

Glenwood High School Biodiversity Development Assessment Report

85 Forman Avenue, Glenwood NSW 2768

NCA21R127901

09 February 2022





Glenwood High School

Biodiversity Development Assessment Report

85 Forman Avenue, Glenwood NSW 2768

Kleinfelder Document: NCA21R127901

Kleinfelder Project: 20221196

Copyright 2021 Kleinfelder
All Rights Reserved

Prepared for:

Jacobs
Level 7, 177 Pacific Highway
North Sydney NSW, 2060
Australia

Prepared by:

Kleinfelder Australia Pty Ltd

Suite 3, 240-244 Pacific Highway, Charlestown, NSW 2290
Phone: +61 2 4949 5200
ABN: 23 146 082 500

Document Control:

Version	Description	Date
4.0	Final	09 February 2022
3.0	Final for Submission	10 November 2021
2.0	Second Draft	23 August 2021
1.0	Draft	22 July 2021
Prepared	Reviewed	Endorsed
David Martin	Gilbert Whyte and Daniel O'Brien	Gilbert Whyte

Only Jacobs, designated representatives or relevant statutory authorities may use this document and only for the specific purpose for which this submission was prepared. It should not be otherwise referenced without permission.



TABLE OF CONTENTS

1	INTRODUCTION.....	4
1.1	SCOPE	4
1.2	LOCAL CONTEXT	4
1.3	PROPOSED DEVELOPMENT	5
1.4	INFORMATION SOURCES	8
1.5	LEGISLATIVE CONTEXT	8
1.5.1	Biodiversity Conservation Act 2016 (NSW)	9
1.5.2	Koala Habitat Protection State Environmental Planning Policy (SEPP 2021).....	11
1.5.3	Sydney Regional Environmental Plan No 20—Hawkesbury-Nepean River (No 2—1997)	11
1.5.4	State Environmental Planning Policy No 19—Bushland in Urban Areas.....	12
1.5.5	Draft Environment State Environmental Planning Policy	12
1.5.6	Biosecurity Act 2015	13
1.5.7	Coastal Management Act 2016.....	13
1.5.8	Water Management Act 2000	14
1.5.9	Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)	15
1.5.10	Blacktown Local Environmental Plan 2015.....	15
1.5.11	Blacktown Development Control Plan 2015.....	16
2	SITE CONTEXT	17
2.1	LANDSCAPE FEATURES.....	17
3	NATIVE VEGETATION	19
3.1	METHODOLOGY.....	19
3.1.1	Data Review	19
3.1.2	Vegetation Mapping Surveys	19
3.2	ASSESSMENT RESULTS	20
3.2.1	Vegetation within the Development Site	20
4	THREATENED SPECIES	31
4.1	ASSESSING HABITAT SUITABILITY	31
4.1.1	Habitat Assessment	31
4.1.2	Ecosystem Credit Species	34
4.1.3	Species Credit Species	35
4.2	THREATENED SPECIES SURVEYS.....	35
4.2.1	Flora Surveys	35
4.2.2	Fauna Surveys	36
5	IMPACT ASSESSMENT	38
5.1	AVOIDING AND MINIMISING IMPACTS.....	38
5.1.1	Impacts on Native Vegetation and Threatened Species Habitat	38
5.1.2	Prescribed Biodiversity Impacts	39
5.2	ASSESSMENT OF IMPACTS.....	40
5.2.1	Impacts on Native Vegetation and Habitat.....	40
5.2.2	Prescribed Biodiversity Impacts	40
5.3	MITIGATE AND MANAGE IMPACTS ON BIODIVERSITY VALUES	41
6	IMPACT SUMMARY	45
6.1	SERIOUS AND IRREVERSIBLE IMPACTS.....	45
6.2	IMPACTS ON NATIVE VEGETATION.....	45



6.3	CUMULATIVE IMPACTS	46
7	ASSESSMENT OF BIODIVERSITY LEGISLATION	47
7.1	ENVIRONMENT PROTECTION AND BIODIVERSITY CONSERVATION ACT 1999	47
7.1.1	Assessment Requirements	47
7.2	BIOSECURITY ACT 2015	47
8	SUMMARY	50
9	REFERENCES.....	51

TABLES

Table 1:	Landscape Features relevant to the Development Site.	17
Table 2:	Composition, Structure and Function components of vegetation integrity	20
Table 3:	Vegetation Communities within the Study Area	21
Table 4:	Current vegetation integrity score for the vegetation zones	29
Table 5:	Assessment of ecosystem credit species within the Development Site.	34
Table 6:	Species credit species and justification for inclusion as candidate species.	35
Table 7:	Summary of mitigation and management measures for direct, prescribed and indirect impacts of the proposed development	41
Table 8:	Summary of ecosystem credit requirements	45
Table 9:	Weed species requiring control within the Development Site	47

FIGURES

Figure 1:	Locality	6
Figure 2:	Study Area and Development Site	7
Figure 3:	Landscape Assessment	18
Figure 4:	Vegetation Mapping	30
Figure 5:	Habitat Features	33
Figure 6:	Survey Effort.....	37

PLATES

Plate 1:	PCT 849 - Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion (CEEC - Moderate Condition).....	22
Plate 2:	PCT 849 - Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion (Low Condition)	24
Plate 3:	PCT 849 - Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion (Planted)	26
Plate 4:	Planted Native/Exotic Vegetation	27
Plate 5:	Exotic Grassland (Managed)	28

APPENDICES

Appendix A – Threatened Species Database Search
Appendix B - Flora Species List
Appendix C – Fauna Species List
Appendix D – Threatened Ecological Community Determinations
Appendix E – Planted Native Vegetation Determination
Appendix F – Predicted and Candidate Species Report
Appendix G – Biodiversity Credit Reports



Appendix H – BAM Plot Datasheets
Appendix I – Staff Contributions
Appendix J – Licensing



1 INTRODUCTION

1.1 SCOPE

Kleinfelder Australia Pty Ltd (Kleinfelder) was engaged by Jacobs Group Australia Pty Ltd (Jacobs) to prepare a Biodiversity Development Assessment Report (BDAR) to support the proposed Glenwood High School (GHS) development located at 85 Forman Avenue, Glenwood, New South Wales (NSW) 2768 (Lot 5227 DP868693) (hereafter referred to as the “Development Site”) (**Figure 1**).

This BDAR accompanies an Environmental Impact Statement (EIS) pursuant to Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) in support of a State Significant Development Application (SSD - 23512960). The development relates to upgrading works comprising alterations and additions to Glenwood High School at 85 Forman Avenue, Glenwood. The site is legally described as Lot 5227 DP 868693 (the “Study Area”).

The site is roughly rectangular in shape, with a total area of 60,790m² and street frontages to Forman Avenue to the south and Glenwood Drive to the east. Glenwood Reserve adjoins the northern and western boundaries of the school.

This report addresses the relevant Secretary’s Environmental Assessment Requirements (SEARs), specifically key issue No. 11 requirement for a BDAR.

This assessment has been undertaken in accordance with the NSW Biodiversity Assessment Method (BAM) (Department of Planning, Infrastructure and Environment [DPIE] 2020a), the *Biodiversity Conservation Act 2016* (NSW) (BC Act) (s.6.12), and the *Biodiversity Conservation Regulation 2017* (BC Regulation) to support a State Significant Development Application (SSDA) for the project.

The following terms are used throughout this report to describe particular geographical areas (see **Figure 2**):

- **Study Area** – 85 Forman Avenue Glenwood NSW 2768 (Lot 5227 DP868693) (6.08 hectares [ha])
- **Development Site** - The area within the Study Area to be directly impacted by the proposed development, i.e. the footprint of the school building (**Figure 2**) (0.21 ha).
- **Locality** - Land within a 5-kilometre (km) radius of the Study Area.

1.2 LOCAL CONTEXT

The Study Area is located within the suburb of Glenwood, approximately 5 km northeast of Blacktown CBD (**Figure 1**). The Study Area is within the Blacktown City Council Local Government Area (LGA) and is zoned as SP2 – Infrastructure under the *Blacktown Local Environmental Plan 2015* (LEP).

The Study Area is bound by residential developments to the east via Glenwood Park drive and to the south via Forman Avenue. The northern and eastern boundaries of the school are bound by Glenwood reserve, which is zoned RE1 – Public Recreation.

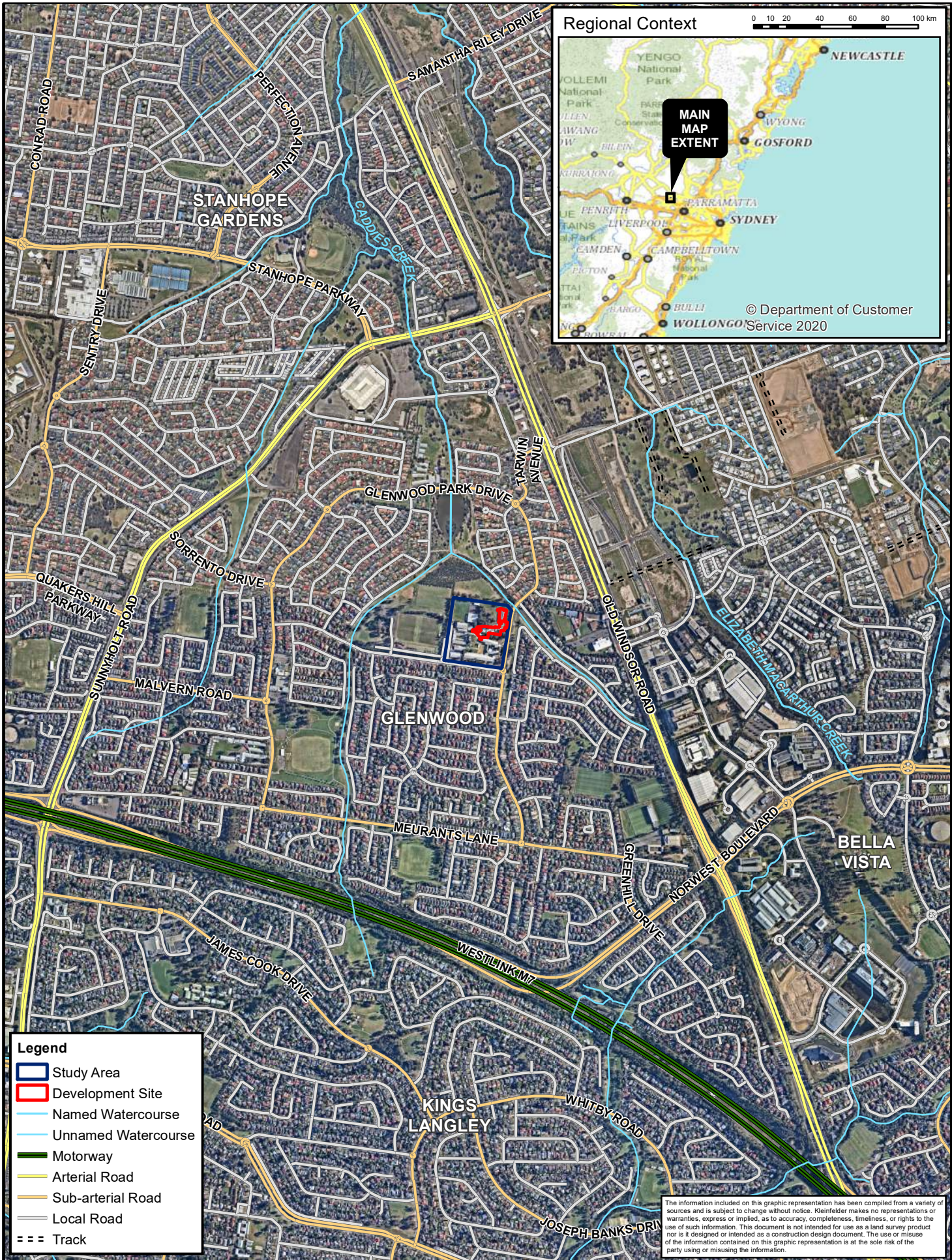


1.3 PROPOSED DEVELOPMENT

The proposal involves major alterations and additions to the existing high school, comprising the construction of a new 3 storey building that will provide contemporary learning spaces, replacing 18 existing demountable classrooms on site. The proposed development will provide 47 additional learning spaces, including refurbished wood/metal and food tech units, provision of an additional support learning unit plus new administration and staff facilities, upgrades to the existing library, construction of new covered walkways and ancillary utility infrastructure and landscaping works.

The proposed development seeks to upgrade Glenwood High School. The upgrade consists of the following alterations and additions:

- Construction of a new three-storey building at the north-eastern portion of the site facing Glenwood Park Drive which will accommodate approximately 54 learning spaces.
- Refurbishment of existing Building Block A (ground floor only) to provide one new support unit within the space of an existing general learning space;
- Refurbishment of Building Block D (ground floor only) to provide an additional office space and storeroom;
- Refurbishment of Building Block E to re-purpose it on the ground floor for computer learning spaces, staff and administration as well as upgrades to the library on the first floor;
- Refurbishment of Building Block J to re-purpose it from visual arts and performing arts to learning spaces and workshops for food tech and woods/metal unit; and
- The proposed development will also involve ancillary works at the site associated with the proposed upgrades



 Bright People. Right Solutions. www.kleinfelder.com	PROJECT REFERENCE: 20221196 DATE DRAWN: 2021/11/02 22:05 Version 2 DRAWN BY: GJoyce DATA SOURCE: NSW DFSI - 2021 Nearmap - 2021	Locality Jacobs Group (Australia) Pty Ltd Biodiversity Development Assessment Report Glenwood High (Lot 5227 DP868693) Forman Avenue, Glenwood NSW	FIGURE: 1
---	---	---	--------------------------------



Metres 0 5 10 20 30 40 50 KLEINFELDER Bright People. Right Solutions. www.kleinfelder.com	PROJECT REFERENCE: 20221196 DATE DRAWN: 2022/02/09 18:57 Version 4 DRAWN BY: GJoyce DATA SOURCE: NSW DFSI - 2021 Nearmap - 2021	Study Area and Development Site Jacobs Group (Australia) Pty Ltd Biodiversity Development Assessment Report Glenwood High (Lot 5227 DP868693) Forman Avenue, Glenwood NSW	FIGURE: 2
---	---	--	--------------------------------



1.4 INFORMATION SOURCES

The following sources of information were used in to appropriately inform the Glenwood High School BDAR:

- The NSW DPIE, BioNet Atlas (DPIE 2021a) for previous records of threatened species, populations, and ecological communities within 5 km radius of the Development Site.
- The Commonwealth Department of Agriculture, Water and the Environment (DAWE) Protected Matters Search Tool (PMST) (DAWE 2021a) for Matters of National Environmental Significance (MNES) including predicted threatened species, populations and ecological communities
- Remnant Vegetation of the Western Cumberland subregion, 2013 Update. VIS_ID 4207 (DPIE 2015) existing vegetation community mapping within the locality.
- The NSW DPIE, BioNet Vegetation Classification Database (DPIE 2021b) for identification and allocation of Plant Community Types (PCTs) to vegetation zones on site.
- The NSW DPIE, BioNet Threatened Biodiversity Data Collection (DPIE 2021c), Threatened Species Profiles (DPIE 2021d) and Final Determinations (DPIE 2021e) for information on threatened species, populations, and ecological communities.

1.5 LEGISLATIVE CONTEXT

This assessment was undertaken in accordance with and/or in consideration of the following Acts and Policies:

- **NSW:**
 - Biodiversity Assessment Method (BAM) (DPIE 2020a).
 - *Biodiversity Conservation Act 2016* (NSW) (BC Act).
 - *Biodiversity Conservation Regulation 2017* (NSW) (BC Regulation).
 - *Biosecurity Act 2015* (NSW).
 - *Coastal Management Act 2016*.
 - *Environmental Planning and Assessment Act 1979* (NSW) (EP&A Act).
 - *Local Land Services Act 2013* (NSW) (LLS Act).
 - State Environmental Planning Policy (Koala Habitat Protection) 2021 (NSW) (Koala SEPP).
 - Draft Environment State Environmental Planning Policy (Draft Environment SEPP)
 - Sydney Regional Environmental Plan No 20—Hawkesbury-Nepean River (No 2—1997) (1997 EPI 592)
 - State Environmental Planning Policy No 19—Bushland in Urban Areas.
 - *Water Management Act 2000* (NSW) (WM Act).
- **Commonwealth:**
 - *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).
- **Local:**
 - Blacktown Local Environmental Plan 2015
 - Blacktown Development Control Plan 2015



1.5.1 Biodiversity Conservation Act 2016 (NSW)

The NSW *Biodiversity Conservation Act 2016* (NSW BC Act), the NSW *Biodiversity Conservation Regulation 2017* (NSW BC Regulation) and amendments to the NSW *Local Land Services Act 2013* (LLS Act) commenced on 25 August 2017. The legislation aims to “maintain a healthy, productive and resilient environment for the greatest well-being of the community, now and into the future, consistent with the principles of ecologically sustainable development”. The NSW BC Act repeals several pre-existing Acts, most notably the NSW *Threatened Species Conservation Act 1995* (TSC), the NSW *Nature Conservation Trust Act 2001* and the NSW *Native Vegetation Act 2003*.

The NSW BC Act together with the NSW BC Regulation outlines the framework for addressing impacts on biodiversity from development and clearing. The framework details a pathway to avoid, minimise and offset impacts on biodiversity from development through the Biodiversity Offset Scheme (The BOS).

1.5.1.1 Entry into the Biodiversity Offset Scheme

Entry into the NSW Biodiversity Offset Scheme (BOS) is triggered by developments, projects and activities that meet criteria or certain thresholds for significant impacts on biodiversity in accordance with Section 6.3 of the BC Act. Alternatively, the BOS can be entered into on an opt-in basis.

Criteria to which the BOS applies includes the following:

- Local Development (assessed under Part 4 of the *Environmental Planning and Assessment Act 1979*) that triggers the BOS Threshold, or is “likely to significantly affect threatened species” (based on a test of significance pursuant to Section 7.3 of the BC Act). The BOS Threshold has two parts, and is triggered by the following:
 - Clearing of vegetation that exceeds an area threshold (based on the minimum lot size), or
 - Impacts are predicted to occur within an area mapped on the Biodiversity Values Map (the BV Map).
- State Significant Development (SSD) and State Significant Infrastructure projects (SSI), unless “the Secretary of the Department of Planning, Industry and Environment and the environment agency head determine that the project is not likely to have a significant impact”.
- Biodiversity certification proposals.
- Clearing of native vegetation in urban areas and areas zoned for environmental conservation that exceeds the BOS threshold and does not require development consent.
- Clearing of native vegetation that requires approval by the Native Vegetation Panel under the *Local Land Services Act 2013*.
- Activities assessed and determined under Part 5 of the EP&A Act (generally, proposals by government entities) if proponents choose to ‘opt in’ to the Scheme.

The proposed Glenwood High School development is a State Significant Development (SSD). The Planning Secretary’s Environmental Assessment Requirements (SEARs) (SSD-23512960) details the provision of a BDAR as a requirement of the proposed SSDA. As such, the BOS applies and a BDAR has been completed.

The Project has been assessed in accordance with the BAM (DPIE 2020a). The Biodiversity Accredited Assessor System (BAAS) Case number for the Project is 00025880/BAAS18041/21/00025881. Gilbert Whyte (Assessor Number BAAS18041) is the Biodiversity Accredited Assessor for the project.



1.5.1.2 Application of the Biodiversity Offset Scheme

The proposed development will result in the clearing of 0.02 ha of low condition native vegetation (*PCT 849 – Grey Box – Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion [Low Condition]*). Further impacts include the removal of 0.03 ha of planted native/exotic vegetation (not consistent with plant communities within the locality), and 0.13 ha of exotic grassland (managed). As such, a total of 0.02 ha of native vegetation will be impacted as part of this proposed development. Whilst entry into the BOS is triggered by the proposed development's status as a SSD, Section 2.2 of the BAM (DPIE 2020a) details three (3) streamlined assessment modules intended to align assessment requirements in relation to the level of biodiversity risk, enabling the preparation of a reduced assessment scope in accordance with the BAM.

These streamlined assessment modules may be used where the proposed development impacts on:

- A. Scattered trees (Appendix B of the BAM).
- B. A small area (Appendix C of the BAM).
- C. Planted native vegetation, where the planted native vegetation was planted for purposes such as street trees and other roadside plantings, windbreaks, landscaping in parks and gardens, and revegetation for environmental rehabilitation (Appendix D of the BAM).

Appendices B, C and D of the BAM set out the circumstances where each of the streamlined assessment modules can be used to assess a proposal and the specific assessment requirements. Streamlined assessment modules cannot be used to assess clearing within areas mapped by the NSW Biodiversity Values Map.

Two (2) streamlined assessment modules are applicable to this assessment: the *Streamlined Assessment Module – Small Area* (Appendix C of the BAM), and *Streamlined Assessment Module – Planted Native Vegetation* (Appendix D of the BAM).

Streamlined Assessment Module – Small Area

The streamlined assessment module for small area developments can be used to assess impacts of development according to the area clearing thresholds detailed in Appendix C and Table 12 of the BAM (DPIE 2020a). The small area module was considered applicable to the proposed development based on the clearing of 0.02 ha of native vegetation (see **Section 5.2**). For development sites with a minimum lot size of between 1 ha and 40 ha, the maximum area clearing limit for application of the small area development module is 2 ha. Given that the Study Area (Lot 5227/DP 868693) has a minimum lot size of 6.06ha and the proposed area of clearing is 0.02 ha, the small area development module is applicable. As such, impacts of the development on biodiversity within the Development Site have been assessed in accordance with Appendix C of the BAM (Streamlined Assessment Module – Small Area).

Streamlined Assessment Module - Planted Native Vegetation

The decision-making key in Appendix D of the BAM (DPIE 2020a) was utilised to determine if the Streamlined Assessment Module – Planted Native Vegetation is applicable to the proposed development. The following determinations were made:

- The planted native vegetation to be impacted as a result of the proposed development, cannot be reasonably assigned to a PCT (Plant Community Type) known to occur in the IBRA (Interim Biogeographic Regionalisation for Australia) subregion.



- The planted vegetation has not been planted for the purposes of environmental rehabilitation or restoration under an existing conservation obligation listed in BAM Section 11.9 (2).
- The planted native vegetation is not comprised of individuals of a threatened species or other native species planted/translocated for the purposes of providing threatened species habitat.
- The planted native vegetation is planted for aesthetic purposes (i.e., landscaping).

Justification for the use of the Streamlined Module – Planted Native Vegetation is presented in **Appendix E**.

1.5.2 Koala Habitat Protection State Environmental Planning Policy (SEPP 2021)

The Koala SEPP aims to encourage the conservation and management of areas of natural vegetation that provide habitat for koalas to support a permanent free-living population over their present range and reverse the current trend of koala population decline. Where an approved Koala Plan of Management (KPoM) applies to the land, council's determination of the development application must be consistent with the approved koala plan of management that applies to the land.

There is currently no KPoM for the Blacktown LGA, which is not a listed LGA within Schedule 1 of the Koala SEPP 2021; therefore, the SEPP does not apply to the proposed development.

1.5.3 Sydney Regional Environmental Plan No 20—Hawkesbury-Nepean River (No 2—1997)

The Sydney Regional Environmental Plan No 20 – Hawkesbury-Nepean River (No 2) (1997) aims to protect the environment of the Hawkesbury-Nepean River system by ensuring that the impacts of future land uses are considered in a regional context. This plan applies to certain land within the Sydney Greater Metropolitan Region, including the LGA of Blacktown, whereby the Study Area is located.

Strategies detailed within the plan relevant to the proposed development include the following:

- **Clause 6, subclause 6 – Flora and Fauna:**
 - a) Conserve and, where appropriate, enhance flora and fauna communities, particularly threatened species, populations and ecological communities, aquatic habitats, wetland flora, rare flora and fauna, riverine flora, flora with heritage value, habitats for indigenous and migratory species of fauna, and existing or potential fauna corridors.
 - b) Locate structures where possible in areas which are already cleared or disturbed instead of clearing or disturbing further land.
 - c) Minimise adverse environmental impacts, protect existing habitat and, where appropriate, restore habitat values by the use of management practices.
 - d) Consider the range of flora and fauna inhabiting the site of the development concerned and the surrounding land, including threatened species and migratory species, and the impact of the proposal on the survival of threatened species, populations and ecological communities, both in the short and longer terms.
 - e) Consider the need to control access to flora and fauna habitat areas.

The BDAR considers each of these impact mitigation and minimisation strategies within **Section 5.3**.



1.5.4 State Environmental Planning Policy No 19—Bushland in Urban Areas.

The State Environmental Planning Policy No 19—Bushland in Urban Areas (the “Urban Bushland SEPP”) aims to protect and preserve bushland within the urban areas referred to in Schedule 1 of the SEPP because of its value to the community as part of the natural heritage, its aesthetic value, and its value as a recreational, educational and scientific resource. The Urban Bushland SEPP applies to the proposed development owing to the inclusion of the Blacktown LGA within Schedule 1, and the location of land zoned as RE1 Public Recreation adjacent to the Study Area.

Considerations required under the SEPP in relation to the proposed development include:

- a) The need to retain any bushland on the land,
- b) The effect of the proposed development on bushland zoned or reserved for public open space purposes and, in particular, on the erosion of soils, the siltation of streams and waterways and the spread of weeds and exotic plants within the bushland, and
- c) Any other matters which, in the opinion of the approving or consent authority, are relevant to the protection and preservation of bushland zoned or reserved for public open space purposes.

The Glenwood BDAR considers each of these impact mitigation and minimisation strategies including avoiding impacts to bushland and weed management within **Section 5.3**.

1.5.5 Draft Environment State Environmental Planning Policy

The Draft Environment State Environmental Planning Policy (Draft Environment SEPP) aims to promote the protection and improvement of key environmental assets for their intrinsic value and the social and economic benefits they provide.

The Draft Environment SEPP aims to deliver a planning framework that:

- consolidates existing state level planning provisions into a single instrument
- is in a format capable of being expanded and amended as future needs dictate
- reflects and is consistent with other legislation and environmental planning instruments
- maintains and improves environmental protections in existing State Environmental Planning Policies.

The Draft Environment SEPP will set out provisions under four parts being:

- catchments
- waterways
- bushland
- protected areas.

Two (2) parts of the Draft Environment SEPP are considered relevant to the proposed development including Catchments and Bushland. These parts of the Draft Environment SEPP considered below.

Catchments

The general objectives of the ‘Catchments’ part will be based on the principle of protecting the catchments for existing and future generations by applying the principles of total catchment management to:

- ensure a healthy and sustainable environment on land and water



- achieve a high quality and ecologically sustainable urban environment
- provide public access to waterways and their foreshores
- protect, maintain and rehabilitate watercourses, freshwater wetlands, riparian lands, remnant vegetation and ecological connectivity
- maintain water quality and flows
- maintain and enhance watercourses for their value to ecological diversity, recreation, scenic quality, the economy, tourism, heritage and culture
- support the maintenance or achievement of the water quality objectives for the Sydney drinking water catchment.

No impacts to aquatic habitat are expected to occur as part of the proposed development. The proposed development is located within 40 m of an existing drainage channel to the north of the Study Area, as such indirect impacts to aquatic habitat and appropriate mitigation measures are addressed in **Section 5**.

Bushland

The 'Bushland' section of the proposed new SEPP will provide aims and objectives consistent with the intent of those from the existing SEPP 19, including preserving publicly owned and managed remnant vegetation on land used for open space and bushland for its aesthetic, recreational, scientific, heritage, biodiversity, and educational value.

The 'Bushland' part of the Draft Environment SEPP will contain provisions outlining:

- the land the 'Bushland' part applies to via a map on the NSW ePlanning Portal
- what is meant by terms like 'bushland' and 'public open space'
- consent requirements for the disturbance of public 'bushland' or bushland on land adjoining public 'bushland'
- what a public authority must consider if proposing to disturb 'bushland'
- guidance for councils who want to prepare a plan of management under the provisions in the 'bushland' part of Draft SEPP

No areas within the site are mapped as Urban Bushland under the Draft Environment SEPP. Consideration of impacts to native vegetation are considered in **Section 5**.

1.5.6 Biosecurity Act 2015

Under the *Biosecurity Act 2015* (NSW) all plants are regulated with a general biosecurity duty "to prevent, eliminate or minimise any biosecurity risk they may pose. Any person who deals with any plant, who knows (or ought to know) of any biosecurity risk, has a duty to ensure the risk is prevented, eliminated or minimised, so far as is reasonably practicable." Under the Act, a biosecurity impact "is an adverse effect on the economy, environment, or the community that arises, or has the potential to arise, from a biosecurity matter." This legislation is addressed in **Section 7.2**.

