HAYES ENVIRONMENTAL

Preliminary Biodiversity Assessment

Proposed Rezoning – Glenmore Park East

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Preamble

Planning Proposal

The Planning Proposal (PP) seeks to rezone a 47.95-hectare (ha) parcel of land bounded by the recently upgraded The Northern Road to the east, Glenmore Parkway to the north, Bradley Street to the south and the existing Glenmore Park neighbourhood to the west. The precinct is within the Penrith Local Government Area (LGA) and the land subject to this PP is described as ***Glenmore Park East***.

The precinct is located 10km to the north of the new 24-hour Western Sydney International Airport and 5km south of the Penrith CBD and is centrally located within the Western Parkland City. The precinct is surrounded by the existing the stages of the Glenmore Park Estate (stages 1-3), Penrith Golf Course to the north, the state led Orchard Hills master planned precinct to the east and the Defence Establishment Orchard Hills to the southeast. The precinct is approximately 1km south of the M4 freeway and approximately 5km west of the new Orchard Hills Metro Station which is currently under construction.

Glenmore Park East will contribute to the long-term housing targets of Penrith and the broader Western Parkland City and will contribute to increased housing supply in the short to medium term which is a key priority of the Premier and the NSW Government. The precinct has also been identified as being 'urban capable' and the proponent (Nergl Developments Pty Ltd) is responding to this capability and government priority through the provision of much needed diversity in housing in the Glenmore Park area and to support future local employment within the Western Parkland City, tapping into the new opportunities that will emerge through the delivery of the Western Sydney Aerotropolis. In doing so, the precinct will achieve its vision of *live, work, play*.

The proponent applied to the Department of Planning and Environment in January 2023 for the PP to be considered under the pilot State Assessed Planning Proposal (SAPP) program. From more than 100 applications across NSW, DPE selected this precinct as one of five (5) to be assessed through the SAPP pilot program. In being selected for this pilot program, DPE was satisfied that the proposal:

- demonstrated public benefit through housing supply and alignment with state policies and land use strategies
- contributed to affordable and social housing outcomes
- offered a pathway to the delivery of housing in the short term
- has adequate infrastructure available or that funding is committed for critical infrastructure

Whilst there has been differing views over the last 20 years about how the precinct should be developed, the growth and evolution of the Western Parkland City confirms that the precinct is a logical urban inclusion in the Penrith Local Environmental Plan 2010 (PLEP 2010) whilst being a contemporary gateway to the Penrith LGA.

The Proposal

The precinct is currently zoned C4 Environmental Living (44.93 hectares), R2 Low Density Residential (225 square meters), SP2 Infrastructure (113 square meters) and RE1 Public Recreation (2.98 hectares) under the PLEP 2010. Land within the precinct is currently utilised for rural residential lifestyle properties, with part of the precinct having been approved for a 17-lot rural residential subdivision in 2005.

The proposed Master Plan provides for approximately 1,710 new homes, offering a diverse range of housing options to meet the needs of a changing community. These new homes include approximately 242 traditional detached homes (with an average site area of 320 square meters), 182 smaller attached terraces (with an average site area of 240 square meters), and 1,286 (1, 2 and 3 bedroom) apartments (with an average size of 90 square meters). The proposal also commits to providing a minimum of 5% affordable housing on the site, in collaboration with a Community Housing Provider, surpassing Penrith City Council's target of 3% affordable housing applied in other locations.

Furthermore, the proposed Master Plan accommodates a range of non-residential uses in the precinct, including mixed-use retail spaces, childcare facilities, medical services, food and beverage establishments, a fresh food market, specialty shops, restaurants and cafes, entertainment venues, offices, and a hotel for short-term accommodation supporting visitors and the requirements of nearby defence industry partners. This diverse range of services and amenities aims to meet the needs of both residents and visitors to the precinct.

The precinct will also feature 14.425ha of public open space (including bushland and riparian corridors), 1.02ha of communal open space and 2.935ha of avoided land[1] which is to be partly utilised for flooding, drainage and landscape purposes. In all, these areas total 18.38ha which represents more than 38.3% of the site. The location of parks and open space areas has been thoughtfully chosen to enhance the existing natural landscape, such as hilltops and creek lines, and to preserve significant bushland areas, providing the highest level of amenity for future residents. Additionally, the precinct proposes significant open space embellishments including a commitment to the provision of a public swimming pool, two (2) public tennis courts and high-end play facilities.

The precinct is connected through a series of pathways and cycleways with the integration of public transport at its core, reducing the reliance on private cars and promoting sustainable transportation options. This focus on urban sustainability is not limited to transport alone and will be a core consideration for buildings within the precinct.

Having regard to the proposed Master Plan detailed above, the PP seeks to change the areas zoned C4 Environmental Living and SP2 Infrastructure to a combination of the following zones:

- R2 – Low Density Residential
- R3 – Medium Density Residential
- MU1 – Mixed Use

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[1] *As identified and defined in the Cumberland Plain Conservation Plan.*

- E1 – Local Centre
- SP2 - Infrastructure
- RE1 – Public Recreation
- C2 – Environmental Conservation

The PP also proposes the introduction of various controls and provisions, including minimum lot sizes, building height restrictions, consideration of scenic and landscape values, maximum lot yield, additional permitted uses, urban release area designation, and flexible boundaries between certain zones, to ensure that the statutory framework is in place to deliver the proposed Master Plan.

Vision

Glenmore Park East (GPE) is the welcoming gateway for residents and visitors moving between Western Sydney Airport and the Penrith Local Government Area. This sustainable and liveable precinct fosters an inclusive and engaged community, whilst providing new housing choices that cater for the needs of a diverse and growing Western Parkland City. GPE proudly embraces its ties to the land, its biodiversity, and its stunning vistas of the Blue Mountains.

The urban areas within this precinct will be seamlessly connected through an array of public open spaces and vibrant community amenities that are easily accessible by walking or cycling. Notably, a district-scale hilltop park will serve as a central attraction, welcoming people of all ages.

Residents will have the convenience of working near their homes or opting for efficient public transportation options to reach destinations including the Western Sydney Airport, Penrith, or nearby jobs, ensuring that the precinct offers a genuine 20-minute neighbourhood. All these objectives will be realized by adhering to the core principles of *Live, Work, Play*.

Live: Diversity in housing options is a central aspect of the precinct's Live principle. It encompasses a wide array of housing choices, such as single-family homes, townhouses, apartments, senior-friendly housing, and mixed-use developments. These options are carefully designed to cater to the diverse needs and preferences of future residents in Penrith. The aim is to offer housing that is not only affordable but also aesthetically appealing, nurturing a strong sense of community and belonging among its residents.

Work: Under the Work principle, the precinct incorporates areas for home offices, co-working spaces, and local enterprises that bolster the Glenmore Park East neighbourhood. This urban framework allows residents easy access to workspaces and jobs right within the community, reducing the reliance on cars and long commutes. Additionally, the precinct will feature an Eat Street, which will provide essential amenities akin to those found in a thriving and evolving city, catering to the needs of local residents and visitors to the precinct.

Play: Under the Play principle, the precinct offers dynamic public spaces and communal gathering spots to encourage social engagement and inclusiveness. It is designed to offer a wide range of recreational and leisure activities, including parks, playgrounds, walking and cycling trails, fitness centers, a public swimming pool, and two public tennis courts. Moreover, there will be local

convenience retail and dining options to ensure that residents can enjoy a high level of urban amenities right within the precinct. This comprehensive approach aims to promote an active and vibrant lifestyle for all residents.

The Glenmore Park East Master Plan achieves the vision through sustainable transportation, connectivity, and community development.

Location and Connectivity: Glenmore Park East's strategic location makes it accessible to both the Western Sydney Airport and the Penrith CBD. It is also adjacent to Orchard Hills and benefits from a new Metro system connecting Western Sydney to Sydney City. This connectivity is essential for the area's growth and accessibility.

Sustainable Transportation: The precinct prioritises walking, cycling, and public transport, which aligns with Council's sustainability goals. Promoting these modes of transportation will reduce dependence on cars and help create a more environmentally friendly community.

Street Design: Streets are designed to be perpendicular to the contours of the land. This design not only creates an attractive public domain but also minimises the impact of housing in sloping land. The intention is to create a visually appealing and walkable neighbourhood.

Block Layout: The layout of the blocks is designed to maximise permeability through a network of streets, paths, and building separation. This layout encourages easy access to key destinations, such as The Northern Road (with bus stops) and open space areas including the new 2ha Hilltop Park.

Mixed-Use Development: The Northern Road frontage is envisioned as a mixed-use area with active ground floor uses including (but not limited to) hotel, medical facilities, child care, entertainment, fresh food market, and apartments above. This mixed-use approach will contribute to a vibrant streetscape and offer convenience to residents. A walkable and bike-friendly environment encourages residents to shop, dine, and work close to home.

Eat Street: The Eat Street serves as food and beverage destination for members of the community and visitors. The area is designed for mixed-use development, including shops, restaurants, and apartments, creating a focal point for the community.

Housing Diversity: The vision emphasises the importance of housing diversity, with a mix of housing types and price points. This approach aims to create a well-rounded community that accommodates a range of residents and lifestyles.

Natural Environment: The plan acknowledges the significance of natural watercourses and drainage channels, advocating for their retention, celebration, or enhancement. This approach aligns with principles of biodiversity and sustainable landscaping. The precinct also recognises and retains significant areas of Cumberland Plain woodland which is embedded as a key element of the design.

Open Space: The vision aims to optimise open space, making it multipurpose and accessible for various activities. The Transgrid easement which passes through the site and connects the precinct to the wider Glenmore Park community, is identified as an opportunity for informal sports fields, urban agriculture, and cycleways.

Community Engagement: The plan encourages development that engages and links with riparian zones and natural habitats. It envisions community gardens to provide fresh produce and shared paths for residents and visitors to enjoy nature, culture and artistic expression.

