenty (20) years are discounted due to being classified as historic. A brief description of identified species and its associated PCT's are provided in Table 3-5

Table 3-5 Listed Known Threatened Fauna Species within the Narrabri SAP

Scientific Name	Common Name	Status[1]		Record[2]	Description[3]	Associated PCT[3]
		EPBC Act	BC Act			
Circus assimilis	Spotted Harrier	Not Listed	V	1 (2021)	The Spotted Harrier is a medium-sized, slender bird of prey having an owl-like facial ruff that creates the appearance of a short, broad head, and long bare yellow legs. The upperparts are blue grey with dark barring, and the wingtips are black. The face, innerwing patch, and underparts are chestnut. The long tail is boldly banded, with a wedge-shaped tip. Juveniles are mottled and streaked ginger and brown, with prominent ginger shoulders, fawn rump, and banded tail.	35 (Brigalow), 71 (Carbeen), 88 (Piliga Box), 397 (Dirty Gum), 399 (Red Gum) and 418 (White Cypress)
Falco subniger	Black Falcon	Not Listed	V	1 (2013)	The Black Falcon is a large (45-55 cm in length), very dark falcon with pale grey cere, eye-rings and feet. It is uniformly dark brown to sooty black, with a pale throat and an indistinct black streak below each eye.	35 (Brigalow), 88 (Piliga Box), 397 (Dirty Gum), and 399 (Red Gum)

[1] Conservation status of each species under the EPBC Act and BC Act are defined as follows: CE=critically endangered species, E=endangered species, and V=vulnerable species.

[2] Record attained from Atlas of Living Australia. Records outside of 20 years is classified as historic and discounted from this dataset, data generated 19/12/2022.

[3] PCT locations of endangered species was cross referenced with BioNet data and Narrabri SAP PCTs to determine associated PCTs for given species.

KIANDOOL
CARDIALE MOULEE ROAD
CULGOORA ROAD
YARRIE LAKE ROAD
KIANDOOL LANE
THE ISLAND ROAD
BOHENA LANE
DUMP ROAD
NARRABRI CREEK
NAMOI RIVER
WILLIAMS DRIVE
KAMILAROI HIGHWAY
LOGANS LANE
NEWELL HIGHWAY
WEEWAA ROAD
CAROLINE WAY
SALEYARDS LANE
MILL CENTRE DRIVE
NARRABRI
VILLARETTE AVENUE
NARRABRI WEST
COOMA ROAD
KELVIN VICKERY AVENUE
PURCELL DRIVE
RIVERSIDE DRIVE
OLD TURRAWAN ROAD
TIBBEREENA
PIPER LANE
HIGHFIELD LANE
KAMILAROI HIGHWAY

Legend

- Narrabri SAP
- Light Industrial Area
- Residential Growth Area
- Green Loop
- Highway
- Main Road
- Local Road
- Track-Vehicular
- Path
- Watercourse
- Spotted Harrier Habitat (Field Verified)
- Spotted Harrier Habitat (Desktop)

Source:
Basedata: Narrabri LGA DCDB / DTDB 2021
Imagery - ESRI World Imagery 2021
Client Provided Aerial (23/09/2021)

Spotted Harrier Habitat within Narrabri SAP

3.4

Drawing No:	0617761_NSAP3_Bio_G017_R02.mxd		Narrabri SAP Biodiversity
Date:	28/04/2023	Drawing Size: A3	
Drawn By:	MB	Reviewed By: MD	Client: Department of Planning and Environment

Coordinate System: GDA 1994 MGA Zone 55

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N

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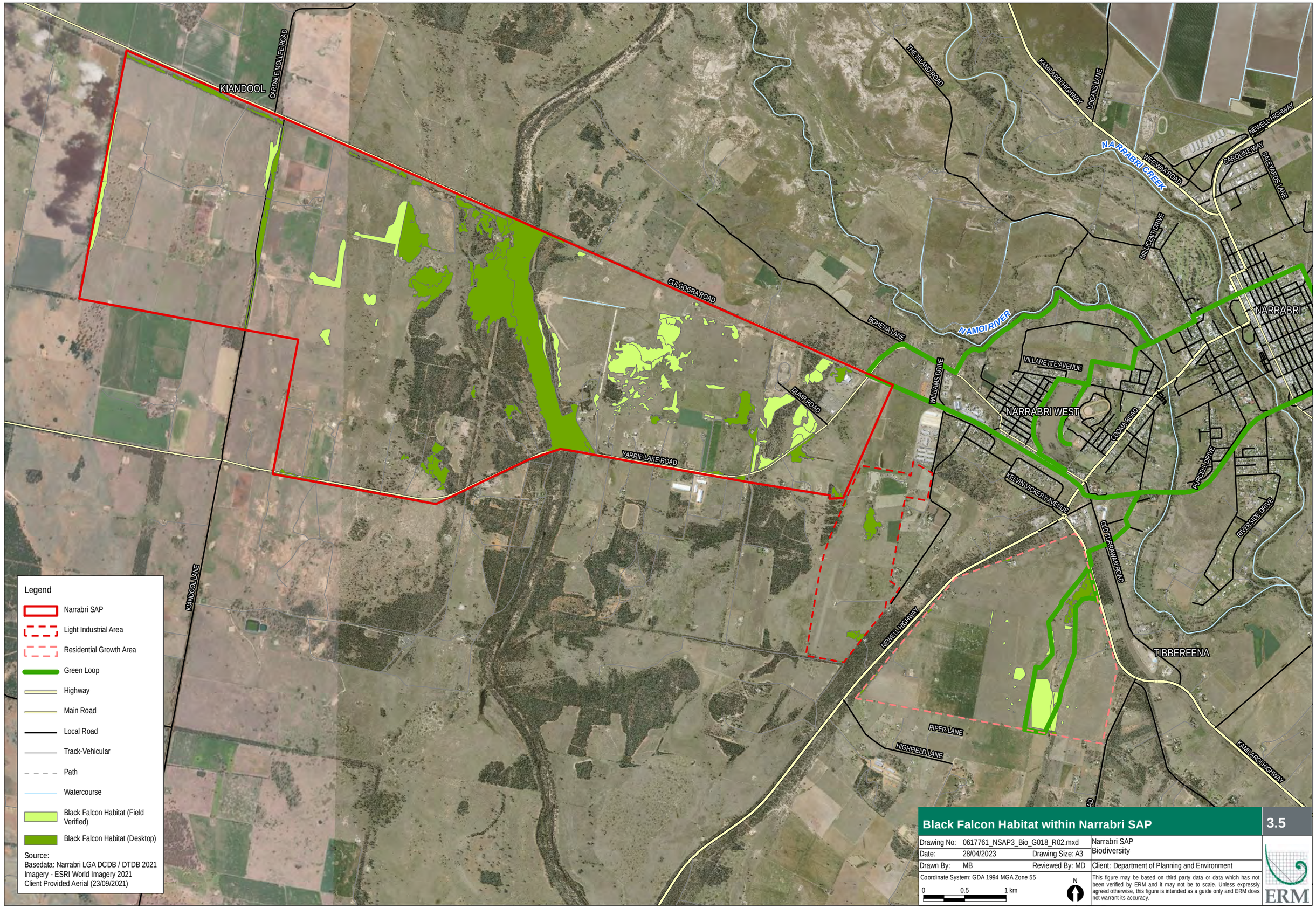