1.5.7 Coastal Management Act 2016

The *Coastal Management Act 2016* replaces the *Coastal Protection Act 1979* and establishes a strategic framework and objectives for managing coastal issues in NSW. The Act promotes a focus on ecologically



sustainable development in relation to the 'coastal zone' as defined by the Act comprising of four coastal management areas:

- Coastal wetlands and littoral rainforests area – areas which display the characteristics of coastal wetlands or littoral rainforests that were previously protected by SEPP 14 and SEPP 26
- Coastal vulnerability area – areas subject to coastal hazards such as coastal erosion and tidal inundation
- Coastal environment area – areas that are characterised by natural coastal features such as beaches, rock platforms, coastal lakes and lagoons and undeveloped headlands. Marine and estuarine waters are also included
- Coastal use area – land adjacent to coastal waters, estuaries and coastal lakes and lagoons.

The Coastal Management SEPP (commenced on 3 April 2018) updates and consolidates into one integrated policy: SEPP 14 (Coastal Wetlands), SEPP 26 (Littoral Rainforests) and SEPP 71 (Coastal Protection), including clause 5.5. of the Standard Instrument – Principal Local Environmental Plan. These policies are now repealed.

The Coastal Management SEPP gives effect to the objectives of the *Coastal Management Act 2016* from a land use planning perspective, by specifying how development proposals are to be assessed if they fall within the coastal zone. It defines the four coastal management areas in the Act through detailed mapping and specifies assessment criteria that are tailored for each coastal management area. Councils and other consent authorities must apply these criteria when assessing proposals for development that fall within one or more of the mapped areas.

The four coastal management areas are:

- **Coastal wetlands and littoral rainforests area** – areas which display the characteristics of coastal wetlands or littoral rainforests that were previously protected by SEPP 14 and SEPP 26.
- **Coastal vulnerability area** – areas subject to coastal hazards such as coastal erosion and tidal inundation.
- **Coastal environment area** – areas that are characterised by natural coastal features such as beaches, rock platforms, coastal lakes and lagoons and undeveloped headlands. Marine and estuarine waters are also included.
- **Coastal use area** – land adjacent to coastal waters, estuaries and coastal lakes and lagoons.

The Study Area does not contain areas mapped as any of the four coastal management areas above. As such, the *Coastal Management Act 2016* does not apply to this development.

1.5.8 Water Management Act 2000

Controlled activities carried out in, on or under waterfront land are regulated by the *Water Management Act 2000* ("WM Act"). 'Waterfront land' is defined as the bed of any river, lake or estuary, and the land within 40 m of the river banks, lake shore or estuary mean high water mark. No mapped waterways exist within the Subject Site. An artificial drainage channel exists approximately 30 metres to the north-east of the Subject Site at its closest point. Whilst the Development Footprint is within 'Waterfront Land', the proposed development does not constitute a 'controlled activity' in accordance with the WM Act, as public authorities are exempt from requiring 'controlled activity' approval under Clause 41 of the *Water Management (General) regulations 2018*.

Consideration of indirect impacts to aquatic and riparian habitat is provided in **Section 5**. Mitigation measures are detailed in **Section 5.3**.



1.5.9 Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)

Under the EPBC Act, an approval is required for actions that are likely to have a significant impact on Matters of National Environmental Significance (MNES). An action includes a project, development, undertaking, activity or series of activities. When a person proposes to take an action, which they believe may need approval under the EPBC Act, they must refer the proposal to the Australian Government Minister for the Environment. The Act identifies the following nine MNES:

1. World Heritage properties.
2. National heritage places.
3. Wetlands of international importance (Ramsar Convention).
4. Listed threatened species and communities.
5. Migratory species listed under international agreements.
6. Great Barrier Reef Marine Park.
7. Commonwealth marine areas.
8. Nuclear actions; and
9. Water resources in respect to CSG and large coal mines.

While this BDAR is not required to address MNES, the proponent is required to address the EPBC Act as part of their development application to Council. Item 4 is relevant to the proposed development.

Refer to **Section 7.1** for a summary of the assessment.

1.5.10 Blacktown Local Environmental Plan 2015

The Study Area is located within the Blacktown Council LGA. The Blacktown Local Environmental Plan 2015 (Blacktown LEP) controls development within the Study Area through zoning and development controls. These controls are described in greater detail by the supporting Blacktown Development Control Plan 2015 (Blacktown DCP).

Clause 7.2 – Terrestrial Biodiversity

Clause 7.2 of the LEP is relevant to the proposed development. This clause aims to “maintain terrestrial biodiversity by protecting native fauna and flora, and protecting the ecological processes necessary for their continued existence, and encouraging the conservation and recovery of native fauna and flora and their habitats”. This clause applies to land identified as “Biodiversity” on the LEP Terrestrial Biodiversity Map. A review of the Terrestrial Biodiversity Map indicates an area of mapped Biodiversity occurs within the north-west of the Subject Site. The proposed development will not occur within mapped Biodiversity areas.

Indirect impacts resulting from the proposed development on areas mapped as Biodiversity are unlikely, however appropriate impact mitigation measures have been detailed within **Section 5.3**.

Clause 7.3 – Riparian Land and Watercourses

Clause 7.3 (Riparian Land and Watercourses) of the LEP is relevant to the proposed development. This clause aims to protect and maintain water quality within watercourses, the stability of the bed and banks of watercourses, aquatic and riparian habitats, and ecological processes within watercourses and riparian areas. This clause applies to land that is a watercourse, and land within 40 metres of the top of the bank of a watercourse. A drainage



channel is located approximately 30 m to the north-east of the Development Footprint (see **Figure 2**). As such, Clause 7.3 applies to the land and the proposed development.

In accordance with Clause 7.3 of the LEP the consent authority must consider:

- Whether or not the development is likely to have any adverse impact on the following:
 - The water quality and flows within the watercourse,
 - Aquatic and riparian species, habitats and ecosystems of the watercourse,
 - The free passage of fish and other aquatic organisms within or along the watercourse,
 - Any future rehabilitation of the watercourse and riparian areas, and
- Whether or not the development is likely to increase water extraction from the watercourse, and
- Any appropriate measures proposed to avoid, minimise or mitigate the impacts of the development.

Consideration of impacts to aquatic and riparian habitats are considered in **Section 5**.

1.5.11 Blacktown Development Control Plan 2015

The Blacktown DCP supports the Blacktown LEP by providing additional detail and guidance on addressing biodiversity issues associated with development. In regard to biodiversity, the DCP contains provisions that relate to environmental effects, soil and erosion control and vegetation. These provisions have been considered during the assessment.

Key components of the DCP relevant to the proposed development include consideration of tree protection including Section 4.3 Tree Preservation. The DCP details that “Existing trees should be preserved wherever possible” and that “All applications for development (other than for the use of an existing building) should indicate the location of existing vegetation and should, on or accompanying the DA Form and on the plans, note the measures to be taken to protect existing vegetation against damage and destruction during construction.

Tree impact mitigation and protection measures have been detailed within **Section 5.3**.



2 SITE CONTEXT

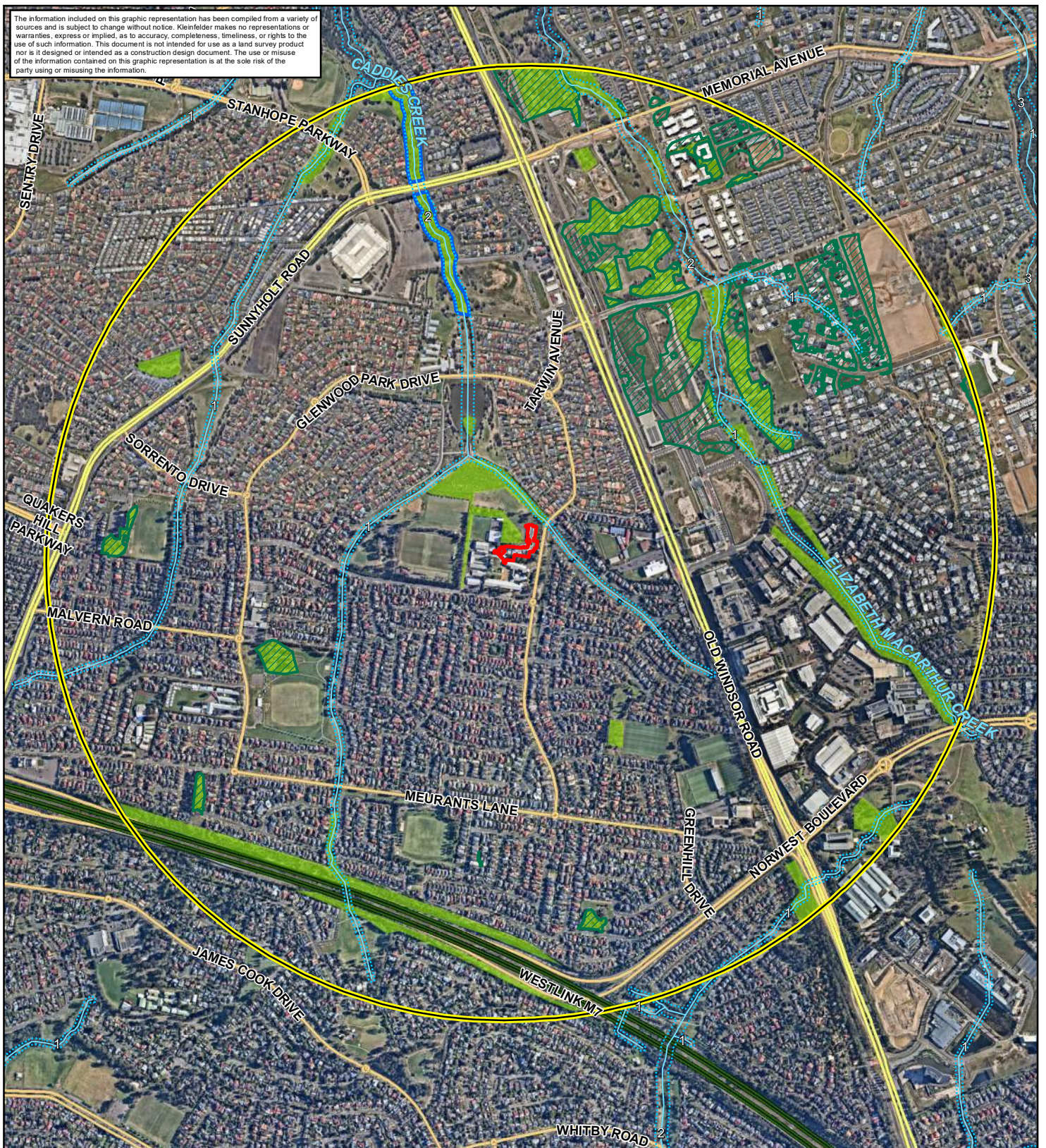
2.1 LANDSCAPE FEATURES

The landscape features detailed in Section 3 of the BAM (DPIE 2020a) and applicable to the Development Site are described in **Table 2**. These landscape features are also shown on **Figure 3**.

Table 1: Landscape Features relevant to the Development Site.

KLF Table Heading	KLF Table Heading
IBRA Region	NSW Sydney - The Development Site occurs centrally within the Sydney Basin Bioregion.
IBRA Sub Region	Cumberland - The Development Site occurs within the Cumberland IBRA Sub Region.
Local Government Area (LGA)	Blacktown City Council Local Government Area
Mitchell Landscapes	Cumberland Plains (Department of Environment and Climate Change [DECC], 2002; Mitchell 2002) Low rolling hills and valleys in a rain shadow area between the Blue Mountains and the coast on horizontal Triassic shales and lithic sandstones forming a down-warped block on the coastal side of the Lapstone monocline. Intruded by a small number of volcanic vents and partly covered by Tertiary river gravels and sands (Hawkesbury-Nepean Terrace Gravels landscape). Quaternary alluvium along the main streams. General elevation 30 to 120m, local relief 50m. and sometimes affected by salt in tributary valley floors. Pedal uniform red to brown clays on volcanic hills. Red and brown texture-contrast soils on crests grading to yellow harsh texture-contrast soils in valleys. Woodlands and open forest of grey box (<i>Eucalyptus moluccana</i>), forest red gum (<i>Eucalyptus tereticornis</i>), narrow-leaved ironbark (<i>Eucalyptus crebra</i>), thin-leaved stringybark (<i>Eucalyptus eugenioides</i>), cabbage gum (<i>Eucalyptus amplifolia</i>) and broad-leaved apple (<i>Angophora subvelutina</i>). Grassy to shrubby understorey often dominated by Australian boxthorn (<i>Bursaria spinosa</i>), poorly drained valley floors, often salt affected with swamp oak (<i>Casuarina glauca</i>) and paperbark (<i>Melaleuca sp.</i>).
Rivers, streams and estuaries	No mapped waterways exist within the Study Area. A mapped first order watercourse is within 40m of the proposed development footprint, located to the north east of the Study Area which then flows into Caddies Creek.
Wetlands	The Coastal Wetlands and Littoral Rainforests Area Map (DPIE 2018b) does not identify any wetlands within the Study Area.
Connectivity of different areas of habitat	The vegetation within Study Area is considered to be partially connected to scattered patches of vegetation along a watercourse to the north, and streetside vegetation throughout the locality. Connectivity is impacted by roads and residential development throughout the locality (Figure 3).
Areas of geological significance and soil hazard features	The Study Area is not located with an area identified as having any particular geological significance. No mapping was identified that would indicate the site contains any soil hazard features.
Areas of outstanding biodiversity value	There are no areas of "outstanding biodiversity value" (in accordance with Section 3.1.3 of the BAM [DPIE 2020a]) mapped within the Development Site or Study Area.
Geology and Soils	Blacktown (9030bt) - This Soil Landscape occurs on gently undulating rises on Wianamatta Group shales. Local relief to 30 m, slopes usually >5%. Broad rounded crests and ridges with gently inclined slopes. Cleared Eucalypt woodland and tall open forest (dry sclerophyll forest).
Native Vegetation Cover	Native Vegetation was assessed as per Section 3.2 of the BAM 2020 (DPIE 2020a). Native vegetation constitutes 6% (44 ha) of the projected 1,500 m site buffer (765 ha) associated with the development site (see Figure 3). Native Vegetation Cover therefore is classed as >0-10% .

The information included on this graphic representation has been compiled from a variety of sources and is subject to change without notice. Kleinfelder makes no representations or warranties, express or implied, as to accuracy, completeness, timeliness, or rights to the use of such information. This document is not intended for use as a land survey product nor is it designed or intended as a construction design document. The use or misuse of the information contained on this graphic representation is at the sole risk of the party using or misusing the information.

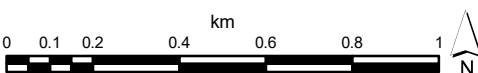


Legend

- Development Site
- Landscape Assessment - 1500m Buffer
- Landscape Assessment - Native Vegetation
- Threatened species or communities with potential for serious and irreversible impacts
- Protected Riparian Land
- IBRA Sub-region Boundary (V7) - (Entire Landscape Assessment Area is Sydney Basin - Hunter)
- Mitchell Landscapes Boundary (V3)
- Watercourse (Labelled with stream order)
- Riparian Buffers
- Motorway
- Arterial Road
- Sub-arterial Road

Biodiversity Values (V11.7)

- Threatened species or communities with potential for serious and irreversible impacts
- Protected Riparian Land



PROJECT REFERENCE: 20221196
 DATE DRAWN: 2021/11/02 21:56 Version 2
 DRAWN BY: GJoice

DATA SOURCE:
 NSW DFSI - 2021
 NSW EOH - 2021
 Nearmap - 2021

Landscape Context

Jacobs Group (Australia) Pty Ltd
 Biodiversity Development Assessment Report
 Glenwood High (Lot 5227 DP868693)
 Forman Avenue, Glenwood NSW

FIGURE:

3





3 NATIVE VEGETATION

3.1 METHODOLOGY

Native vegetation at the Development Site was assessed in accordance with Section 4 of the BAM (DPIE 2020a).

3.1.1 *Data Review*

Vegetation mapping completed as part of the Remnant Vegetation of the Western Cumberland subregion, 2013 Update. VIS_ID 4207 (DPIE 2015) was reviewed to assist with the determination of PCTs within the Study Area.

3.1.2 *Vegetation Mapping Surveys*

Vegetation Mapping and Surveys

Detailed vegetation surveys were conducted across the Study Area on the 01 June 2021. Areas of vegetation to be impacted by the proposed development were mapped during this period.

The boundaries of each of the identified vegetation communities within the Study Area were mapped using a combination of rapid data points (RDP) and walking transects, using the polygons produced through aerial photo interpretation (API) to assist in targeting survey effort. RDPs involved collecting waypoints over the Study Area using a handheld Trimble™ GPS unit and recording dominant species, structure and condition. Walking transects involved verifying polygons where homogenous in floristic composition and condition, as well as walking vegetation ecotones and using the recorded tracks to define vegetation community boundaries. The RDPs and survey tracks were then overlaid on an aerial photograph and used to delineate and/or clarify vegetation boundaries.

3.1.2.1 Linework and Attribution

RDPs and plots were classified and tagged with a PCT by field surveyors. Polygons produced from the API work adopted the PCT of the sample point that they intersected.

3.1.2.2 Plant Community Type and Determination

Each vegetation community identified within the Study Area was assigned to the closest equivalent PCT from those listed in the BioNet Vegetation Classification database (DPIE 2021b). The closest equivalent PCT for each vegetation community was determined through a comparison of the floristic descriptions of PCTs in the database with the plot / transect data collected from the Development Site. In addition to floristic and structural similarity, the landscape position, soil type and other diagnostic features of the vegetation communities on the site were compared to the descriptions in the database to determine the most suitable PCT. Threatened ecological communities (TECs) as defined in NSW and Commonwealth legislation were also identified if present.

3.1.2.3 Vegetation Zones

Vegetation zones were identified and delineated in the Development Site in accordance with Section 4.3 of the BAM (DPIE 2020a). A vegetation zone is defined in the BAM as a relatively homogenous area that is the same vegetation type and broad condition.



3.1.2.4 Assessing Vegetation Integrity (Site Condition)

Following stratification of the Development Site into vegetation zones, plots/transects were undertaken to collect site condition data for the composition, structure and function attributes listed in **Table 2** in accordance with Section 4.3 of the BAM (DPIE 2020a). The location of the plots/transects were selected through stratified random sampling to provide a representative sample of the variation in vegetation composition and condition within each vegetation zone.

Table 2: Composition, Structure and Function components of vegetation integrity

Growth form groups used to assess composition (species richness) and structure (percent foliage cover)	Function attributes
• Tree (TG) • Shrub (SG) • Grass and grass-like (GG) • Forb (FG) • Fern (EG) • Other (OG)	• Number of large trees • Tree regeneration (presence/absence) • Tree stem size class (presence/absence) • Total length of fallen logs • Litter cover • High threat exotic vegetation cover (HTE) • Hollow-bearing trees (HBT)

The number of plots/transects undertaken across the site meets the minimum number of transects required for each vegetation zone area as detailed in Section 4.3.4, Table 3 of the BAM (DPIE 2020a). Two plots were undertaken within the Development Site (see **Figure 4**).

3.1.2.5 Floristic Identification and Nomenclature

Floristic identification and nomenclature were based on Harden (1992, 1993, 2000 and 2002) with subsequent revisions as published on PlantNet (<http://plantnet.rbgsyd.nsw.gov.au>).

3.2 ASSESSMENT RESULTS

3.2.1 Vegetation within the Development Site

3.2.1.1 Vegetation Description

One Plant Community Type (PCT) was identified within the site; *PCT 849 - Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion*. The remainder of the Development Site was characterised by areas of managed exotic grassland, and gardens with a mix of planted native/exotic species.

The vegetation within the Study Area was assigned to five (5) vegetation zones based on floristics and vegetation condition. Vegetation Zones comprised the following:

- **Vegetation Zone 1:** *PCT 849 - Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion, Critically Endangered Ecological Community (CEEC) - Moderate Condition*
- **Vegetation Zone 2:** *PCT 849 - Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion (Low Condition)*
- **Vegetation Zone 3:** *PCT 849 - Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion (Planted)*
- **Vegetation Zone 4:** *Planted Native/Exotic Vegetation*
- **Vegetation Zone 5:** *Exotic Grassland (Managed)*



The extent of each vegetation zone is illustrated on Figure 4. The Planted Native Vegetation within the Development Site could not be reasonably assigned to a PCT occurring within the Cumberland IBRA sub-region (see **Appendix E**). Therefore, the *Streamlined Assessment Module – Planted Native Vegetation* was deemed appropriate in accordance with Appendix D of the BAM (DPIE 2020a).

In accordance with Table 28 of the BAM (DPIE, 2020a) impacts to the Planted Native/Exotic Vegetation have been considered in the context of potential habitat for threatened species throughout this report *see **Section 5.2**. The removal of this vegetation from the Development Site does not generate an ecosystem credit obligation.

A summary of vegetation communities is provided in **Table 3**. Full descriptions of each vegetation zone are provided in the following sub-sections. Floristic and structural plot data is provided in **Appendix H**.

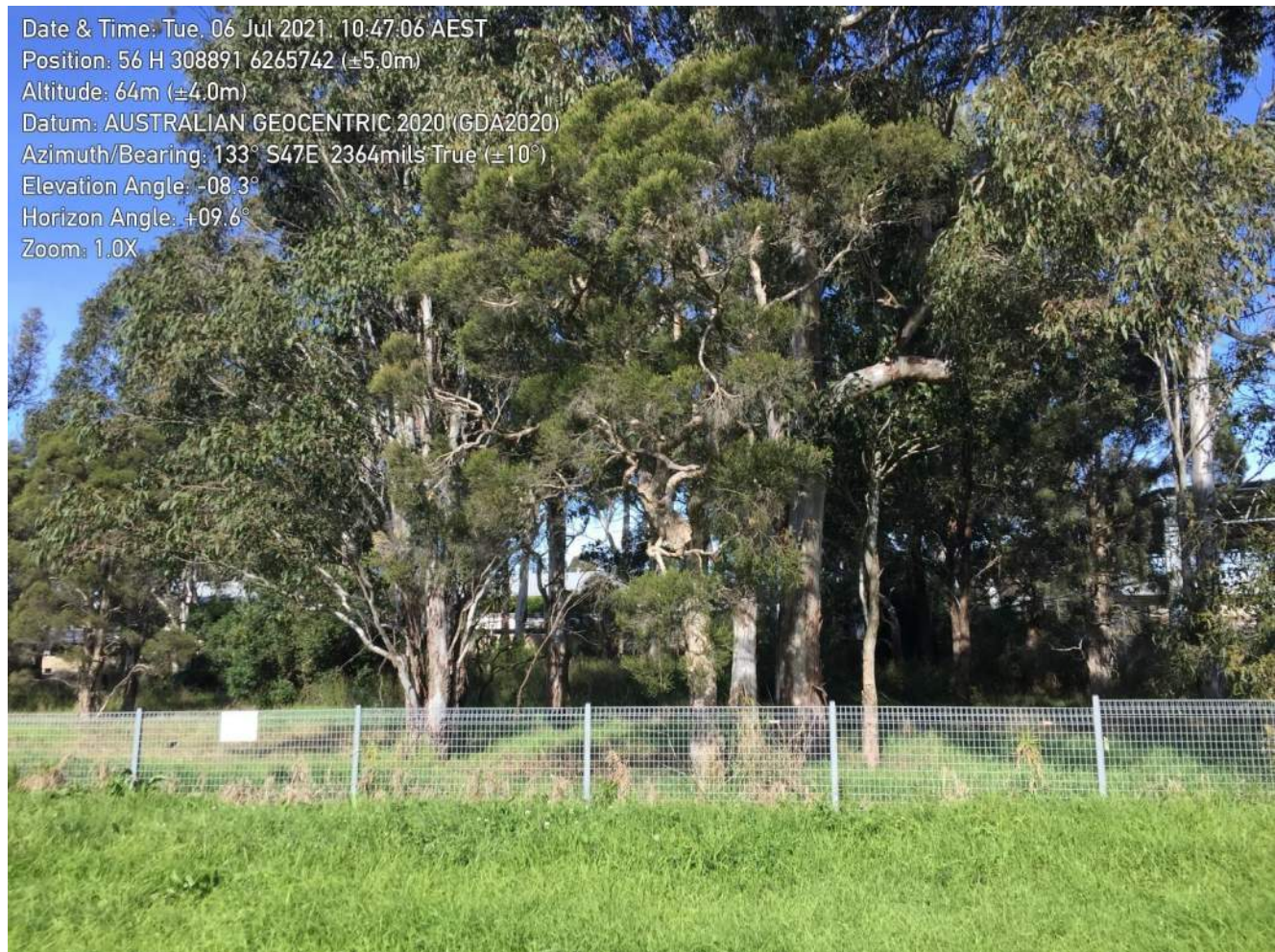
The proposed development detailed within this report constitutes a component of broader upgrades to the facilities within Glenwood High School addressed in separate assessments and planning pathways, including a *Review of Environmental Factors* (REF), and a *Flora and Fauna Assessment Report* (FFAR). The cumulative impacts of these three separate planning components on each of the determined vegetation zones are provided below in **Table 3**.

Table 3: Vegetation Communities within the Study Area

Vegetation Community	Vegetation Formation	Vegetation Class	Area within Study Area	Area Cumulative impacts TOTAL	Area within Development Site
Vegetation Zone 1: PCT 849 - Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion (CEEC - Moderate Condition)	Grassy Woodlands	Coastal Valley Grassy Woodlands	0.34 ha	0.001 (1 tree)	0 ha
Vegetation Zone 2: PCT 849 - Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion (Low Condition)	Grassy Woodlands	Coastal Valley Grassy Woodlands	0.49 ha	0.10 ha	0.02 ha
Vegetation Zone 3: PCT 849 - Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion (Planted)	Grassy Woodlands	Coastal Valley Grassy Woodlands	0.41 ha	0 ha	0 ha
Vegetation Zone 4: Planted Native/Exotic Vegetation	NA	NA	1.23 ha	0.03 ha	0.03 ha
Vegetation Zone 5: Exotic Grassland (Managed)	NA	NA	1.65 ha	0.14 ha	0.13 ha
Total			2.95 ha	0.291 ha	0.18 ha



Vegetation Zone 1



Date & Time: Tue, 06 Jul 2021, 10:47:06 AEST
Position: 56 H 308891 6265742 ($\pm 5.0\text{m}$)
Altitude: 64m ($\pm 4.0\text{m}$)
Datum: AUSTRALIAN GEOCENTRIC 2020 (GDA2020)
Azimuth/Bearing: 133° S47E 2364mils True ($\pm 10^\circ$)
Elevation Angle: -08.3°
Horizon Angle: $+09.6^\circ$
Zoom: 1.0X

Plate 1: PCT 849 - Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion (CEEC - Moderate Condition)

PCT	Vegetation Formation
Vegetation Formation and Class	Grassy Woodlands Coastal Valley Grassy Woodlands
Area within Development Site	0 ha (0.34 ha within the Study Area) – Cumulative Impact Total: 0.001 ha
Survey Effort	Required: 0 plot/transect Conducted: 1 plot/transect.
Floristic description	The vegetation within this zone was characterised by a canopy dominated by <i>Eucalyptus tereticornis</i> (Forest Red Gum), with the occasional <i>Eucalyptus crebra</i> (Narrow-leaved Ironbark). The midstorey is comprised of <i>Melaleuca decora</i>, <i>Acacia parramattensis</i> (Parramatta Wattle), <i>Bursaria spinosa</i> (Sweet Bursaria), and the occasional <i>Olea europaea</i> subsp. <i>cuspidata</i>* (African Olive). The ground layer within this zone is dominated by exotic grasses including <i>Paspalum dilatatum</i>* (Paspalum), <i>Eragrostis curvula</i>* (African Lovegrass), and <i>Ehrharta erecta</i>* (Panic Veldtgrass). A mix of native grasses and herbs still persist within this vegetation zone, including <i>Microlaena stipoides</i> (Weeping Grass), <i>Einadia hastata</i> (Berry Saltbush), <i>Dichondra repens</i> (Kidney Weed), and <i>Commelina cyanea</i> (Native Wandering Jew). Key exotic species within this zone include the dominance of High Threat Weeds (HTW) in the ground layer (e.g., <i>Paspalum dilatatum</i>, <i>Eragrostis curvula</i>, <i>Ehrharta erecta</i>) and Priority Weeds for the Greater Sydney region including <i>Olea europaea</i> subsp. <i>cuspidata</i>, <i>Rubus fruticosus</i> (Blackberry), <i>Asparagus asparagoides</i> (Bridal Creeper), and <i>Senecio madagascariensis</i> (Fireweed).