Summary of Biodiversity Assessment

Biodiversity Values

The majority of the land has historically been cleared of native woodland and forest. Small patches of remnant, regrowth and planted native vegetation are scattered across the land.

The vegetation is generally in poor condition, due to historic clearing, thinning, understorey removal, earthworks, grazing, weed-invasion and introduction of exotic and non-local species.

The current extent of native vegetation (not including potential native grassland areas) is 12.1 hectares. This is comprised of:

* PCT 4025 *Cumberland Red Gum Riverflat Forest* (1.1 ha);
* PCT 3320 *Cumberland Shale Plains Woodland* (5.9 ha);
* Planted and unclassed native vegetation requiring further assessment for classification (5.1 ha).

PCT 4025 within the subject land is classed as the threatened ecological community (TEC) *River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions*, listed as 'endangered' under the BC Act. This PCT may also be part of the corresponding EPBC Act listed *River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria*, depending on condition criteria.

PCT 3320 within the subject land is classed as the TEC *Cumberland Plain Woodland in the Sydney Basin Bioregion*, listed as 'critically endangered' under the BC Act. This PCT may also be part of the corresponding EPBC Act listed *Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest*, depending on condition criteria.

No threatened plant or animal species are known to occur on the subject land, or are considered likely to occur. Further targeted surveys are required to confirm absence of some species.

A third order stream[2] in the catchment of Surveyors Creek runs across the northeastern part of the land.

[2] *Strahler classification.*

Impact Assessment

Biodiversity certifcation for the Cumberland Plain Conservation Plan applies to the subject land. Parts of the riparian corridor within the land are classed under the certification as 'Avoided Land' due to important biodiversity values.

The concept masterplan retains all areas of 'Avoided Land'. However, there are likely to be temporary and minor impacts on some of these areas. On this basis, and to provide flexibility for the masterplan, this assessment conservatively assesses all vegetation within the precinct against the requirements of the BC Act. A revised approach to assessment that integrates the existing certifcation can be determined at the development application stage, when further details of the biodiversity values and the development design are available.

The concept masterplan would result in loss of 5.5 hectares of native vegetation, comprised of two TECs and additional planted areas.

The NSW Biodiversity Offsets Scheme would apply to the project. Development in accordance with the concept Masterplan would exceed both the map and area thresholds for entry to the scheme.

The concept masterplan has responded to biodiversity values as follows:

1) Retention of the natural third order stream across the northeastern portion of the subject land. A 60-70m wide riparian corridor would be established along the stream. Rehabilitation and vegetation regeneration works are proposed to restore biodiversity values and create visual amenity for adjacent public landuses.

2) Retention of all native vegetation within the existing transmission line easement. The plan would enable improved connectivity of these habitats with better linkage to the natural stream, and thereby across The Northern Road to the Department of Defence Orchard Hills site.

3) Retention of all planted and regrowth native vegetation along the ridge on the western boundary of the land, with existing clearings to be used as public open space.

4) Retention of the highest value patch of Cumberland Plain Woodland within the precinct lands, located in the south of the precinct, on the eastern boundary. Some adjustment to the edges of the patch would involve loss of edge trees and replacement planting, to enable a more manageable shape for ongoing protection and management.

5) Retention and planting of a row of native vegetation along the eastern boundary of the precinct, bordering The Northern Road, to provide connectivity of retained patches to the main riparian corridor.

6) Retention of planted native vegetation as public open space in the far southwest of the precinct.

Areas of vegetation proposed for removal are generally the smaller and more isolated patches that could not practicably be retained and managed in the long term, and lower quality fringe areas of some

larger patches that are to be retained, where this will enable better reserve shape for ongoing management. For example, by enabling a road boundary that can be used to control overland flows and public use of the land.

Development of the subject land also has the potential to impose a range of indirect impacts on native vegetation retained within the precinct. The concept masterplan has been designed to pre-empt and facilitate management of such impacts at the detailed design stage.

Both TECs present on the subject land are entities listed as being at risk of Serious and Irreversible Impact (SAII). A detailed assessment of the proposed impacts against the SAII principles would be required to be undertaken by the consent authority at the time of development determination. In general, the areas of TEC proposed to be removed are very small patches of low quality woodland and forest, some of which are planted. These areas are not currently viable in the long term.

A detailed assessment of the condition of areas of native vegetation to be removed (involving VIS plot surveys) would be required to enable calculation of the required biodiversity offset. Targeted surveys will be required for some threatened species to confirm absence from the land. The results of this further assessment would not be likely to materially affect the permissibility or feasibility of the concept masterplan.

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Shortened forms

APZ	asset protection zone
BAM	Biodiversity Assessment Method
BAM-C	Biodiversity Assessment Method Calculator
BC Act	*Biodiversity Conservation Act 2016* (NSW)
BC Regulation	Biodiversity Conservation Regulation 2017 (NSW)
BOAMS	Biodiversity Offsets and Agreement Management System
BOS	Biodiversity Offsets Scheme
CEEC	critically endangered ecological community
DBH	diameter at breast height over bark
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Cwlth)
EP&A Act	*Environmental Planning and Assessment Act 1979* (NSW)
EEC	endangered ecological community
HTW	high threat weed
IBRA	Interim Biogeographic Regionalisation for Australia
LLS Act	*Local Land Services Act 2013* (NSW)
MNES	matters of national environmental significance
NSW	New South Wales
PCT	plant community type
SAII	serious and irreversible impact
TBDC	Threatened Biodiversity Data Collection
TEC	threatened ecological community

Terms used in this report

Subject Land	47.95 ha	Land included within the Planning Proposal. Bounded by the recently upgraded The Northern Road to the east, Glenmore Parkway to the north, Bradley Street to the south and the existing Glenmore Park neighbourhood to the west. Refer to Figure 1.
Assessment Area	1,282.2 ha	The area within 1500m of the *subject land*, measured from the boundary of the *subject land*.

Declarations

i. Details and experience of author/s and contributors

Authors and contributors

Name	BAM Assessor Accreditation no. (if relevant)	Position/Role	Tasks performed	Relevant qualifications & experience
Ms Rebecca Hogan	BAAS17090	Lead Ecologist	Project management; Report preparation & certification; Bionet data analysis; GIS work & figure preparation; Identification of Plant Community Type/s; Fauna habitat evaluation; Opportunistic fauna observations.	BSc (environmental biology), UTS Sydney, 1996 MEngMngt, UTS Sydney, 2000 27 years of ecological consulting experience in the Sydney and greater Sydney region. Executive member of the Ecological Consultants Association of NSW.
Mr Daniel Clarke	n/a	Botanist	General botanical inspections. Review and assistance with mapping and identification of plant community type/s;	BSc (Hons) (Botany), University of Sydney, 2010 Cert. IV in General Horticulture, 2005 Cert. II in Bushland Regeneration, 2000 Cert. IV in Workplace Training and Assessment, 2011 Grad. Plant Science Internship, National Herbarium of NSW, Royal Botanic Gardens, 2009 Practicing member of the Ecological Consultants Association of NSW. 23 years of field botanist experience in the Sydney and greater Sydney region.

ii. Conflict of interest

I declare that I have considered the circumstances and there is no actual, perceived or potential conflict of interest

This declaration has been made in the interests of full disclosure to the decision-maker. Full disclosure has also been provided to the client.

Signature:

Rebecca Hogan

Date: 14th September 2023

BAM Assessor Accreditation no: BAAS17090

Stage 1: Biodiversity assessment

1. Introduction

1.1 Planning Proposal

1.1.1 Overview

The Planning Proposal (PP) seeks to rezone a 47.95 hectare (ha) parcel of land bounded by the recently upgraded The Northern Road to the east, Glenmore Parkway to the north, Bradley Street to the south and the existing Glenmore Park neighbourhood to the west.

The precinct is within the Penrith Local Government Area (LGA) and the land subject to this PP is described as ***Glenmore Park East.***

NSW DPE have selected this precinct as one of five (5) to be assessed through the State Assessed Planning Proposal (SAPP) pilot program.

Refer to Figure 1 (Site map) and Figure 2 (Location map).

1.1.2 Subject Land

The precinct is currently zoned C4 Environmental Living (44.93 hectares), R2 Low Density Residential (225 square meters), SP2 Infrastructure (113 square meters) and RE1 Public Recreation (2.98 hectares) under the PLEP 2010.

Land within the precinct is currently utilised for rural residential lifestyle properties, with part of the precinct having been approved for a 17-lot rural residential subdivision in 2005.

The majority of the land has historically been cleared of native woodland and forest. Small patches of remnant, regrowth and planted native vegetation are scattered across the land, with two Plant Community Types (PCTs) confirmed to be present:

* PCT 4025 *Cumberland Red Gum Riverflat Forest*; and
* PCT 3320 *Cumberland Shale Plains Woodland*.

A third order stream[3] in the catchment of Surveyors Creek runs across the northeastern part of the land.

[3] *Strahler classification.*

1.1.3 Proposal

The plan acknowledges the significance of natural watercourses and drainage channels, advocating for their retention, celebration, or enhancement. This approach aligns with principles of biodiversity and sustainable landscaping. The precinct also recognises and retains significant areas of Cumberland Plain woodland which is embedded as a key element of the design.

The proposed Master Plan provides for:

* Approximately 1,710 new homes, offering a diverse range of housing options;
* A range of non-residential uses, including mixed-use retail spaces, childcare facilities, medical services, food and beverage establishments, a fresh food market, specialty shops, restaurants and cafes, entertainment venues, offices, and a hotel for short-term accommodation supporting visitors and the requirements of nearby defence industry partners;
* 14.425ha of public open space (including bushland and riparian corridors), 1.02ha of communal open space and 2.935ha of avoided land[4] which is to be partly utilised for flooding, drainage and landscape purposes. In all, these areas total 18.38ha which represents more than 38.3% of the site.
* Precinct connection through a series of pathways and cycleways with the integration of public transport at its core, reducing the reliance on private cars and promoting sustainable transportation options.