Black Falcon Habitat within Narrabri SAP

3.5

Drawing No:	0617761_NSAP3_Bio_G018_R02.mxd		Narrabri SAP Biodiversity
Date:	28/04/2023	Drawing Size: A3	
Drawn By:	MB	Reviewed By: MD	Client: Department of Planning and Environment

Coordinate System: GDA 1994 MGA Zone 55

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3.5 Threatened Ecological Communities

Field surveys confirmed the presence of three TECs listed under the BC Act and EPBC Act within the Narrabri SAP, these included:

- Brigalow within the Brigalow Belt South, Nandewar, and Darling Riverine Plains Bioregions (Endangered under BC Act and EPBC Act);
- Areas of endangered Poplar Box Grassy Woodland on alluvial plains (Endangered under the EPBC Act)
- Carbeen Open Forest Community in the Darling Riverine Plains and Brigalow Belt South Bioregions (Endangered).

Brigalow within the Brigalow Belt South, Nandewar, and Darling Riverine Plains Bioregions (Brigalow TEC) was the most extensive across the Narrabri SAP in terms of total area and distribution across the centre of the N2IP site (Figure 3.). This TEC was identified through field verification and was not previously identified through review of the State Vegetation Type Map (SVTM), which has these areas mapped as eucalypt open forest communities. A total of 75 ha of Brigalow TEC, as defined under the BC Act has been identified across the Narrabri SAP, as well as the residential growth and light industrial areas.

This TEC is characterised by the dominance of Brigalow (*Acacia harpophylla*) trees in the canopy layer and exists in the Narrabri SAP in the form of larger contiguous patches of vegetation in the centre of the site and smaller fragments. All areas of Brigalow, regardless of patch size are considered to meet the BC Act definition of the TEC.

The community is also considered endangered under the EPBC Act, only when patch size is greater than 0.5ha and when exotic cover in the ground layer is less than 50%. This criteria has been considered when mapping areas of EPBC Act listed Brigalow TEC as shown in Figure 3.2. Only patches assessed as being in a high or moderate condition within the Narrabri SAP, and greater than 0.5ha in size, are considered to be the EPBC Act TEC.

Brigalow TEC is listed as a serious and irreversible impact (SAII) entity under the BC Act and will require additional consideration during any process for approval, whether for a biocertification or development application. The approval Authority is responsible for deciding whether an impact is serious and irreversible. This decision is to be made in accordance with principles set out in clause 6.7 of the *Biodiversity Conservation Regulation 2017*. The approval authority must take any impacts to these species into consideration and determine whether there are any additional and appropriate measures that will minimise those impacts if approval is to be granted.

SAII entities are therefore considered to be a very high biodiversity constraint due to the requirement under the BC Act show how impacts to these features have been avoided and minimised. SAII entities are designated this status due to their conservation significance, and additional measures are afforded to these entities to ensure their protection.

Poplar Box Grassy Woodland is considered endangered under the EPBC Act, key characteristics for this classification require the presence of a dominant *Eucalyptus populnea* (Poplar Box) canopy level with 10% coverage. These areas were found within the Narrarbi SAP with a classified moderate level of condition. Therefore, meeting characteristic requirements to establish this as TEC, despite resources such as BioNet not associating the 397 PCT as such. A total of 19ha of Poplar Box Grassy Woodland, as defined by the EPBC Act characteristics, has been identified within the Narrabri SAP.

The area of known Carbeen Open Forest Community in the Darling Riverine Plains and Brigalow Belt South Bioregions (Carbeen Open Forest) TEC is located in the north-west corner of the N2IP site, within the Bohena Creek riparian zone.

KIANDOOL
CARDALE MOLLEE ROAD
MANDOOLANE
BOHENA LANE
CULGOORA ROAD
MAJOR RIVER
THE ISLAND ROAD
DUMP ROAD
WILLIAMS DRIVE

Legend

- Narrabri SAP
- Light Industrial Area
- Residential Growth Area
- Green Loop
- Highway
- Main Road
- Local Road
- Track-Vehicular
- Watercourse

TEC (Field Verified)

- Brigalow TEC (BC Act)
- Carbeen Open Forest TEC
- Poplar Box Grassy Woodland TEC
- Brigalow TEC (EPBC Act)

TEC (Desktop SVTM)

- Brigalow TEC
- Poplar Box Grassy Woodland TEC

Source:
Basedata: Narrabri LGA DCDB / DTDB 2021
Imagery - ESRI World Imagery 2021
Client Provided Aerial (23/09/2021)

Threatened Ecological Communities within the Narrabri SAP

3.6

Drawing No:	0617761_NSAP3_Bio_G006_R06.mxd		Narrabri SAP Biodiversity
Date:	28/04/2023	Drawing Size: A3	
Drawn By:	MB	Reviewed By: MD	Client: Department of Planning and Environment

Coordinate System: GDA 1994 MGA Zone 55

0 0.5 1 km

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3.6 Summary of Known Biodiversity Conservation Values within the Narrabri SAP