PCT	Vegetation Formation
Condition within Development Site	The vegetation within this zone is representative of moderate condition PCT 849 with an intact native canopy and midstorey including diagnostic species. Vegetation condition within this zone is impacted by the occurrence of priority weed species and the dominance of an exotic grassy groundlayer.
Justification for PCT selection	The vegetation within this zone most closely resembles a Grassy Woodland due to the dominance of an open eucalypt canopy, and conspicuous and diverse ground cover of native grasses and herbs. Within this formation, the vegetation is most closely aligned with the Coastal Valley Grassy Woodlands class due to the presence of a canopy dominated by <i>Eucalyptus tereticornis</i> (Forest Red Gum), and occurrence of <i>Eucalyptus crebra</i> (Narrow-leaved Ironbark), <i>Eucalyptus moluccana</i> (Grey Box), and <i>Angophora floribunda</i> (Rough-barked Apple). PCT 849 was deemed to be most closely aligned PCT to the vegetation within the Subject Site due to the presence the following key features: ▪ Open canopy containing both key diagnostic species <i>Eucalyptus tereticornis</i> and <i>Eucalyptus moluccana</i> (occurring immediately outside of the Study Area). ▪ Reduced midstorey and shrub layer with key diagnostic species <i>Bursaria spinosa</i> (Sweet Bursaria) ▪ A reduced native grassy ground layer, albeit with diagnostic species including <i>Microlaena stipoides</i> (Weeping Grass) and <i>Dichondra repens</i> (Kidney Weed), ▪ Location within the Sydney Cataract (SYD) IBRA sub-regions ▪ Landscape position on clay/loam soils on Wianamatta Group shales within the Cumberland Plain.
Status	BC Act: The vegetation within this zone meets the definition for <i>Cumberland Plain Woodland in the Sydney Bioregion</i> CEEC under the BC Act. See Appendix D for TEC determination. EPBC Act: The vegetation within this zone <u>does not</u> meet the definition for <i>Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest</i> CEEC under the EPBC Act. See Appendix D for TEC determination.
SAII	Yes
PCT % Cleared	93%



Vegetation Zone 2



Plate 2: PCT 849 - Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion (Low Condition)

PCT	Vegetation Formation
Vegetation Formation and Class	Grassy Woodlands Coastal Valley Grassy Woodlands
Area within Development Site	0.02 ha (0.49 ha within the Study Area) Cumulative Impact Total: 0.10 ha
Survey Effort	Required: 1 plot/transect Conducted: 1 plot/transect.
Floristic description	The vegetation within this zone is characterised by a mix of scattered canopy trees including <i>Eucalyptus tereticornis</i> (Forest Red Gum), and occurrence of <i>Eucalyptus crebra</i> (Narrow-leaved Ironbark), and <i>Angophora floribunda</i> (Rough-barked Apple). There is the occasional 'midstorey' species including <i>Melaleuca decora</i>, <i>Acacia parramattensis</i> (Parramatta Wattle). The shrub layer within this zone is either completely absent or replaced by planted non-indigenous/exotic species associated with gardens. The groundcover within this zone is highly managed (mown) and dominated by exotic grasses including <i>Cenchrus clandestinus</i> (Kikuyu Grass), <i>Setaria parviflora</i> (Pigeon Grass), <i>Lolium rigidum</i> (Wimmera Ryegrass), and <i>Sporobolus africanus</i> (Parramatta Grass). Some native grasses and herbs persist within the vegetation zone including <i>Microlaena stipoides</i> (Weeping Grass), <i>Dichondra repens</i> (Kidney Weed), and <i>Oxalis perennans</i>.



PCT	Vegetation Formation
Condition within Development Site	The vegetation within this zone is of low condition and is primarily comprised of exotic grasses and forbs. The vegetation zone is characterised by scattered canopy trees with native shrubs being largely absent from this zone as a result of ongoing management (mowing).
Justification for PCT selection	See justification for Vegetation Zone 1. This zone represents a lower condition form of the Zone 1.
Status	BC Act: The vegetation within this zone <u>does not meet</u> the definition for <i>Cumberland Plain Woodland in the Sydney Bioregion</i> CEEC under the BC Act. See Appendix D for TEC determination. EPBC Act: The vegetation within this zone <u>does not meet</u> the definition for <i>Cumberland Plain Woodland in the Sydney Bioregion</i> CEEC under the EPBC Act. See Appendix D for TEC determination.
SAII	No
PCT % Cleared	93%



Vegetation Zone 3



Plate 3: PCT 849 - Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion (Planted)

PCT	Vegetation Formation
Vegetation Formation and Class	N/A
Area within Development Site	0 ha (0.41 ha within the Study Area) - Cumulative Impact Total: 0 ha
Survey Effort	Required: 0 plot/transect Conducted: 0 plot/transect.
Floristic description	The vegetation within this zone is characterised by a mix of planted eucalypt species representative of PCT 849, including <i>Eucalyptus tereticornis</i> (Forest Red Gum), and occurrence of <i>Eucalyptus crebra</i> (Narrow-leaved Ironbark), and <i>Eucalyptus moluccana</i> (Grey Box). The shrub layer is predominantly absent, with the occasional <i>Acacia parramattensis</i> (Parramatta Wattle) along the fence line. The ground layer is consistent with that of Vegetation Zone 2 and 3, being highly managed (mown) and dominated by the exotic grasses including <i>Cenchrus clandestinus</i> (Kikuyu Grass). Some native grasses and herbs persist within the vegetation zone including <i>Microlaena stipoides</i> (Weeping Grass), and <i>Dichondra repens</i> (Kidney Weed).
Condition within Development Site	Zone 3 represents a planted form of PCT 849.
Justification for PCT selection	See justification for Vegetation Zone 1.
Status	BC Act: N/A EPBC Act: N/A
SAII	No
PCT % Cleared	N/A



Vegetation Zone 4



Date & Time: Tue, 06 Jul 2021, 09:59:15 AEST
Position: 56 H 308955,6265632 ($\pm 5.0\text{m}$)
Altitude: 63m ($\pm 3.0\text{m}$)
Datum: AUSTRALIAN GEOCENTRIC 2020 (GDA2020)
Azimuth/Bearing: 274° N86W 4871mils True ($\pm 25^\circ$)
Elevation Angle: +04.4°
Horizon Angle: -01.6°
Zoom: 1.0X

Plate 4: Planted Native/Exotic Vegetation

PCT	Vegetation Formation
Vegetation Formation and Class	N/A
Area within Development Site	0.03 ha (1.23 ha within the Study Area) - Cumulative Impact Total: 0.03 ha
Survey Effort	Required: 0 plot/transect Conducted: 0 plot/transect.
Floristic description	The vegetation within this zone is characterised by an absence of a canopy and a shrub layer comprising of mix of planted native/exotic species, including <i>Callistemon citrinus</i> (Crimson Bottlebrush), <i>Acacia parramattensis</i> (Parramatta Wattle), <i>Yucca aloifolia</i> (Spanish Bayonet), <i>Dimorphotheca ecklonis</i> (Cape Daisy), <i>Tropaeolum majus</i> (Nasturtium), <i>Fraxinus</i> spp, and <i>Westringia fruticosa</i> (Coastal Rosemary). The groundcover is predominantly exotic consistent with that of Vegetation Zone 2 and 3, being highly managed (mown) and dominated by the exotic grasses including <i>Cenchrus clandestinus</i> (Kikuyu Grass).
Condition within Development Site	The vegetation within this zone is characterised by a mix of planted native/exotic trees and shrubs, the majority of which are not locally indigenous.
Justification for PCT selection	Vegetation within this zone is not representative of a PCT. Justification for the status of this vegetation zone as "Planted Native Vegetation" is provided in Appendix E .
Status	BC Act: N/A EPBC Act: N/A
SAII	No
PCT % Cleared	N/A



Vegetation Zone 5



Plate 5: Exotic Grassland (Managed)

PCT	Vegetation Formation
Vegetation Formation and Class	N/A
Area within Development Site	0.13 ha (1.65 ha within the Study Area) - Cumulative Impact Total: 0.14 ha
Survey Effort	Required: 0 plot/transect Conducted: 0 plot/transect.
Floristic description	The vegetation within this zone is representative of that described for Vegetation Zone 2, albeit without any native canopy, midstorey or shrub species. The vegetation is highly managed (mown) and dominated by the exotic grasses including <i>Cenchrus clandestinus</i> (Kikuyu Grass), <i>Setaria parviflora</i> (Pigeon Grass), <i>Lolium rigidum</i> (Wimmera Ryegrass), and <i>Sporobolus africanus</i> (Parramatta Grass). Some native grasses and herbs persist within the vegetation zone including <i>Microlaena stipoides</i> (Weeping Grass), and <i>Dichondra repens</i> (Kidney Weed).
Condition within Development Site	Zone 5 represented highly managed low condition exotic grassland. This is based on the absence of upper and mid strata, as well as the high proportion of exotic ground cover species. Native flora is sparse and low in diversity within this zone.
Justification for PCT selection	Vegetation within this zone is not representative of a PCT.
Status	BC Act: N/A EPBC Act: N/A
SAII	No
PCT % Cleared	N/A



3.2.1.2 Assessment of Patch Size

The patch size for PCT 849 (Vegetation Zones 1, 2, and 3) was assessed as 5-25 ha as the vegetation within the Study Area is connected to scattered patches of intact areas of native vegetation extending to the north and south-west of the site. Any gaps in the connective vegetation considered for the patch sizes are less than 100 m (appropriate for woody vegetation).

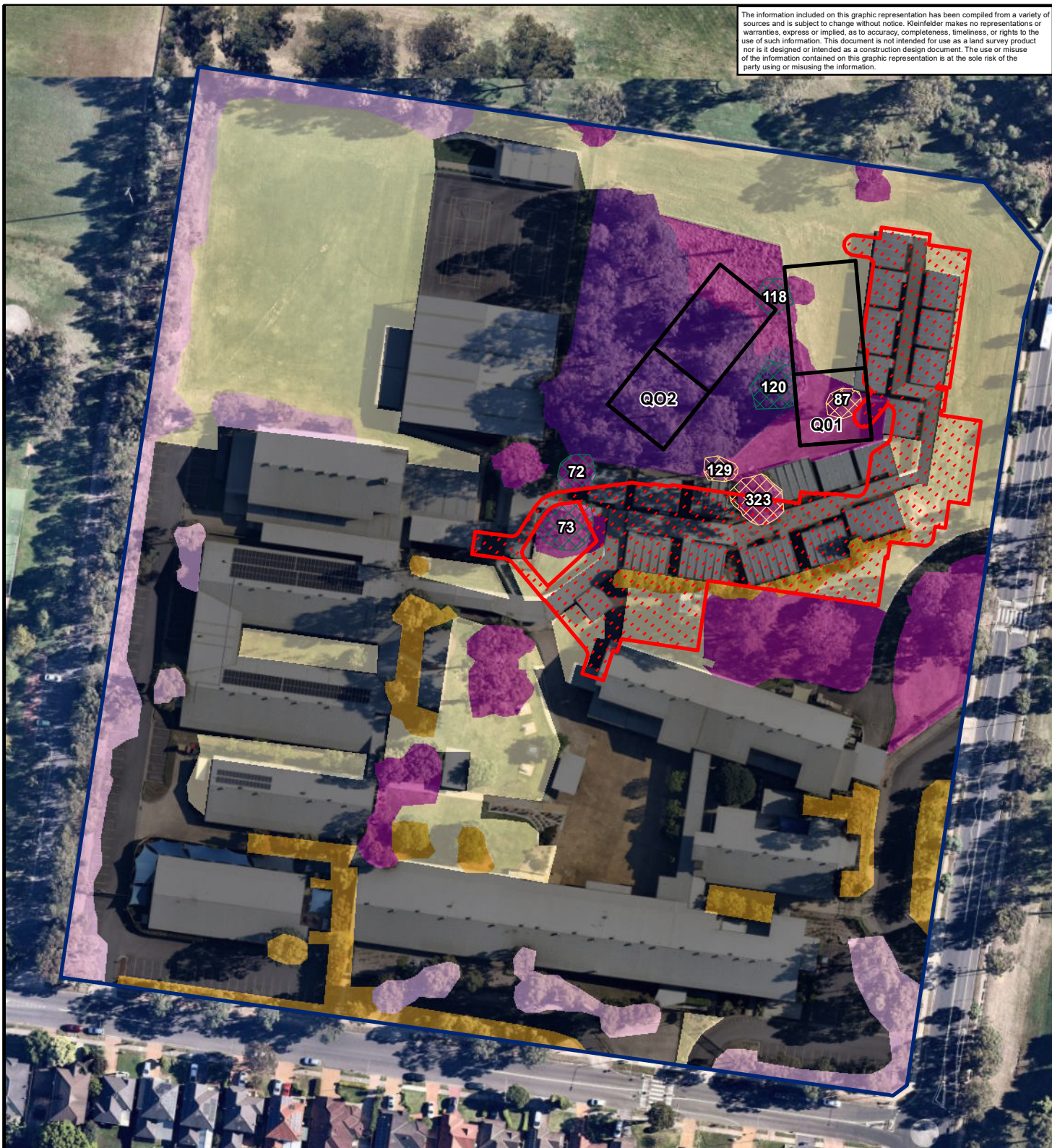
3.2.1.3 Vegetation Integrity Score

The current vegetation integrity score of the vegetation zones located within the Development Site are outlined in **Table 4**.

Table 4: Current vegetation integrity score for the vegetation zones

Zone	PCT	Condition class	Area (ha)	Condition scores (Current Score)			Vegetation integrity score
				Composition	Structure	Function	
1	849	Moderate EEC	N/A	N/A	N/A	N/A	N/A
2	849	Low	0.02	5.1	13	9.8	8.6
3	849	Planted	N/A	N/A	N/A	N/A	N/A
4	Planted Veg	N/A	N/A	N/A	N/A	N/A	N/A
5	Exotic Grass	N/A	N/A	N/A	N/A	N/A	N/A

The information included on this graphic representation has been compiled from a variety of sources and is subject to change without notice. Kleinfelder makes no representations or warranties, express or implied, as to accuracy, completeness, timeliness, or rights to the use of such information. This document is not intended for use as a land survey product nor is it designed or intended as a construction design document. The use or misuse of the information contained on this graphic representation is at the sole risk of the party using or misusing the information.



Legend

- Study Area
- Development Site
- BAM Plots

Trees (Labelled with Tree Number)

- To be Retained
- To be Removed - Subject to a Separate DA

Plant Community Types and Vegetation Zones

- Zone 1: PCT 849 - Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion (Moderate Condition)
- Zone 2: PCT 849 - Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion (Low Condition)
- Zone 3: PCT 849 - Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion (Planted)
- Zone 4: Planted Native/Exotic Vegetation
- Zone 5: Exotic Grassland (Managed)
- Existing Infrastructure

0 10 20 30 40 50 Metres Bright People. Right Solutions. www.kleinfelder.com	PROJECT REFERENCE: 20221196	Vegetation Zones	FIGURE: 4
	DATE DRAWN: 2022/02/10 09:31 Version 4		
	DRAWN BY: GJoyce	Jacobs Group (Australia) Pty Ltd Biodiversity Development Assessment Report Glenwood High (Lot 5227 DP868693) Forman Avenue, Glenwood NSW	
	DATA SOURCE: NSW DFSI - 2021 Nearmap - 2021		



4 THREATENED SPECIES

4.1 ASSESSING HABITAT SUITABILITY

To inform the assessment of suitable habitat for threatened species and populations within the Study Area, a database search of the NSW DPIE BioNet Atlas (DPIE 2021a) and the Commonwealth DAWE Protected Matters Search Tool (PMST) (DAWE 2021a) were conducted. Results of the database search and 'likelihood of occurrence' assessment are provided in **Appendix A**.

4.1.1 Habitat Assessment

4.1.1.1 Flora

The Study Area is characterised by areas of managed exotic grassland (sporting fields and open spaces), gardens and planted native vegetation, scattered mature eucalypts (*Eucalyptus tereticornis*, *Eucalyptus crebra*, and *Angophora floribunda*), and a patch of intact native grassy woodland. Therefore, much of the site is not considered to represent suitable habitat for many locally occurring threatened flora species. The woodland patch (Vegetation Zone 1) is considered to represent the highest value habitat for threatened flora species within the Study Area. However, the dominance of exotic groundcover species within this zone reduces habitat suitability for most local threatened flora species.

Vegetation within the Development Site is characterised by one mature *Eucalyptus tereticornis*, managed exotic grassland, and gardens of planted native/exotic species. As such, the Development Site is not considered to represent suitable habitat for any locally occurring threatened flora species.

4.1.1.2 Fauna

Fauna habitat within the Study Area is characterised by open managed (mown) grassland areas, gardens of dense shrubs (i.e. *Callistemon spp.*, *Acacia spp.* and exotics), mature eucalypts, and a fenced off patch of intact native woodland. Much of the vegetation within the Study Area is highly managed (**Photo 1**), as such there is a low abundance of wooden debris, leaf litter and dense shrub cover which would otherwise provide important habitat for ground dwelling native fauna. As such most of the vegetation within the Study Area is likely to only constitute habitat for highly mobile threatened species (i.e. birds and bats), and locally occurring species associated with urban/suburban environments.

The exception is the patch of native woodland (Vegetation Zone 1), which is characterised by a mature canopy of eucalypts, a scattered midstorey of *Melaleuca spp.*, *Acacia spp.* and *Bursaria spinosa*, hollow-bearing trees, abundant fallen timber, and a drainage depression capable of retaining water (considered likely frog habitat) (**Photo 2**). Conversely, the woodland patch is dominated by exotic groundcover species and is only partially connected to scattered patches of vegetation along a watercourse to the north, and streetside vegetation throughout the locality. As such, the woodland patch represents habitat for locally occurring woodland birds, common arboreal marsupials, and only highly mobile threatened species (i.e. birds and bats).

A total of four (4) hollow-bearing trees (HBT) were recorded within the Study Area during the site assessment, including three (3) HBT within Vegetation Zone 1, and one (1) HBT within Vegetation Zone 2. No HBT were recorded within the Development Site (see **Figure 5**).



Photo 1: Highly managed vegetation characteristic of the Development Site.

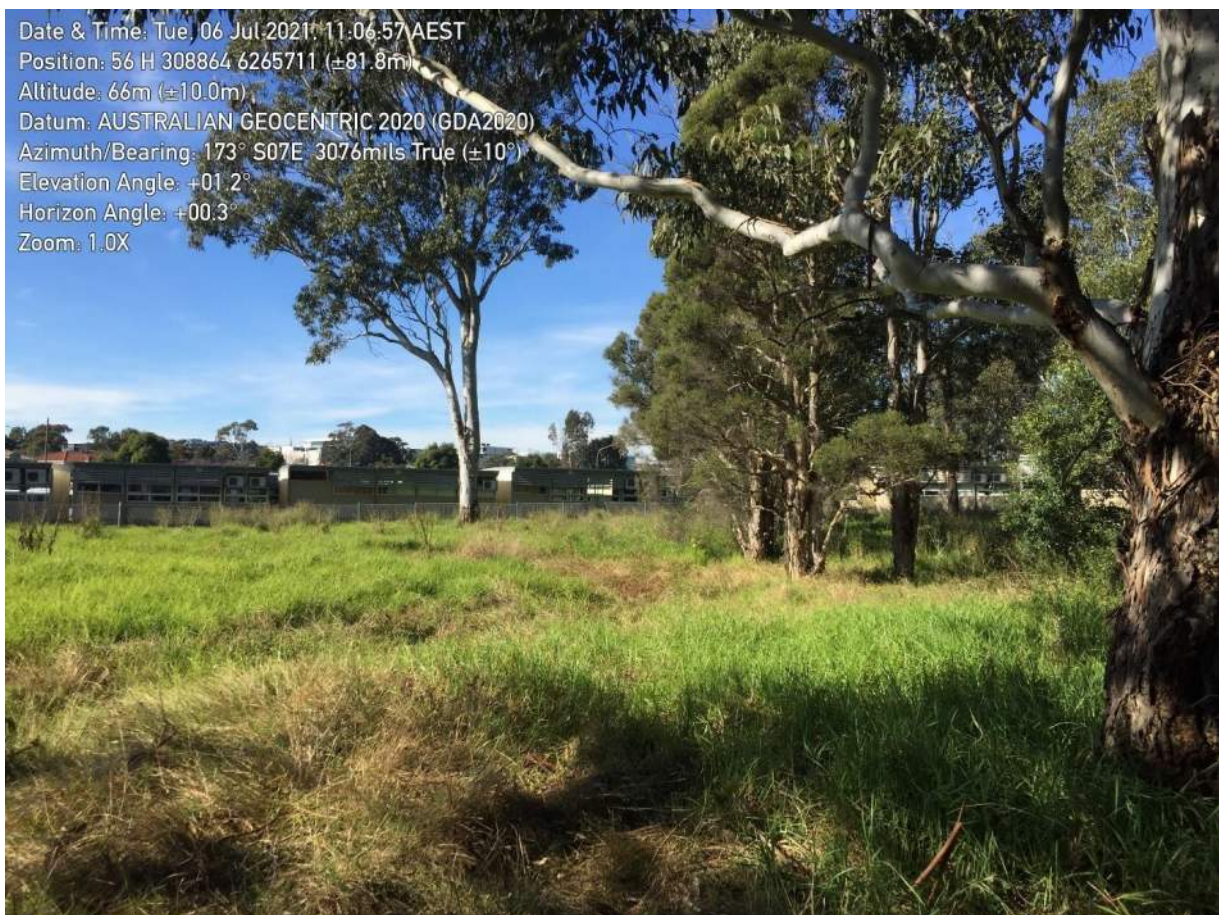


Photo 2: Vegetation and drainage depression within the woodland patch.

The information included on this graphic representation has been compiled from a variety of sources and is subject to change without notice. Kleinfelder makes no representations or warranties, express or implied, as to accuracy, completeness, timeliness, or rights to the use of such information. This document is not intended for use as a land survey product nor is it designed or intended as a construction design document. The use or misuse of the information contained on this graphic representation is at the sole risk of the party using or misusing the information.



Legend

Study Area

Development Site

Trees (Labelled with Tree Number)

To be Retained

To be Removed - Subject to a Separate DA

Habitat Feature Type

Dead Stag

Hollow Log (on ground)

Hollow bearing Tree

Threatened Ecological Communities

Cumberland Plain Woodland in the Sydney Bioregion (CEEC) (BC Act)

Metres
0 5 10 20 30 40 50



PROJECT REFERENCE: 20221196

DATE DRAWN: 2022/02/10 09:52 Version 4

DRAWN BY: GJoyce

DATA SOURCE:
NSW DFSI - 2021
Nearmap - 2021

Fauna Habitat and Threatened Species

Jacobs Group (Australia) Pty Ltd
Biodiversity Development Assessment Report
Glenwood High (Lot 5227 DP868693)
Forman Avenue, Glenwood NSW

FIGURE:

5



www.kleinfelder.com



4.1.2 Ecosystem Credit Species

The following assessment of habitat suitability for ecosystem credit species was conducted in accordance with Section 6.2 of the BAM. Ecosystem credits represent threatened species that can be predicted to be present by the type and condition of vegetation at the Development Site. Targeted surveys are not required for ecosystem credit species.

Step 1: Identify threatened species for assessment

A list of predicted ecosystem credit species for the Development Site was reviewed in the BAM calculator, according to PCTs present on the subject land. Predicted Species Report is within **Appendix F**.

Step 2: Assessment of the habitat constraints and vagrant species on the subject land

The potential for identified ecosystem credit species to occur on the Development Site was assessed according to species specific habitat requirements, as detailed in **Table 5**. Where habitat features were not present due to the degraded condition of the site vegetation, ecosystem credit species were determined to not be predicted species and no further assessment was required within these vegetation zones.

Table 5: Assessment of ecosystem credit species within the Development Site.

Scientific name	Common name	Confirmed Predicted Species	Justification
<i>Anthochaera phrygia</i>	Regent Honeyeater	Yes	-
<i>Artamus cyanopterus cyanopterus</i>	Dusky Woodswallow	Yes	-
<i>Chthonicola sagittata</i>	Speckled Warbler	Yes	-
<i>Climacteris picumnus victoriae</i>	Brown Treecreeper (eastern subspecies)	Yes	-
<i>Dasyurus maculatus</i>	Spotted-tailed Quoll	Yes	-
<i>Glossopsitta pusilla</i>	Little Lorikeet	Yes	-
<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle	Yes	-
<i>Hirundapus caudacutus</i>	White-throated Needletail	Yes	-
<i>Lathamus discolor</i>	Swift Parrot	Yes	-
<i>Melanodryas cucullata cucullata</i>	Hooded Robin (south-eastern form)	Yes	-
<i>Micronomus norfolkensis</i>	Eastern Coastal Free-tailed Bat	Yes	-
<i>Miniopterus australis</i>	Little Bent-winged Bat	Yes	-
<i>Miniopterus orianae oceanensis</i>	Large Bent-winged Bat	Yes	-
<i>Petroica boodang</i>	Scarlet Robin	Yes	-
<i>Petroica phoenicea</i>	Flame Robin	Yes	-
<i>Phascolarctos cinereus</i>	Koala	Yes	-
<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	Yes	-
<i>Stagonopleura guttata</i>	Diamond Firetail	Yes	-



4.1.3 Species Credit Species

Step 1: Identify threatened species for assessment

A list of predicted species credit species for the Development Site was reviewed in the BAM calculator. Species credits pertain to threatened species that cannot be predicted by the vegetation present. Candidate Species Report is within **Appendix F**.

Step 2: Assessment of the habitat constraints and vagrant species on the subject land

The potential for identified species credit species to occur on the Development Site was assessed according to species specific habitat requirements. A total of six (6) species credit species were identified as potentially occurring within the Study Area. as detailed in **Table 6**.

4.1.3.1 Step 3: Identify candidate species credit species for further assessment

All six (6) identified species credit species were excluded as candidate species due to their geographic or habitat constraints not being met by the Development Site, and no further assessment of these species was required (**Table 6**).

Table 6: Species credit species and justification for inclusion as candidate species.

Scientific name	Common name	Confirmed Candidate Species	Justification
<i>Anthochaera phrygia</i>	Regent Honeyeater	No	Habitat Constraints – Development Site not mapped as important habitat
<i>Caladenia tessellata</i>	Thick Lip Spider Orchid	No	Species Vagrant
<i>Lathamus discolor</i>	Swift Parrot	No	Habitat Constraints – Development Site not mapped as important habitat
<i>Miniopterus australis</i>	Little Bent-winged Bat	No	Habitat constraints (breeding) - No Caves, tunnels, mines, culverts or structure known for breeding.
<i>Miniopterus orianae oceanensis</i>	Large Bent-winged Bat	No	Habitat constraints (breeding) - No Caves, tunnels, mines, culverts or structure known for breeding.

4.2 THREATENED SPECIES SURVEYS

Step 4: Determine presence or absence of candidate species credit species.

4.2.1 Flora Surveys

The assessment identified no candidate threatened flora species. As such no targeted threatened flora surveys were conducted as part of this assessment. A general Vegetation/Habitat assessment was conducted by a suitably qualified ecologist throughout the Study Area (see **Figure 6**) to assess indirect impacts on threatened species and their habitat and allow for design changes regarding the location of the Project infrastructure.

A total of 64 flora species were identified during field surveys, 40 of these were exotic species, of which eight (8) are considered 'High Threat Exotics' and four (4) are listed Priority Weeds for the Greater Sydney Local Land Services Region under the *Biosecurity Act 2015* (NSW). No threatened species were identified within the Study Area. A list of the flora species identified within the Study Area is provided in **Appendix B**.



4.2.2 Fauna Surveys

The assessment revealed that the Study Area lacks suitable habitat for candidate threatened fauna species returned by the BAM. Therefore, no candidate threatened fauna species required targeted surveys as part of this assessment. Opportunistic fauna surveys were undertaken across the Study Area by two suitably qualified ecologists on 1 June 2021. The fauna survey effort is shown in **Figure 6**.

4.2.2.1 Fauna Survey Results

No threatened fauna species were identified within the Study Area during the site assessment. A total of eleven (11) species of fauna were detected within the Study Area during field surveys (**Appendix C**). These included eleven (11) bird species, which are common to urban/suburban environments. More commonly encountered species included the Red-rumped Parrot (*Psephotus haematonotus*), Rainbow Lorikeet (*Trichoglossus haematodus*), Eastern Rosella (*Platycercus eximius*), and Noisy Miner (*Manorina melanocephala*).

A list of the fauna species identified within the Study Area is provided in **Appendix C**.



Legend

Study Area

Development Site

Trees (Labelled with Tree Number)

To be Removed - Subject to a Separate DA

BAM Plots

Walkover

The information included on this graphic representation has been compiled from a variety of sources and is subject to change without notice. Kleinfelder makes no representations or warranties, express or implied, as to accuracy, completeness, timeliness, or rights to the use of such information. This document is not intended for use as a land survey product nor is it designed or intended as a construction design document. The use or misuse of the information contained on this graphic representation is at the sole risk of the party using or misusing the information.