The PP seeks to change the areas zoned C4 Environmental Living and SP2 Infrastructure to a combination of the following zones:

- R2 – Low Density Residential
- R3 – Medium Density Residential
- MU1 – Mixed Use
- E1 – Local Centre
- SP2 - Infrastructure
- RE1 – Public Recreation
- C2 – Environmental Conservation

The PP also proposes the introduction of various controls and provisions, including minimum lot sizes, building height restrictions, consideration of scenic and landscape values, maximum lot yield, additional permitted uses, urban release area designation, and flexible boundaries between certain zones, to ensure that the statutory framework is in place to deliver the proposed Master Plan.

1.1.4 Other documentation

Documents referred to and relied upon in this assessment include:

[4] As identified and defined in the Cumberland Plain Conservation Plan

* *Glenmore Park East Concept Masterplan* (Hatch Roberts Day, 13th September 2023).
* *Flora and Fauna Assessment Report, The Northern Road, Glenmore Park, Proposed Residential Subdivision* (Hayes Environmental, December 2001).
* *Biodiversity Assessment, The Northern Road Upgrade between Glenmore Parkway and Jamison Road* (Roads & Maritime, August 2016).

1.2 Cumberland Plain Conservation Plan

Biodiversity certifcation for the Cumberland Plain Conservation Plan applies to the subject land. Parts of the riparian corridor within the land are classed under the certification as 'Avoided Land' due to important biodiversity values.

The concept masterplan retains all areas of 'Avoided Land'. However, there are likely to be temporary and minor impacts on some of these areas to facilitate restoration of the riparian corridor. There may also be a need for minor impacts related to service installations or pedestrian connections. These impacts on native vegetation within the 'Avoided Land' would require a new assessment and approval under the BC Act.

On this basis, and to provide flexibility for the masterplan, this assessment conservatively assesses all vegetation within the precinct against the requirements of the BC Act. A revised approach to assessment that integrates the existing certifcation can be determined at the development application stage, when further details of the biodiversity values and the development design are available.

1.3 Biodiversity Offsets Scheme entry

Areas of vegetation along the northern section of the third order stream within the subject land are mapped on the DPE Biodiversity Values Map. Refer to Figure 1 (Site Map). The concept masterplan has been designed to retain, protect and enhance the riparian corridor. However, this will necessitate some works within the riparian corridor, on land included on the map.

The minimum lot size applicable to the subject land is 1.0 hectare. The area of clearing threshold for development is 0.5 hectares. The concept masterplan has been designed to retain and protect most areas of native vegetation. Nevertheless, the residual impact is anticipated to exceed 0.5 hectares.

Development in accordance with the concept Masterplan would exceed both the map and area thresholds. The NSW Biodiversity Offsets Scheme would apply.

Much of the native vegetation present on the land has been planted and some of this includes non-local native tree species. The Streamlined small area threshold for the land is 2.0 hectares. It is possible that one or both of the BAM (2020) Streamlined Small Area and Planted Native Vegetation modules may apply.

1.4 Excluded impacts

There are no biodiversity values not assessed under BAM 2020 (listed in s1.5 of BAM 2020) of relevance to the subject land. There are no areas of LLS Act Category 1 – exempt land within the subject land.

1.5 Information sources

Relevant legislation and policies for this report include:

* *Commonwealth Environment Protection & Biodiversity Conservation Act 1999* (EPBC Act)
* *NSW Biodiversity Conservation Act 2016* (BC Act)
* *NSW Biodiversity Conservation Regulation 2017* (BC Reg)
* *NSW Biodiversity Assessment Method Order 2020* (BAM)
* *Penrith Local Environmental Plan 2010* (PLEP)

Relevant guidelines for this report include:

* *Biodiversity Assessment Method Operational Manual – Stage 1*. State of NSW and Department of Planning, Industry & Environment (2020).
* *Biodiversity Assessment Method Operational Manual – Stage 2*. State of NSW and Department of Planning, Industry & Environment (2019).
* Surveying threatened plants and their habitats. NSW survey guide for the Biodiversity Assessment Method (2020). Department of Planning, Industry & Environment (2020).
* Flora species with specific survey requirements. NSW Office of Environment & Heritage.
* *NSW Survey Guide for Threatened Frogs.* Department of Planning, Industry & Environment (2020).
* Guide for mapping threatened species for inclusion in the NSW regulatory framework. Department of Planning, Industry & Environment (2020).
* NSW survey guide – 'Species credit' threatened bats and their habitats (2018).
* Threatened biodiversity survey and assessment: Guidelines for developments and activities. NSW Department of Environment and Conservation (2004, in draft).

Data sources researched include:

* SEED | Sharing and Enabling Environmental Data (www.seed.nsw.gov.au): NSW Interim Biogeographic Regions of Australia (IBRA) regions and subregions, NSW Mitchell Landscapes (version 3.1), State Vegetation Type Map – SVTM_NSW_Extant_PCT.
* NSW Bionet (www.bionet.nsw.gov.au): Vegetation Classification database (PCT profiles including lineage and profile sources), Threatened Biodiversity Data Collection (TBDC), and Atlas sightings.
* Vegetation community descriptions in Tozer *et al* (2010).

- Threatened biodiversity profiles. NSW Office of Environment & Heritage.
- Aerial photography of the site: Department of Lands SIX Viewer, Google Maps 2022 and Nearmap (various dates up to 21st June 2023).
- Lidar contour mapping at 0.5m intervals.
- *A Directory of Important Wetlands in Australia*, Third Edition, Environment Australia (2001). http://www.environment.gov.au/water/wetlands/publications/directory-important-wetlands-australia-third-edition.

2. Methods

2.1 Site context methods

2.1.1 Landscape features

A general inspection of the subject land was undertaken by Ms Rebecca Hogan on the 25th August 2023. Site features were compared in the field to high resolution aerial images of the land (Nearmap, various dates).

2.1.2 Native vegetation cover

An estimate of native woodland and forest cover in the assessment area was obtained through interpretation of aerial images (Nearmap, various dates up to 21/06/2023).

All Plant Community Types (PCTs) relevant to the subject land are of a woodland or forest formation. There are no grassland PCTs of relevance to the proposal that require an estimate of native grassland cover to apply threatened species filters.

2.2 Native vegetation, threatened ecological communities and vegetation integrity methods

2.2.1 Existing information

Small patches of remnant, regrowth and planted native vegetation are scattered across the land, as evident on current aerial imagery.

The most recent regional vegetation mapping (SEED: SVTM_NSW_Extant_PCT) indicates that two Plant Community Types (PCTs) are present:

* PCT 4025 *Cumberland Red Gum Riverflat Forest*; and
* PCT 3320 *Cumberland Shale Plains Woodland*.

A review was undertaken of the scientific descriptions for mapped PCTs within the BioNet Vegetation Classification database. Site data was compared to BioNet PCT descriptions and lineages, and also to the Final Determinations of threatened ecological communities listed under the BC Act and EPBC Act.

2.2.2 Mapping native vegetation extent

Native vegetation extent within the subject land has been mapped using a combination of:

* Previous surveys conducted across parts of the land by Hayes Environmental (2001) and RMS (2016);

* consideration of high resolution Nearmap aerial images spanning several years and seasons; and
* site inspections by Ms Rebecca Hogan on the 25th August 2023, and by Mr Daniel Clarke on 7th September 2023.

2.2.3 Plot-based vegetation survey

Plot-based surveys have not been conducted for this preliminary assessment. Plot data will be required for the DA stage of development assessment to calculate vegetation integrity scores and offset requirements in accordance with BAM (2020).

Sufficient data is available to be confident of plant community type identification and condition assessment for strategic planning purposes.

2.3 Threatened flora survey methods

2.3.1 Review of existing information

A search was undertaken within the BioNet sightings database for records of any threatened species on or in the vicinity of the subject land.

2.3.2 Habitat constraints assessment

Habitat suitability for threatened plant species was assessed on an opportunistic basis while undertaking a random meander by vehicle and on foot through the subject land. This information was considered in conjunction with results from previous field surveys (Hayes Env, 2001; RMS, 2016).

2.3.3 Field surveys

Comprehensive threatened flora surveys have not been conducted for this assessment. Sufficient data is available to provide a high level of confidence in assessment of likelihood of presence of threatened plant species.

Targeted surveys will be required for some species to meet BAM (2020) requirements for the DA stage of development assessment.

2.4 Threatened fauna survey methods

2.4.1 Review of existing information

A search was undertaken within the BioNet sightings database for records of any threatened fauna species on or in the vicinity of the subject land.

2.4.2 Habitat constraints assessment

Habitat suitability for threatened plant species was assessed on an opportunistic basis while undertaking a random meander by vehicle and on foot through the subject land. This information was considered in conjunction with results from previous field surveys (Hayes Env, 2001; RMS, 2016).

2.4.3 Field surveys

Comprehensive threatened fauna surveys have not been conducted for this assessment. Sufficient data is available to provide a high level of confidence in assessment of likelihood of presence of threatened fauna species.

Targeted surveys will be required for some species to meet BAM (2020) requirements for the DA stage of development assessment.

3. Site context

3.1 Assessment area

The assessment area is the area within 1500m of the subject land, measured from the outer boundary of the subject land. Refer to Figure 2 (Location map).

3.2 Landscape features

Landscape features identified within the subject land and assessment area are shown on Figure 1 (Site map) and Figure 2 (Location map), respectively.

3.2.1 IBRA bioregions and IBRA subregions

Subject Land:

- IBRA bioregion: Sydney Basin (SYB)
    - IBRA subregion: Cumberland (SYB08)

Assessment Area:

- IBRA bioregion: Sydney Basin (SYB)
    - IBRA subregion: Cumberland (SYB08)

3.2.2 Rivers, streams, estuaries and wetlands

A third order stream[5] in the catchment of Surveyors Creek runs across the northeastern part of the land. Surveyors Creek drains to the Nepean River to the north.

Two low-lying swampy areas have been created along the stream within the subject land, as a result of earthworks and fill activities associated with adjacent roads and development.