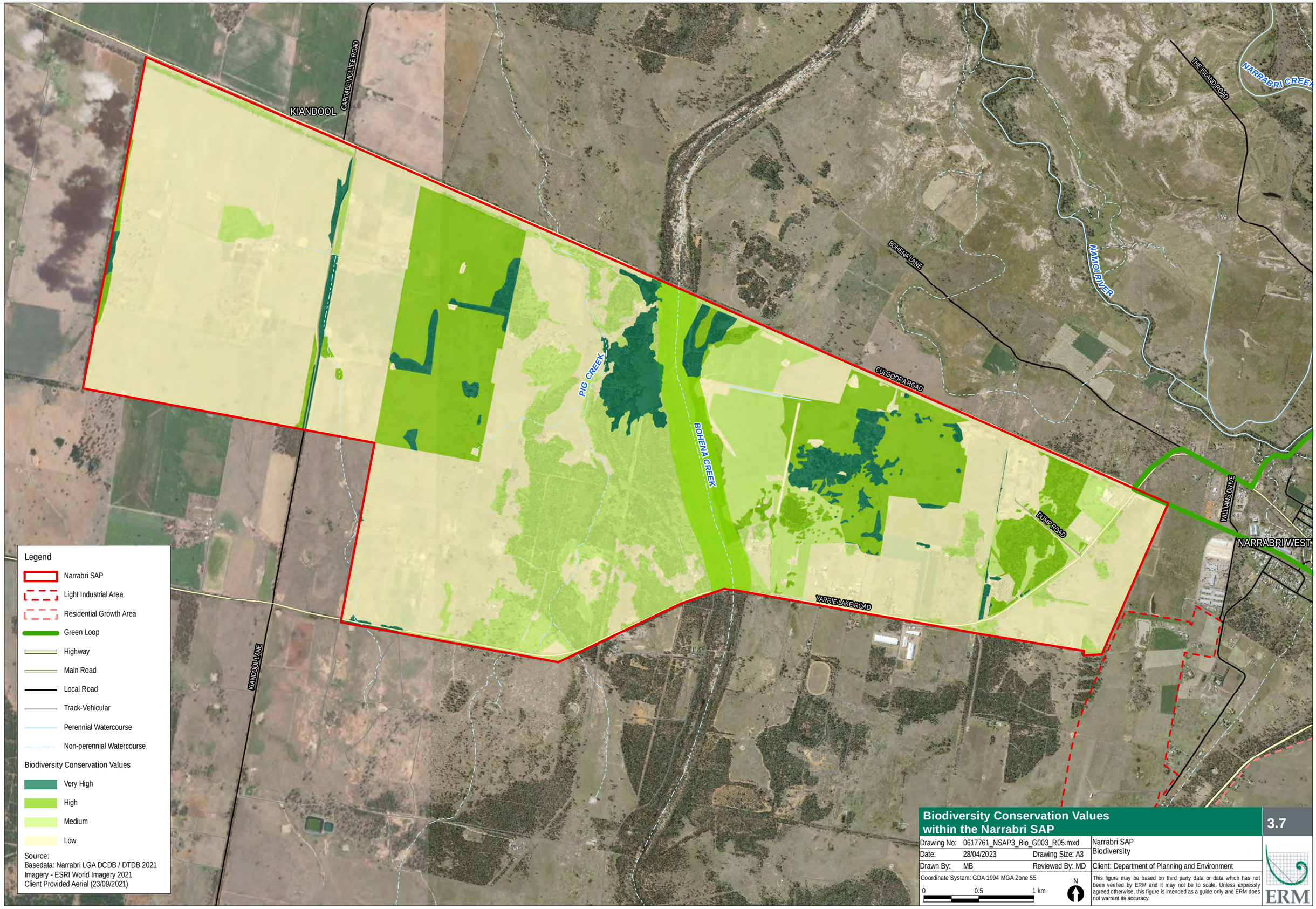
The field and desktop assessment has identified several biodiversity conservation values within the Narrabri SAP area, ranging from very high to low constraint when applying the methodology outlined in Section 2.2 of this report (Table 3-5).

The most important value to consider is the confirmed presence or Brigalow TEC, mapped and confirmed throughout the field surveys. Due to its conservation significance as a BC Act and EPBC Act listed TEC, as well as being an SAII entity, Brigalow TEC is considered a very high constraint. The small patch of Carbeen Open Forest in the north-west corner of the N2IP site is also considered to be a very high constraint.

Areas of high constraint include other patches of field-verified native vegetation communities with a high and moderate condition. These areas of native vegetation also contribute to the provision of habitat for potential listed threatened flora and fauna species that could occur within the Narrabri SAP. Although these have not been field verified as part of this assessment, the areas of high and moderate native vegetation are likely to contribute to habitat for listed threatened species and provide important corridor linkages along Bohena Creek and across the Narrabri SAP site.

Table 3-5 Biodiversity Conservation Values within the Narrabri SAP

Biodiversity Conservation Value	Feature within the Narrabri SAP
Very high	■ Brigalow and Carbeen Open Forest TECs ■ Poplar Box Grassy Woodland on alluvial plains (TEC)
High	■ Woodland PCTs and native riparian vegetation that are not TECs'
Medium	■ Remaining areas of native vegetation including derived native grassland ■ Habitat linkages over cleared land;
Low	■ Disturbed cleared lands and exotic plantations. ■ Category 1 – exempt under the Local Land Services Act 2013



Biodiversity Conservation Values within the Narrabri SAP

3.7

Drawing No:	0617761_NSAP3_Bio_G003_R05.mxd		Narrabri SAP Biodiversity
Date:	28/04/2023	Drawing Size: A3	
Drawn By:	MB	Reviewed By: MD	Client: Department of Planning and Environment

Coordinate System: GDA 1994 MGA Zone 55

0 0.5 1 km

N

ERM

4. BIODIVERSITY VALUES WITHIN THE RESIDENTIAL GROWTH AND LIGHT INDUSTRIAL AREAS

4.1 Land Category Assessment

As part of the desktop and field investigations a preliminary land category assessment has been completed to identify areas of land within the Narrabri SAP that would meet the definition of Category 1 – exempt land, as defined by the *Local Land Services Act 2013* (LLS Act) (Figure 4.1).

Areas of planted vegetation, non-native vegetation, and infrastructure (dams, tracks, roads, buildings, the landfill site) were identified and mapped as PCT 0 as no native vegetation values were present in these areas. Areas that had been highly modified for intensive agriculture, such as cropping, were identified as Category 1 – exempt land. Under the BAM, Category 1 land is exempt from requiring assessment for any future biocertification or development assessment application to be assessed under the BC Act.

All other remaining areas have been classified and mapped as Category 2 – regulated vegetation, as they contain native vegetation. These areas have been assigned a biodiversity value that has been considered in the assessment of the master plan.

4.2 Plant Community Types

Vegetation within the Narrabri SAP has been mapped and classified using a combination of desktop and field sources. PCTs confirmed within the Residential Growth and Light Industrial Areas are listed in Table 4-1 and shown on Figure 4.2 . Details of associated TECs are also provided and whether they are likely to meet criteria for TEC listing under the BC Act and / or the EPBC Act. A total of three PCTs have been verified as occurring within the residential growth area that was subject to field verification, with an additional four PCTs mapped outside the field-verified area.