0 5 10 20 30 40 50
Metres



PROJECT REFERENCE: 20221196

DATE DRAWN: 2022/02/10 09:53 Version 4

DRAWN BY: GJoyce

DATA SOURCE:
NSW DFSI - 2021
Nearmap - 2021

Survey Effort

FIGURE:

6



Jacobs Group (Australia) Pty Ltd
Biodiversity Development Assessment Report
Glenwood High (Lot 5227 DP868693)
Forman Avenue, Glenwood NSW



5 IMPACT ASSESSMENT

5.1 AVOIDING AND MINIMISING IMPACTS

Avoidance and minimisation measures considered for the Glenwood High School development are outlined in the following sections.

5.1.1 Impacts on Native Vegetation and Threatened Species Habitat

Steps to avoid, minimise and mitigate impacts to native vegetation, threatened species, populations and their habitat were considered in selecting a final proposed Glenwood High School design with the least biodiversity impact.

Site Selection

The proposed school upgrades are located within the site of the existing Glenwood High School, allowing for the school to continue to meet the educational needs of the growing residential population of Glenwood and the broader City of Blacktown LGA. The site is considered to be able to accommodate a development of this nature with potential land use conflicts with surrounding development (i.e. traffic impacts) minimised.

Site Layout and Design

The design of the proposed Glenwood High School development considers existing biodiversity values within the Study Area, including the avoidance of an area of remnant woodland (Vegetation Zone 1) located within the school grounds. Key ecological values existing within the remnant woodland, which are to be avoided as a result of the proposed development design, include the following:

- The vegetation within this area represents *Cumberland Plain Woodland in the Sydney Basin Bioregion* a Critically Endangered Ecological Community (CEEC) listed under the NSW BC Act.
- The vegetation is in a moderate condition, with an intact native canopy (*Eucalyptus tereticornis*, *Eucalyptus crebra*), midstorey (*Melaleuca spp.*, *Acacia spp.*) and scattered native shrub layer (*Bursaria spinosa*).
- The vegetation contains a number of important fauna habitat features including three (3) hollow-bearing trees, two (2) dead stags containing hollows, an abundance of fallen timber, and a swallow depression known to retain water and provide habitat for frogs.
- The vegetation was observed as being in use by a number of local bird species and likely represents suitable habitat for locally occurring arboreal mammals and only highly mobile threatened species common within the locality (i.e. Grey Headed Flying Fox [*Pteropus poliocephalus*]).

The proposed Glenwood High School redevelopment layout is positioned to avoid impacts to the CEEC and the habitat in which it provides for local biodiversity. As a result, no impacts to threatened ecological communities, threatened species, threatened populations or their habitat is expected to occur as part of this proposed development. Impacts to Tree 73 (**Figure 4**) have been avoided through realignment of the proposed development footprint, and the implementation of tree protection measures.

Appropriate mitigation measures have been detailed in **Section 5.3** to further minimise any indirect impacts to biodiversity values within the site and the environment.



5.1.2 Prescribed Biodiversity Impacts

The following are prescribed impacts which need to be considered as per section 8.3 of the BAM (DPIE 2020a).

Impacts of the development on the habitat of threatened species or ecological communities associated with significant geological features, human made structure or non-native vegetation.

The proposed development will impact:

- 0.03 ha of Vegetation Zone 4 (Planted Native/Exotic Vegetation), and
- 0.13 ha of Vegetation Zone 5 (Exotic Grassland [Managed]).

None of the abovementioned vegetation zones are considered to represent threatened ecological communities, or habitat for threatened species. An area of woodland within the Study Area was identified as representative of the *Cumberland Plain Woodland CEEC*, however this area exists outside of the development site and therefore there will be no impacts to the CEEC as part of the proposed SSD. Mitigation measures to minimise any indirect impacts to biodiversity values within the Study Area (i.e. CEEC and fauna habitat) are detailed in **Section 5.3**.

Impacts of the development on the connectivity of different habitat which facilitates movement of threatened species.

The vegetation within the development site is partially connected to an area of woodland to the north-west (Vegetation Zone 1) which is only partially connected to scattered patches of vegetation along a watercourse to the north, and streetside vegetation throughout the locality. The site was considered likely to only represent habitat for highly mobile threatened species (i.e. birds and bats).

Impact of the development on movement of threatened species that maintains their life cycle

As discussed above, the proposed development would have limited impacts on the movement of threatened species in the local area. While a small area of native grassland associated with Vegetation Zone 2, and a small area of planted native vegetation would be removed, movement corridors within the local area would largely be maintained with the retention of a large area of intact native woodland, scattered mature trees, and areas of planted native vegetation throughout the Study Area.

Impacts of the development on water quality, bodies and hydrological processes that sustain threatened species or ecological communities.

The Development Site is located within 40 m to the south-west of a small artificial tributary to Glenwood Lake and Caddies Creek. A small ephemeral drainage depression is located within the Study Area, within the area of *Cumberland Plain Woodland CEEC* (Vegetation Zone 1). The artificial watercourse and the drainage depression, along with the area of *Cumberland Plain Woodland CEEC* will not be directly impacted by the proposed development. Any indirect impacts to these areas will be avoided and minimised through the implementation of mitigation measures outlined in **Section 5.3**.

Impact of wind turbine strikes on protected animals

Not applicable to the current application.

Impacts of vehicle strikes on threatened species or on animals that are part of a TEC

Given the nature of the proposed development, impacts of vehicle strikes on threatened species or animals that are part of the *Cumberland Plain Woodland CEEC* are unlikely. To minimise potential impacts from increased



movement of vehicles during the construction phase appropriate mitigation measures will be enforced, as outlined in **Section 5.3**.

5.2 ASSESSMENT OF IMPACTS

5.2.1 Impacts on Native Vegetation and Habitat

5.2.1.1 Direct Impacts

The proposed development will impact approximately 0.02 ha of native vegetation identified as a low condition form of *PCT 849 – Grey Box – Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion*, within the Study Area. The proposed development will also impact 0.13 ha of exotic grassland (Vegetation Zone 5), and 0.03 ha of Planted Native/Exotic Vegetation (Vegetation Zone 4) that could not reasonably be assigned to a PCT. A total of 0.08 ha of cumulative impacts will occur as a result of the three separate planning components for the Glenwood High School upgrades.

5.2.1.2 Indirect Impacts

The proposed development has the potential for edge effects on the adjoining vegetation. Potential indirect impacts resulting from the development include:

- Increased weed invasion and potential spread or introduction of pathogens from the site to adjacent vegetation.
- Accidental incursions during clearing.
- Reduced viability of adjoining habitats due to increased noise, dust or light spill; or
- Increase in rubbish dumping in adjoining habitats.

These potential indirect impacts may have an effect on vegetation adjacent to the Development Site, in particular Vegetation Zone 1 representative of the *Cumberland Plain Woodland* CEEC, and scattered large eucalypts occurring within Vegetation Zone 2 to the south of the Development Site. Provided appropriate mitigation measures and management plans are enforced, the proposed development is unlikely to indirectly impact threatened species, ecological communities, and their habitats during construction and operational phases.

5.2.2 Prescribed Biodiversity Impacts

The proposed development is not anticipated to impact any prescribed impacts listed in **Section 5.1.2**. Appropriate mitigation measures are detailed in **Section 5.3**.



5.3 MITIGATE AND MANAGE IMPACTS ON BIODIVERSITY VALUES

The measures outlined in **Table 7** are proposed to minimise and avoid potential impacts associated with the proposed development.

Table 7: Summary of mitigation and management measures for direct, prescribed and indirect impacts of the proposed development

Impact	Action and Outcome	Responsibility	Timing
Direct impact / prescribed impact			
Clearing of native vegetation	- Avoid and minimise clearing impacts to native vegetation where possible. - Clearly delineate the boundaries of the project footprint to prevent any unnecessary clearing beyond its extent. This includes the installation of appropriate fencing around the area of <i>Cumberland Plain Woodland</i> (Vegetation Zone 1). Fencing should prohibit entry into the woodland and the minimise indirect impacts during construction such as the movement of dust and rubbish into the woodland. - Ensure vehicle and equipment parking areas and stockpile areas are identified and positioned to avoid areas containing ecological value. - Appropriate signage such as 'no go zone' or 'environmental protection area' should be installed surrounding the area of <i>Cumberland Plain Woodland</i> (Vegetation Zone 1). - Identify and communicate the location of any 'no go zones' in site inductions. - Tree protection measures will be implemented to protect retained scattered trees surrounding the development footprint, i.e. scattered <i>Eucalyptus tereticornis</i>, <i>Eucalyptus crebra</i>, and <i>Melaleuca decora</i> trees within Vegetation Zone 2. Tree protection measures should consider allowances for Tree Protection Zones in accordance with AS4970 (Standards Australia, 2009).	Construction site manager	Prior to and during vegetation clearing
Removal of hollow-bearing trees / habitat trees, resulting in fauna injury and mortality	- Limit removal of trees to that required within the project footprint where possible. - A pre-clearing protocol will be implemented during clearing works, as follows: - Pre-clearance surveys will be undertaken to determine if any inhabiting fauna, or habitat features (i.e. nests or hollows) are present; - A suitably qualified and trained fauna handler will be present during hollow-bearing tree clearing to rescue and relocate displaced fauna. - Appropriate exclusion fencing around any trees and woodland that are to be retained within and immediately surrounding the development site should be erected, considering allowance for Tree Protection Zones in accordance with AS4970 (Standards Australia, 2009).	Construction site manager and suitably qualified/ Trained fauna handler	Prior to and during tree clearing
Impacts to surface and groundwater quality and quantity due to sediment run-off	- Source controls such as sediment fences, mulching and jute matting will be utilised where appropriate. - Site-based vehicles will carry spill kits. - Erosion and sediment control will be required for the development in accordance with Managing Urban	Construction site manager	During vegetation clearing, construction and operation



Impact	Action and Outcome	Responsibility	Timing
and/or contaminant runoff into adjacent watercourses	Stormwater: Soils and Construction (Landcom, 2004) prior to commencement of construction. Limit the use of pesticides in the project footprint where possible to avoid contamination of nearby watercourses/wetland areas.		
Vehicle collision with fauna	- Speed limits within and immediately surrounding the Development Site should be limited to 40 km/hr. - This limit should be clearly signed at all entry points to site.	Construction site manager	During construction and operation
Indirect Impact			
Transfer of weeds and pathogens to and from Development Site	- The fungal pathogens <i>Phytophthora cinnamomi</i> and Myrtle Rust (<i>Puccinia psidii</i>) are known to occur in the City of Blacktown LGA however, it is unknown if they occur within the Development Site. These pathogens can have devastating impacts on native plant communities and inhabiting fauna if not properly managed. - Appropriate wash down facilities will be available to clean vehicles and equipment prior to arrival on-site and prior to departure. - Ensure soil and seed material is not transferred in accordance with measures outlined in the CEMP. - Weed infestations within the construction footprint are to be identified and mapped prior to construction.	Construction site manager	During vegetation clearing and construction
Noise, vibration, lighting, waste and air pollution impacts to adjacent sensitive habitat areas	- Increased human activity (from workers and traffic levels) directly adjacent to sensitive habitat areas may cause disturbance to flora and fauna species in adjoining habitat. - Impacts from operational activities, such as disturbance to an animal's normal behaviour patterns due to noise, vibration, lighting or dust may cause areas of previously suitable habitat to become sub-optimal and may cause fauna species to vacate areas of previously suitable habitat. - Measures to mitigate impacts on flora and fauna from noise, vibration, waste, light and air pollution such as: - Fence sensitive areas to delineate 'no go' zones. - Levels of lighting within the site will be reduced to a minimal level to reduce any adverse effects upon the essential behavioural patterns of light-sensitive fauna. - Lighting should comply with Australian Standard AS4282 (INT) 1997 – Control of Obtrusive Effects of Outdoor Lighting. - Noise minimisation practices in accordance with DPIE recommendations. - Dust control measures such as covering loads where required; amending operations under excessive wind conditions including ceasing operations if required; use of water tankers as required, to control dust; rehabilitation through vegetation of surfaces to be left unsealed; and, truck wheel washes or other dust removal measures.	Construction site manager	During construction and operation



Impact	Action and Outcome	Responsibility	Timing
Ongoing Management			
Maintenance of Cumberland Plain Woodland Patch	- The boundary of the Cumberland Plain Woodland Patch (Vegetation Zone 1) should remain delineated by retaining existing fencing until a time in which an appropriated management plan is developed and implemented for the community. The delineation of the boundary of the Cumberland Plain Woodland and managed exotic grassland will prevent encroachment into the woodland through mowing. - Weed dominance is recognised as a key threat to the Cumberland Plain Woodland. It is recommended that management of weeds within the Cumberland Woodland Patch prioritise weeds listed in Table 9, until a time in which an appropriate management plan is developed for the Cumberland Plain Woodland	School Management	Operation
Restoration of Cumberland Plain Woodland Patch (Recommended)	- In accordance with recommendations by the State Design Review Panel (SDRP) a strategy for the regeneration of the Cumberland Plain Woodland Patch is recommended. This strategy should be incorporated into a Biodiversity Management Plan, be prepared by a suitably qualified ecologist or bush regeneration specialist, and outline a clear strategy for the following: - Management of weeds identified in Table 9. - Retention of existing fauna habitat values including hollow-bearing trees and dead snag located to the immediate north of the existing Cumberland Plain Woodland Patch. - Provision of additional plantings to the immediate north of the existing Cumberland Plain Woodland Patch (within currently fenced area). Plantings are to include native Canopy, shrub and groundcover species commensurate with species associated with <i>PCT 849 - Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion</i> and the Cumberland Plain Woodland CEEC. - Enhancement of existing fauna habitat values including but not limited to the suitable placement of salvaged habitat features (i.e. logs from cleared trees), and plantings of suitable species surrounding the small swale known to occasionally provide habitat for frogs (following heavy rain). - Incorporation of Caring for Country values associated with the woodland. - Incorporation of educational opportunities associated with the Cumberland Plain Woodland. This includes the provision of signage, outdoor learning and hands-on engagement with the process of restoring and managing the woodland patch.	School Management	Operation
Additional School Plantings	- It is recommended that native species consistent with PCT 849 and/or the Cumberland Plain Woodland CEEC be selected (where suitable) for additional plantings and landscaping. - Additional plantings of canopy species within the Cumberland Woodland Patch are proposed within the landscaping plans. These plantings are to include species consistent with the Cumberland Plain Woodland CEEC	School Management	Operation



Impact	Action and Outcome	Responsibility	Timing
	and local government planting guides. The plantings and their management are to be incorporated into the Biodiversity Management Plan. Prior to the implementation of the plan it is recommended that: ▪ Impacts to the groundcover within the Cumberland Plain Woodland Patch be limited to the area immediately surrounding the tree plantings (1500m radius as proposed by the landscape plan). ▪ Planting survival and weed cover immediately surrounding the plantings be monitored twice a year. With the results of monitoring events used to inform the adaptive management of the plantings. ▪ Weed management surrounding the tree plantings should be implemented on a needs-basis to ensure tree planting survival. Key weeds for management within the Cumberland Woodland Patch identified within the site are detailed in Section 7.2.		



6 IMPACT SUMMARY

6.1 SERIOUS AND IRREVERSIBLE IMPACTS

No species at risk of Serious and Irreversible Impacts (SAILs) are to be impacted as a result of the proposed development. One threatened ecological community (TEC) at risk of SAILs was identified within the Study Area, *Cumberland Plain Woodland* CEEC (Vegetation Zone 1). There will be no direct impacts to this CEEC as part of the proposed development, as such no SAILs assessments were completed in accordance with Section 9.1 of the BAM (DPIE 2020a). Impact avoidance and minimisation measures, regarding the CEEC, were detailed in **Section 5.1.1**. Impact mitigation measures are detailed in **Section 5.3**.

6.2 IMPACTS ON NATIVE VEGETATION

This section provides an assessment of the direct impacts to native vegetation requiring offsetting, and those not requiring offsets in accordance with Section 10.1 of the BAM (DPIE 2020a).

The proposed development will result in the clearing of 0.02 ha of native vegetation (Vegetation Zone 2). The current vegetation integrity score (VI Score) for Vegetation Zone 2 is 8.6. In accordance with the BAM (Section 9.2.1 [DPIE 2020a]) assessors must determine an offset for all impacts of proposals on PCTs that are associated with a vegetation zone that has a vegetation integrity score of:

- ≥ 15 , where the PCT is representative of an EEC or a CEEC.
- ≥ 17 , where the PCT is associated with threatened species habitat (as represented by ecosystem credits) or represents a vulnerable ecological community.
- ≥ 20 , where the PCT does not represent a TEC and is not associated with threatened species habitat.

As the proposed development will result in impacts to Vegetation Zone 2 (not determined to represent a TEC) with a current VI Score of 8.6, no offsets are required.

A summary of the impacts on native vegetation and the required ecosystem credits is provided in **Table 8**.

Table 8: Summary of ecosystem credit requirements

Vegetation Zone	Vegetation Zone Name	Area (ha)	Current Vegetation Integrity Score	Future Vegetation Integrity Score	Credits Required
Zone 2	PCT 849 - Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion (Low Condition)	0.02 ha	8.6	0	0
Total Credit Requirement					0

The Biodiversity Credit Report (Variations) showing like-for-like credit retirement options is provided in **Appendix G**.

The proposed development will also result in the following impacts that do not require offsets:

- **0.03 ha of Vegetation Zone 4** – Planted Native/Exotic Vegetation
- **0.13 ha of Vegetation Zone 5** – Exotic Grassland (Managed)



6.3 CUMULATIVE IMPACTS

The proposed development detailed within this report constitutes a component of broader upgrades to the facilities within Glenwood High School addressed in separate assessments and planning pathways, detailed below:

- **Glenwood High School Sewer Diversion and Removal of Portable Classrooms** – This activity is to be assessed under Part 5 of the *Environment Planning and Assessment Act 1979*, with impacts addressed within a Review of Environmental Factors (REF) (Kleinfelder 2021a). Impacts resulting from this activity that are not addressed in the BDAR include
 - 0.01 ha of exotic grassland (Vegetation Zone 5) to be removed.
 - No impacts to native vegetation or habitat for threatened fauna is expected to occur as part of this activity.
- **Glenwood High School Bulk Earthworks** – This development involves the removal of native vegetation and completion of Bulk Earthworks related to the school development detailed within this BDAR. The development application (DA) is to be assessed by Blacktown Council, impacts are addressed within a Flora and Fauna Assessment Report (FFAR) (Kleinfelder 2021b). Impacts resulting from this activity that are not addressed in the BDAR include:
 - 0.0013 ha of *PCT 849 - Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion* (Vegetation Zone 1) – commensurate with *Cumberland Plain Woodland in the Sydney Bioregion* CEEC. The proposed development was determined to not represent a significant impact to this CEEC due to the small scale of impacts (removal of one tree).
 - 0.092 ha of *PCT 849 - Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion (Low Condition)* (Vegetation Zone 2).
 - 0.097 ha of *Exotic Grassland (Managed)*
 - No impacts to habitat for threatened fauna was expected to occur as a result of the proposed development.

A total of 0.10 ha of native vegetation is predicted to be impact by the proposed Glenwood High School development (inclusive of each of the three planning pathways). Of this, a total of 0.001 ha (1 tree) of Vegetation Zone 1 (consistent with Cumberland Plain Woodland CEEC) will be impacted as part of the proposed developments, this was determined to not represent a significant impact to the CEEC. Likewise, the cumulative impacts to native vegetation within the vicinity of the Cumberland Plain Woodland patch is not expected to result in a significant impact to the CEEC or local biodiversity values. Mitigation and management measures (**Section 5.3**) are provided to minimise indirect impacts to biodiversity values within the site.

Early remediation works to the Cumberland Plain Woodland patch are proposed under the proposed Glenwood High School development, including the provision of plantings (canopy tree species) within the fenced area immediately north of the existing Cumberland Plain Woodland patch. It is recommended that the restoration and management of the Cumberland Plain Woodland patch be appropriately detailed within a Biodiversity Management Plan (BMP).



7 ASSESSMENT OF BIODIVERSITY LEGISLATION

7.1 ENVIRONMENT PROTECTION AND BIODIVERSITY CONSERVATION ACT 1999

7.1.1 Assessment Requirements

The EPBC Act requires that developments or undertakings that are likely to have a significant impact on MNES be referred for a determination as to whether they are a controlled action that requires approval under the EPBC Act (Section 1.5.1).

Of the nine MNES listed under the Act, the one (1) MNES considered relevant to the Study Area was potential impacts on listed threatened species or communities, regarding the presence of *Cumberland Plain Woodland* within the Study Area. The results of the assessment (see **Appendix D**) determined that the vegetation within Vegetation Zone 1 constituted moderate condition PCT 849 and was representative of *Cumberland Plain Woodland* CEEC as listed under the NSW BC Act. The vegetation did not meet the determination of the EPBC Act listed *Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest* CEEC. An assessment of the relevant threatened species databases and an assessment of the likelihood of occurrence of threatened and migratory species is provided in **Appendix A**. No EPBC listed species were assessed as likely to occur within the Subject site, therefore, a referral to the Commonwealth Minister for the Environment is not considered necessary.

7.2 BIOSECURITY ACT 2015

Species which require control prior to and post construction of the Project to ensure they are not spread due to works, include the high threat species listed in **Table 9**.

Table 9: Weed species requiring control within the Development Site

Family	Scientific Name	Common Name	Weeds of National Significance (WONS)	Priority weeds of the Greater Sydney LLS (Biosecurity Act)	High Threat Weeds (BAM)
Agavaceae	<i>Yucca aloifolia</i>	Spanish Bayonet	-	-	-
Apocynaceae	<i>Araujia sericifera</i>	Moth Vine	-	-	✓
Apocynaceae	<i>Plumeria rubra</i>	Frangipani	-	-	-
Asparagaceae	<i>Asparagus asparagoides</i>	Bridal Creeper	✓	✓	✓
Asteraceae	<i>Bidens pilosa</i>	Cobbler's Pegs	-	-	-
Asteraceae	<i>Dimorphotheca ecklonis</i>	Cape Daisy	-	-	-
Asteraceae	<i>Senecio madagascariensis</i>	Fireweed	✓	✓	-
Asteraceae	<i>Soliva sessilis</i>	Bindyi	-	-	-
Asteraceae	<i>Sonchus asper</i>	Prickly Sowthistle	-	-	-
Asteraceae	<i>Taraxacum officinale</i>	Dandelion	-	-	-



Family	Scientific Name	Common Name	Weeds of National Significance (WONS)	Priority weeds of the Greater Sydney LLS (Biosecurity Act)	High Threat Weeds (BAM)
Brassicaceae	<i>Brassica fruticulosa</i>	Twiggy Turnip	-	-	-
Caryophyllaceae	<i>Stellaria media</i>	Common Chickweed	-	-	-
Fabaceae (Faboideae)	<i>Medicago polymorpha</i>	Burr Medic	-	-	-
Fabaceae (Faboideae)	<i>Trifolium repens</i>	White Clover	-	-	-
Lamiaceae	<i>Marrubium vulgare</i>	White Horehound	-	-	-
Malvaceae	<i>Modiola caroliniana</i>	Red-flowered Mallow	-	-	-
Malvaceae	<i>Sida rhombifolia</i>	Paddy's Lucerne	-	-	-
Oleaceae	<i>Fraxinus spp.</i>	-	-	-	-
Oleaceae	<i>Olea europaea</i> subsp. <i>cuspidata</i>	Common Olive	✓	-	✓
Plantaginaceae	<i>Plantago lanceolata</i>	Lamb's Tongues	-	-	-
Plantaginaceae	<i>Plantago major</i>	Large Plantain	-	-	-
Plumbaginaceae	<i>Plumbago auriculata</i>	Cape Leadwot	-	-	-
Poaceae	<i>Cenchrus clandestinus</i>	Kikuyu Grass	-	-	-
Poaceae	<i>Chloris gayana</i>	Rhodes Grass	-	-	✓
Poaceae	<i>Ehrharta erecta</i>	Panic Veldtgrass	-	-	✓
Poaceae	<i>Eragrostis curvula</i>	African Lovegrass	-	-	✓
Poaceae	<i>Lolium rigidum</i>	Wimmera Ryegrass	-	-	-
Poaceae	<i>Paspalum dilatatum</i>	Paspalum	-	-	✓
Poaceae	<i>Poa annua</i>	Winter Grass	-	-	-
Poaceae	<i>Setaria parviflora</i>	-	-	-	-
Poaceae	<i>Sporobolus africanus</i>	Parramatta Grass	-	-	-
Poaceae	<i>Vulpia bromoides</i>	Squirrel Tail Fesque	-	-	-
Primulaceae	<i>Lysimachia arvensis</i>	Scarlet Pimpernel	-	-	-
Rosaceae	<i>Rubus fruticosus</i> sp. agg.	Blackberry complex	✓	✓	✓
Rubiaceae	<i>Galium aparine</i>	Goosegrass	-	-	-
Rubiaceae	<i>Galium murale</i>	Small Bedstraw	-	-	-



Family	Scientific Name	Common Name	Weeds of National Significance (WONS)	Priority weeds of the Greater Sydney LLS (Biosecurity Act)	High Threat Weeds (BAM)
Sapindaceae	<i>Acer negundo</i>	Box Elder	-	-	✓
Solanaceae	<i>Solanum nigrum</i>	Black-berry Nightshade	-	-	-
Solanaceae	<i>Solanum pseudocapsicum</i>	Madeira Winter Cherry	-	-	-



8 SUMMARY

The proposed Glenwood High School development located at 85 Forman Avenue Glenwood New South Wales (NSW) 2768 (Lot 5227 DP868693), comprises of the upgrading of existing buildings and the construction of a new multi-storey school building to accommodate for increased student numbers. The proposed development will result in the clearing of 0.02 ha of low condition native vegetation (*PCT 849 – Grey Box – Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion [Low Condition]*). The development will also result in direct impacts to 0.03 ha of planted native/exotic vegetation and 0.13 ha of exotic grassland. The vegetation within these zones do not constitute a Threatened Ecological Community (TEC), and no threatened flora or fauna species were identified within the Study Area during the site assessment. The vegetation within the Development Site provides potential foraging habitat for highly mobile threatened fauna species; however, the habitat is not considered to be important to the long-term viability of populations of any of these species in the locality.

The proposed development detailed within this report constitutes a component of broader upgrades to the facilities within Glenwood High School addressed in separate assessments and planning pathways, including a *Review of Environmental Factors* (REF), and a *Flora and Fauna Assessment Report* (FFAR). The cumulative impacts of these developments/activities includes the clearing of 0.25 ha of vegetation including 0.10 ha of native vegetation. Cumulative impacts of these developments are discussed in **Section 6.3**.

Avoidance and impact minimisation measures, including the design and placement of the proposed development, ensure that the proposed development will not directly impact Vegetation Zone 1. This area was characterised as having high fauna habitat values (hollow-bearing trees, fallen logs) and determined to constitute *Cumberland Plain Woodland* CEEC under the BC Act. Further avoidance measures were implemented to protect existing trees within Vegetation Zone 2.

The vegetation within the development site does not meet the definition of the Critically Endangered Ecological Community *Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest* as listed under the EPBC Act.

No threatened species or threatened ecological communities vulnerable to Serious and Irreversible Impacts (SAIIs), or their habitats, were identified within the Development Site.

No offsets are required for impacts to Vegetation Zone 2 (*PCT 849 – Grey Box – Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion [Low Condition]*), owing to the vegetation zone's low Vegetation Integrity (VI) score.

Further impacts not requiring offsets include the clearing of 0.03 ha of Planted Native/Exotic Vegetation (Vegetation Zone 4), and 0.14 ha of Exotic Grassland (Managed) (Vegetation Zone 5).

Potential direct and indirect impacts associated with the proposed development would be further avoided and/or minimised through the implementation of mitigation and management measures outlined in **Section 5.3**.