Several small farm dams are scattered across the land, most of which are used by livestock and contain very limited aquatic or macrophytic vegetation.

The whole of the Assessment Area is within the Hawkesbury-Nepean catchment.

There are no DIWA listed 'important wetlands' within the assessment area.

3.2.3 Habitat connectivity

Habitats within the subject land consist of small fragmented patches separated by exotic pastures and developed areas. Refer to Figure 1 (Site Map) and Figure 4 (Native vegetation).

Tenuous linkages occur across major roads and developed areas to more extensive areas of habitat within Orchard Hills Department of Defence lands to the east and Mulgoa Nature Reserve to the west. Refer to Figure 2 (Location Map).

3.2.4 Karst, caves, crevices, cliffs, rocks or other geological features of significance

No such features of geological significance occur within the subject land.

Significant sandstone escarpments are located within the foothills of the Blue Mountains, approximately 5km to the west of the subject land.

3.2.5 Areas of outstanding biodiversity value

Not applicable.

3.2.6 NSW (Mitchell) landscape

Subject Land:

- *Cumberland Plain* (Cpl): Landscape 89% cleared

Assessment Area:

- *Cumberland Plain* (Cpl): Landscape 89% cleared

---

5 *Strahler classification.*

3.2.7 Additional landscape features identified in SEARs

Not applicable.

3.2.8 Soil hazard features

None known.

3.3 Native vegetation cover

Approximately 161 hectares of native woodland and forest in variable condition occurs within the assessment area (based on woody vegetation cover evident on aerial images - Nearmap, various dates).

Mixed native/ornamental tree groups around dwellings and widely scattered native trees within cleared paddocks have generally been excluded from this estimate.

Non-woody native vegetation cover has not been determined. Grassland areas within the assessment area have historically been cleared of woody vegetation for agriculture or rural-residential development. There are no natural grassland communities relevant to the assessment area.

Table 1 summarises the extent of native vegetation cover within the assessment area. Figure 2 (Location Map) shows native vegetation cover within the assessment area.

Table 1 Native vegetation cover in the assessment area

Assessment area (ha)	1,282.2 ha
Total area of native vegetation cover (ha)	160.6 ha
Percentage of native vegetation cover (%)	13 %
Class (0-10, >10-30, >30-70 or >70%)	>10-30%

4. Native vegetation, threatened ecological communities and vegetation integrity

4.1 Native vegetation extent

The subject land is 47.95 ha in size.

The current extent of native vegetation (not including potential native grassland areas) is 12.1 hectares. This is comprised of:

* PCT 3320 Cumberland Shale Plains Woodland (5.9 ha);
* PCT 4025 Cumberland Red Gum Riverflat Forest (1.1 ha);
* Planted and unclassed native vegetation requiring further assessment for classification (5.1 ha).

Refer to Figure 4 (Native vegetation).

4.1.1 Changes to the mapped native vegetation extent

Not relevant. Site inspection and field survey found that aerial images represent the current extent of native vegetation across the subject land.

4.1.2 Areas that are not native vegetation

A variety of vegetation types have been planted within the subject land, for ornamental purposes around existing dwellings, and for screening as part of the previously approved subdivision. These include patches of non-native vegetation and patches of planted native vegetation that do not conform to local plant community types.

Refer to Figure 4 (Native vegetation).

4.2 Plant community types

4.2.1 Overview

Vegetation within the subject land has been assessed as aligning with the BioNet Vegetation Classification PCTs identified within Table 3 below. Their extent is shown on Figure 4 (Native vegetation).

The PCT identification and mapping broadly corresponds with regional vegetation mapping for the subject land (SEED: SVTM_NSW_Extant_PCT), with the following variations:

* Areas mapped as PCT 3320 in the west of the property are mostly planted native vegetation, with some patches predominantly containing non-local species. These areas require further detailed survey work to confirm appropriate classifications.
* Polygon boundaries have been adjusted to match the canopy spread of trees based on current aerial imagery (Nearmap, 21st June 2023), removing common errors caused by shadowing, waterbodies and adjacent exotic gardens.
* Mapping for this assessment has been conducted at a finer scale than the regional map, such that additional small patches and trees have been identified and mapped as native vegetation.

Refer to Table 2 and Figure 4 (Native vegetation). A description of the PCTs is provided in the following subsection.

Table 2 PCTs identified within the subject land

PCT ID	PCT name	Subject land area (ha)
4025	*Cumberland Red Gum Riverflat Forest*	0.84 ha
3320	*Cumberland Shale Plains Woodland*	2.06 ha
-	planted unclassed native vegetation	4.36 ha
	Total area	7.25 ha

4.2.2 PCT 4025: Cumberland Red Gum Riverflat Forest

4.2.2.1 PCT overview

Table 3 PCT 4025 Cumberland Red Gum Riverflat Forest

PCT ID	4025
PCT name	*Cumberland Red Gum Riverflat Forest*
Vegetation formation	Forested Wetlands
Vegetation class	Coastal Floodplain Wetlands
Per cent cleared value (%)	88.84 %
Extent within subject land (ha)	0.84 ha

PCT 4025 within the subject land contains a canopy variously dominated by Forest Red Gum *Eucalyptus tereticornis*, Swamp Gum *Eucalyptus amplifolia* and Rough-barked Apple *Angophora floribunda*. Areas of planted casuarina nearby may be included in this classification. Trees of various ages are present, with evidence of natural regeneration.

The mid-layer contains regenerating eucalypts and casuarina. Some areas are dominated by exotic shrubs including Small-leaved Privet *Ligustrum sinense* and Cassia *Senna pendula*.

The groundlayer is sparse beneath weedy shrubs. Native grasses and groundcovers in more open areas include Basket Grass *Oplismenus imbecilis*, Scurvy Weed *Commelina cyanea*, Saltbushes *Einadia hastata* and *Einadia polygonoides*. Aquatic species present in streams and swampy areas include Cumbungi *Typha orientalis*, *Persicaria* spp and *Damasonium minus*. Exotic species are prevalent throughout.

The PCT is in poor condition as a result of previous clearing, earthworks, stream modification, and effects from adjacent agricultural and residential landuses. Weeds are prevalent and include a variety of invasive and high threat species.

4.2.2.2 Condition states

This PCT is present as a single condition state within the subject land – poor condition.

Photo 1 PCT 4025, zone a – poor

4.2.2.3 Justification of PCT selection

The PCT was identified in the first instance using the BioNet Vegetation Classification filter tool, on the basis of IBRA subregion (Cumberland), and common tree, shrub and grass species present within the vegetation zone.

The profiles of six PCTs (3320, 3321, 3448, 4058, 4025, 3262) which equally best matched the filter criteria were reviewed and considered further.

Upon review of the scientific descriptions contained in the BioNet Vegetation Classification database, PCT 4025 was selected as the best match on the basis of alignment of dominant floristics for each strata, particularly the canopy, and landscape position.

The identification was compared to regional vegetation mapping and results of previous studies. The identification was found to align well, serving as further confirmation.

4.2.2.4 Alignment with TECs

PCT 4025 is associated with the ecological community: *River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions*, listed as 'endangered' under the BC Act.

Vegetation mapped as PCT 4025 on the subject land appears to meet the criteria for listing as this community, and is therefore classed as this TEC for the purpose of this biodiversity assessment.

4.2.2.5 Alignment with EPBC Act listed ECs

PCT 4025 is associated with the ecological community: *River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria*, listed as 'critically endangered' under the EPBC Act.

Vegetation mapped as PCT 4025 on the subject land consists of small highly degraded patches. Further survey work is required to confirm whether some or all of the patches meet the condition criteria for listing as this EC.

4.2.3 PCT 3320: Cumberland Shale Plains Woodland

4.2.3.1 PCT overview

Table 4 PCT 3320 Cumberland Shale Plains Woodland

PCT ID	3320
PCT name	*Cumberland Shale Plains Woodland*
Vegetation formation	Grassy Woodlands
Vegetation class	Coastal Valley Grassy Woodlands
Per cent cleared value (%)	93.03 %
Extent within subject land (ha)	2.06 ha

PCT 3320 within the subject land contains a canopy variously dominated by Narrow-leaved Ironbark *Eucalyptus crebra*, Forest Red Gum *Eucalyptus tereticornis* and Grey Box *Eucalyptus moluccana*, with Rough-barked Apple *Angophora floribunda* occurring near riparian areas. Most areas consist predominantly of semi-mature canopy regrowth, with occasional larger mature trees.

The mid-layer is generally absent. Species recorded include Parramatta Green Wattle *Acacia parramattensis* and Blackthorn *Bursaria spinosa*.

The groundlayer is generally dominated by exotic grasses, with some hardier native species persisting in some areas, particularly near the base of trees. Common groundlayer species recorded include Weeping Meadow Grass *Microlaena stipoides*, Saltbush *Einadia hastata*, Blady Grass *Imperata cylindrica*, Wire Grasses *Aristida* spp, Kidney Weed *Dichondra repens*, White Root *Pratia purpurascens*, Jersey Cudweed *Pseudognaphalium luteo-album*, *Brachycome angustifolia*, Native Bluebell *Wahlenbergia gracilis*, Mulga Fern *Cheilanthes sieberi*, Wallaby Grass *Danthonia tenuior*, Trumpet

Flower *Brunoniella australis*, Bordered Panic *Entolasia marginata* and Common Couch *Cynodon dactylon*.

The PCT is in poor condition as a result of previous clearing, earthworks, stream modification, and effects from adjacent agricultural and residential landuses. Weeds are prevalent and include a variety of perennial grasses, and invasive and high threat species.

4.2.3.2 Condition states

This PCT is present as a single condition state within the subject land – poor condition.

Photo 2 PCT 3320, zone a – poor

4.2.3.3 Justification of PCT selection

The PCT was identified in the first instance using the BioNet Vegetation Classification filter tool, on the basis of IBRA subregion (Cumberland), and common tree, shrub and grass species present within the vegetation zone.

The profiles of six PCTs (3320, 3321, 3448, 4058, 4025, 3262) which equally best matched the filter criteria were reviewed and considered further.