Table 4-1 Plant Community Types in the Residential Growth and Light Industrial Area

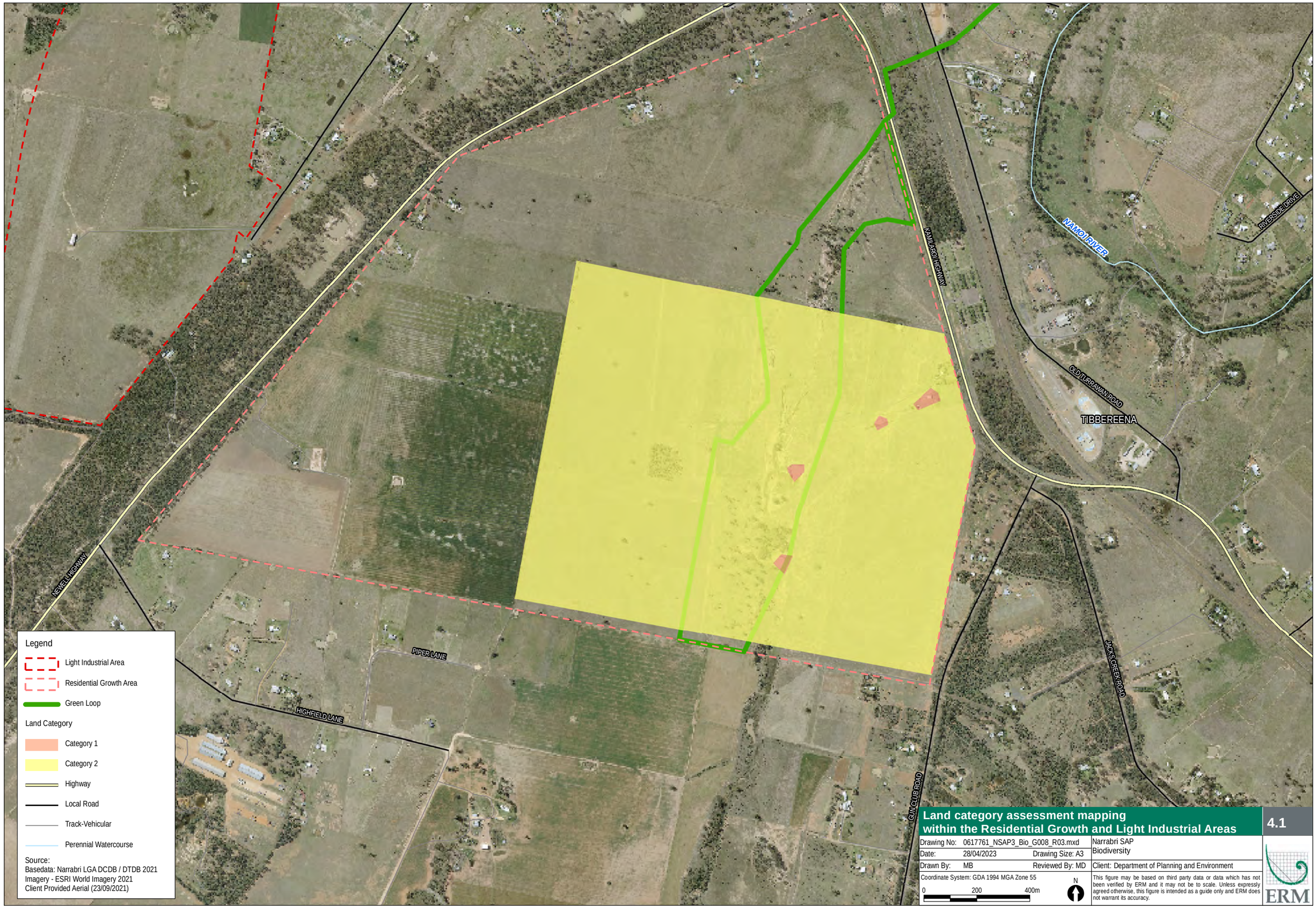
Plant Community Type (PCT) ID	PCT Name	Threatened Ecological Community (TEC) Association	Notes
35	Brigalow - Belah open forest / woodland on alluvial often gilgaied clay from Pilliga Scrub to Goondiwindi, Brigalow Belt South Bioregion	Listed BC Act (critically endangered): Artesian Springs Ecological Community in the Great Artesian Basin (Part) Listed BC Act (endangered): Brigalow within the Brigalow Belt South, Nandewar, and Darling Riverine Plains Bioregions (Part) Listed EPBC Act (endangered): Brigalow (*Acacia harpophylla* dominant and co-dominant) (Part)	Field survey confirmed areas of high and moderate quality of this PCT conforms to Listed BC Act (endangered) and Listed EPBC Act (endangered) Brigalow TECs PCT 35 does not conform to the Artesian Springs Ecological Community in the Great Artesian Basin TEC

Plant Community Type (PCT) ID	PCT Name	Threatened Ecological Community (TEC) Association	Notes
88	Pilliga Box - White Cypress Pine - Buloke shrubby woodland in the Brigalow Belt South Bioregion	EPBC Act (endangered): Poplar Box Grassy Woodland on Alluvial Plains (Part)	PCT highly modified within proposed SAP area. Mainly cleared. Doesn't conform to EPBC TEC description as PCT in Narrabri SAP study area does not contain Poplar Box (these areas have been mapped as PCT 397).
206	Dirty Gum - White Cypress Pine tall woodland of alluvial sand (sand monkeys) in the Darling Riverine Plains Bioregion and Brigalow Belt South Bioregion	No associated TEC	Described as occurring on alluvial sand or 'sand monkeys' – areas of PCT at Narrabri SAP site fit this description.

The State Vegetation Type Map (SVTM) has been used as the best desktop resource to map native vegetation across the balance of the investigation areas that have not been subject to field validation. An additional two PCTs that have been identified within the light industrial area are provided in Table 4-2 with their location mapped on Figure 4.1 and Figure 4.2

Table 4-2 Additional desktop Plant Community Types (SVTM, version C1.1.M1)

Plant Community Type (PCT) ID	PCT Name	Threatened Ecological Community (TEC) Association
397	Poplar Box - White Cypress Pine shrub grass tall woodland of the Pilliga - Warialda region, Brigalow Belt South Bioregion	EPBC Act (endangered): Poplar Box Grassy Woodland on Alluvial Plains (Part)
398	Narrow-leaved Ironbark - White Cypress Pine - Buloke tall open forest on lower slopes and flats in the Pilliga Scrub and surrounding forests in the central north Brigalow Belt South Bioregion	No associated TEC



Land category assessment mapping within the Residential Growth and Light Industrial Areas