9 REFERENCES

- Department of Agriculture, Water and the Environment (DAWE) (2021a). *Protected Matters Search Tool*. Available at: [Protected Matters Search Tool | Department of Agriculture, Water and the Environment](#)
- Department of the Agriculture, Water and the Environment (DAWE) (2021b). *Species Profile and Threats Database (SPRAT)*. Available at: <http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl>
- Department of Environment and Conservation (DEC). (2004). *Threatened Species Survey and Assessment: Guidelines for developments and activities (working draft)*. New South Wales Department of Environment and Conservation, Hurstville, NSW.
- Department of Environment and Climate Change (DECC) (2002). *Descriptions for NSW (Mitchell) Landscapes, Version 2*. Based on descriptions compiled by Dr. Peter Mitchell.
- Department of Planning, Industry and Environment (DPIE) (2015). *Remnant Vegetation of the Western Cumberland subregion*, 2013 Update. VIS_ID 4207
- Department of Planning, Industry and Environment (DPIE) (2018). *Coastal Wetlands and Littoral Rainforest Area Map*. Published by the Environment, Energy and Science, Department of Planning, Industry and Environment, Parramatta, NSW. Available at: https://webmap.environment.nsw.gov.au/PlanningHtml5Viewer/?viewer=SEPP_CoastalManagement
- Department of Planning, Industry and Environment (DPIE) (2020a). *Biodiversity Assessment Method*. Published by the Environment, Energy and Science, Department of Planning, Industry and Environment, Parramatta, NSW.
- Department of Planning, Industry and Environment (DPIE) (2020b). *Surveying threatened plants and their habitats - NSW survey guide for the Biodiversity Assessment Method*. Published by Environment, Energy and Science, Department of Planning, Industry and Environment, Parramatta, NSW.
- Department of Planning, Industry and Environment (DPIE) (2021a). *BioNet Atlas of NSW*. Available at: <http://www.bionet.nsw.gov.au/>
- Department of Planning, Industry and Environment (DPIE) (2021b). *BioNet Vegetation Classification*. Available at: <https://www.environment.nsw.gov.au/research/Visclassification.htm>
- Department of Planning, Industry and Environment (DPIE) (2021c). *BioNet Threatened Biodiversity Data Collection*. Available at: <https://www.environment.nsw.gov.au/threatenedSpeciesApp/>
- Department of Planning, Industry and Environment (DPIE) (2021d). *Threatened Biodiversity Profile Search*. Available at: <https://www.environment.nsw.gov.au/threatenedspeciesapp/>
- Department of Planning, Industry and Environment (DPIE) (2021e). *NSW Threatened Species Scientific Committee – Final Determinations*. Available at: <https://www.environment.nsw.gov.au/topics/animals-and-plants/threatened-species/nsw-threatened-species-scientific-committee/determinations/final-determinations>
- Department of Spatial Services (DSS) *Six Maps* Available at: <https://maps.six.nsw.gov.au/>
- Harden, G.J. (ed.) (1992). *Flora of New South Wales*, Volume 3, NSW University Press, Sydney.
- Harden, G.J. (ed.) (1993). *Flora of New South Wales*, Volume 4, NSW University Press, Sydney.
- Harden, G.J. (ed) (2000). *Flora of New South Wales*, Volume 1, NSW University Press, Sydney.
- Harden, G.J. (ed.) (2002). *Flora of New South Wales*, Volume 2, NSW University Press, Sydney.
- Matthei, L. E. (1995). *Soil Landscapes of Newcastle 1:100 000 Sheet*. Sydney, Department of Land and Water Conservation.
- Pizzey G. & Knight F. (2017) *Birds of Australia Digital Edition V1.5*. 8th edn. Gibbon Multimedia (Aus) Pty Ltd, Craigieburn, Australia.



APPENDIX A – THREATENED SPECIES DATABASE SEARCH





THREATENED SPECIES DATABASE SEARCH

A list of threatened species, populations and ecological communities that have been reported or modelled to occur from within a five-kilometre radius of the Study Area was obtained from the following databases:

- NSW DPIE BioNet Atlas: (<http://www.bionet.nsw.gov.au/>); and
- Commonwealth DAWE Protected Matters search tool: (<https://www.environment.gov.au/epbc/protected-matters-search-tool>).

Further resources used to inform the threatened species database search included:

- The BAM – Calculator ([BAM Calculator \(nsw.gov.au\)](http://www.bam.nsw.gov.au/)), and
- NSW DPIE BioNet Threatened Biodiversity Profiles: ([NSW BioNet Quick Guides and Manuals | NSW Environment, Energy and Science](#)).
- DAWE (2021b). *Species Profile and Threats Database (SPRAT)*. Available at: <http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl>

An assessment was then made of the likelihood of the threatened species, populations, and ecological communities reported or modelled to occur in the locality occurring within the Development Site or using the habitat within the Development Site as an essential part of a foraging range.

The table below summarises the likelihood of threatened species and EPBC Act listed migratory species occurring within the Development Site based on the habitat requirements of each species.

A brief definition of the likelihood of occurrence criteria is provided below:

- Known – species identified within the site during surveys;
- High – species known from the area (DPIE BioNet Atlas records), suitable habitat (such as roosting and foraging habitat) present within the site;
- Moderate – species may be known from the area, potential habitat is present within the site;
- Low – species not known from the area and/or marginal habitat is present within the site; and
- Nil – habitat requirements not met for this species within the site



Table A1 'Likelihood of Occurrence' table

	Species	Status		Records	Source	Habitat	LoO	Summary
		BC	EPBC					
Flora								
1.	<i>Acacia bynoeana</i> Bynoe's Wattle	E	V	2	BioNet, PMST	Bynoe's wattle is found in central eastern NSW, from the Hunter District (Morisset) south to the Southern Highlands and west to the Blue Mountains. Occurs in heath or dry sclerophyll forest on sandy soils. Seems to prefer open, sometimes slightly disturbed sites such as trail margins, edges of roadside spoil mounds and in recently burnt patches.	Low	No suitable habitat within the Development Site. Nearest records approximately 4.9 km from the Study Area. Not recorded during site assessment.
2.	<i>Acacia pubescens</i> Downy Wattle	V	V	12	BioNet PMST	Concentrated around the Bankstown-Fairfield-Rookwood area and the Pitt Town area, with outliers occurring at Barden Ridge, Oakdale and Mountain Lagoon. Occurs in open woodland and forest, in a variety of plant communities, including Cooks River/Castlereagh Ironbark Forest, Shale/Gravel Transition Forest and Cumberland Plain Woodland.	Low	No suitable habitat within the Development Site. Records within the locality. Not recorded during site assessment.
3.	<i>Allocasuarina galreicola</i>	E	E	-	PMST	Primarily restricted to the Richmond (NW Cumberland Plain) district, but with an outlier population found at Voyager Point, Liverpool. Grows in Castlereagh woodland on lateritic soil. Found in open woodland with <i>Eucalyptus parramattensis</i> , <i>Eucalyptus fibrosa</i> , <i>Angophora bakeri</i> , <i>Eucalyptus sclerophylla</i> and <i>Melaleuca decora</i> .	Nil	No suitable habitat within the Development Site. No records within the locality. Not recorded during site assessment.
4.	<i>Asterolasia elegans</i>	E	E	-	PMST	Occurs north of Sydney, in the Baulkham Hills, Hawkesbury and Hornsby local government areas. Found in sheltered forests on mid- to lower slopes and valleys, e.g. in or adjacent to gullies which support sheltered forest.	Nil	No suitable habitat within the Development Site. No records within the locality. Not recorded during site assessment.



	Species	Status		Records	Source	Habitat	LoO	Summary
		BC	EPBC					
5.	<i>Callistemon linearifolius</i> Netted Bottle Brush	V	-	1	BioNet	Recorded from the Georges River to Hawkesbury River in the Sydney area, and north to the Nelson Bay area of NSW. Grows in dry sclerophyll forest on the coast and adjacent ranges.	Nil	No suitable habitat within the Development Site. Only one record within the locality. Not recorded during site assessment.
6.	<i>Caladenia tessellate</i> Thick-lipped Spider-orchid	E	V	-	PMST, BAM	The Thick Lip Spider Orchid is known from the Sydney area (old records), Wyong, Ulladulla and Braidwood in NSW. Generally found in grassy sclerophyll woodland on clay loam or sandy soils, though the population near Braidwood is in low woodland with stony soil.	Nil	No suitable habitat within the Development Site. No records within the locality. Not recorded during site assessment.
7.	<i>Cryptostylis hunteriana</i> Leafless Tongue Orchid	V	V	-	PMST	Does not appear to have well defined habitat preferences and is known from a range of communities, including swamp-heath and woodland. The larger populations typically occur in woodland dominated by Scribbly Gum (<i>Eucalyptus sclerophylla</i>), Silvertop Ash (<i>E. sieberi</i>), Red Bloodwood (<i>Corymbia gummifera</i>) and Black Sheoak (<i>Allocasuarina littoralis</i>); appears to prefer open areas in the understorey of this community.	Nil	No suitable habitat within the Development Site. No records within the locality. Not recorded during site assessment.
8.	<i>Cynanchum elegans</i> White-flowered Wax Plant		E	-	PMST	Restricted to eastern NSW where it is distributed from Brunswick Heads on the north coast to Gerroa in the Illawarra region. The White-flowered Wax Plant usually occurs on the edge of dry rainforest vegetation.	Nil	No suitable habitat within the Development Site. No records within the locality. Not recorded during site assessment.



	Species	Status		Records	Source	Habitat	LoO	Summary
		BC	EPBC					
9.	<i>Darwinia biflora</i>	V	V	112	BioNet, PMST	Recorded in Ku-ring-gai, Hornsby, Baulkham Hills and Ryde local government areas. Occurs on the edges of weathered shale-capped ridges, where these intergrade with Hawkesbury Sandstone. Associated overstorey species include Eucalyptus haemastoma, Corymbia gummifera and/or E. squamosa. The vegetation structure is usually woodland, open forest or scrub-heath.	Nil	No suitable habitat within the Development Site. No records within the locality. Not recorded during site assessment.
10.	<i>Epacris purpurascens</i> var. <i>purpurascens</i>	V	-	54	BioNet	Recorded from Gosford in the north, to Narrabeen in the east, Silverdale in the west and Avon Dam vicinity in the South. Found in a range of habitat types, most of which have a strong shale soil influence.	Nil	No suitable habitat within the Development Site. No records within the locality. Not recorded during site assessment.
11.	<i>Eucalyptus</i> sp. <i>Cattai</i>	CE	CE	92	BioNet, PMST	Occurs in The Hills Local Government Area, with known populations occurring within the area bounded by Kellyville - Maraylya – Glenorie. Occurs as a rare emergent tree in scrub, heath and low woodland on sandy soils, usually as isolated individuals or occasionally in small clustered groups. The sites at which it occurs are generally flat and on ridge tops.	Nil	No suitable habitat within the Development Site. No records within the locality. Not recorded during site assessment.
12.	<i>Eucalyptus nicholii</i>	V	V	2	BioNet	This species is sparsely distributed but widespread on the New England Tablelands from Nundle to north of Tenterfield, being most common in central portions of its range. Found largely on private property and roadsides, and occasionally in conservation reserves. Planted as urban trees, windbreaks and corridors. Typically grows in dry grassy woodland, on shallow soils of slopes and ridges. Found primarily on infertile soils derived from granite or metasedimentary rock.	Nil	No suitable habitat within the Development Site. Records within the locality, outside of known distribution. Not recorded during site assessment.



	Species	Status		Records	Source	Habitat	LoO	Summary
		BC	EPBC					
13.	<i>Genoplesium baueri</i> Yellow Gnat-orchid	E	E	-	PMST	The species has been recorded from locations between Ulladulla and Port Stephens. Currently the species is known from just over 200 plants across 13 sites. The species has been recorded at locations now likely to be within the following conservation reserves: Berowra Valley Regional Park, Royal National Park and Lane Cove National Park. May occur in the Woronora, O'Hares, Metropolitan and Warragamba Catchments. Grows in dry sclerophyll forest and moss gardens over sandstone.	Nil	No suitable habitat within the Development Site. No records within the locality. Not recorded during site assessment.
14.	<i>Grevillea juniperina subsp. Juniperina</i> Juniper-leaved Grevillea	V	-	6	BioNet	Endemic to Western Sydney, centred on an area bounded by Blacktown, Erskine Park, Londonderry and Windsor with outlier populations at Kemps Creek and Pitt Town. Recorded from Cumberland Plain Woodland, Castlereagh Ironbark Woodland, Castlereagh Scribbly Gum Woodland and Shale/Gravel Transition Forest.	Nil	No suitable habitat within the Development Site. Records within the locality. Not recorded during site assessment.
15.	<i>Haloragodendron lucasii</i>	E	E	-	PMST	The known locations of this species are confined to a very narrow distribution on the north shore of Sydney. Associated with dry sclerophyll forest. Reported to grow in moist sandy loam soils in sheltered aspects, and on gentle slopes below cliff-lines near creeks in low open woodland.	Nil	No suitable habitat within the Development Site. No records within the locality. Not recorded during site assessment.
16.	<i>Hibbertia superans</i>	E	-	24	BioNet	Occurs from Baulkham Hills to South Maroota in the northern outskirts of Sydney, where there are currently 16 known sites, and at one locality at Mount Boss, inland from Kempsey. Occurs in both open woodland and heathland, and appears to prefer open disturbed areas, such as tracksides.	Nil	No suitable habitat within the Development Site. Records within the locality. Not recorded during site assessment.



	Species	Status		Records	Source	Habitat	LoO	Summary
		BC	EPBC					
17.	<i>Isotoma fluviatilis subsp. fluviatilis</i>	-	Extinct	1	BioNet	Currently known from only two adjacent sites on a single private property at Erskine Park in the Penrith LGA. Previous sightings are all from western Sydney, at Homebush and at Agnes Banks. Known to grow in damp places, on the Cumberland Plain, including freshwater wetland, grassland/alluvial woodland and an alluvial woodland/shale plains woodland (Cumberland Plain Woodland) ecotone.	Nil	Broadly suitable woodland habitat within the Development Site, albeit highly degraded and managed (mown). No recent records within the locality. Not recorded during site assessment.
18.	<i>Lasiopetalum joyceae</i>	V	V	1	BioNet, PMST	Has a restricted range occurring on lateritic to shaley ridgetops on the Hornsby Plateau south of the Hawkesbury River. Grows in heath on sandstone.	Nil	No suitable habitat within the Development Site. Only one record within the locality. Not recorded during site assessment.
19.	<i>Leucopogon fletcheri subsp. fletcheri</i>	E	-	6	Bionet	Restricted to north-western Sydney between St Albans in the north and Annangrove in the south, within the local government areas of Hawkesbury, Baulkham Hills and Blue Mountains. Occurs in dry eucalypt woodland or in shrubland on clayey lateritic soils, generally on flat to gently sloping terrain along ridges and spurs.	Nil	No suitable habitat within the Development Site. Records within the locality. Not recorded during site assessment.
20.	<i>Macadamia integrifolia</i> Macadamia Nut	-	V	2	Bionet	While specimens have been collected from the North Coast of NSW, this species is not known to occur naturally in NSW.	Nil	No suitable habitat within the Development Site. Records within the locality, outside of known distribution. Not recorded during site assessment.



	Species	Status		Records	Source	Habitat	LoO	Summary
		BC	EPBC					
21.	<i>Melaleuca deanei</i> Deane's Paperbark	V	V	-	PMST	Deane's Paperbark occurs in two distinct areas, in the Ku-ring-gai/Berowra and Holsworthy/Wedderburn areas respectively. The species occurs mostly in ridgetop woodland, with only 5% of sites in heath on sandstone.	Nil	No suitable habitat within the Development Site. No records within the locality. Not recorded during site assessment.
22.	<i>Persicaria elatior</i> Tall Knotweed	V	V	-	PMST	Tall Knotweed has been recorded in south-eastern NSW (Mt Dromedary (an old record), Moruya State Forest near Turlinjah, the Upper Avon River catchment north of Robertson, Bermagui, and Picton Lakes. This species normally grows in damp places, especially beside streams and lakes. Occasionally in swamp forest or associated with disturbance.	Nil	No suitable habitat within the Development Site. No records within the locality. Not recorded during site assessment.
23.	<i>Persoonia hirsute</i> Hairy Geebung	E	E	15	BioNet	Persoonia hirsuta has a scattered distribution around Sydney. The species is distributed from Singleton in the north, along the east coast to Bargo in the south and the Blue Mountains to the west. The Hairy Geebung is found in sandy soils in dry sclerophyll open forest, woodland and heath on sandstone.	Nil	No suitable habitat within the Development Site. Records within the locality. Not recorded during site assessment.
24.	<i>Persoonia nutans</i> Nodding Geebung	E	E	-	PMST	Restricted to the Cumberland Plain in western Sydney, between Richmond in the north and Macquarie Fields in the south. Northern populations are confined to aeolian and alluvial sediments and occur in a range of sclerophyll forest and woodland vegetation communities, with the majority of individuals occurring within Agnes Banks Woodland or Castlereagh Scribbly Gum Woodland and some in Cooks River / Castlereagh Ironbark Forests.	Nil	No suitable habitat within the Development Site. No records within the locality. Not recorded during site assessment.



	Species	Status		Records	Source	Habitat	LoO	Summary
		BC	EPBC					
25.	<i>Pimelea curviflora</i> <i>var. curviflora</i>	V	V	7	BioNet	Confined to the coastal area of the Sydney and Illawarra regions. Populations are known between northern Sydney and Maroota in the north-west. Occurs on shaley/lateritic soils over sandstone and shale/sandstone transition soils on ridgetops and upper slopes amongst woodlands. Also recorded in Illawarra Lowland Grassy Woodland habitat at Albion Park on the Illawarra coastal plain.	Nil	No suitable habitat within the Development Site. Records within the locality. Not recorded during site assessment.
26.	<i>Pimelea spicata</i> Spiked Rice-flower	E	E	41	BioNet, PMST	Once widespread on the Cumberland Plain, the Spiked Rice-flower occurs in two disjunct areas; the Cumberland Plain (Marayong and Prospect Reservoir south to Narellan and Douglas Park) and the Illawarra (Landsdowne to Shellharbour to northern Kiama). In both the Cumberland Plain and Illawarra environments this species is found on well-structured clay soils	Low	No suitable habitat within the Development Site. Records within the locality. Not recorded during site assessment.
27.	<i>Pomaderris brunnea</i> Rufous pomaderris	E	V	-	PMST	Brown Pomaderris is found in a very limited area around the Colo, Nepean and Hawkesbury Rivers, including the Bargo area and near Camden. It also occurs near Walcha on the New England tablelands and in far eastern Gippsland in Victoria. Brown Pomaderris grows in moist woodland or forest on clay and alluvial soils of flood plains and creek lines	Nil	No suitable habitat within the Development Site. No records within the locality. Not recorded during site assessment.
28.	<i>Pomaderris prunifolia</i>	E	-	3	NSW Atlas	Known from only three sites within the listed local government areas, at Rydalmere, within Rookwood Cemetery and at The Crest of Bankstown.	Nil	No suitable habitat within the Development Site. Records within the locality. Not recorded during site assessment.
29.	<i>Pterostylis gibbose</i> Illawarra Greenhood	E	E	-	PMST	It is apparently extinct in western Sydney which is the area where it was first collected (1803). All known populations grow in open forest or woodland, on flat or gently sloping land with poor drainage.	Nil	No suitable habitat within the Development Site. No records within the locality. Not recorded during site assessment.



	Species	Status		Records	Source	Habitat	LoO	Summary
		BC	EPBC					
30.	<i>Pterostylis Saxicola</i> Sydney Plains Greenhood	E	E	-	PMST	Restricted to western Sydney between Freemans Reach in the north and Picton in the south. There are very few known populations and they are all very small and isolated. Most commonly found growing in small pockets of shallow soil in depressions on sandstone rock shelves above cliff lines. The vegetation communities above the shelves where <i>Pterostylis saxicola</i> occurs are sclerophyll forest or woodland on shale/sandstone transition soils or shale soils.	Nil	No suitable habitat within the Development Site. No records within the locality. Not recorded during site assessment.
31.	<i>Pultenaea parviflora</i>	E	V	1	BioNet, PMST	Endemic to the Cumberland Plain. Core distribution is from Windsor to Penrith and east to Dean Park. Outlier populations are recorded from Kemps Creek and Wilberforce. May be locally abundant, particularly within scrubby/dry heath areas within Castlereagh Ironbark Forest and Shale Gravel Transition Forest on tertiary alluvium or laterised clays.	Low	Broadly suitable woodland habitat within the Development Site, albeit highly degraded and managed (mown). Only one record within the locality. Not recorded during site assessment.
32.	<i>Rhizanthella slateri</i> Eastern Australian Underground Orchid	V	E	-	PMST	Habitat requirements are poorly understood and no particular vegetation type has been associated with the species, although it is known to occur in sclerophyll forest. Highly cryptic given that it grows almost completely below the soil surface, with flowers being the only part of the plant that can occur above ground. Therefore usually located only when the soil is disturbed. Flowers September to November.	Nil	No suitable habitat within the Development Site. No records within the locality. Not recorded during site assessment.
33.	<i>Rhodamnia rubescens</i> Scrub Turpentine	CE	-	-	PMST	Found in littoral, warm temperate and subtropical rainforest and wet sclerophyll forest usually on volcanic and sedimentary soils.	Nil	No suitable habitat within the Development Site. No records within the locality. Not recorded during site assessment.



	Species	Status		Records	Source	Habitat	LoO	Summary
		BC	EPBC					
34.	<i>Rhodomyrtus psidioides</i> Native Guava	CE	-	-	PMST	Occurs from Broken Bay, approximately 90 km north of Sydney, New South Wales, to Maryborough in Queensland. Pioneer species found in littoral, warm temperate and subtropical rainforest and wet sclerophyll forest often near creeks and drainage lines.	Nil	No suitable habitat within the Development Site. No records within the locality. Not recorded during site assessment.
35.	<i>Syzygium paniculatum</i> Magenta Lilly Pilly	CE	-	10	BioNet, PMST	Occurs from Broken Bay, approximately 90 km north of Sydney, New South Wales, to Maryborough in Queensland. Pioneer species found in littoral, warm temperate and subtropical rainforest and wet sclerophyll forest often near creeks and drainage lines	Nil	No suitable habitat within the Development Site. Records within the locality. Not recorded during site assessment.
36.	<i>Tetratheca glandulosa</i>	V	-	4	BioNet	Restricted to the following Local Government Areas: Baulkham Hills, Gosford, Hawkesbury, Hornsby, Ku-ring-gai, Pittwater, Ryde, Warringah, and Wyong. Vegetation structure varies from heaths and scrub to woodlands/open woodlands, and open forest.	Nil	No suitable habitat within the Development Site. Records within the locality. Not recorded during site assessment.
37.	<i>Zieria involucrata</i>	E	V	90	BioNet, PMST	Has a disjunct distribution north and west of Sydney, in the Baulkham Hills, Hawkesbury, Hornsby and Blue Mountains local government areas. Occurs primarily on Hawkesbury sandstone. Also occurs on Narrabeen Group sandstone and on Quaternary alluvium. Found primarily in sheltered forests on mid- to lower slopes and valleys, e.g. in or adjacent to gullies which support sheltered forest, although some populations extend upslope into drier vegetation.	Nil	No suitable habitat within the Development Site. Records within the locality. Not recorded during site assessment.



	Species	Status		Records	Source	Habitat	LoO	Summary
		BC	EPBC					
Birds								
1.	<i>Anthochaera phrygia</i> Regent Honeyeater	CE	CE	5	BioNet, PMST, BAM	Mostly recorded in box-ironbark eucalypt associations. At times of food shortage, the species also uses other woodland types and wet lowland coastal forest dominated by Swamp Mahogany or Spotted Gum.	Low	Marginally suitable habitat within the Development Site. Records within the locality. Not recorded during site assessment.
2.	<i>Artamus cyanopterus cyanopterus</i> Dusky Woodswallow	V	-	6	BioNet	The species occurs throughout most of New South Wales, but is sparsely scattered in, or largely absent from, much of the upper western region. Primarily inhabit dry, open eucalypt forests and woodlands, including mallee associations, with an open or sparse understorey of eucalypt saplings, acacias and other shrubs, and ground-cover of grasses or sedges and fallen woody debris.	Low	Marginally suitable aerial foraging habitat within the Development Site. Records within the locality. Not recorded during site assessment.
3.	<i>Botaurus poiciloptilus</i> Australasian Bittern	E	E	-	BioNet, PMST	Favours permanent freshwater wetlands with tall, dense vegetation, particularly bullrushes (<i>Typha spp.</i>) and spikerushes (<i>Eleocharis spp.</i>).	Nil	No suitable habitat within the Development Site. No records within the locality. Not recorded during site assessment.
4.	<i>Calidris ferruginea</i> Curlew Sandpiper	E	CE	-	PMST	It generally occupies littoral and estuarine habitats, and in New South Wales is mainly found in intertidal mudflats of sheltered coasts. It also occurs in non-tidal swamps, lakes and lagoons on the coast and sometimes inland.	Nil	No suitable habitat within the Development Site. No records within the locality. Not recorded during site assessment.



	Species	Status		Records	Source	Habitat	LoO	Summary
		BC	EPBC					
5.	<i>Callocephalon fimbriatum</i> Gang-gang Cockatoo	V	-	2	BioNet	In New South Wales, the Gang-gang Cockatoo is distributed from the south-east coast to the Hunter region, and inland to the Central Tablelands and south-west slopes. In spring and summer, generally found in tall mountain forests and woodlands, particularly in heavily timbered and mature wet sclerophyll forests.	Low	No suitable habitat within the Development Site. Records within the locality. Not recorded during site assessment.
6.	<i>Calyptorhynchus lathami</i> Glossy Black-Cockatoo	V	-	5	BioNet	The species is uncommon although widespread throughout suitable forest and woodland habitats, from the central Queensland coast to East Gippsland in Victoria. Inhabits open forest and woodlands of the coast and the Great Dividing Range where stands of sheoak occur. Black Sheoak (<i>Allocasuarina littoralis</i>) and Forest Sheoak (<i>A. torulosa</i>) are important foods.	Nil	No suitable habitat within the Development Site. Records within the locality. Not recorded during site assessment.
7.	<i>Climacteris picumnus victoriae</i> Brown Treecreeper	V	-	1	BioNet	The eastern subspecies lives in eastern NSW in eucalypt woodlands through central NSW. Found in eucalypt woodlands (including Box-Gum Woodland) and dry open forest of the inland slopes and plains inland of the Great Dividing Range; mainly inhabits woodlands dominated by stringybarks or other rough-barked eucalypts.	Nil	No suitable habitat within the Development Site. Records within the locality. Not recorded during site assessment.
8.	<i>Daphoenositta chrysoptera</i> Varied Sittella	V	-	14	BioNet	Inhabits eucalypt forests and woodlands, especially those containing rough-barked species and mature smooth-barked gums with dead branches, mallee and Acacia woodland.	Low	Marginally suitable habitat within the Development Site. Records within the locality. Not recorded during site assessment.



	Species	Status		Records	Source	Habitat	LoO	Summary
		BC	EPBC					
9.	<i>Falco hypoleucos</i> Grey Falcon	E	V	P	PMST	Medium-sized, compact, pale falcon with a heavy, thick-set, deep-chested appearance. The species is sparsely distributed in NSW, chiefly throughout the Murray-Darling Basin, with the occasional vagrant east of the Great Dividing Range. Usually restricted to shrubland, grassland and wooded watercourses of arid and semi-arid regions, although it is occasionally found in open woodlands near the coast.	Nil	No suitable habitat within the Development Site. No records within the locality. Not recorded during site assessment.
10.	<i>Glossopsitta pusilla</i> Little Lorikeet	V	-	9	BioNet	Forages primarily in the canopy of open Eucalyptus forest and woodland, yet also finds food in <i>Angophora</i> , <i>Melaleuca</i> and other tree species. Riparian habitats are particularly used, due to higher soil fertility and hence greater productivity.	Low	Marginally suitable foraging habitat within the Development Site. Records within the locality. Not recorded during site assessment.
11.	<i>Grantiella picta</i> Painted Honeyeater	V	V	P	PMST	Inhabits <i>Acacia pendula</i> , <i>Acacia harpophylla</i> , Box-Gum Woodlands and Box-Ironbark Forests. Feeds on the fruits of mistletoes growing on woodland eucalyptus and acacia.	Nil	No suitable habitat within the Development Site. No records within the locality. Not recorded during site assessment.
12.	<i>Haliaeetus leucogaster</i> White-bellied Sea-Eagle	V	M	2	BioNet	Occurs at sites near the sea or sea-shore, such as around bays and inlets, beaches, reefs, lagoons, estuaries and mangroves; and at, or in the vicinity of freshwater swamps, lakes, reservoirs, billabongs and saltmarsh. Terrestrial habitats include coastal dunes, tidal flats, grassland, heathland, woodland, and forest (including rainforest).	Low	No suitable habitat within the Development Site. Records within the locality. Not recorded during site assessment.



	Species	Status		Records	Source	Habitat	LoO	Summary
		BC	EPBC					
13.	<i>Hieraaetus morphnoides</i> Little Eagle	V	-	3	BioNet	Occupies open eucalypt forest, woodland or open woodland. Sheoak or Acacia woodlands and riparian woodlands of interior NSW are also used.	Low	Marginally suitable foraging habitat within the Development Site. Records within the locality. Not recorded during site assessment.
14.	<i>Hirundapas caudacutus</i> White-throated Needle-tail		M	3	BioNet, PMST	Most often seen in eastern Australia before storms, low pressure troughs and approaching cold fronts and occasionally bushfire. These conditions are often used by insects to swarm (eg termites and ants) or tend to lift insects away from the surface which favours sighting of White-throated Needle-tails as they feed.	Low	Marginally suitable aerial foraging habitat within the Development Site. Records within the locality. Not recorded during site assessment.
15.	<i>Lathamus discolor</i> Swift Parrot	E	CE, M	14	BioNet, PMST, BAM	This migratory species has been recorded on the mainland from a variety of habitat types including dry and wet sclerophyll forest, forested wetlands, coastal swamp forests and heathlands. This species does not breed within mainland Australia. Found in a variety of timbered habitats including dry woodlands and open forests. Shows a particular preference for timbered watercourses.	Low	Broadly suitable foraging habitat within the Development Site. Records within the locality. Not recorded during site assessment.
16.	<i>Lophoictinia isura</i> Square-tailed Kite	V	-	1	BioNet	The Square-tailed Kite ranges along coastal and subcoastal areas from south-western to northern Australia, Queensland, NSW and Victoria.	Low	No suitable habitat within the Development Site. Only one record within the locality. Not recorded during site assessment.