Upon review of the scientific descriptions contained in the BioNet Vegetation Classification database, PCT 3320 was selected as the best match on the basis of excellent alignment of dominant floristics for each strata, particularly the canopy, and landscape position.

The presence of *E moluccana* was used to distinguish areas of PCT 3320 from areas of PCT 4025 within the subject land.

The identification was compared to regional vegetation mapping and results of previous studies. The identification was found to align well, serving as further confirmation.

4.2.3.4 Alignment with TECs

PCT 3320 is associated with two TECs:

* *Cumberland Plain Woodland in the Sydney Basin Bioregion*, listed as 'critically endangered' under the BC Act.
* *Shale Gravel Transition Forest in the Sydney Basin Bioregion*, listed as 'endangered' under the BC Act.

Vegetation mapped as PCT 3320 on the subject land appears to best meet the criteria for listing as *Cumberland Plain Woodland in the Sydney Basin Bioregion*, on the basis of dominant canopy trees (with lack of *Eucalyptus fibrosa* which dominates Shale Gravel Transition Forest) and site location (southwestern portion of the Cumberland Plain).

PCT 3320 is therefore classed as *Cumberland Plain Woodland in the Sydney Basin Bioregion* for the purpose of this biodiversity assessment.

4.2.3.5 Alignment with EPBC Act listed ECs

PCT 3320 is associated with the ecological community: *Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest*, listed as 'critically endangered' under the EPBC Act.

Vegetation mapped as PCT 3320 on the subject land consists of small highly degraded patches. Further survey work is required to confirm whether some or all of the patches meet the condition criteria for listing as this EC.

4.3 Threatened ecological communities

Table 5 TECs within the subject land

TEC name	Profile ID (from TBDC)	BC Act status	EPBC Act status	Associated vegetation zones within the subject land	Area within subject land (ha)
River-Flat Eucalypt Forest on Coastal	10787	E	-	4025a – forest (poor)	0.84 ha

TEC name	Profile ID (from TBDC)	BC Act status	EPBC Act status	Associated vegetation zones within the subject land	Area within subject land (ha)
Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions					
River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria	20383	-	CE	tbc	tbc
Cumberland Plain Woodland in the Sydney Basin Bioregion	10191	CE	-	3320a – woodland (poor)	2.06 ha
Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest	20403	-	CE	tbc	tbc

4.4 Vegetation zones

Vegetation across the subject land is generally in poor condition, consisting of small, degraded and fragmented patches.

The vegetation has been graded into three zones, with several patch sizes applicable to each zone:

i. PCT 4025a: forest (poor) - (0.84 ha).

ii. PCT 3320a: woodland (poor) - (2.06 ha).

iii. Planted native vegetation - (2.97 ha).

Some areas are yet to be classed into one of the above three categories, and some areas currently mapped as planted native vegetation may be re-classed when further details are available.

Patch size was identified using aerial images (Google 2023, and Nearmap, various dates up to 21st June 2023).

Refer to Table 6 (Vegetation zones & patch sizes). Refer to Figure 4 (Vegetation zones & patch sizes).

Table 6 Vegetation zones & patch sizes

Vegetation zone ID	PCT ID number and name	Condition / other defining feature	Area (ha)	Patch size class (select multiple if areas of native vegetation are discontinuous)	No. vegetation integrity plots required for DA assessment and calculations
4025	4025: *Cumberland Red Gum Riverflat Forest*	forest (poor)	0.3	☒ <5 ha ☐ 5–24 ha ☒ 25–100 ha ☐ >100 ha	1
3320	3320: *Cumberland Shale Plains Woodland*	woodland (poor)	3.3	☒ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	2
Unclassed	n/a	n/a	1.9	☒ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☐ >100 ha	2

5. Habitat suitability for threatened species

5.1 Identification of threatened species for assessment

Table 7 Identification of relevant threatened species

Common Name	Scientific Name	BC Act	EPBC Act	Assoc PCTs	No. in IBRA SYB08	Sp/ Eco	min. patch size	% native cover	geogr. constr-aints	habitat constraints	likely relevance to the subject land
Flora											
Deyeuxia appressa	*Deyeuxia appressa*	E	E	3320, 4025	3	S	n/a	n/a	none	-	Unlikely to occur. Survey required to confirm.
Downy Wattle	*Acacia pubescens*	V	V	3320	5788	S	n/a	n/a	none	-	Unlikely to occur. Survey required to confirm.
Dillwynia tenuifolia	*Dillwynia tenuifolia*	V		3320	93	S	n/a	n/a	none	-	Unlikely to occur. Survey required to confirm.
Juniper-leaved Grevillea	*Grevillea juniperina ssp juniperina*	V		3320, 4025	4939	S	n/a	n/a	none	-	Unlikely to occur. Survey required to confirm.
Hibbertia puberula	*Hibbertia puberula*	E		3320	1248	S	n/a	n/a	none	-	Unlikely to occur. Survey required to confirm.
Hibbertia sp Bankstown	*Hibbertia sp Bankstown*	CE	CE	4025	363	S	n/a	n/a	none	-	Unlikely to occur. Survey required to confirm.
Micromyrtus minutiflora	*Micromyrtus minutiflora*	E	V	3320	828	S	n/a	n/a	none	-	Unlikely to occur. Survey required to confirm.

Common Name	Scientific Name	BC Act	EPBC Act	Assoc PCTs	No. in IBRA SYB08	Sp/ Eco	min. patch size	% native cover	geogr. constr-aints	habitat constraints	likely relevance to the subject land
Hairy Geebung	*Persoonia hirsuta*	E	E	3320	51	S	n/a	n/a	none	-	Unlikely to occur. Survey required to confirm.
Nodding Geebung	*Persoonia nutans*	E	E	3320	2541	S	n/a	n/a	none	-	Unlikely to occur. Survey required to confirm.
Pimelea curviflora var curviflora	*Pimelea curviflora var curviflora*	V	V	3320	69	S	n/a	n/a	none	-	Unlikely to occur. Survey required to confirm.
Spiked Rice-flower	*Pimelea spicata*	E	E	3320, 4025	1983	S	n/a	n/a	none	-	Unlikely to occur. Survey required to confirm.
Brown Pomaderris	*Pomaderris brunnea*	E	V	3320, 4025	88	S	n/a	n/a	none	-	Unlikely to occur. Survey required to confirm.
Pultenaea parviflora	*Pultenaea parviflora*	E	V	3320	1515	S	n/a	n/a	none	-	Unlikely to occur. Survey required to confirm.
Matted Bush-pea	*Pultenaea pedunculata*	E		3320	40	S	n/a	n/a	none	-	Unlikely to occur. Survey required to confirm.
Camden White Gum	*Eucalyptus benthamii*	V	V	3320, 4025	593	S	n/a	n/a	none	-	Unlikely to occur. Survey required to confirm.
Slaty Red Gum	*Eucalyptus glaucina*	V	V	3320	P	S	n/a	n/a	none	-	Unlikely to occur. Survey required to confirm.
Magenta Lilly Pilly	*Syzygium paniculatum*	E	V	4025	87	S	n/a	n/a	none	-	Unlikely to occur. Survey required to confirm.

Common Name	Scientific Name	BC Act	EPBC Act	Assoc PCTs	No. in IBRA SYB08	Sp/ Eco	min. patch size	% native cover	geogr. constr-aints	habitat constraints	likely relevance to the subject land
Fauna											
Giant Burrowing Frog	*Heleioporus australiacus*	V	V	4025	6	S	5-25	31-70	none	-	Not relevant (% cover).
Green & Golden Bell Frog	*Litoria aurea*	E	V	3320, 4025	16432	S	<5ha	<10%	none	semi-permanent/ephemeral wet areas, swamps, waterbodies and within 1km	Unlikely to occur. Survey required to confirm.
Rosenberg's Goanna	*Varanus rosenbergi*	V		3320, 4025	5	E	5-25	11-30	none	-	To be assessed as an ecosystem credit species. Survey not required.
Regent Honeyeater	*Anthochaera phrygia*	CE	CE	3320, 4025	105	S/E	<5ha	<10%	none	S – as per important habitat map	The land is not included on the important habitat map. To be assessed as an ecosystem credit species. Survey not required.
Dusky Woodswallow	*Artamus cyanopterus cyanopterus*	V		3320, 4025	587	E	<5ha	<10%	none	-	To be assessed as an ecosystem credit species. Survey not required.
Australasian Bittern	*Botaurus poiciloptilus*	E	E	4025	30	E	<5ha	<10%	none	waterbodies – brackish or freshwater wetlands	To be assessed as an ecosystem credit species. Survey not required.
Bush Stone-curlew	*Burhinus grallarius*	E		3320, 4025	10	S	<5ha	11-30	none	-	Unlikely to occur. Survey required to confirm.

Common Name	Scientific Name	BC Act	EPBC Act	Assoc PCTs	No. in IBRA SYB08	Sp/ Eco	min. patch size	% native cover	geogr. constr-aints	habitat constraints	likely relevance to the subject land
Gang Gang Cockatoo	*Callocephalon fimbriatum*	V	E	3320, 4025	115	S/E	<5ha	11-30	none	Eucalypt tree species with hollows at least 3 m above the ground and with hollow diameter of 7 cm or larger.	Unlikely to breed within subject land. Survey required to confirm. To be assessed as an ecosystem credit species.
South-eastern Glossy Black Cockatoo	*Calyptorhynchus lathami*	V		3320, 4025	133	S/E	<5ha	<10%	none	Living or dead tree with hollows greater than 15cm diameter and greater than 8m above ground. Presence of Allocasuarina and casuarina species	Unlikely to breed within subject land. Survey required to confirm. To be assessed as an ecosystem credit species.
Speckled Warbler	*Chthonicola sagittata*	V		3320, 4025	401	E	<5ha	<10%	none	-	To be assessed as an ecosystem credit species. Survey not required.
Spotted Harrier	*Circus assimilis*	V		3320, 4025	37	E	<5ha	11-30%	none	-	To be assessed as an ecosystem credit species. Survey not required.
Brown Treecreeper	*Climacteris picumnus victoriae*	V		3320, 4025	53	E	<5ha	<10%	none	-	To be assessed as an ecosystem credit species. Survey not required.
Varied Sittella	*Daphoenositta chrysoptera*	V		3320, 4025	435	E	<5ha	11-30	none	-	To be assessed as an ecosystem credit species. Survey not required.
White-fronted Chat	*Ephippiorhynchus asiaticus*	V		3320, 4025	253	E	<5ha	<10%	none	-	To be assessed as an ecosystem credit species. Survey not required.