4.1

Drawing No:	0617761_NSAP3_Bio_G008_R03.mxd		Narrabri SAP Biodiversity
Date:	28/04/2023	Drawing Size: A3	
Drawn By:	MB	Reviewed By: MD	Client: Department of Planning and Environment

Coordinate System: GDA 1994 MGA Zone 55

0 200 400m

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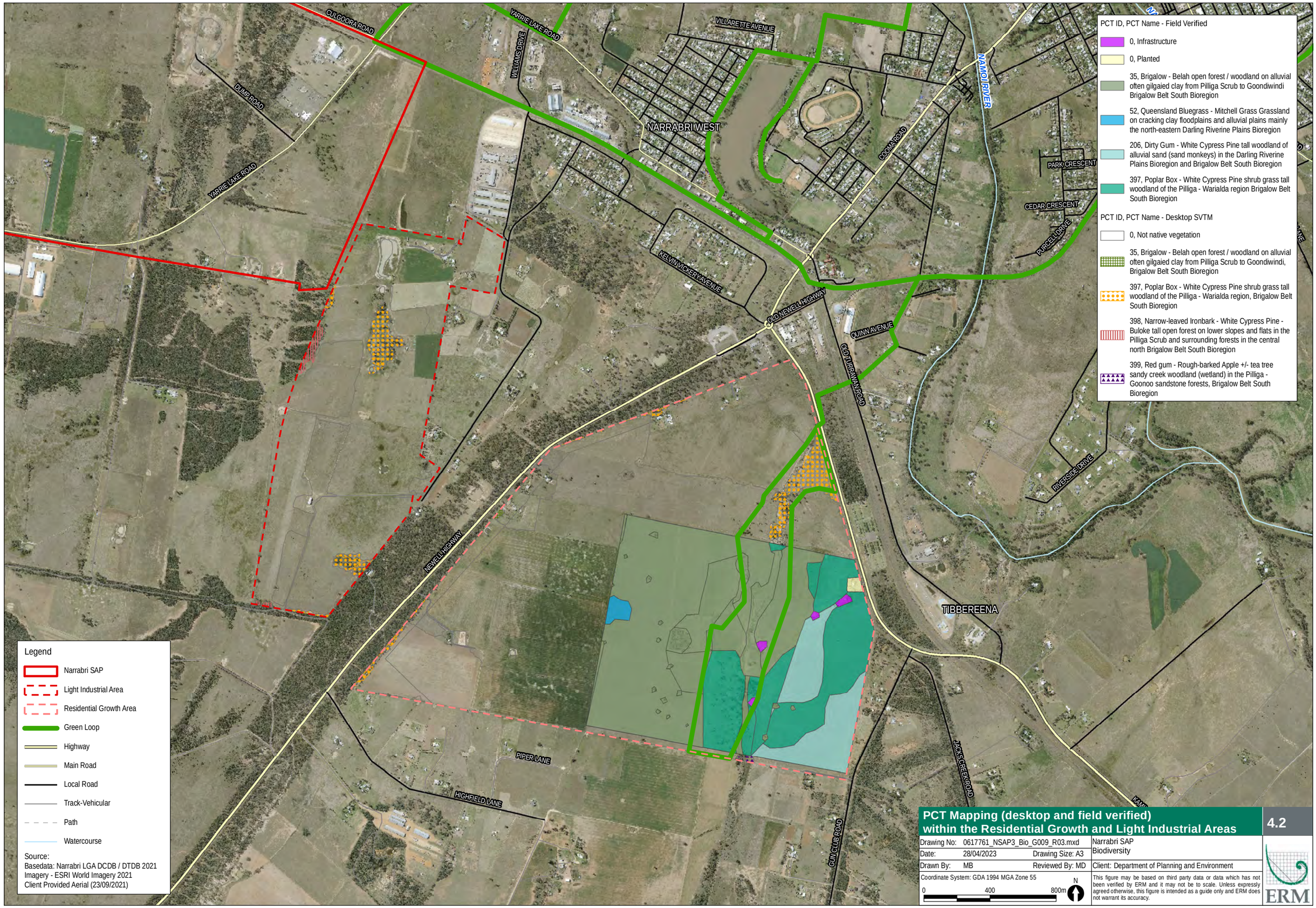

PCT Mapping (desktop and field verified) within the Residential Growth and Light Industrial Areas

4.2

Drawing No:	0617761_NSAP3_Bio_G009_R03.mxd		Narrabri SAP Biodiversity
Date:	28/04/2023	Drawing Size: A3	
Drawn By:	MB	Reviewed By: MD	Client: Department of Planning and Environment

Coordinate System: GDA 1994 MGA Zone 55

0 400 800m N

ERM

4.3 Threatened Ecological Communities

Field surveys confirmed the presence of one TEC listed under the BC Act and EPBC Act within the residential growth area:

- Brigalow within the Brigalow Belt South, Nandewar, and Darling Riverine Plains Bioregions (Endangered under BC Act and EPBC Act).

Brigalow within the Brigalow Belt South, Nandewar, and Darling Riverine Plains Bioregions (Brigalow TEC) was the most extensive across the Narrabri SAP in terms of total area and distribution across the centre of the N2IP site (Figure 3.). This TEC was identified through field verification and was not previously identified through review of the State Vegetation Type Map (SVTM), which has these areas mapped as eucalypt open forest communities. A total of 30ha of Brigalow TEC, as defined under the BC Act has been identified across the Narrabri SAP, as well as the residential growth and light industrial areas.

Within the residential growth area, Brigalow TEC has been mapped in one small patch, approximately 1.8ha in size located to the west of the drainage line that runs through the centre of the site.

This TEC is characterised by the dominance of Brigalow (*Acacia harpophylla*) trees in the canopy layer and exists in the Narrabri SAP in the form of larger contiguous patches of vegetation in the centre of the site and smaller fragments. All areas of Brigalow, regardless of patch size are considered to meet the BC Act definition of the TEC.

The community is also considered endangered under the EPBC Act, only when patch size is greater than 0.5ha and when exotic cover in the ground layer is less than 50%. Only patches assessed as being in a high or moderate condition within the Narrabri SAP, and greater than 0.5ha in size, are considered to be the EPBC Act TEC. As the small patch located on the residential growth area exceeds this size threshold it is also considered to meet the EPBC Act definition of the TEC.

Brigalow TEC is listed as a serious and irreversible impact (SAII) entity under the BC Act and will require additional consideration during any process for approval, whether for a biocertification or development application. The approval Authority is responsible for deciding whether an impact is serious and irreversible. This decision is to be made in accordance with principles set out in clause 6.7 of the *Biodiversity Conservation Regulation 2017*. The approval authority must take any impacts to these species into consideration and determine whether there are any additional and appropriate measures that will minimise those impacts if approval is to be granted.