	Species	Status		Records	Source	Habitat	LoO	Summary
		BC	EPBC					
17.	<i>Melithreptus gularis gularis</i> Black-chinned Honeyeater	V	-	2	BioNet	The Black-chinned Honeyeater has two subspecies, with only the nominate (<i>gularis</i>) occurring in NSW. Occupies mostly upper levels of drier open forests or woodlands dominated by box and ironbark eucalypts, especially Mugga Ironbark (<i>Eucalyptus sideroxylon</i>), White Box (<i>E. albens</i>), Inland Grey Box (<i>E. microcarpa</i>), Yellow Box (<i>E. melliodora</i>), Blakely's Red Gum (<i>E. blakelyi</i>) and Forest Red Gum (<i>E. tereticornis</i>).	Low	Marginally suitable foraging habitat within the Development Site. Records within the locality. Not recorded during site assessment.
18.	<i>Neophema pulchella</i> Turquoise Parrot	V	-	3	BioNet	The Turquoise Parrot's range extends from southern Queensland through to northern Victoria, from the coastal plains to the western slopes of the Great Dividing Range. Lives on the edges of eucalypt woodland adjoining clearings, timbered ridges and creeks in farmland.	Low	Broadly suitable habitat within the Development Site. Records within the locality. Not recorded during site assessment.
19.	<i>Ninox connivens</i> Barking Owl	V	-	2	NSW Atlas	Inhabits woodland and open forest, including fragmented remnants and partly cleared farmland. It is flexible in its habitat use, and hunting can extend in to closed forest and more open areas. Sometimes able to successfully breed along timbered watercourses in heavily cleared habitats (e.g. western NSW) due to the higher density of prey on these fertile riparian soils.	Low	Broadly suitable habitat within the Development Site. No suitable nesting hollows within the Development Site. Records within the locality. Not recorded during site assessment.
20.	<i>Ninox strenua</i> Powerful Owl	V	-	36	BioNet	The Powerful Owl requires large tracts of forest or woodland habitat but can occur in fragmented landscapes as well. The species breeds and hunts in open or closed sclerophyll forest or woodlands and occasionally hunts in open habitats. It roosts by day in dense vegetation comprising species such as Turpentine, Black She-oak, Blackwood, Rough-barked Apple, Cherry Ballart and a number of eucalypt species. Powerful Owls nest in large tree hollows (at least 0.5 m deep), in large eucalypts (diameter at breast height of 80-240 cm) that are at least 150 years old.	Low	Broadly suitable habitat within the Development Site. No suitable nesting hollows within the Development Site. Records within the locality. Not recorded during site assessment.



	Species	Status		Records	Source	Habitat	LoO	Summary
		BC	EPBC					
21.	<i>Numenius madagascariensis</i> Eastern Curlew	-	CE	-	PMST	The eastern curlew is Australia's largest shorebird and a long-haul flyer. It is easily recognisable, with its long, down-curved bill. The species takes an annual migratory flight to Russia and north-eastern China to breed, arriving back home to Australia in August.	Nil	No suitable habitat within the Development Site. No records within the locality. Not recorded during site assessment.
22.	<i>Petroica boodang</i> Scarlet Robin	V	-	2	BioNet	The Scarlet Robin is found from south east Queensland to south east South Australia and also in Tasmania and south west Western Australia. In NSW, it occurs from the coast to the inland slopes. The Scarlet Robin lives in dry eucalypt forests and woodlands. The understorey is usually open and grassy with few scattered shrubs.	Low	Broadly suitable habitat within the Development Site. Records within the locality. Not recorded during site assessment.
23.	<i>Petroica phoenicea</i> Flame Robin	V	-	1	BioNet	The Flame Robin is endemic to south eastern Australia, and ranges from near the Queensland border to south east South Australia and also in Tasmania. Breeds in upland tall moist eucalypt forests and woodlands, often on ridges and slopes.	Nil	Broadly suitable habitat within the Development Site. Only one record within the locality. Not recorded during site assessment.
24.	<i>Polytelis swainsonii</i> Superb Parrot	V	V	1	BioNet	The Superb Parrot is found throughout eastern inland NSW. On the South-western Slopes their core breeding area is roughly bounded by Cowra and Yass in the east, and Grenfell, Cootamundra and Coolac in the west.	Low	No suitable habitat within the Development Site. Only one record within the locality. Not recorded during site assessment.
25.	<i>Rostratula australis</i> Australian Painted Snipe	E	E	-	PMST	In NSW many records are from the Murray-Darling Basin including the Paroo wetlands, Lake Cowal, Macquarie Marshes, Fivebough Swamp and more recently, swamps near Balldale and Wanganella. Prefers fringes of swamps, dams and nearby marshy areas where there is a cover of grasses, lignum, low scrub or open timber.	Nil	No suitable habitat within the Development Site. No records within the locality. Not recorded during site assessment.



	Species	Status		Records	Source	Habitat	LoO	Summary
		BC	EPBC					
26.	<i>Tyto novaehollandiae</i> Masked Owl	V	-	1	BioNet	Lives in dry eucalypt forests and woodlands from sea level to 1100 m. A forest owl, but often hunts along the edges of forests, including roadsides. The typical diet consists of tree-dwelling and ground mammals, especially rats. Roosts and breeds in moist eucalypt forested gullies, using large tree hollows or sometimes caves for nesting.	Nil	Broadly suitable habitat within the Development Site. No suitable nesting hollows within the Development Site. Records within the locality. Not recorded during site assessment.

Mammals

1.	<i>Chalinolobus dwyeri</i> Large-eared Pied Bat	V	V	1	BioNet, PMST	Found in well-timbered areas containing gullies. Roosts in caves (near their entrances), crevices in cliffs, old mine workings and in the disused, bottle-shaped mud nests of the Fairy Martin (<i>Petrochelidon ariel</i>), frequenting low to mid-elevation dry open forest and woodland close to these features.	Nil	No suitable nesting habitat within the Development Site or locality. Only one record within the locality. Not recorded during site assessment.
2.	<i>Dasyurus maculatus</i> Spotted-tailed Quoll	V	E	1	BioNet, PMST	Recorded across a range of habitat types, including rainforest, open forest, woodland, coastal heath and inland riparian forest, from the sub-alpine zone to the coastline.	Nil	No suitable habitat within the Development Site. Only one record within the locality. Not recorded during site assessment.
3.	<i>Falsistrellus tasmaniensis</i> Eastern False Pipistrelle	V	-	19	BioNet	Prefers moist habitats, with trees taller than 20 m. Generally, roosts in tree hollows but has also been found under loose bark on trees or in buildings.	Low	Broadly suitable habitat within the Development Site. Records within the locality. Not recorded during site assessment.



	Species	Status		Records	Source	Habitat	LoO	Summary
		BC	EPBC					
4.	<i>Micronomus norfolkensis</i> Eastern Coastal Free-tailed Bat	V	-	40	BioNet	Occur in dry sclerophyll forest, woodland, swamp forests and mangrove forests east of the Great Dividing Range. Roost mainly in tree hollows but will also roost under bark or in man-made structures.	Low	Broadly suitable habitat within the Development Site. Records within the locality. Not recorded during site assessment.
5.	<i>Miniopterus australis</i> Little Bentwing-bat	V	-	14	BioNet, BAM	Moist eucalypt forest, rainforest, vine thicket, wet and dry sclerophyll forest, Melaleuca swamps, dense coastal forests and banksia scrub. Generally found in well-timbered areas. Roost in caves, tunnels, tree hollows, abandoned mines, stormwater drains, culverts, bridges and sometimes buildings.	Low	Broadly suitable foraging habitat within the Development Site. Records within the locality. Not recorded during site assessment.
6.	<i>Miniopterus orianae oceanensis</i> Large Bent-winged Bat	V	-	71	BioNet, BAM	Forages in forested habitats. Caves are the primary roosting habitat, but also use derelict mines, storm-water tunnels, buildings, and other man-made structures.	Low	Broadly suitable foraging habitat within the Development Site. Records within the locality. Not recorded during site assessment.
7.	<i>Myotis macropus</i> Southern Myotis	V	-	22	BioNet	Generally roost in groups of 10 - 15 close to water in caves, mine shafts, hollow-bearing trees, storm water channels, buildings, under bridges and in dense foliage. Forage over streams and pools catching insects and small fish by raking their feet across the water surface.	Low	No suitable foraging habitat within the Development Site. Records within the locality. Not recorded during site assessment.



	Species	Status		Records	Source	Habitat	LoO	Summary
		BC	EPBC					
8.	<i>Petauroides volans</i> Greater Glider	-	V	-	PMST	Feeds exclusively on eucalypt leaves, buds, flowers and mistletoe. Shelters during the day in tree hollows.	Nil	No suitable habitat within the Development Site. No records within the locality. Not recorded during site assessment.
9.	<i>Petaurus australis</i> Yellow-bellied Glider	V	-	2	BioNet	The Yellow-bellied Glider is found along the eastern coast to the western slopes of the Great Dividing Range, from southern Queensland to Victoria. Occur in tall mature eucalypt forest generally in areas with high rainfall and nutrient rich soils.	Nil	No suitable habitat within the Development Site. No records within the locality. Not recorded during site assessment.
10.	<i>Petrogale penicillata</i> Brush-tailed Rock-wallaby	-	E	P	PMST	Occupy rocky escarpments, outcrops and cliffs with a preference for complex structures with fissures, caves and ledges, often facing north.	Nil	No suitable habitat within the Development Site. No records within the locality. Not recorded during site assessment.
11.	<i>Phascolarctos cinereus</i> Koala	V	V	2	BioNet, PMST	Found in a variety of forest types with suitable feed tree species.	Low	Marginally suitable habitat within the Development Site. Only two records within the locality. Not recorded during site assessment.
12.	<i>Pseudomys novaehollandiae</i> New Holland Mouse	-	V	P	PMST	Inhabits open heathlands, open woodlands with a heathland understorey, and vegetated sand dunes.	Nil	No suitable habitat within the Development Site. No records within the locality. Not recorded during site assessment.



	Species	Status		Records	Source	Habitat	LoO	Summary
		BC	EPBC					
13.	<i>Pteropus poliocephalus</i> Grey-headed Flying-fox	V	V	302	BioNet, PMST	Occurs across a wide range of habitat types along the eastern seaboard of Australia, depending on food availability. Fruit from myrtaceous trees and rainforest trees form the major components of their diet.	Low	Suitable foraging habitat present across the Development Site when Eucalypt species are in flower. No camps detected on site. Not recorded during site assessment.
14.	<i>Saccolaimus flaviventris</i> Yellow-bellied Sheath-tail-bat	V	-	12	BioNet	Forages in most habitats across its very wide range, with and without trees; appears to defend an aerial territory. Roosts in tree hollows and buildings; in treeless areas they are known to utilise mammal burrows.	Low	Broadly suitable foraging habitat within the Development Site. Records within the locality. Not recorded during site assessment.
15.	<i>Scoteanax rueppellii</i> Greater Broad-nosed Bat	V	-	26	BioNet	This species occurs in a variety of habitats including rainforest, dry and wet sclerophyll forest and eucalypt woodland.	Low	Broadly suitable foraging habitat within the Development Site. Records within the locality. Not recorded during site assessment.
16.	<i>Vespadelus troughtoni</i> Eastern Cave Bat	V	-	1	BioNet	The Eastern Cave Bat is found in a broad band on both sides of the Great Dividing Range from Cape York to Kempsey, with records from the New England Tablelands and the upper north coast of NSW. A cave-roosting species that is usually found in dry open forest and woodland, near cliffs or rocky overhangs; has been recorded roosting in disused mine workings, occasionally in colonies of up to 500 individuals.	Low	Broadly suitable foraging habitat within the Development Site. No suitable roosting habitat. Only one record within the locality. Not recorded during site assessment.



	Species	Status		Records	Source	Habitat	LoO	Summary
		BC	EPBC					
Amphibians								
1.	<i>Heleioporus australiacus</i> Giant Burrowing Frog	V	V	-	PMST	Found in heath, woodland and open dry sclerophyll forest on a variety of soil types except those that are clay based. Breeding habitat of this species is generally soaks or pools within first or second order streams. They are also commonly recorded from 'hanging swamp' seepage lines and where small pools form from the collected water.	Nil	No suitable habitat within the Development Site. No records within the locality. Not recorded during site assessment.
2.	<i>Litoria aurea</i> Green and Golden Bell Frog	E	V	1	BioNet, PMST	This species prefers open water bodies, fringed by reeds and other aquatic vegetation for breeding and foraging purposes. Needs fallen logs and debris for shelter and over-wintering purposes.	Nil	No suitable habitat within the Development Site. Only one record within the locality. Not recorded during site assessment.
3.	<i>Pseudophryne australis</i> Red-crowned Toadlet	V	-	7	BioNet	The Red-crowned Toadlet has a restricted distribution. It is confined to the Sydney Basin, from Pokolbin in the north, the Nowra area to the south, and west to Mt Victoria in the Blue Mountains. Occurs in open forests, mostly on Hawkesbury and Narrabeen Sandstones. Inhabits periodically wet drainage lines below sandstone ridges that often have shale lenses or cappings.	Nil	No suitable habitat within the Development Site. Records within the locality. Not recorded during site assessment.
Gastropod								
1.	<i>Pommerhelix duralensis</i> Dural Land Snail	E	E	13	BioNet, PMST	The species is a shale-influenced-habitat specialist, which occurs in low densities along the western and northwest fringes of the Cumberland IBRA subregion on shale-sandstone transitional landscapes. The species has a strong affinity for communities in the interface region between shale-derived and sandstone-derived soils, with forested habitats that have good native cover and woody debris.	Low	No suitable habitat within the Development Site. Suitable habitat exists within the Study Area (Vegetation Zone 1), but this will not be impacted. Records within the locality. Not recorded during site assessment.



	Species	Status		Records	Source	Habitat	LoO	Summary
		BC	EPBC					
2.	<i>Meridolum corneovirens</i> Cumberland Plain Land Snail	E	-	50	BioNet	Lives in small areas on the Cumberland Plain west of Sydney, from Richmond and Windsor south to Picton and from Liverpool west to the Hawkesbury and Nepean Rivers at the base of the Blue Mountains. Lives under litter of bark, leaves and logs, or shelters in loose soil around grass clumps. Occasionally shelters under rubbish.	Low	No suitable habitat within the Development Site. Suitable habitat exists within the Study Area (Vegetation Zone 1), but this will not be impacted. Records within the locality. Not recorded during site assessment.

Migratory Species

1.	<i>Apus pacificus</i> Pacific Swift	-	M		PMST	Almost entirely aerial and give spectacular displays of high-speed flying above any habitat, urban or rural. Swifts are most often seen in late summer, nearly always in flocks. They are typically associated with stormy weather when they feed on nuptial swarms of various insects.	Low	Broadly suitable aerial foraging habitat within the Development Site. Records within the locality. Not recorded during site assessment.
2.	<i>Cuculus optatus</i> Oriental Cuckoo	-	M	-	PMST	Inhabits rainforest margins, monsoon forest, vine scrub, riverine thickets, wet densely canopied Eucalypt forests, paperbark swamp and mangroves.	Nil	No suitable habitat within the Development Site. No records within the locality. Not recorded during site assessment.
3.	<i>Hirundapus caudacutus</i> White-throated Needletail	-	M,V	3	BioNet	Forages in high open spaces over varied habitat types. May aerially forage over the Development Site.	Low	Broadly suitable aerial foraging habitat within the Development Site. Records within the locality. Not recorded during site assessment.



	Species	Status		Records	Source	Habitat	LoO	Summary
		BC	EPBC					
4.	<i>Monarcha melanopsis</i> Black-faced Monarch	-	M	-	PMST	Found in rainforests, eucalypt woodlands, coastal scrub and damp gullies. It may be found in more open woodland when migrating.	Nil	No suitable habitat within the Development Site. No records within the locality. Not recorded during site assessment.
5.	<i>Monarcha trivirgatus</i> Spectacled Monarch	-	M	-	PMST	Prefers thick understorey in rainforests, wet gullies and waterside vegetation, as well as mangroves.	Nil	No suitable habitat within the Development Site. No records within the locality. Not recorded during site assessment.
6.	<i>Motacilla flava</i> Yellow Wagtail	-	M	-	PMST	Typically inhabits inundated fields, saltmarsh and wetlands and occasionally coastal areas.	Nil	No suitable habitat within the Development Site. No records within the locality. Not recorded during site assessment.
7.	<i>Myiagra cyanoleuca</i> Satin Flycatcher	-	M	-	PMST	Found in tall forests, preferring wetter habitats such as heavily forested gullies, but not rainforests.	Nil	No suitable habitat within the Development Site. No records within the locality. Not recorded during site assessment.
8.	<i>Rhipidura rufifrons</i> Rufous Fantail	-	M	-	PMST	Found in rainforest, dense wet forests, swamp woodlands and mangroves, preferring deep shade, and is often seen close to the ground.	Nil	No suitable habitat within the Development Site. No records within the locality. Not recorded during site assessment.



	Species	Status		Records	Source	Habitat	LoO	Summary
		BC	EPBC					
Threatened Ecological Communities								
1.	Castlereagh Scribbly Gum and Agnes Banks Woodlands of the Sydney Basin Bioregion	CE	E		PMST	Occurs in western Sydney and originally extended over about 615 hectares, but now has only 98 hectares remaining intact, mostly near Agnes Banks on the east bank of the Hawkesbury River, in the Penrith local government area.	Nil	Absent from Development Site
2.	Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland ecological community.	-	E	P	PMST	The ecological community is found within the South Eastern Queensland (SEQ), NSW North Coast (NNC), Sydney Basin (SYB) and part of the South East Corner (SEC) IBRA7 bioregions. The canopy layer is dominated2 by Casuarina glauca (swamp oak, swamp she-oak).	Nil	Absent from Development Site
3.	Cooks River/Castlereagh Ironbark Forest of the Sydney Basin Bioregion	E	CE	P	PMST	Occurs in western Sydney, and the extent of intact remnants is now reduced to 1011 hectares, with the most extensive stands occurring in the Castlereagh and Holsworthy areas. Smaller remnants occur in the Kemps Creek area and in the eastern section of the Cumberland Plain. Good examples can be seen at the Castlereagh and Windsor Downs Nature Reserves.	Nil	Absent from Development Site
4.	Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest	E	CE	P	PMST	The Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest is endemic to New South Wales, specifically the area in and around western Sydney.	Present within the Study Area.	Absent from Development Site. Occurs within the Study Area, however this area will not be impacted by the proposed development.
5.	River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria	E	CE	P	PMST	Given its habitat, the community has an important role in maintaining river ecosystems and riverbank stability Associated with silts, clay-loams and sandy loams, on periodically inundated alluvial flats, drainage lines and river terraces associated with coastal floodplains. Generally occurs below 50 m elevation, but may occur on localised river flats up to 250 m above sea level.	Nil	Absent from Development Site



	Species	Status		Records	Source	Habitat	LoO	Summary
		BC	EPBC					
6.	Shale Sandstone Transition Forest of the Sydney Basin Bioregion	CE	CE	P	PMST	9,950 ha remains intact (22.6% of its original extent) and the bulk of this occurs in the Hawkesbury, Baulkham Hills, Liverpool, Parramatta, Penrith, Campbelltown and Wollondilly local government areas. Good examples can be seen at Gulguer Nature Reserve, in the Wilton area and in the Sackville - Maroota area.	Nil	Absent from Development Site
7.	Turpentine-Ironbark Forest of the Sydney Basin Bioregion	CE	CE	P	PMST	This subtropical forest occurs on the coastal floodplains of the North Coast of NSW.	Nil	Absent from Development Site
8.	Western Sydney Dry Rainforest and Moist Woodland on Shale	E	CE	P	PMST	Very restricted and occurs most commonly in the far southern section of the Cumberland Plain, in the Razorback Range near Picton. Outlying occurrences have been recorded at Grose Vale and Cattai.	Nil	Absent from Development Site



APPENDIX B - FLORA SPECIES LIST





Table B1 - Flora Species List

Number	Family	Scientific Name	Common Name	Form	Plot 1		Plot 2	
					Cover	Abundance	Cover	Abundance
1.	Agavaceae	<i>Yucca aloifolia</i>	Spanish Bayonet	Exotic				
2.	Apiaceae	<i>Daucus glochidiatus</i>	Native Carrot	Forb (FG)	0.5	100		
3.	Apocynaceae	<i>Araujia sericifera</i>	Moth Vine	HTW - Manageable			0.5	5
4.	Apocynaceae	<i>Plumeria rubra</i>	Frangipani	Exotic				
5.	Asparagaceae	<i>Asparagus asparagoides</i>	Bridal Creeper	HTW			0.1	10
6.	Asteraceae	<i>Bidens pilosa</i>	Cobbler's Pegs	Exotic	0.1	4	2	30
7.	Asteraceae	<i>Dimorphotheca ecklonis</i>	Cape Daisy	Exotic				
8.	Asteraceae	<i>Senecio madagascariensis</i>	Fireweed	Exotic	0.1	5		
9.	Asteraceae	<i>Soliva sessilis</i>	Bindyi	Exotic				
10.	Asteraceae	<i>Sonchus asper</i>	Prickly Sowthistle	Exotic				
11.	Asteraceae	<i>Taraxacum officinale</i>	Dandelion	Exotic	0.1	20		
12.	Brassicaceae	<i>Brassica fruticulosa</i>	Twiggy Turnip	Exotic	0.1	3	0.2	15
13.	Campanulaceae	<i>Lobelia purpurascens</i>	whiteroot	Forb (FG)				
14.	Caryophyllaceae	<i>Stellaria media</i>	Common Chickweed	Exotic	0.1	30	0.1	30
15.	Chenopodiaceae	<i>Einadia hastata</i>	Berry Saltbush	Forb (FG)			0.1	10
16.	Chenopodiaceae	<i>Einadia trigonos</i>	Fishweed	Forb (FG)			0.1	20
17.	Commelinaceae	<i>Commelina cyanea</i>	Native Wandering Jew	Forb (FG)			0.1	20
18.	Convolvulaceae	<i>Dichondra repens</i>	Kidney Weed	Forb (FG)	0.1	40	0.2	50
19.	Fabaceae (Faboideae)	<i>Glycine tabacina</i>	Variable Glycine	Other (OG)			0.1	20



Number	Family	Scientific Name	Common Name	Form	Plot 1		Plot 2	
					Cover	Abundance	Cover	Abundance
20.	Fabaceae (Faboideae)	<i>Medicago polymorpha</i>	Burr Medic	Exotic	0.2	50		
21.	Fabaceae (Faboideae)	<i>Trifolium repens</i>	White Clover	Exotic	0.1	40		
22.	Fabaceae (Mimosoideae)	<i>Acacia parramattensis</i>	Parramatta Wattle	Tree (TG)			1	1
23.	Juncaceae	<i>Juncus subsecundus</i>	Finger Rush	Grass & grasslike (GG)				
24.	Lamiaceae	<i>Marrubium vulgare</i>	White Horehound	Exotic				
25.	Lamiaceae	<i>Westringia fruticosa</i>	Coastal Rosemary	Shrub (SG)				
26.	Lomandraceae	<i>Lomandra longifolia</i>	Spiny-headed Mat-rush	Grass & grasslike (GG)				
27.	Malvaceae	<i>Modiola caroliniana</i>	Red-flowered Mallow	Exotic	0.1	20		
28.	Malvaceae	<i>Sida rhombifolia</i>	Paddy's Lucerne	Exotic	0.2	5	5	50
29.	Myrtaceae	<i>Angophora floribunda</i>	Rough-barked Apple	Tree (TG)				
30.	Myrtaceae	<i>Callistemon citrinus</i>	Crimson Bottlebrush	Shrub (SG)				
31.	Myrtaceae	<i>Eucalyptus crebra</i>	Narrow-leaved Ironbark	Tree (TG)				
32.	Myrtaceae	<i>Eucalyptus moluccana</i>	Grey Box	Tree (TG)				
33.	Myrtaceae	<i>Eucalyptus tereticornis</i>	Forest Red Gum	Tree (TG)	15	1	40	6
34.	Myrtaceae	<i>Melaleuca decora</i>	-	Shrub (SG)			5	2
35.	Oleaceae	<i>Fraxinus spp.</i>	-	Exotic				
36.	Oleaceae	<i>Olea europaea</i>	Common Olive	HTW - Manageable				
37.	Oxalidaceae	<i>Oxalis perennans</i>	-	Forb (FG)	0.1	50		
38.	Pittosporaceae	<i>Bursaria spinosa</i>	Native Blackthorn	Shrub (SG)			10	30



Number	Family	Scientific Name	Common Name	Form	Plot 1		Plot 2	
					Cover	Abundance	Cover	Abundance
39.	Plantaginaceae	<i>Plantago lanceolata</i>	Lamb's Tongues	Exotic	0.5	50	0.1	10
40.	Plantaginaceae	<i>Plantago major</i>	Large Plantain	Exotic				
41.	Plumbaginaceae	<i>Plumbago auriculata</i>	Cape leadwot	Exotic				
42.	Poaceae	<i>Cenchrus clandestinus</i>	Kikuyu Grass	Exotic	25	1000		
43.	Poaceae	<i>Chloris gayana</i>	Rhodes Grass	HTW			2	30
44.	Poaceae	<i>Cynodon dactylon</i>	Common Couch	Grass & grasslike (GG)	5	40		
45.	Poaceae	<i>Ehrharta erecta</i>	Panic Veldtgrass	HTW			20	500
46.	Poaceae	<i>Eragrostis curvula</i>	African Lovegrass	HTW	1	20	10	40
47.	Poaceae	<i>Lolium rigidum</i>	Wimmera Ryegrass	Exotic	5	50		
48.	Poaceae	<i>Microlaena stipoides</i>	Weeping Grass	Grass & grasslike (GG)	10	200	10	500
49.	Poaceae	<i>Paspalum dilatatum</i>	Paspalum	HTW	2	100	55	1000
50.	Poaceae	<i>Poa annua</i>	Winter Grass	Exotic	1	50		
51.	Poaceae	<i>Setaria parviflora</i>	-	Exotic	40	1000		
52.	Poaceae	<i>Sporobolus africanus</i>	Parramatta Grass	Exotic	10	100		
53.	Poaceae	<i>Vulpia bromoides</i>	Squirrel Tail Fesque	Exotic	3	100		
54.	Primulaceae	<i>Lysimachia arvensis</i>	Scarlet Pimpernel	Exotic				
55.	Proteaceae	<i>Grevillea spp.</i>	-	Shrub (SG)				
56.	Proteaceae	<i>Grevillea spp.</i>	-	Shrub (SG)				
57.	Rosaceae	<i>Rubus fruticosus sp. agg.</i>	Blackberry complex	Exotic				
58.	Rubiaceae	<i>Galium aparine</i>	Goosegrass	Exotic				



Number	Family	Scientific Name	Common Name	Form	Plot 1		Plot 2	
					Cover	Abundance	Cover	Abundance
59.	Rubiaceae	<i>Galium murale</i>	Small Bedstraw	Exotic	0.1	10		
60.	Sapindaceae	<i>Acer negundo</i>	Box Elder	HTW - Manageable				
61.	Solanaceae	<i>Solanum nigrum</i>	Black-berry Nightshade	Exotic			0.1	10
62.	Solanaceae	<i>Solanum pseudocapsicum</i>	Madeira Winter Cherry	Exotic			0.1	3
63.	Vitaceae	<i>Cayratia clematidea</i>	Native Grape	Other (OG)			0.1	10



APPENDIX C – FAUNA SPECIES LIST





Table C1 Fauna Species List

No.	Scientific Name	Common Name	Status		Observation Type*	General Abundance within Subject Site**
			BC	EPBC		
1.	<i>Acridotheres tristis</i>	Common Myna	-	-	O	UC
2.	<i>Corvus coronoides</i>	Australian Raven	-	-	O	UC
3.	<i>Dacelo novaeguineae</i>	Laughing Kookaburra	-	-	O	UC
4.	<i>Gymnorhina tibicen</i>	Australian Magpie	-	-	O	UC
5.	<i>Manorina melanocephala</i>	Noisy Miner	-	-	O	UC
6.	<i>Ocyphaps lophotes</i>	Crested Pigeon	-	-	O	UC
7.	<i>Platycercus eximius</i>	Eastern Rosella	-	-	O	UC
8.	<i>Psephotus haematonotus</i>	Red-rumped Parrot	-	-	O	C
9.	<i>Strepera graculina</i>	Pied Currawong	-	-	O	UC
10.	<i>Threskiornis moluccus</i>	Australian White Ibis	-	-	O	UC
11.	<i>Trichoglossus haematodus</i>	Rainbow Lorikeet	-	-	O	C

*Observation Type: O (Visual Observation), H (Heard whilst on site), E (Evidence recorded inc scats, tracks or markings), R (Recorded through the use of call detectors [level of confidence C: Confident, Pr: Probable, Po: Possible]).