Common Name	Scientific Name	BC Act	EPBC Act	Assoc PCTs	No. in IBRA SYB08	Sp/ Eco	min. patch size	% native cover	geogr. constr-aints	habitat constraints	likely relevance to the subject land
Grey Falcon	*Falco hypoleucos*	E		4025	1	E	<5ha	<10%	not listed for SR	(*paddock trees within 100m of water*)	Not listed in the species profile for this subregion. Possibly a vagrant record. Unlikely to occur. Survey not required.
Black Falcon	*Falco subniger*	V		3320, 4025	24	E	<5ha	<10%	incom plete	-	To be assessed as an ecosystem credit species. Survey not required.
Little Lorikeet	*Glossopsitta pusilla*	V		3320, 4025	320	E	<5ha	<10	none	-	To be assessed as an ecosystem credit species. Survey not required.
White-bellied Sea-Eagle	*Haliaeetus leucogaster*	V		3320, 4025	788	S/E	<5ha	<10%	incom plete	Living or dead mature trees within suitable vegetation within 1km of a rivers, lakes, large dams or creeks, wetlands and coastlines Within 1km of a rivers, lakes, large dams or creeks, wetlands and coastlines	Unlikely to breed within subject land. Survey required to confirm. To be assessed as an ecosystem credit species.
Little Eagle	*Hieraaetus morphnoides*	V		3320, 4025	180	S/E	<5ha	11-30%	none	Nest trees - live (occasionally dead) large old trees within vegetation.	Unlikely to breed within subject land. Survey required to confirm. To be assessed as an ecosystem credit species.
White-throated Needletail	*Hirundapus caudacutus*		V	3320, 4025	169	E	<5ha	<10%	none	-	To be assessed as an ecosystem credit species. Survey not required.

Common Name	Scientific Name	BC Act	EPBC Act	Assoc PCTs	No. in IBRA SYB08	Sp/ Eco	min. patch size	% native cover	geogr. constr -aints	habitat constraints	likely relevance to the subject land
Comb-crested Jacana	*Irediparra gallinacea*	V		4025	11	E	<5ha	<10%	none	Freshwater wetlands with a good surface cover of floating aquatic vegetation	Not relevant (habitat constraint).
Black-tailed Godwit	*Limosa limosa*	V		4025	12	S/E	<5ha	<10%	none	S – as per important habitat map	The land is not included on the important habitat map. To be assessed as an ecosystem credit species. Survey not required.
Square-tailed Kite	*Lophoictinia isura*	V		3320, 4025	90	S/E	<5ha	11-30	none	Nest trees	Unlikely to breed within subject land. Survey required to confirm. To be assessed as an ecosystem credit species.
Black-chinned Honeyeater	*Melithreptus gularis gularis*	V		3320	34	E	5-25	11-30	none	-	To be assessed as an ecosystem credit species. Survey not required.
Turquoise Parrot	*Neophema pulchella*	V		3320, 4025	22	E	<5ha	11-30%	none	-	To be assessed as an ecosystem credit species. Survey not required.
Barking Owl	*Ninox connivens*	V		3320, 4025	36	S/E	<5ha	11-30	none	Living or dead trees with hollows greater than 20 cm diameter and greater than 4m above the ground.	Unlikely to breed within subject land. Survey required to confirm. To be assessed as an ecosystem credit species.
Powerful Owl	*Ninox strenua*	V		3320, 4025	1988	S/E	<5ha	11-30	none	Living or dead trees with hollow greater than 20cm diameter	Unlikely to breed within subject land. Survey required to confirm. To be assessed as an ecosystem credit species.

Common Name	Scientific Name	BC Act	EPBC Act	Assoc PCTs	No. in IBRA SYB08	Sp/ Eco	min. patch size	% native cover	geogr. constr-aints	habitat constraints	likely relevance to the subject land
Eastern Osprey	*Pandion cristatus*	V		3320, 4025	16	S/E	<5ha	<10%	none	S - Presence of stick-nests in living and dead trees (>15m) or artificial structures within 100m of a floodplain for nesting	Unlikely to breed within subject land. Survey required to confirm. To be assessed as an ecosystem credit species.
Scarlet Robin	*Petroica boodang*	V		3320	91	E	<5ha	<10%	none	-	To be assessed as an ecosystem credit species. Survey not required.
Flame Robin	*Petroica phoenicea*	V		3320, 4025	51	E	<5ha	<10%	none	-	To be assessed as an ecosystem credit species. Survey not required.
Pink Robin	*Petroica rodinogaster*	V		4025	2	S	<5ha	11-30%	not listed for SR	-	Not listed in the species profile for this subregion. Possibly vagrant records. Unlikely to occur. Survey may be required. Further research required.
Australian Painted Snipe	*Rostratula australis*	E	E	4025	20	E	<5ha	<10%	none	-	To be assessed as an ecosystem credit species. Survey not required.
Diamond Firetail	*Stagonopleura guttata*	V		3320, 4025	22	E	<5ha	<10%	none	-	To be assessed as an ecosystem credit species. Survey not required.
Masked Owl	*Tyto novaehollandiae*	V		3320, 4025	40	S/E	<5ha	11-30	none	HBTs - Living or dead trees with hollows greater than 20cm diameter.	Unlikely to breed within subject land. Survey required to confirm. To be assessed as an ecosystem credit species.

Common Name	Scientific Name	BC Act	EPBC Act	Assoc PCTs	No. in IBRA SYB08	Sp/ Eco	min. patch size	% native cover	geogr. constr-aints	habitat constraints	likely relevance to the subject land
Sooty Owl	*Tyto tenebricosa*	V		3320	6	S/E	>100 ha	>70%	none	S - Caves or clifflines/ledges, Living or dead trees with hollows greater than 20cm diameter.	Not relevant (% cover).
Eastern Pygmy-possum	*Cercartetus nanus*	V		3320, 4025	13	S	<5ha	11-30	none	-	Unlikely to occur. Survey required to confirm.
Spotted-tailed Quoll	*Dasyurus maculatus*	V	E	3320, 4025	58	E	<5ha	<10%	none	-	To be assessed as an ecosystem credit species. Survey not required.
Southern Greater Glider	*Petauroides volans*	E	E	3320, 4025	32	S	5-25	31-70	none	-	Not relevant (% cover).
Squirrel Glider	*Petaurus norfolcensis*	V		3320, 4025	34	S	<5ha	<10%	none	*(Relies on large old trees with hollows for breeding and nesting. These trees are also critical for movement and typically need to be closely-connected (i.e. no more than 50 m apart).)*	Unlikely to occur. Survey required to confirm.
Brush-tailed Rock Wallaby	*Petrogale penicillata*	E	V	3320	1	S	5-25	11-30	not listed for SR	Land within 1 km of rocky escarpments, gorges, steep slopes, boulder piles, rock outcrops or clifflines	Not listed in the species profile for this subregion. Possibly a vagrant record. Unlikely to occur. Survey may be required. Further research required.

Common Name	Scientific Name	BC Act	EPBC Act	Assoc PCTs	No. in IBRA SYB08	Sp/ Eco	min. patch size	% native cover	geogr. constr-aints	habitat constraints	likely relevance to the subject land
Koala	*Phascolarctos cinereus*	E	E	3320, 4025	2299	S	<5ha	<10%	none	Presence of koala use trees - refer to Survey Comments field in TBDC	Unlikely to occur. Survey required to confirm.
Large-eared Pied Bat	*Chalinolobus dwyeri*	V	V	3320, 4025	78	S	<5	11-30	none	Within two kilometres of rocky areas containing caves, overhangs, escarpments, outcrops, or crevices, or within two kilometres of old mines or tunnels.	Not relevant (habitat constraint).
Eastern False Pipistrelle	*Falsistrellus tasmaniensis*	V		3320, 4025	166	E	5-25	31-70	none	-	Not relevant (% cover).
Eastern Coastal Free-tailed Bat	*Micronomous norfolkensis*	V		3320, 4025	414	E	<5ha	<10%	none	-	To be assessed as an ecosystem credit species. Survey not required.
Little Bent-wing Bat	*Miniopterus australis*	V		3320, 4025	138	S/E	<5ha	<10%	none	S - Cave, tunnel, mine, culvert or other structure known or suspected to be used for breeding including species records in BioNet with microhabitat code 'IC – in cave'; observation type code 'E nest-roost'; with numbers of individuals >500; or from the scientific literature.	Subject land does not contain breeding habitat. To be assessed as an ecosystem credit species. Survey not required.

Common Name	Scientific Name	BC Act	EPBC Act	Assoc PCTs	No. in IBRA SYB08	Sp/ Eco	min. patch size	% native cover	geogr. constr-aints	habitat constraints	likely relevance to the subject land
Large Bent-wing Bat	*Miniopterus orianae oceanensis*	V		3320, 4025	697	S/E	<5a	<10	none	S - Cave, tunnel, mine, culvert or other structure known or suspected to be used for breeding including species records with microhabitat code "IC - in cave;" observation type code "E nest-roost;" with numbers of individuals >500	Subject land does not contain breeding habitat. To be assessed as an ecosystem credit species. Survey not required.
Southern Myotis	*Myotis macropus*	V		3320, 4025	544	S	<5ha	<10%	none	Waterbodies with permanent pools/stretches 3m or wider, including rivers, large creeks, billabongs, lagoons, estuaries, dams and other waterbodies, on or within 200m of the site.	Potentially present. Survey required. Concept masterplan retains the riparian corridor and adjacent vegetation, and can incorporate additional protection for this species, if required.
Grey-headed Flying-fox	*Pteropus poliocephalus*	V	V	3320, 4025	5211	S/E	<5ha	<10%	none	breeding camps	No camps present within the subject land. To be assessed as an ecosystem credit species. Survey not required.
Yellow-bellied Sheath-tail Bat	*Saccolaimus flaviventris*	V		3320, 4025	92	E	<5ha	11-30%	none	-	To be assessed as an ecosystem credit species. Survey not required.
Greater Broad-nosed Bat	*Scoteanax rueppellii*	V		3320, 4025	264	E	5-25ha	31-70%	none	-	Not relevant (% cover).