SAII entities are therefore considered to be a very high biodiversity constraint due to the requirement under the BC Act show how impacts to these features have been avoided and minimised. SAII entities are designated this status due to their conservation significance, and additional measures are afforded to these entities to ensure their protection.

YARRIE LAKE ROAD
KELVIN VICKERY AVENUE
OLD NEWELL HIGHWAY
GOOMA ROAD
NAMOI RIVER
QUINN AVENUE
OLD TURRAWAN ROAD
KAMILAROI HIGHWAY
NEWELL HIGHWAY
TIBBEREENA
GUN CLUB ROAD
JACKS CREEK ROAD
PIPER LANE
HIGHFIELD LANE

Legend

- Narrabri SAP
- Light Industrial Area
- Residential Growth Area
- Green Loop
- Highway
- Main Road
- Local Road
- Track-Vehicular
- Path
- Watercourse

TEC (Field Verified)

- Brigalow TEC (BC Act)
- Poplar Box Grassy Woodland TEC
- Brigalow TEC (EPBC Act)

TEC (Desktop SVTM)

- Brigalow TEC
- Poplar Box Grassy Woodland TEC

Source:
Basedata: Narrabri LGA DCDB / DTDB 2021
Imagery - ESRI World Imagery 2021
Client Provided Aerial (23/09/2021)

Threatened Ecological Communities within the Residential Growth and Light Industrial Areas

4.3

Drawing No:	0617761_NSAP3_Bio_G010_R02.mxd		Narrabri SAP Biodiversity
Date:	28/04/2023	Drawing Size: A3	
Drawn By:	MB	Reviewed By: MD	Client: Department of Planning and Environment

Coordinate System: GDA 1994 MGA Zone 55

0 200 400m

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4.4 Biodiversity Conservation Values within the Residential Growth and Light Industrial Areas

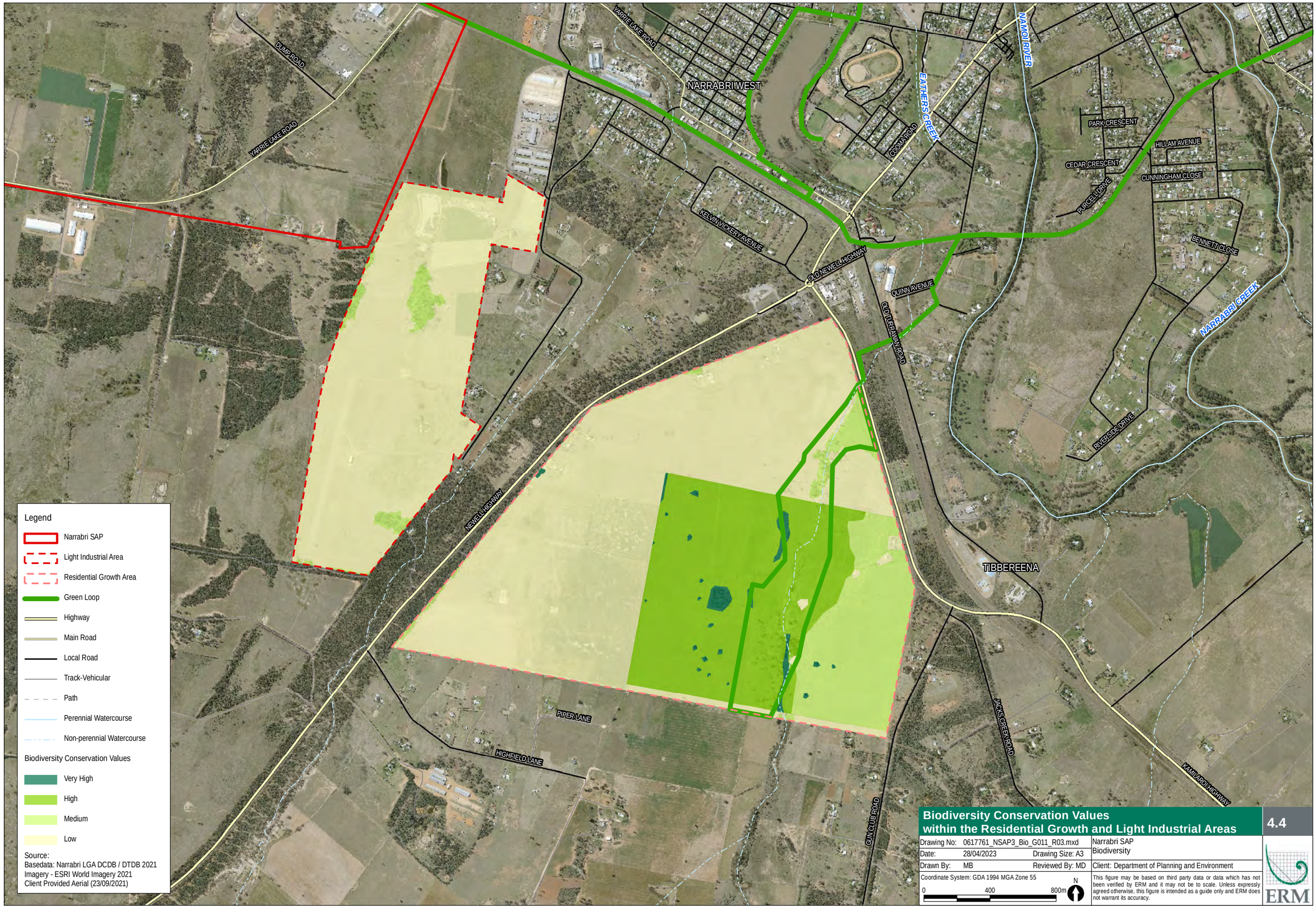
The field and desktop assessment has identified some biodiversity conservation values within the residential growth and light industrial areas, ranging from very high to low constraint when applying the methodology outlined in Section 2.2 of this report (Table 4-3).

The most important value to consider is the confirmed presence or Brigalow TEC, mapped and confirmed throughout the field surveys. Due to its conservation significance as a BC Act and EPBC Act listed TEC, as well as being an SAII entity, Brigalow TEC is considered a very high constraint.

Areas of high constraint include other patches of field-verified native vegetation communities with a high and moderate condition. These areas of native vegetation also contribute to the provision of habitat for potential listed threatened flora and fauna species that could occur within the Narrabri SAP. Although these have not been field verified as part of this assessment, the areas of high and moderate native vegetation are likely to contribute to habitat for listed threatened species and provide important corridor linkages along Bohena Creek and across the Narrabri SAP site.