** General Abundance: I (Individual record), UC (Uncommon, 2-5 records), C(Common occurrence on site >5 records)



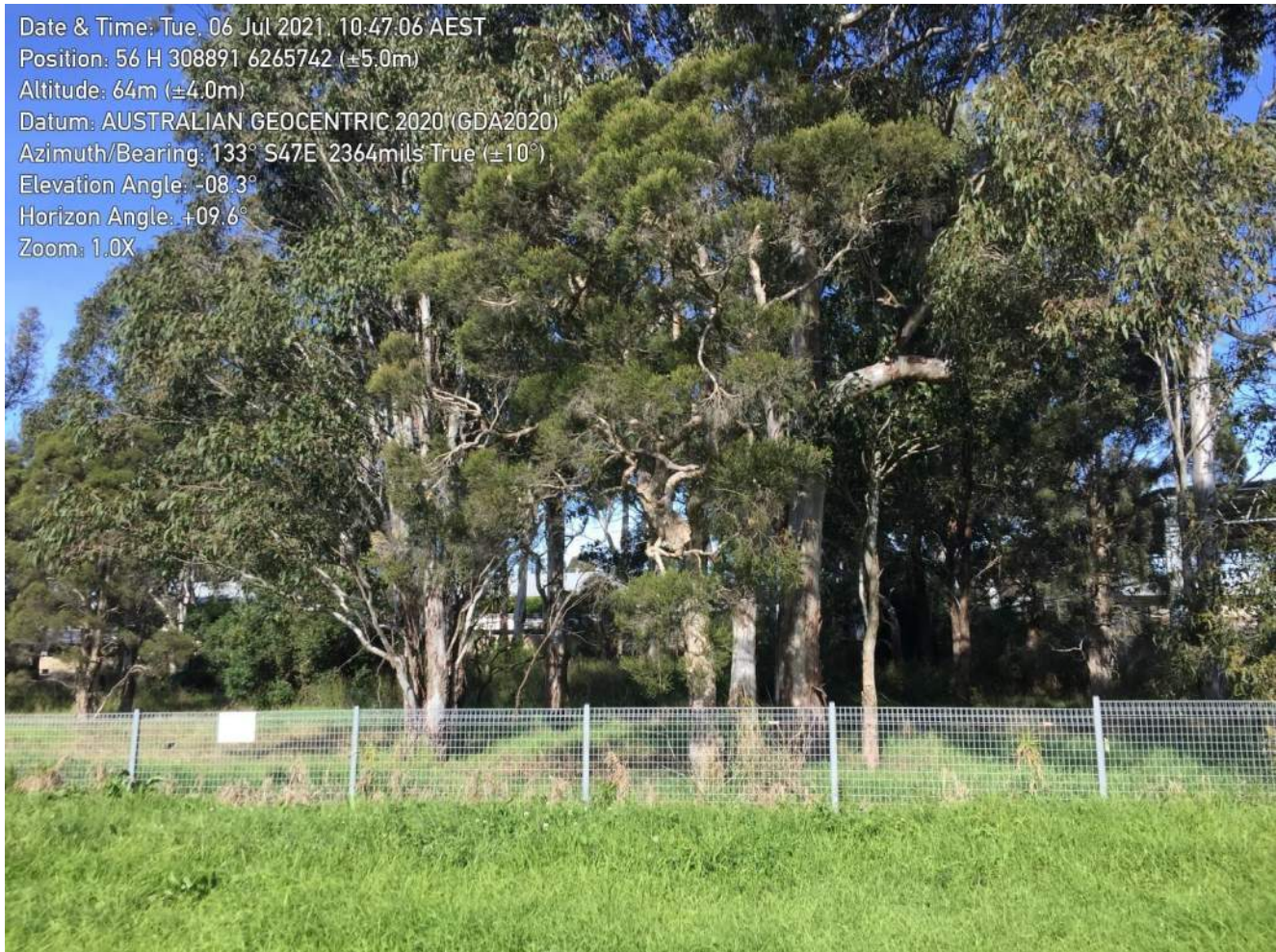
APPENDIX D – THREATENED ECOLOGICAL COMMUNITY DETERMINATIONS





Appendix D-1: Threatened Ecological Community Determination – EPBC Act Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest CEEC

Vegetation Zone 1 – Patch 1/1 – PCT 849 - Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion (CEEC - Moderate Condition)



Date & Time: Tue, 06 Jul 2021, 10:47:06 AEST
Position: 56 H 308891 6265742 (± 5.0 m)
Altitude: 64m (± 4.0 m)
Datum: AUSTRALIAN GEOCENTRIC 2020 (GDA2020)
Azimuth/Bearing: 133° S47E 2364mils True ($\pm 10^\circ$)
Elevation Angle: -08.3°
Horizon Angle: +09.6°
Zoom: 1.0X

Table D-1-1: Assessment of Conservation Status - Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest CEEC (EPBC Act). – Vegetation Zone 1: PCT 849 - Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion (CEEC - Moderate Condition)

Decision Key Criteria	Answer	Justification
1. Are native tree species ¹ present with a minimum projected foliage cover ² of 10%? (i). Yes – Go to 2. (ii). No – Not the listed ecological community.	Yes	The vegetation within this zone was characterised by a canopy dominated by <i>Eucalyptus tereticornis</i> (Forest Red Gum), with the occasional <i>Eucalyptus crebra</i> (Narrow-leaved Ironbark). Projected foliage cover of <i>Eucalyptus tereticornis</i> within Vegetation Zone 1 was estimated at 40%, above the benchmark of 10%. The canopy was dominated by <i>Eucalyptus tereticornis</i> , a recognised dominant tree species for <i>Cumberland Plain Woodland</i> .
2. Is the patch ³ of the ecological community 0.5 ha or greater in size? (i). Yes – Go to 3. (ii). No - Not the listed ecological community.	Yes	The Patch is 0.34 ha in size.



Decision Key Criteria	Answer	Justification
3. Of the perennial understorey vegetative cover present, is 50% made up of native species ⁴ ? (i). Yes – The listed ecological community. (ii) No – Go to 4.	No	The groundlayer within this zone is dominated by exotic grasses including <i>Paspalum dilatatum</i> * (Paspalum), <i>Eragrostis curvula</i> * (African Lovegrass), and <i>Ehrharta erecta</i> * (Panic Veldtgrass). A mix of native grasses and herbs still persist within this vegetation zone, including <i>Microlaena stipoides</i> (Weeping Grass), <i>Einadia hastata</i> (Berry Saltbush), <i>Dichondra repens</i> (Kidney Weed), and <i>Commelina cyanea</i> (Native Wandering Jew).
4. Is the patch 5 ha or greater in size? (i). Yes – Go to 5. (ii) No – Go to 6.	No	The Patch is 0.34 ha in size.
5. Of the perennial understorey vegetative cover present, is 30% made up of native species ⁴ ? (i). Yes – The listed ecological community. (ii) No – Not the listed ecological community.	NA	Not Applicable
6. Is the patch contiguous ⁵ with a native vegetation patch 5 ha or greater in size? (i). Yes – The listed ecological community. (ii) No – Not the listed ecological community.	No	The Patch is 0.34 ha in size. Whilst the vegetation within Vegetation Zone 1 is characterised by some level of connectivity to areas of native tree canopy (Vegetation Zone 3 [Planted native vegetation] and further street trees) these areas are not dominated by native species within each vegetation layer present (absent native shrub layer, exotic dominated groundcover) (see Photo 3). Therefore, the patch is not contiguous with native vegetation beyond the patch.
7. Does the patch contain at least one tree per ha that is large (> 80cm dbh ⁶) or has a hollow? (i). Yes – Go to 5. (ii) No – Not the listed ecological community.	NA	Not Applicable
Determination	The vegetation within Vegetation Zone 1 does not meet the definition of the Critically Endangered Ecological Community <i>Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest</i> as listed under the Commonwealth's Environment Protection Biodiversity Conservation Act 1999.	

Key notes pertaining to the decision criteria in the above table.

¹Typical dominant tree species are grey box (*Eucalyptus moluccana*), forest red gum (*Eucalyptus tereticornis*) and red ironbark (*Eucalyptus fibrosa*). Dominant means that one or more of the species listed above comprise 50% or more of the tree cover. Other tree canopy species may occur in association with the typical dominant species and may be locally dominant within the patch at some sites.

²Projected foliage cover excludes gaps between branches and leaves—for example, the amount of shadow that would be cast on the ground if there were a light source directly overhead.

³A patch is defined as a discrete and continuous area that comprises the ecological community. It is recognised that patches may occur in a range of sizes and shapes. In general, surveys within patches should be based on samples of at least 0.04 ha (a 20 m x 20 m plot or equivalent). The number of plots (quadrats or survey transects) per patch must take into consideration the size, shape and condition across the site. Permanent man-made structures, such as roads and buildings, are typically excluded from a patch, but a patch may include small-scale disturbances, such as tracks or breaks or other small-scale variations in native vegetation that do not significantly alter the overall functionality of the ecological community—for instance, the easy movement of wildlife or dispersal of plant spores and seeds.

⁴This determines how much of the understorey is native versus exotic. Perennial understorey vegetation cover includes vascular plant species of the ground and shrub layers with a lifecycle of more than two growing seasons. Measurements of perennial understorey vegetation cover exclude annuals, lichens and mosses, leaf litter or exposed soil.



Decision Key Criteria	Answer	Justification
		⁵Contiguous means the woodland patch is continuous with, or close to (within 100 m), another patch of vegetation that is dominated by native species in each vegetation layer present. Apart from native vegetation with a tree canopy, adjoining native vegetation may consist of derived grasslands or shrublands. 'Derived' or 'secondary' grasslands or shrublands are sites where the trees have been cleared but the native understorey is retained, giving the appearance of a grassland or shrubland. ⁶dbh—diameter at breast height (measured 1.3 m above the base of the tree).



Photo 3: Example of Native Canopy, absent native shrub layer and exotic dominated groundcover (Vegetation Zone 3) along Study Area boundary.



Vegetation Zone 2 – Patch 1/1 – PCT 849 - Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion (Low Condition)



Table D-1-2: Assessment of Conservation Status - Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest CEEC (EPBC Act). – Vegetation Zone 2: PCT 849 - Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion (Low Condition)

Decision Key Criteria	Answer	Justification
1. Are native tree species ¹ present with a minimum projected foliage cover ² of 10%? (i). Yes – Go to 2. (ii). No – Not the listed ecological community.	No	The vegetation within this zone is characterised by a mix of scattered canopy trees including <i>Eucalyptus tereticornis</i> (Forest Red Gum), and occurrence of <i>Eucalyptus crebra</i> (Narrow-leaved Ironbark), and <i>Angophora floribunda</i> (Rough-barked Apple). There is the occasional 'midstorey' species including <i>Melaleuca decora</i> , <i>Acacia parramattensis</i> (Parramatta Wattle). Whilst BAM plot data indicates a canopy PFC of approximately 15%, this is likely to be <10% when considering the entire vegetation zone.
2. Is the patch ³ of the ecological community 0.5 ha or greater in size? (i). Yes – Go to 3. (ii). No - Not the listed ecological community.	NA	Not Applicable



Decision Key Criteria	Answer	Justification
3. Of the perennial understorey vegetative cover present, is 50% made up of native species ⁴ ? (i). Yes – The listed ecological community. (ii). No – Go to 4.	NA	Not Applicable
4. Is the patch 5 ha or greater in size? (i). Yes – Go to 5. (ii). No – Go to 6.	NA	Not Applicable
5. Of the perennial understorey vegetative cover present, is 30% made up of native species ⁴ ? (i). Yes – The listed ecological community. (ii). No – Not the listed ecological community.	NA	Not Applicable
6. Is the patch contiguous ⁵ with a native vegetation patch 5 ha or greater in size? (i). Yes – The listed ecological community. (ii). No – Not the listed ecological community.	NA	Not Applicable
7. Does the patch contain at least one tree per ha that is large (> 80cm dbh ⁶) or has a hollow? (i). Yes – Go to 5. (ii). No – Not the listed ecological community.	NA	Not Applicable
Determination	The vegetation within Vegetation Zone 2 does not meet the definition of the Critically Endangered Ecological Community <i>Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest</i> as listed under the Commonwealth's Environment Protection Biodiversity Conservation Act 1999.	

Key notes pertaining to the decision criteria in the above table.

¹Typical dominant tree species are grey box (*Eucalyptus moluccana*), forest red gum (*Eucalyptus tereticornis*) and red ironbark (*Eucalyptus fibrosa*). Dominant means that one or more of the species listed above comprise 50% or more of the tree cover. Other tree canopy species may occur in association with the typical dominant species and may be locally dominant within the patch at some sites.

² Projected foliage cover excludes gaps between branches and leaves—for example, the amount of shadow that would be cast on the ground if there were a light source directly overhead.

³A patch is defined as a discrete and continuous area that comprises the ecological community. It is recognised that patches may occur in a range of sizes and shapes. In general, surveys within patches should be based on samples of at least 0.04 ha (a 20 m x 20 m plot or equivalent). The number of plots (quadrats or survey transects) per patch must take into consideration the size, shape and condition across the site. Permanent man-made structures, such as roads and buildings, are typically excluded from a patch, but a patch may include small-scale disturbances, such as tracks or breaks or other small-scale variations in native vegetation that do not significantly alter the overall functionality of the ecological community—for instance, the easy movement of wildlife or dispersal of plant spores and seeds.

⁴This determines how much of the understorey is native versus exotic. Perennial understorey vegetation cover includes vascular plant species of the ground and shrub layers with a lifecycle of more than two growing seasons. Measurements of perennial understorey vegetation cover exclude annuals, lichens and mosses, leaf litter or exposed soil.

⁵Contiguous means the woodland patch is continuous with, or close to (within 100 m), another patch of vegetation that is dominated by native species in each vegetation layer present. Apart from native vegetation with a tree canopy, adjoining native vegetation may consist of derived grasslands or shrublands. 'Derived' or 'secondary' grasslands or shrublands are sites where the trees have been cleared but the native understorey is retained, giving the appearance of a grassland or shrubland.

⁶dbh—diameter at breast height (measured 1.3 m above the base of the tree).



Appendix D-2: Threatened Ecological Community Determination – BC Act *Cumberland Plain Woodland in the Sydney Bioregion CEEC*

Vegetation Zone 1 – Patch 1/1 – PCT 849 - Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion (CEEC - Moderate Condition)

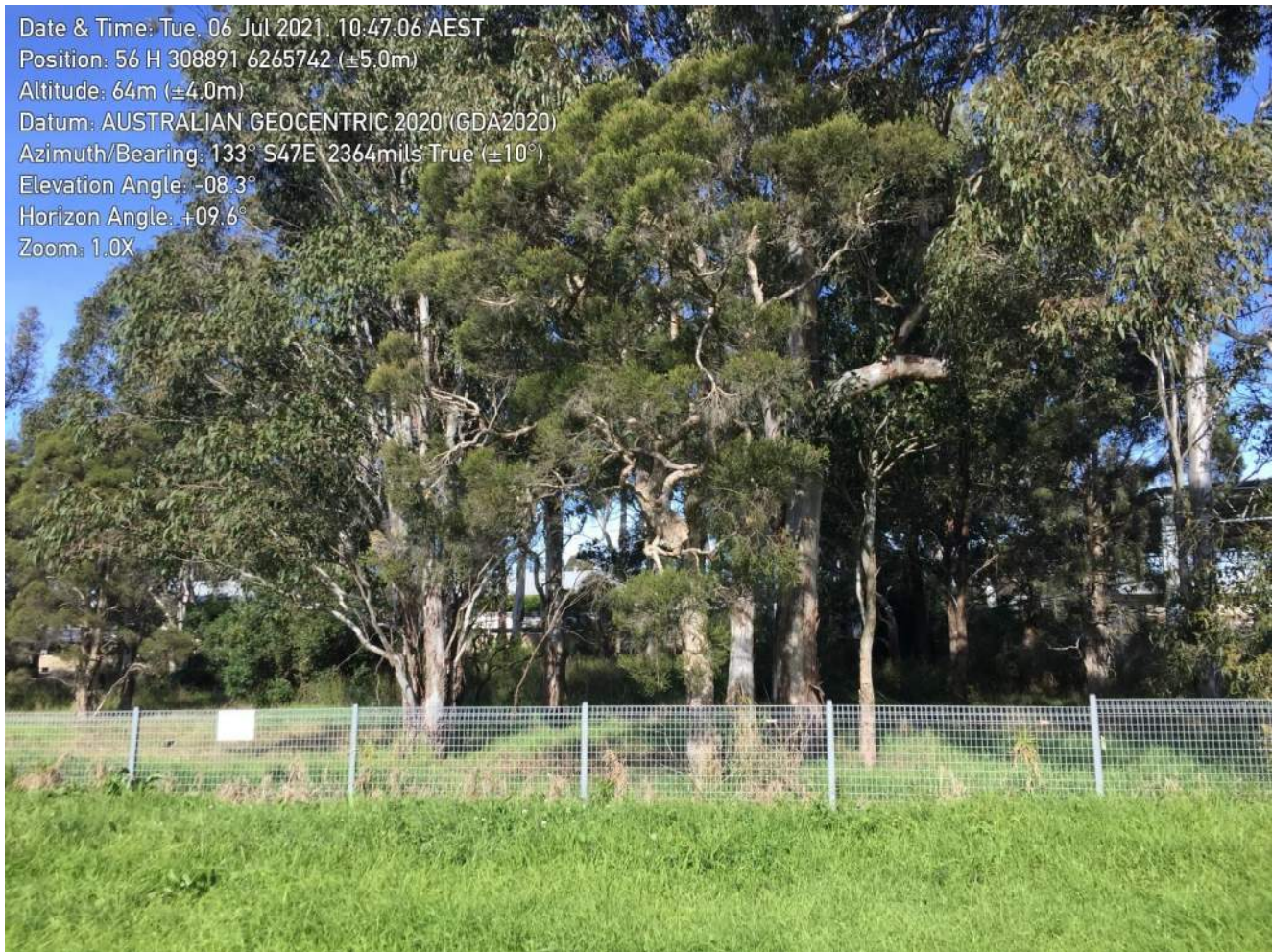


Table D-2-1: Assessment of Conservation Status - *Cumberland Plain Woodland in the Sydney Bioregion CEEC* (BC Act). – Vegetation Zone 2: PCT 849 - Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion (Low Condition)

Determination Criteria	Presence	Justification
Location - The vegetation is located within the area defined in the Determination (i.e. within the Sydney Basin bioregion associated with clay soils derived from Wianamatta Group geology, or more rarely alluvial substrates, on the Cumberland Plain)	Yes	The Study Area is located within the Sydney Basin IBRA Bioregion and Cumberland Plain IBRA Subregion.
Climate - The mean annual rainfall of this area is typically in the range of 700-900 mm, and is generally lower than that received on more elevated terrain that partially surrounds the Plain.	Yes	Mean annual rainfall for Bankstown is 866.4 mm
Landscape position - The community typically occurs on flat to undulating or hilly terrain up to about 350 m elevation but may also occur on locally steep sites and at slightly higher elevations.	Yes	The Study Area is positioned on flat to slightly undulating terrain approximately 60 m elevation.



Determination Criteria	Presence	Justification
Canopy floristics- Cumberland Plain Woodland is characterised by an upper-storey that is usually dominated by <i>Eucalyptus moluccana</i> (Grey Box) and <i>E. tereticornis</i> (Forest Red Gum), often with <i>E. crebra</i> (Grey Ironbark), <i>E. eugenioides</i> (Narrow-leaved Stringybark), <i>Corymbia maculata</i> (Spotted Gum) or other less frequently occurring eucalypts, including <i>Angophora floribunda</i> , <i>A. subvelutina</i> (Broad-leaved Apple), <i>E. amplifolia</i> (Cabbage Gum) and <i>E. fibrosa</i> (Broad-leaved Ironbark).	Yes	The vegetation within this zone was characterised by a canopy dominated by <i>Eucalyptus tereticornis</i> (Forest Red Gum), with the occasional <i>Eucalyptus crebra</i> (Narrow-leaved Ironbark). <i>Eucalyptus moluccana</i> (Grey Box) was located within the vicinity of the Study Area.
Mid-storey floristics - The community may have an open stratum of small trees that may include any of these eucalypts, as well as species such as <i>Acacia decurrens</i> (Black Wattle), <i>A. parramattensis</i> (Parramatta Wattle), <i>A.implexa</i> (Hickory Wattle) or <i>Exocarpos cupressiformis</i> (Native Cherry).	Yes	The midstorey is comprised of <i>Melaleuca decora</i> and <i>Acacia parramattensis</i> (Parramatta Wattle).
Shrub Layer floristics - Shrubs are typically scattered in the understorey but may be absent or locally dense as a result of clearing activity or changes in grazing or fire regimes. <i>Bursaria spinosa</i> (Blackthorn) is usually dominant, while other species include <i>Daviesia ulicifolia</i> (Gorse Bitter Pea), <i>Dillwynia sieberi</i> , <i>Dodonaea viscosa</i> subsp. <i>cuneata</i> and <i>Indigofera australis</i> (Native Indigo).	Yes	The shrub layer is characterised by scattered native shrubs including <i>Bursaria spinosa</i> (Sweet Bursaria), and exotic species including the occasional <i>Olea europaea</i> subsp. <i>cuspidata</i> * (African Olive).
Groundcover floristics - The ground cover is dominated by a diverse range of grasses including <i>Aristida ramosa</i> (Purple Wiregrass), <i>A. vagans</i> (Threeawn Speargrass), <i>Cymbopogon refractus</i> (Barbed Wire Grass), <i>Dichelachne micrantha</i> (Plumegrass), <i>Echinopogon caespitosus</i> (Forest Hedgehog Grass), <i>Eragrostis leptostachya</i> (Paddock Lovegrass), <i>Microlaena stipoides</i> (Weeping Grass), <i>Paspalidium distans</i> and <i>Themeda australis</i> (Kangaroo Grass), and with graminoids <i>Carex inversa</i> (Knob Sedge), <i>Cyperus gracilis</i> , <i>Lomandra filiformis</i> subsp. <i>filiformis</i> (Wattle Mat-rush) and <i>L. multiflorus</i> subsp. <i>multiflorus</i> (Many-flowered Mat-rush). The ground cover also includes a diversity of forbs such as <i>Asperula conferta</i> (Common Woodruff), <i>Brunoniella australis</i> (Blue Trumpet), <i>Desmodium varians</i> (Slender Tick Trefoil), <i>Dianella longifolia</i> (Blue Flax Lily), <i>Dichondra repens</i> (Kidney Weed), <i>Oxypetalum diphylloides</i> , <i>Oxalis perennans</i> and <i>Wahlenbergia gracilis</i> (Australian Bluebell), as well as scramblers, <i>Glycine</i> spp. and <i>Hardenbergia violacea</i> (Native Sarsaparilla) and the fern <i>Cheilanthes sieberi</i> (Poison Rock Fern).	Yes – but degraded	The groundlayer within this zone is dominated by exotic grasses including <i>Paspalum dilatatum</i> * (Paspalum), <i>Eragrostis curvula</i> * (African Lovegrass), and <i>Ehrharta erecta</i> * (Panic Veldtgrass). A mix of native grasses and herbs still persist within this vegetation zone, including <i>Microlaena stipoides</i> (Weeping Grass), <i>Einadia hastata</i> (Berry Saltbush), <i>Dichondra repens</i> (Kidney Weed), and <i>Commelina cyanea</i> (Native Wandering Jew).
Community structure - The community typically comprises an open tree canopy, a near-continuous groundcover dominated by grasses and herbs, sometimes with layers of shrubs	Yes	The vegetation within this zone is characterised by an open canopy of <i>E.tereticornis</i> and <i>E.crebra</i> , with layers of small trees (midstorey) of <i>Melaleuca decora</i> and <i>Acacia parramattensis</i> ,



Determination Criteria	Presence	Justification
and/or small trees. Shrubs may sometimes occur in locally dense stands. Less disturbed stands of the community may have a woodland or forest structure. Small trees or saplings may dominate the community in relatively high densities after partial or total clearing, and the groundcover may be relatively sparse, especially where densities of trees or shrubs are high. The community also includes 'derived' native grasslands which result from removal of the woody strata from the woodlands and forests.		scattered native shrubs including <i>Bursaria spinosa</i>, and a grass and herb dominated groundcover, albeit exotic dominated.
Determination	The vegetation within Vegetation Zone 1 <u>does meet</u> the definition of the Critically Endangered Ecological Community <i>Cumberland Plain Woodland in the Sydney Bioregion</i> as listed under the New South Wales Biodiversity Conservation Act 2016.	



Vegetation Zone 2 – Patch 1/1 – PCT 849 - Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion (Low Condition)



Table D-2-2: Assessment of Conservation Status - Cumberland Plain Woodland in the Sydney Bioregion CEEC (BC Act). – Vegetation Zone 2: PCT 849 - Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion (Low Condition)

Determination Criteria	Presence	Justification
Location - The vegetation is located within the area defined in the Determination (i.e. within the Sydney Basin bioregion associated with clay soils derived from Wianamatta Group geology, or more rarely alluvial substrates, on the Cumberland Plain)	Yes	The Study Area is located within the Sydney Basin IBRA Bioregion and Cumberland Plain IBRA Subregion.
Climate - The mean annual rainfall of this area is typically in the range of 700-900 mm, and is generally lower than that received on more elevated terrain that partially surrounds the Plain.	Yes	Mean annual rainfall for Bankstown is 866.4 mm
Landscape position - The community typically occurs on flat to undulating or hilly terrain up to about 350 m elevation but may also occur on locally steep sites and at slightly higher elevations.	Yes	The Study Area is positioned on flat to slightly undulating terrain approximately 60 m elevation.
Canopy floristics - Cumberland Plain Woodland is characterised by an upper-storey that is	Yes	The vegetation within this zone was characterised by a canopy dominated by scattered



Determination Criteria	Presence	Justification
usually dominated by <i>Eucalyptus moluccana</i> (Grey Box) and <i>E. tereticornis</i> (Forest Red Gum), often with <i>E. crebra</i> (Grey Ironbark), <i>E. eugenioides</i> (Narrow-leaved Stringybark), <i>Corymbia maculata</i> (Spotted Gum) or other less frequently occurring eucalypts, including <i>Angophora floribunda</i> , <i>A. subvelutina</i> (Broad-leaved Apple), <i>E. amplifolia</i> (Cabbage Gum) and <i>E. fibrosa</i> (Broad-leaved Ironbark).		<i>Eucalyptus tereticornis</i> (Forest Red Gum) and <i>Eucalyptus crebra</i> (Narrow-leaved Ironbark).
Mid-storey floristics - The community may have an open stratum of small trees that may include any of these eucalypts, as well as species such as <i>Acacia decurrens</i> (Black Wattle), <i>A. parramattensis</i> (Parramatta Wattle), <i>A. implexa</i> (Hickory Wattle) or <i>Exocarpos cupressiformis</i> (Native Cherry).	Yes	The midstorey is comprised of the occasional <i>Melaleuca decora</i> and <i>Acacia parramattensis</i> (Parramatta Wattle).
Shrub Layer floristics - Shrubs are typically scattered in the understorey but may be absent or locally dense as a result of clearing activity or changes in grazing or fire regimes. <i>Bursaria spinosa</i> (Blackthorn) is usually dominant, while other species include <i>Daviesia ulicifolia</i> (Gorse Bitter Pea), <i>Dillwynia sieberi</i> , <i>Dodonaea viscosa</i> subsp. <i>cuneata</i> and <i>Indigofera australis</i> (Native Indigo).	No	The shrub layer is predominantly absent within the Vegetation Zone and not characterised by species listed in the determination.
Groundcover floristics - The ground cover is dominated by a diverse range of grasses including <i>Aristida ramosa</i> (Purple Wiregrass), <i>A. vagans</i> (Threeawn Speargrass), <i>Cymbopogon refractus</i> (Barbed Wire Grass), <i>Dichelachne micrantha</i> (Plumegrass), <i>Echinopogon caespitosus</i> (Forest Hedgehog Grass), <i>Eragrostis leptostachya</i> (Paddock Lovegrass), <i>Microlaena stipoides</i> (Weeping Grass), <i>Paspalidium distans</i> and <i>Themeda australis</i> (Kangaroo Grass), and with graminoids <i>Carex inversa</i> (Knob Sedge), <i>Cyperus gracilis</i> , <i>Lomandra filiformis</i> subsp. <i>filiformis</i> (Wattle Mat-rush) and <i>L. multiflorus</i> subsp. <i>multiflorus</i> (Many-flowered Mat-rush). The ground cover also includes a diversity of forbs such as <i>Asperula conferta</i> (Common Woodruff), <i>Brunoniella australis</i> (Blue Trumpet), <i>Desmodium varians</i> (Slender Tick Trefoil), <i>Dianella longifolia</i> (Blue Flax Lily), <i>Dichondra repens</i> (Kidney Weed), <i>Opercularia diphylla</i> , <i>Oxalis perennans</i> and <i>Wahlenbergia gracilis</i> (Australian Bluebell), as well as scramblers, <i>Glycine</i> spp. and <i>Hardenbergia violacea</i> (Native Sarsaparilla) and the fern <i>Cheilanthes sieberi</i> (Poison Rock Fern).	Yes – but highly degraded	The groundcover within this zone is highly managed (mown) and dominated by exotic grasses including <i>Cenchrus clandestinus</i> (Kikuyu Grass), <i>Setaria parviflora</i> (Pigeon Grass), <i>Lolium rigidum</i> (Wimmera Ryegrass), and <i>Sporobolus africanus</i> (Parramatta Grass). Some native grasses and herbs persist within the vegetation zone including <i>Microlaena stipoides</i> (Weeping Grass), <i>Dichondra repens</i> (Kidney Weed), and <i>Oxalis perennans</i> .
Community structure - The community typically comprises an open tree canopy, a near-continuous groundcover dominated by grasses and herbs, sometimes with layers of shrubs and/or small trees. Shrubs may sometimes occur in locally dense stands. Less disturbed	Yes	The vegetation within this zone is characterised by scattered <i>E.tereticornis</i> , and <i>E.crebra</i> trees the occasional <i>Melaleuca decora</i> and <i>Acacia parramattensis</i> . The community is not characterised by a native shrub layer and the groundcover is dominated by exotic species



Determination Criteria	Presence	Justification
stands of the community may have a woodland or forest structure. Small trees or saplings may dominate the community in relatively high densities after partial or total clearing, and the groundcover may be relatively sparse, especially where densities of trees or shrubs are high. The community also includes 'derived' native grasslands which result from removal of the woody strata from the woodlands and forests.		including <i>Cenchrus clandestinus</i> (Kikuyu Grass), <i>Setaria parviflora</i> (Pigeon Grass), <i>Lolium rigidum</i> (Wimmera Ryegrass), and <i>Sporobolus africanus</i> (Parramatta Grass). Due to the dominance of exotic groundcover species (>80% cover, see Appendix B) and its condition as highly managed exotic grassland, the vegetation zone does not constitute a derived grassland form of the TEC.
Determination	The vegetation within Vegetation Zone 2 <u>does not meet</u> the definition of the Critically Endangered Ecological Community <i>Cumberland Plain Woodland in the Sydney Bioregion</i> as listed under the New South Wales Biodiversity Conservation Act 2016.	