Common Name	Scientific Name	BC Act	EPBC Act	Assoc PCTs	No. in IBRA SYB08	Sp/ Eco	min. patch size	% native cover	geogr. constr-aints	habitat constraints	likely relevance to the subject land
Cumberland Plain Land Snail	*Meridolum corneovirens*	E		3320, 4025	1816	S	<5ha	<10%	none	-	Potentially present. Survey required.

5.2 Presence of threatened species

No threatened plant or animal species are known to occur on the subject land.

Previous surveys have been conducted across large parts of the land in 2001 and 2016. These surveys are out of date and cannot be relied upon for assessment purposes. However, the surveys found that habitats are generally highly degraded and are unlikely to support most threatened species.

The concept masterplan involves retention of the higher quality and more connected areas of habitat on the land, and has some flexibility to enable additional protection and management of specific areas of habitat, should this be required.

6. Identifying prescribed impacts

Table 8 Prescribed impacts identified

Feature	Present	Description of feature characteristics and location	Threatened entities that use, are likely to use, or are part of the habitat feature. Where relevant, threatened species or fauna that are part of a TEC or EC, that are at risk of vehicle strike
Karst, caves, crevices, cliffs, rocks or other geological features of significance	☐Yes / ☒No	No such features of geological significance occur within the subject land.	n/a
Human-made structures	☒Yes / ☐No	The subject land contains a number of existing dwellings with associated sheds. These appear to all be in reasonable condition and current use.	It is possible some threatened bat species could be roosting in existing structures. Targeted survey would be required to further consider potential impacts upon such species at the DA stage.
Non-native vegetation	☒Yes / ☐No	The subject land contains areas of planted exotic gardens and areas of weed invasion.	None of these areas are likely to be of value for threatened species known to occur in the region.
Habitat connectivity	☐Yes / ☒No	The subject land contains a series of small fragmented patches of native vegetation. The land is not part of a wildlife corridor.	Habitat connectivity is not a constraint for those threatened species or fauna that are part of a TEC that may currently use the land.

Feature	Present	Description of feature characteristics and location	Threatened entities that use, are likely to use, or are part of the habitat feature. Where relevant, threatened species or fauna that are part of a TEC or EC, that are at risk of vehicle strike
Waterbodies, water quality and hydrological processes	☒Yes / ☐No	Streams within the subject land support the Eucalypt Riverflat Forest TEC.	*River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions.*
Wind turbine strikes (wind farm development only)	☐Yes / ☒No	n/a	n/a
Vehicle strikes	☐Yes / ☒No	n/a	

Stage 2: Impact Assessment

7. Avoid and minimise impacts

7.1 Project location

The Glenmore Park East precinct has been selected by the DPE as one of five (5) to be assessed through the State Assessed Planning Proposal pilot program. In being selected for this pilot program, DPE was satisfied that the proposal:

- demonstrated public benefit through housing supply and alignment with state policies and land use strategies;
- contributed to affordable and social housing outcomes;
- offered a pathway to the delivery of housing in the short term;
- has adequate infrastructure available or that funding is committed for critical infrastructure.

A concept masterplan has been prepared for a proposed rezoning across the entirety of the precinct.

The plan acknowledges the significance of natural watercourses and drainage channels, advocating for their retention, celebration, or enhancement. This approach aligns with principles of biodiversity and sustainable landscaping. The precinct also recognises and retains significant areas of Cumberland Plain woodland which is embedded as a key element of the design.

7.2 Project design

The concept masterplan has responded to biodiversity values as follows:

1) Retention of the natural third order stream across the northeastern portion of the subject land. A 60-70m wide riparian corridor would be established along the stream. Rehabilitation and vegetation regeneration works are proposed to restore biodiversity values and create visual amenity for adjacent public landuses.

2) Retention of all native vegetation within the existing transmission line easement. The plan would enable improved connectivity of these habitats with better linkage to the natural stream, and thereby across The Northern Road to the Department of Defence Orchard Hills site.

3) Retention of all planted and regrowth native vegetation along the ridge on the western boundary of the land, with existing clearings to be used as public open space.

4) Retention of the highest value patch of Cumberland Plain Woodland within the precinct lands, located in the south of the precinct, on the eastern boundary. Some adjustment to the edges of the patch would involve loss of edge trees and replacement planting, to enable a more manageable shape for ongoing protection and management.

5) Retention and planting of a row of native vegetation along the eastern boundary of the precinct, bordering The Northern Road, to provide connectivity of retained patches to the main riparian corridor.

6) Retention of planted native vegetation as public open space in the far southwest of the precinct.

Areas of vegetation proposed for removal are generally smaller and more isolated patches that could not practicably be retained and managed in the long term, and lower quality fringe areas of some larger patches that are to be retained, where this will enable better reserve shape for ongoing management. For example, by enabling a road boundary that can be used to control overland flows and public use of the land.

Refer to Figure 5 (Impact on native vegetation).

8. Impact assessment

8.1 Direct Impacts

8.1.1 Residual direct impacts

The extent of residual direct impacts on native vegetation is shown on Figure 5 (Impact on native vegetation).

Table 9 Summary of residual direct impacts

Direct impact (Describe the impact on PCT/TEC/EC or threatened species and their habitat)	**BC Act status**	**EPBC Act status**	**SAII entity**	**Project phase/timing of impact** (e.g. construction, operation, rehabilitation)	**Extent** (ha, number of individuals)
PCT 4025 - loss of native vegetation	E	tbc	Yes	construction	0.3 ha
PCT 3320 - loss of native vegetation	CE	tbc	Yes	construction	3.3 ha
other native vegetation	tbc	tbc	tbc	construction	1.9 ha
				TOTAL	5.5 ha

8.2 Indirect Impacts

Development of the subject land has the potential to impose a range of indirect impacts on native vegetation retained within the precinct.

The concept masterplan has been designed to pre-empt and facilitate management of such impacts, by:

* Providing road and public area boundaries to retained vegetation;
* Design of stormwater management features to avoid and minimise impacts;
* Improving connectivity of vegetation and habitats, to facilitate natural pollination, pest control and functionality of vegetation, to assist ongoing management.

Further detailed consideration of the management of indirect impacts, and assessment of impacts of residual indirect impacts, will be required at the development application stage.

8.3 Serious and irreversible impacts

Both TECs present on the subject land are entities listed as being at risk of Serious and Irreversible Impact (SAII).

A detailed assessment of the proposed impacts against the SAII principles would be required to be undertaken by the consent authority at the time of development determination.

In general, the areas of TEC proposed to be removed are very small patches of low quality woodland and forest. These areas are not currently viable in the long term.

The concept masterplan would retain the better quality (with a focus on remnant and regrowth patches rather than planted) and more connected areas of these TECs on the site. The concept masterplan would enable additional areas to be revegetated to improve the quality and connectivity of the TECs and provide for a better long-term outcome.

9. Impact summary and offset requirement

The concept masterplan would result in loss of 5.5 hectares of native vegetation, comprised of two TECs and additional planted areas.

The Biodiversity Offset Scheme would apply to development of the land.

A detailed assessment of the condition of areas of native vegetation to be removed (involving VIS plot surveys) would be required to enable calculation of the required biodiversity offset.

Targeted surveys will be required for some threatened species to confirm absence from the land.

The results of this detailed assessment are not likely to materially affect the permissibility or feasibility of the concept masterplan.

10. Figures

Figure 1 Site Map

Aerial image is from Nearmap (21/06/2023).

Figure 2 Location Map

Aerial image is from Google satellite (2023).