Table 4-3 Biodiversity Conservation Values within the Residential Growth and Light Industrial Areas

Biodiversity Conservation Value	Feature within the Narrabri SAP
Very high	■ Brigalow TEC
High	■ Field-verified Plant Community Types with an intact canopy of high and moderate condition
Medium	■ Remaining areas of PCTs from field and desktop sources, including field verified vegetation in low condition (derived native communities) and desktop PCTs that are not TECs
Low	■ Disturbed cleared lands and exotic plantations. ■ Category 1 – exempt under the Local Land Services Act 2013



Biodiversity Conservation Values within the Residential Growth and Light Industrial Areas

4.4

Drawing No:	0617761_NSAP3_Bio_G011_R03.mxd		Narrabri SAP Biodiversity
Date:	28/04/2023	Drawing Size: A3	
Drawn By:	MB	Reviewed By: MD	Client: Department of Planning and Environment

Coordinate System: GDA 1994 MGA Zone 55

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5. POTENTIAL IMPACTS AND MITIGATION MEASURES

There are a number known biodiversity values and constraints within the Narrabri SAP, Light Industrial and Residential Growth precincts that have been identified in this biodiversity assessment. The development and implementation of the master plan has the potential to impact on some of these features, whilst also presenting opportunities for the long-term protection and enhancement of biodiversity values.

The most important biodiversity feature identified is the 30ha of Brigalow TEC identified across the Narrabri SAP and Residential Growth Area. The current draft master plan has responded to this constraint by proposing a conservation zone in the centre of the SAP that protects the majority of the Brigalow TEC.

Whilst this conservation zone protects the majority of the Brigalow TEC in the SAP, under the current master plan there will be some impacts to smaller patches across the Narrabri SAP and potentially in the residential growth area. It is recommended that any amendments to the master plan are implemented to maximise retention of all areas of TEC, unless there are significant design constraints that would cause the main land use outcomes to be compromised. The design and retention of vegetation across the precinct must also consider bushfire risk and be designed and managed to comply with the requirement of the NSW RFS Planning for Bushfire Protection 2019.

For the protection, maintenance and enhancement of biodiversity values, the SAP presents a number of potential opportunities. These opportunities can be largely realised through the retention of areas of existing native vegetation, and landscape-scale planning to restore and connect these areas of vegetation. There are also opportunities to engage Traditional Owners and the community with areas of native vegetation and habitat in a meaningful way during the planning process.

Potential opportunities to protect and enhance biodiversity values through the implementation of the Narrabri SAP and the Residential Growth, light industrial and Green Loop precincts include:

- Improved landscape connectivity within and external to the SAP boundary. This includes a green corridor linking two major riparian zones associated with Bohena Creek within the Narrabri SAP and opportunities to enhance connectivity to Narrabri Creek through planning and implementation of the Green Loop;
- Maintain habitat connectivity within the eastern portion of the Narrabri SAP area, through the retention of the larger connected patches of Brigalow TEC and other areas of mapped native vegetation that provide connectivity to Bohena Creek;
- Conserve and protect a minimum 200m wide corridor along the Bohena Creek.
- Protection of a diversity of Plant Community Types representative of the bioregion, including Acacia woodland (Brigalow), Callitris Pine open forest/woodland, eucalypt open forest/woodland and native grasslands;
- Increased understanding of the species and vegetation communities that have significance to Traditional Owners and work to enhance these areas and include traditional knowledge when assigning significance to areas of native vegetation;
- Increased understanding of the local flora and fauna species as well as the ecological drivers impacting population and community health as well as the success of conservation management practices; and
- Investigate opportunities to establish Biodiversity Stewardship Sites in locations where vegetation communities and native species habitats can be enhanced through cost effective management actions. Further detailed field surveys within the SAP will be required to identify PCTs and vegetation zone conditions to identify areas where offsets could be delivered within the SAP areas, or on additional properties outside the boundaries assessed in this report.

6. CONCLUSION AND RECOMMENDATIONS

This biodiversity assessment of the Narrabri SAP, Residential Growth and Light Industrial Area, as well as considerations for the Green Loop have confirmed several significant biodiversity values that have been considered in the development of the master plan. These include:

- Areas of endangered Brigalow TEC that is a SAII entity under the BC Act and
- a listed TEC under the EPBC Act within the Narrabri SAP and Residential Growth Area;
- Areas of Carbeen TEC that is protected under the BC Act as an endangered community located on Bohena Creek;
- Areas of endangered Poplar Box Grassy Woodland listed as Endangered under the EPBC Act within the Narrabri SAP. Area's ground-truthed that meet key characteristic requirements (as stated by EPBC) determine it as a TEC, within the Narrabri SAP;
- The Bohena Creek riparian corridor containing high quality native vegetation communities;
- Areas of moderate and high-quality native vegetation; and
- Local corridors and linkages within the Narrabri SAP and Residential Growth areas, that include connectivity through the Green Loop area to Narrabri Creek and the wider landscape.

In addition to these known areas of constraint that have been addressed, the areas of native vegetation are also likely to support threated species identified in the baseline assessment (Appendix A). The areas of mapped high and moderate quality native vegetation should also be considered potential habitat for these species.

The current draft master plan for the Narrabri SAP has responded to these constraints through land use planning decisions that have protected and retained some of the significant biodiversity values, including:

- Proposed conservation zones to protect the majority of the largest patches of Brigalow TEC.
- Additional conservation zones extending from the Brigalow TEC patch to the south-west providing a connection from the TEC to Bohena Creek.
- Proposed conservation zones in the Residential Growth area along the existing drainage line. Consideration to extend this zone to protect the patch of Brigalow TEC to the west of the drainage line would also be of value.

6.1 Proposed Performance Criteria

Key specifications and requirements to assist in the continued protection and enhancement of biodiversity value through the development of the Master Plan are provided in Table 6-1.

Table 6-1 Proposed Performance Criteria – Biodiversity

Performance Criteria No.	Performance Criteria Description
1	Avoid all areas of mapped very high biodiversity constraint, including: ■ Threatened Ecological Communities, including all patches of Brigalow. ■ Identified habitat areas for confirmed threatened flora and fauna species that are serious and irreversible entities. These areas must be protected using an appropriate conservation zoning in any amendment to the LEP.
2	Identify and map all native vegetation and threatened species habitat across Narrabri SAP. All high and medium conservation value vegetation should be avoided.
3	Any native vegetation and threatened species habitat that cannot be avoided must be offset in accordance with the Biodiversity Conservation Act 2016.
4	Riparian corridors along Bohena Creek to be protected and enhanced, with provision for a minimum 100 m buffer (measured from the top of the bank) on either side and all riparian vegetation to be protected in a conservation zone.
5	The riparian corridor along the drainage line within the residential growth area to be protected and enhanced through the provision of a minimum 20m buffer (measured from the top of bank) on either side to be protected in a conservation or environmental management zoning.
6	The detailed layout and design of the urban residential area must include for the provision of local parks and recreation areas that utilise vegetation and habitats in the SAP
7	Any revegetation works proposed along the Green Loop area must include the use of locally occurring flora species.