APPENDIX E – PLANTED NATIVE VEGETATION DETERMINATION



Appendix E-1: Planted Native Vegetation Determination

The decision key below details the assessment of Planted Native Vegetation in accordance with Appendix D of the BAM (DPIE 2020a).

Vegetation Zone 3 – Planted Native/Exotic Vegetation.



Table E-1-1: Planted Native Vegetation Determination – In accordance with Planted Native Vegetation decision-making key in Appendix D of the BAM (DPIE 2020a). – Vegetation Zone 2 – Planted Native/Exotic Vegetation

Decision Key Criteria	Answer	Justification
1. Does the planted native vegetation occur within an area that contains a mosaic of planted and remnant native vegetation and which can be reasonably assigned to a PCT known to occur in the same IBRA subregion as the proposal? (i). Yes - The planted native vegetation must be allocated to the best-fit PCT and the BAM must be applied. (ii). No - Go to 2.	No	The vegetation within this zone is characterised by a mix of planted native and exotic species. A PCT could not be allocated to the vegetation onsite with the assemblage of species present within the development footprint.
2. Is the planted native vegetation: a. planted for the purpose of environmental rehabilitation or restoration under an existing conservation obligation listed in BAM Section 11.9(2.), and b. the primary objective was to replace or regenerate a plant community type or a threatened plant species population or its habitat?	No	The planted vegetation present onsite does not constitute rehabilitation or regeneration of a plant community type. The existing floristics within this vegetation zone is dominated by non-indigenous native species planted as for aesthetic purposes.



Decision Key Criteria	Answer	Justification
(i). Yes - <i>The planted native vegetation must be assessed in accordance with Chapters 4 and 5 of the BAM.</i> (ii) No - Go to 3.		
3. Is the planted/translocated native vegetation individuals of a threatened species or other native species planted/translocated for the purpose of providing threatened species habitat under one of the following: a. <i>a species recovery project</i> b. <i>Saving our Species project</i> c. <i>other types of government funded restoration project</i> d. condition of consent for a development approval that required those species to be planted or translocated for the purpose of providing threatened species habitat e. legal obligation as part of a condition or ruling of court. This includes regulatory directed or ordered remedial plantings (e.g. Remediation Order for clearing without consent issued under the BC Act or the Native Vegetation Act) f. ecological rehabilitation to re-establish a PCT or TEC that was, or is carried out under a mine operations plan, or g. approved vegetation management plan (e.g. as required as part of a Controlled Activity Approval for works on waterfront land under the NSW Water Management Act 2000)? (i). Yes - <i>The planted native vegetation must be assessed in accordance with Chapters 4 and 5 of the BAM.</i> (ii) No - Go to 4.	No	The native vegetation within the Subject Site was not planted/translocated for the purposes listed in Decision Criteria 3.
4. Was the planted native vegetation (including individuals of a threatened flora species) undertaken voluntarily for revegetation, environmental rehabilitation or restoration without a legal obligation to secure or provide for management of the native vegetation? (i). Yes - <i>Go to D.2 Assessment of planted native vegetation for threatened species habitat (the use of Chapters 4 and 5 of the BAM are not required to be applied).</i> (ii) No - Go to 5.	No	The native vegetation within the Subject Site was not planted for the purposes of revegetation, environmental rehabilitation or restoration.
5. <i>Is the native vegetation (including individuals of a threatened flora species) planted for functional, aesthetic, horticultural or plantation forestry purposes? This includes examples such as: windbreaks in agricultural landscapes, roadside plantings (including street trees, median strips, roadside batters), landscaping in parks, gardens and sport fields/complexes, macadamia plantations or teatree farms?</i> (i). Yes - <i>Go to D.2 Assessment of planted native vegetation for threatened species habitat (the use of Chapters 4 and 5 of the BAM are not required to be applied).</i> (ii) No - Go to 6.	Yes	The native vegetation present onsite has been planted for aesthetic purposes (i.e. landscaping).



Decision Key Criteria	Answer	Justification
6. Is the planted native vegetation a species listed as a widely cultivated native species on a list approved by the Secretary of the Department (or an officer authorised by the Secretary)? (i). Yes - Go to D.2 Assessment of planted native vegetation for threatened species habitat (the use of Chapters 4 and 5 of the BAM are not required to be applied). (ii) No - There may be other types of occurrences of planted native vegetation that do not easily fit into the decision-making key above. Assessors should contact the BAM Support mailbox at bam.support@environment.nsw.gov.au for further advice on using the BAM to assess other types of occurrences of planted native vegetation.	N/A	N/A



APPENDIX F – PREDICTED AND CANDIDATE SPECIES REPORT



BAM Predicted Species Report

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00025880/BAAS21021/21/00025881	Glenwood High School	24/11/2021
Assessor Name	Report Created	BAM Data version *
Gilbert Whyte	09/02/2022	50
Assessor Number	Assessment Type	BAM Case Status
BAAS18041	Part 4 Developments (Small Area)	Finalised
Assessment Revision	BOS entry trigger	Date Finalised
1	Test of significance	09/02/2022

* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.

Threatened species reliably predicted to utilise the site. No surveys are required for these species. Ecosystem credits apply to these species.

Common Name	Scientific Name	Vegetation Types(s)
Brown Treecreeper (eastern subspecies)	Climacteris picumnus victoriae	849-Cumberland shale plains woodland
Diamond Firetail	Stagonopleura guttata	849-Cumberland shale plains woodland
Dusky Woodswallow	Artamus cyanopterus cyanopterus	849-Cumberland shale plains woodland
Eastern Coastal Free-tailed Bat	Micronomus norfolkensis	849-Cumberland shale plains woodland
Flame Robin	Petroica phoenicea	849-Cumberland shale plains woodland
Grey-headed Flying-fox	Pteropus poliocephalus	849-Cumberland shale plains woodland
Hooded Robin (south-eastern form)	Melanodryas cucullata cucullata	849-Cumberland shale plains woodland
Koala	Phascolarctos cinereus	849-Cumberland shale plains woodland
Large Bent-winged Bat	Miniopterus orianae oceanensis	849-Cumberland shale plains woodland
Little Bent-winged Bat	Miniopterus australis	849-Cumberland shale plains woodland

BAM Predicted Species Report

Little Lorikeet	Glossopsitta pusilla	849-Cumberland shale plains woodland
Regent Honeyeater	Anthochaera phrygia	849-Cumberland shale plains woodland
Scarlet Robin	Petroica boodang	849-Cumberland shale plains woodland
Speckled Warbler	Chthonicola sagittata	849-Cumberland shale plains woodland
Spotted-tailed Quoll	Dasyurus maculatus	849-Cumberland shale plains woodland
Swift Parrot	Lathamus discolor	849-Cumberland shale plains woodland
White-bellied Sea-Eagle	Haliaeetus leucogaster	849-Cumberland shale plains woodland
White-throated Needletail	Hirundapus caudacutus	849-Cumberland shale plains woodland

Threatened species Manually Added

None added

Threatened species assessed as not within the vegetation zone(s) for the PCT(s)

Refer to BAR for detailed justification

Common Name	Scientific Name	Justification in the BAM-C
-------------	-----------------	----------------------------

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00025880/BAAS21021/21/00025881	Glenwood High School	24/11/2021
Assessor Name	Report Created	BAM Data version *
Gilbert Whyte	09/02/2022	50
Assessor Number	Assessment Type	BAM Case Status
BAAS18041	Part 4 Developments (Small Area)	Finalised
Assessment Revision	Date Finalised	BOS entry trigger
1	09/02/2022	Test of significance

* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.

List of Species Requiring Survey

Name	Presence	Survey Months
------	----------	---------------

Threatened species Manually Added

None added

Threatened species assessed as not on site

Refer to BAR for detailed justification

Common name	Scientific name	Justification in the BAM-C
Large Bent-winged Bat	Miniopterus orianae oceanensis	Habitat constraints
Little Bent-winged Bat	Miniopterus australis	Habitat constraints
Regent Honeyeater	Anthochaera phrygia	Habitat constraints
Swift Parrot	Lathamus discolor	Habitat constraints
Thick Lip Spider Orchid	Caladenia tessellata	Species is vagrant



APPENDIX G – BIODIVERSITY CREDIT REPORTS





BAM Biodiversity Credit Report (Like for like)

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00025880/BAAS21021/21/00025881	Glenwood High School	24/11/2021
Assessor Name	Assessor Number	BAM Data version *
Gilbert Whyte	BAAS18041	50
Proponent Names	Report Created	BAM Case Status
Marcus Kraefft	09/02/2022	Finalised
Assessment Revision	Assessment Type	Date Finalised
1	Part 4 Developments (Small Area)	09/02/2022
BOS entry trigger	* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.	
Test of significance		

Potential Serious and Irreversible Impacts

Name of threatened ecological community	Listing status	Name of Plant Community Type/ID
Nil		
Species		
Nil		

Additional Information for Approval

Assessment Id	Proposal Name
00025880/BAAS21021/21/00025881	Glenwood High School



BAM Biodiversity Credit Report (Like for like)

PCT Outside Ibra Added

None added

PCTs With Customized Benchmarks

PCT

No Changes

Predicted Threatened Species Not On Site

Name

No Changes

Ecosystem Credit Summary (Number and class of biodiversity credits to be retired)

Name of Plant Community Type/ID	Name of threatened ecological community	Area of impact	HBT Cr	No HBT Cr	Total credits to be retired
849-Cumberland shale plains woodland	Not a TEC	0.0	0	0	0



BAM Biodiversity Credit Report (Like for like)

849-Cumberland shale plains woodland

Like-for-like credit retirement options

Class	Trading group	Zone	HBT	Credits	IBRA region
Coastal Valley Grassy Woodlands This includes PCT's: 116, 834, 849, 1326	Coastal Valley Grassy Woodlands >=90%	849_Classname 101	No	0	Cumberland, Burragorang, Pittwater, Sydney Cataract, Wollemi and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Species Credit Summary

No Species Credit Data

Credit Retirement Options

Like-for-like credit retirement options



BAM Biodiversity Credit Report (Like for like)

BAM Biodiversity Credit Report (Variations)

Proposal Details

Assessment Id

00025880/BAAS21021/21/00025881

Assessor Name

Gilbert Whyte

Proponent Name(s)

Marcus Kraefft

Assessment Revision

1

BOS entry trigger

Test of significance

Proposal Name

Glenwood High School

Assessor Number

BAAS18041

Report Created

09/02/2022

Assessment Type

Part 4 Developments (Small Area)

BAM data last updated *

24/11/2021

BAM Data version *

50

BAM Case Status

Finalised

Date Finalised

09/02/2022

* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.

Potential Serious and Irreversible Impacts

Name of threatened ecological community	Listing status	Name of Plant Community Type/ID
Nil		
Species		
Nil		

Additional Information for Approval

PCT Outside Ibra Added

None added

PCTs With Customized Benchmarks

BAM Biodiversity Credit Report (Variations)

PCT
No Changes

Predicted Threatened Species Not On Site

Name
No Changes

Ecosystem Credit Summary (Number and class of biodiversity credits to be retired)

Name of Plant Community Type/ID	Name of threatened ecological community	Area of impact	HBT Cr	No HBT Cr	Total credits to be retired
849-Cumberland shale plains woodland	Not a TEC	0.0	0	0	0.00

849-Cumberland shale plains woodland	Like-for-like credit retirement options					
	Class	Trading group	Zone	HBT	Credits	IBRA region
	Coastal Valley Grassy Woodlands This includes PCT's: 116, 834, 849, 1326	Coastal Valley Grassy Woodlands > =90%	849_Classname101	No	0	Cumberland,Burraborang, Pittwater, Sydney Cataract, Wollemi and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	Variation options					
	Formation	Trading group	Zone	HBT	Credits	IBRA region
	Grassy Woodlands	Tier 1	849_Classname101	No	0	IBRA Region: Sydney Basin, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Species Credit Summary



BAM Biodiversity Credit Report (Variations)

No Species Credit Data

Credit Retirement Options Like-for-like options



APPENDIX H – BAM PLOT DATASHEETS



BAM Site – Field Survey Form Site Sheet no: 1 of 1

Date		Survey Name		Zone ID		Recorders	
6/17/21		Glenwood H.S		1		David Martin	
Zone	Datum	Plot ID		Plot dimensions	Photo #		
S6	GDA2020	Q02		20 x 20 20 x 50	✓		
Easting	Northing	IBRA region		Midline bearing from 0 m	Magnetic °		
208663	6265750	Sydney Cumberland		27°			
Vegetation Class		Coastal Valley Grassy Woodland					Confidence: H M L
Plant Community Type		PCT 849: Grey Box - Forest Reg. Cum grassy woodland on flats of the Cumberland plain, Sydney					Confidence: H M L

Record easting and northing at 0 m on midline. Dimensions (Shape) of 0.04 ha base plot.

Bioregion (MOO - CEEC)

BAM Attribute (400 m ² plot)		Sum values
Count of Native Richness	Trees	2
	Shrubs	2
	Grasses etc.	1
	Forbs	4
	Ferns	0
	Other	2
Sum of Cover of native vascular plants by growth form group	Trees	41
	Shrubs	15
	Grasses etc.	10
	Forbs	0.5
	Ferns	0
	Other	0.2
High Threat Weed cover		87.6

BAM Attribute (1000 m ² plot)		
DBH	# Tree Stems Count	# Stems with Hollows
80 + cm	✓	✓
50 – 79 cm	111	✓
30 – 49 cm	1111	✓
20 – 29 cm	1	✓
10 – 19 cm	1111	✓
5 – 9 cm	1	✓
< 5 cm	1	n/a
Length of logs (m) (≥10 cm diameter, >50 cm in length)		111 1111 Tally space 11m

Counts apply when the number of tree stems within a size class is ≤ 10. Estimates can be used when > 10 (eg. 10, 20, 30..., 100, 200, 300...). For a multi-stemmed tree, only the largest living stem is included in the count/estimate. Tree stems must be living.

For hollows, count only the presence of a stem containing hollows. For a multi-stemmed tree, only the largest stem is included in the count/estimate. Stems may be dead and may be shrubs.

BAM Attribute (1 x 1 m plots)	Litter cover (%)	Bare ground cover (%)	Cryptogam cover (%)	Rock cover (%)
Subplot score (% in each)	25 10 16 20 12	a b c d e	a b c d e	a b c d e
Average of the 5 subplots	15%			

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots centred at 5, 15, 25, 35, 45 m along the plot midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter). Assessors may also record the cover of rock, bare ground and cryptogams.

- Physiography + site features that may help in determining PCT and Management Zone (optional)

Morphological Type	Landform Element	Landform Pattern	Microrelief
Lithology	Soil Surface Texture	Soil Colour	Soil Depth
Slope	Aspect	Site Drainage	Distance to nearest water and type

Plot Disturbance	Severity code	Age code	Observational evidence:
Clearing (inc. logging)			
Cultivation (inc. pasture)			
Soil erosion			
Firewood / CWD removal			
Grazing (identify native/stock)			
Fire damage			
Storm damage			
Weediness			
Other			

Severity: 0=no evidence, 1=light, 2=moderate, 3=severe

Age: R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

400 m ² plot: Sheet _ of _	Survey Name	Plot Identifier	Recorders
Date <u>6/7/21</u>	<u>Glenwood H.s</u>	<u>Q02</u>	<u>David Martin</u>

GF Code	Top 3 native species in each growth form group: Full species name mandatory All other native and exotic species: Full species name where practicable	N, E or HTE	Cover	Abund	stratum	voucher
1	<i>Eucalyptus tereticornis</i>		40	6		
2	<i>Melaleuca decora</i>		5	2		
3	<i>Bursaria spinosa</i>		10	30		
4	<i>Sida rhombifolia</i>		5	50		
5	<i>Acacia parramattensis</i>		1	1		
6	<i>Paspalum dilatatum</i>		55	1000		
7	<i>Bidens pillosa</i>		2	20		
8	<i>Solanum nigrum</i>		0.1	10		
9	<i>Microlaena stipoides</i>		10	500		
10	<i>Ehrharta erecta</i>		20	500		
11	<i>Stellaria media</i>		0.1	30		
12	<i>Chloris gayana</i>		2	30		
13	<i>Eragrostis curvula</i>		10	40		
14	<i>Brassica fruticulosa</i>		0.2	15		
15	<i>Commelina cyanea</i>		0.1	20		
16	<i>Eustrephus latifolius</i>		0.1	10		
17	<i>Aravja sericifera</i>		0.5	5		
18	<i>Einadia trigonos</i>		0.1	20		
19	<i>Setaria parviflora</i>		1	40		
20	<i>Glycine tabacina</i>		0.1	20		
21	<i>Dichondra repens</i>		0.2	50		
22	<i>Solanum pseudocapsicum</i>		0.1	3		
23	<i>Cayratia clematidea</i>		0.1	10		
24	<i>Einadia hastata</i>		0.1	10		
25	<i>Plantago lanceolata</i>		0.1	10		
26						
27						
28						
29						
30						
31						
32						
33						
34						
35						
36						
37						
38						
39						
40						

GF Code: see Growth Form definitions in Appendix 1

N: native, E: exotic, HTE: high threat exotic

GF – circle code if 'top 3'.

Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ...100% (foliage cover); Note: 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m

Abundance: 1, 2, 3, ..., 10, 20, 30, ... 100, 200, ..., 1000, ...

BAM Site – Field Survey Form	Site Sheet no: 1 of _____
-------------------------------------	---------------------------

		Survey Name	Zone ID	Recorders		
Date	6/07/21	Glenwood H.S.	2	David Martin		
Zone	56	Datum	GDA2020	Plot ID	Q01	Plot dimensions
						20x20 20x50
Easting	308943	Northing	6265662	IBRA region	Sydney 7 Cumberland.	Midline bearing from 0 m
						352°
Vegetation Class		Coastal Valley Grassy Woodland				Confidence:
Plant Community Type		PCT 849: Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain - Sydney Bioregion (Low condition)				EEC: X
						Confidence:
						H M L

Record easting and northing at 0 m on midline. Dimensions (Shape) of 0.04 ha base plot. *Cumberland Plain - Sydney Bioregion (Low condition)*

BAM Attribute (400 m ² plot)		Sum values
Count of Native Richness	Trees	1
	Shrubs	0
	Grasses etc.	2
	Forbs	3
	Ferns	0
	Other	0
Sum of Cover of native vascular plants by growth form group	Trees	15
	Shrubs	0
	Grasses etc.	15
	Forbs	0.7
	Ferns	0
	Other	0
High Threat Weed cover		3

BAM Attribute (1000 m ² plot)		
DBH	# Tree Stems Count	# Stems with Hollows
80 + cm	✓	✓
50 – 79 cm	1	✓
30 – 49 cm	✓	✓
20 – 29 cm	✓	✓
10 – 19 cm	✓	✓
5 – 9 cm	✓	✓
< 5 cm	✓	n/a
Length of logs (m) (≥10 cm diameter, >50 cm in length)		0m Tally space

Counts apply when the number of tree stems within a size class is ≤ 10. Estimates can be used when > 10 (eg. 10, 20, 30..., 100, 200, 300...). For a multi-stemmed tree, only the largest living stem is included in the count/estimate. Tree stems must be living.

For hollows, count only the presence of a stem containing hollows. For a multi-stemmed tree, only the largest stem is included in the count/estimate. Stems may be dead and may be shrubs.

BAM Attribute (1 x 1 m plots)	Litter cover (%)					Bare ground cover (%)					Cryptogam cover (%)					Rock cover (%)				
Subplot score (% in each)	5	10	5	1	1	a	b	c	d	e	a	b	c	d	e	a	b	c	d	e
Average of the 5 subplots	2.6%																			

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots centred at 5, 15, 25, 35, 45 m along the plot midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter). Assessors may also record the cover of rock, bare ground and cryptogams.

Physiography + site features that may help in determining PCT and Management Zone (optional)

Morphological Type	Landform Element	Landform Pattern	Microrelief
Lithology	Soil Surface Texture	Soil Colour	Soil Depth
Slope	Aspect	Site Drainage	Distance to nearest water and type

Plot Disturbance	Severity code	Age code	Observational evidence:
Clearing (inc. logging)			
Cultivation (inc. pasture)			
Soil erosion			
Firewood / CWD removal			
Grazing (identify native/stock)			
Fire damage			
Storm damage			
Weediness			
Other			

Severity: 0=no evidence, 1=light, 2=moderate, 3=severe

Age: R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

400 m ² plot: Sheet 2 of 2	Survey Name	Plot Identifier	Recorders
Date 6/7/21	Glenwood H.S	QC1	David Martin

GF Code	Top 3 native species in each growth form group: Full species name mandatory All other native and exotic species: Full species name where practicable	N, E or HTE	Cover	Abund	stratum	voucher
1	<i>Euralyptus tereticornis</i>		15	1		
2	<i>Senecio madagascariensis</i>		0.1	5		
3	<i>Plantago lanceolata</i>		0.5	50		
4	<i>Stellaria media</i>		0.1	30		
5	<i>Oxalis perrenans</i>		0.1	50		
6	<i>Daucus glachidiatus</i>		0.5	100		
7	<i>Trifolium repens</i>		0.1	40		
8	<i>Medicago polymorpha</i>		0.2	50		
9	<i>Cynodon dactylon</i>		5	40		
10	<i>Lolium rigidum</i>		5	50		
11	<i>Sporobolus africanus</i>		10	100		
12	<i>Modiola caroliniana</i>		0.1	20		
13	<i>Sida rhombifolia</i>		0.2	5		
14	<i>Poa annua</i>		1	50		
15	<i>Microlaena stipoides</i>		10	200		
16	<i>Eragrostis curvula</i>		1	20		
17	<i>Galium murale</i>		0.1	10		
18	<i>Paspalum dilatatum</i>		2	100		
19	<i>Taraxacum officinale</i>		0.1	20		
20	<i>Vulpia bromoides</i>		3	100		
21	<i>Dichondra repens</i>		0.1	40		
22	<i>Cenchrus clandestinus</i>		25	1000		
23	<i>Brassica fruticulosa</i>		0.1	3		
24	<i>Bidens pillosa</i>		0.1	4		
25	<i>Setaria parviflora</i>		40	1000		
26						
27						
28						
29						
30						
31						
32						
33						
34						
35						
36						
37						
38						
39						
40						

GF Code: see Growth Form definitions in Appendix 1

N: native, E: exotic, HTE: high threat exotic

GF – circle code if 'top 3'.

Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ...100% (foliage cover); Note: 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m

Abundance: 1, 2, 3, ..., 10, 20, 30, ... 100, 200, ..., 1000, ...

400 m ² plot: Sheet _ of _	Survey Name	Plot Identifier	Recorders
Date 06/07/21	Glenwood H.S	Walkover	David Martin

GF Code	Top 3 native species in each growth form group: Full species name mandatory All other native and exotic species: Full species name where practicable	N, E or HTE	Cover	Abund	stratum	voucher
1	<i>Eucalyptus tereticornis</i>					
2	<i>Sida rhombifolia</i>					
3	<i>Melaleuca decora</i>					
4	<i>Sonchus asper</i>					
5	<i>Solanum nigrum</i>					
6	<i>Plantago lanceolata</i>					
7	<i>Bidens pillosa</i>					
8	<i>Glycine tabacina</i>					
9	<i>Bursaria spinosa</i>					
10	<i>Rubus fruticosus</i>					
11	<i>Dichondra repens</i>					
12	<i>Solvia sessilis</i>					
13	<i>Pratia purpurescens</i>					
14	<i>Solanum pseudocapsicum</i>					
15	<i>Acacia parramattensis</i>					
16	<i>Cenchrus clandestinus</i>					
17	<i>Eragrostis curvula</i>					
18	<i>Cynodon dactylon</i>					
19	<i>Sporobolus africanus</i>					
20	<i>Senecio madagascariensis</i>					
21	<i>Microlaena stipoides</i>					
22	<i>Oxalis perennans</i>					
23	<i>Tritolium repens</i>					
24	<i>Brassica fruticulosa</i>					
25	<i>Eucalyptus moluccana</i>					
26	<i>Paspalum dilatatum</i>					
27	<i>Stellaria media</i>					
28	<i>Galium aparine</i>					
29	<i>Lysimachia arvensis</i>					
30	<i>Acer negundo</i>					
31	<i>Araujia sericifera</i>					
32	<i>Clea europaea</i>					
33	<i>Lomandra longifolia</i>					
34	<i>Eucalyptus crebra</i>					
35	<i>Plymeria rubra</i>					
36	<i>Plantago major</i>					
37	<i>Westringia fruticosa</i>					
38	<i>Callistemon citrinus</i>					
39	<i>Creillea cultivar A</i>					
40	<i>Creillea cultivar B</i>					

GF Code: see Growth Form definitions in Appendix 1

N: native, E: exotic, HTE: high threat exotic

GF – circle code if 'top 3'.

Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ..., 100% (foliage cover); Note: 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m

Abundance: 1, 2, 3, ..., 10, 20, 30, ..., 100, 200, ..., 1000, ...



APPENDIX I – STAFF CONTRIBUTIONS

The following staff were involved in the compilation of this report.

Table H1 Staff Contributions

Name	Qualification	Title/Experience	Contribution
David Martin	MSc	Ecologist (Botanist)	Report Author, BAM Calculations, Flora and Fauna surveys, Vegetation Mapping and PCT Allocation, BAM plot data.
Mark Dean	BEnvSc&Mgnt	Ecologist	Reporting
Gayle Joyce	BSc (Forestry) (Hons)	GIS Specialist	GIS and figure preparation
Dr. Gilbert Whyte	BSc (Hons), PhD Accredited BAM Assessor	Senior Ecologist	Report Review and BAM Accredited Assessor
Dr Daniel O'Brien	BEnvSc&Mgt (Hons), PhD	Senior Ecologist	Report Review



APPENDIX J – LICENSING

Kleinfelder employees involved in the current study are licensed or approved under the *Biodiversity Conservation Act 2016* (License Number: SL100730, Expiry: 31 March 2022) and the *Animal Research Act 1985* to harm/trap/release protected native fauna and to pick for identification purposes native flora and to undertake fauna surveys.