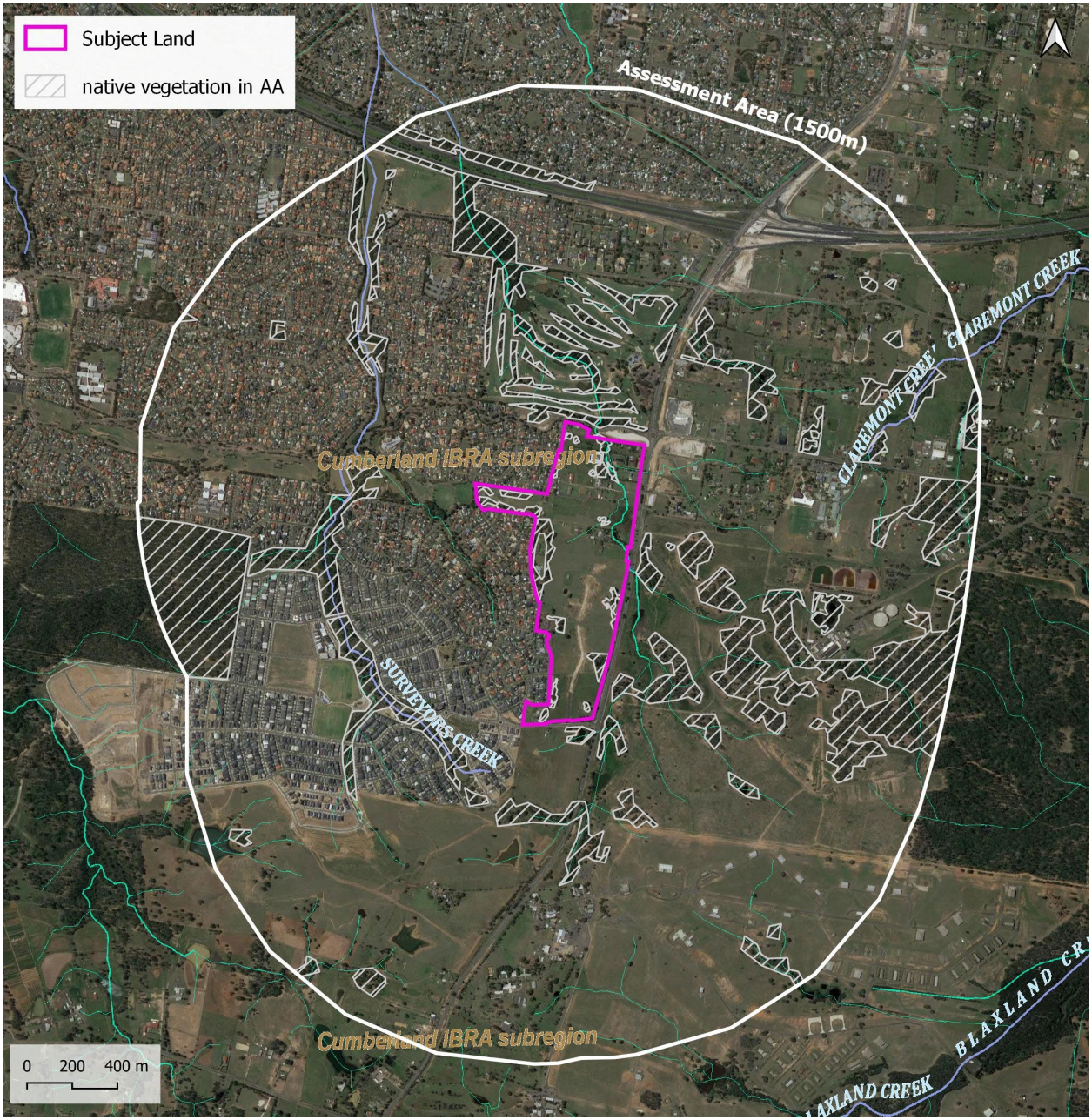

Figure 3 Concept Masterplan

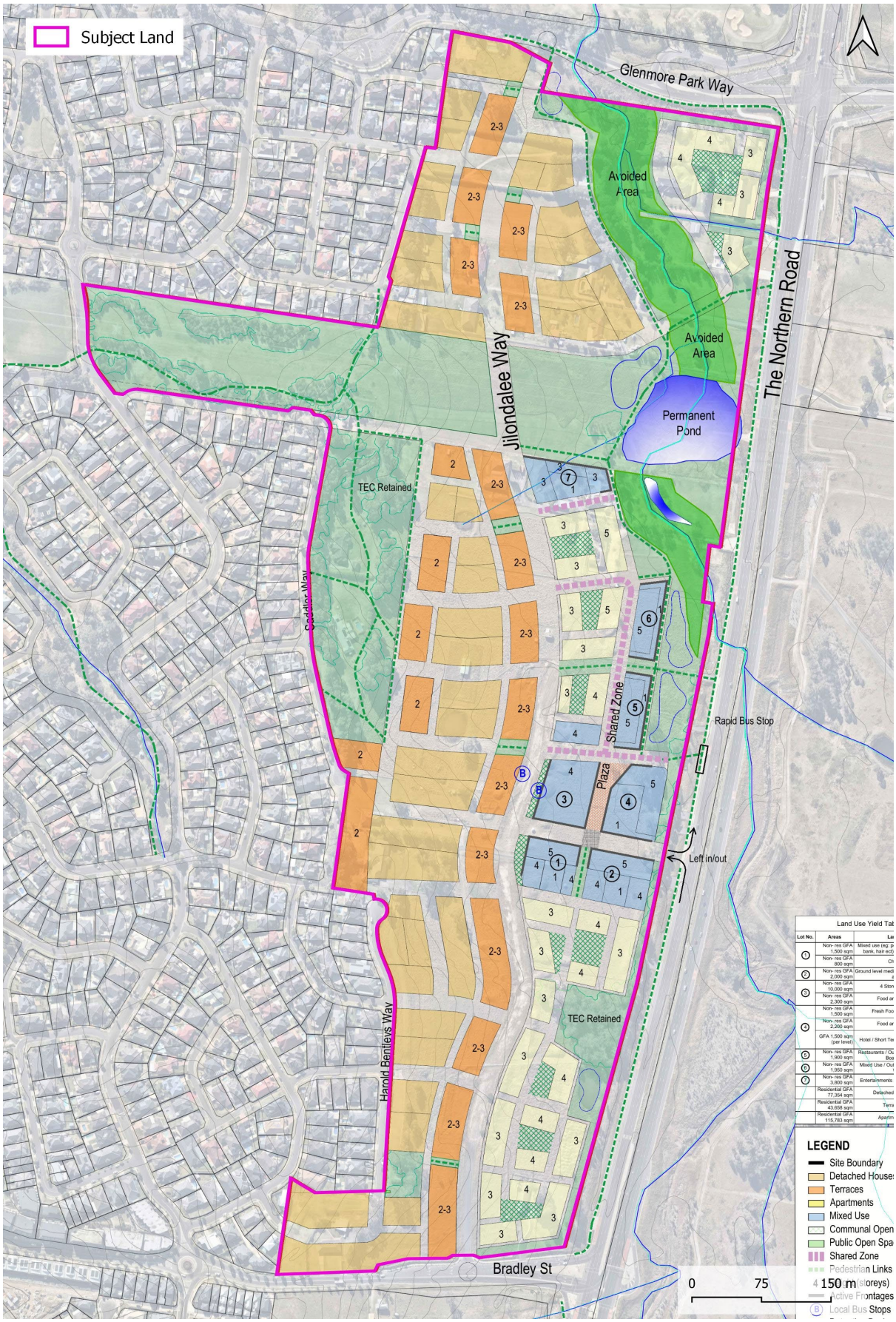

Figure 4 Native vegetation.

Aerial image is from Nearmap (21/06/2023).

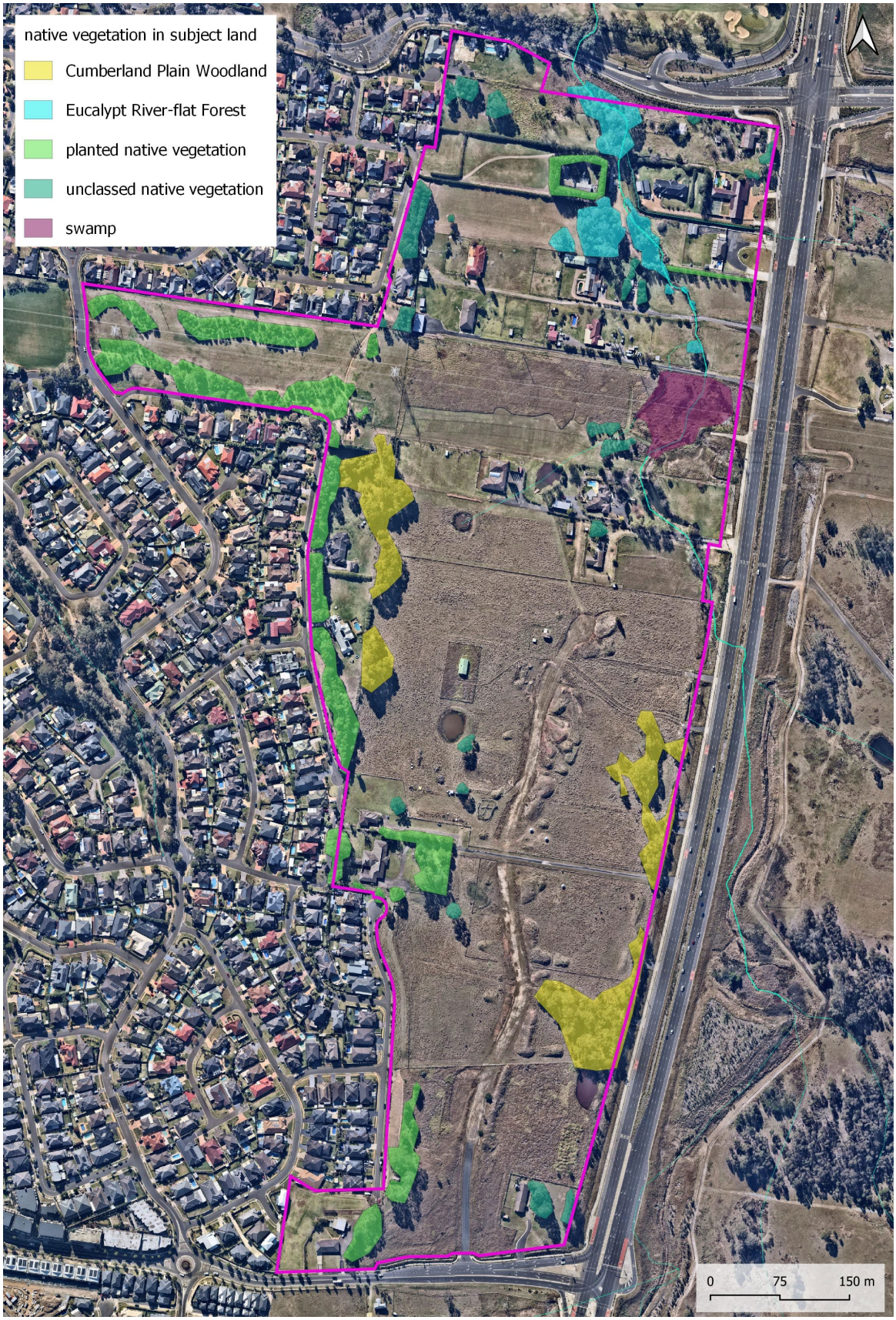

Figure 5 Impact on native vegetation.

Aerial image is from Nearmap (21/06/2023).