APPENDIX A SUMMARY OF THE BASELINE ASSESSMENT

Table A-1 Baseline Biodiversity values in the Narrabri SAP, ERM 2021

Landscape Feature	Summary Notes
IBRA Bioregion	Brigalow Belt South Region Pilliga Outwash IBRA Subregion
Current land uses	The Narrabri SAP Investigation Area is predominately zoned RU1 – Primary Production and R5 – Large Lot Residential. This reflects the primary land use of Primary Production. The area is a sparsely populated rural area.
National Parks Estate and Conservation Areas	No conservation areas protected under the NP&W Act occur within the Narrabri SAP Investigation Area.
Vegetation (Baseline desktop only)	The Narrabri SAP Investigation Area is known to contain a range of vegetation communities. The vegetation communities range from semi-arid woodlands and dry sclerophyll forests to brigalow and belah woodlands. The following Plant Community Types (PCT) are mapped in the Narrabri SAP Investigation Area: ■ 88 Pilliga Box – White Cypress Pine – Buloke Shrubby Woodland ■ 397 Poplar Box – White Cypress Pine Woodland ■ 398 Narrow-leaved Ironbark – White Cypress Pine Open Forest ■ 35 Brigalow – Belah Open Woodland ■ 399 Red Gum – Rough Barked Apple Woodland
Threatened ecological communities	One Critically Endangered and three Endangered Ecological Communities (TEC) listed under the BC Act and EPBC Act may be present in the Investigation Areas: *Critically Endangered:* ■ White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland *Endangered:* ■ Brigalow within the Brigalow Belt South, Nandewar, and Darling Riverine Plains Bioregions ■ Carbeen Open Forest Community in the Darling Riverine Plains and Brigalow Belt South Bioregions ■ Coolibah - Black Box Woodlands of the Darling Riverine Plains and the Brigalow Belt South Bioregion ■ Poplar Box Grassy Woodland on Alluvial Plains. These TECs as identified on the state vegetation mapping only are shown in Table A-6-2
Threatened species	Searches of relevant databases and a literature review have listed a total of two threatened flora species and three threatened fauna species within the Narrabri SAP Investigation Area.

Landscape Feature	Summary Notes
Broad Habitat Types	The Narrabri SAP Investigation Area includes a diverse range of habitats and vegetation communities. For the purposes of this baseline study these have been broadly identified and mapped by ERM as: ■ Disturbed Habitats and candidate native grasslands ■ Acacia (Brigalow) woodlands ■ Shrublands ■ Floodplain swamps ■ Riverine forests ■ Vine thickets ■ Dry sclerophyll forests; and ■ Semi-Arid Woodlands. These have been mapped in Figure 4.2 based on a review of vegetation community mapping, Bionet records and desktop review of recent studies undertaken across the area.
Landscape Connectivity	■ Important local habitat corridors identified in this biodiversity baseline assessment include continuous patches of habitat large enough to sustain viable populations of threatened flora and fauna and to facilitate dispersal movement. These include a combination of: ■ Bohena Creek riparian vegetation, the border of which occurs in the Narrabri SAP investigation area; ■ Large areas of vegetation that facilitate dispersal and movement between adjacent habitats; and ■ Areas of mapped TECs.
High Biodiversity Values Map	A review of the Biodiversity Map Viewer (Department of Customer Service, 2020) confirms that parts of the Narrabri SAP Investigation Area are identified as having biodiversity values.
Serious and Irreversible Impact (SAII)	Two flora species that may be present within the Narrabri SAP Investigation Area are currently listed as potentially being at risk of a serious and irreversible impact (SAII). ■ *Bertya opponens* ■ *Prasophyllum sp*. Wybong The approval authority is responsible for deciding whether an impact is serious and irreversible. This decision is to be made in accordance with principles set out in clause 6.7 of the *Biodiversity Conservation Regulation 2017*. The approval authority must take any impacts to these species into consideration and determine whether there are any additional and appropriate measures that will minimise those impacts if approval is to be granted. Habitat for these species has not been able to be mapped due to limitations for site access and field survey.

Table A-2 Key Resources Used in the Development of Biodiversity Constraints and Opportunities

Information Source/Constraint Parameter	Details	Applicability to Analysis
Database searches (undertaken for the Baseline Assessment)	Protected Matters Search Tool (4/11/2021) Atlas of Living Australia (15/11/2021) BioNet (9/11/2021).	The databases were used to identify threatened species that have been recorded in the SAP or have the potential to occur. The Baseline Assessment identified the species known to occur in the SAP and these species are carried over to this Analysis.
Vegetation mapping (undertaken for the Baseline Assessment)	State Vegetation Type Map (version C1.1.M1)	The vegetation mapping provides the extent of native vegetation within the SAP and also identifies where threatened ecological communities (TECs) occur. **These areas are identified as having medium biodiversity value**
Threatened Ecological Communities	Threatened Ecological Communities are those that are listed as vulnerable, endangered, or critically endangered under the EPBC Act or BC Act. They have been identified and mapped using the Plant Community Type descriptions and State Vegetation Type Mapping dataset.	The vegetation mapping provides the extent of native vegetation in each scenario and also identifies where threatened ecological communities (TECs) occur. **These areas are identified as having high biodiversity value**
Biodiversity Values Map (BVM)	The BVM identifies areas of high biodiversity value and is used to determine when the BOS and BAM is to be applied to a development project.	The BVM is used to identify areas of high biodiversity value that may trigger the BOS within the SAP. **These areas are identified as having high biodiversity value**
Biodiversity Corridors	Important local habitat corridors identified in the Baseline Assessment incorporating continuous patches of habitat large enough to sustain viable populations of threatened flora and fauna and to facilitate dispersal movement.	Corridors are identified where they occur within the SAP as they are areas of high biodiversity value in which impacts should be avoided. **These areas are identified as having medium biodiversity value**
Threatened species records	Known locations of threatened flora and fauna as identified in the Baseline Assessment.	Known locations for threatened species are based on desktop observations from the NSW Bionet Atlas. A conservative approach has been adopted for this assessment and it is assumed that all areas of native vegetation have the potential to provide habitat for threatened species.

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