total earth care

Stage 2 Redevelopment of Nepean Hospital

Biodiversity Development Assessment Report

April 2022

Quality Control

Quality Control	© Total Earth Care Pty Ltd 2020	
Prepared by:	K Raines, W. Thurston	
Approved by:	W. Thurston	
Prepared for:	CBRE, on behalf of Heath Infrastructure NSW	
TEC Job No.	J9507	
Revision/Version No.	Date of revision	Summary
REV 1 DRAFT	27/09/2021	Draft for client review
REV 2 DRAFT	18/10/2021	Updated with CBRE comments
Final	11/11/2021	Finalised in BAM Calculator
Final v1	14/04/2022	Finalised with Department of Planning and Environment amendments

Conflict of Interest

To the best of my knowledge and belief, I, William Thurston, have no past, present or future relationship to stakeholders or decision-makers connected to this project that might be regarded as an actual, perceived or potential conflict of interest with my professional responsibilities and duties as a consultant.

Certification

This Biodiversity Development Assessment Report (BDAR) has been prepared to address requirements of the NSW *Biodiversity Conservation Act 2016, Biodiversity Conservation Regulation 2017*, the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (as covered by the bi-lateral agreement. This BDAR meets the minimum requirements of assessment and reporting under the Biodiversity Assessment Method (BAM). To the best of my knowledge, it presents true and relevant facts without omission, and draws conclusions from logical and reasonable interpretation of the facts.

This BDAR has been certified on 11/11/2021.

William Thurston

Accredited BAM Assessor (Accreditation BAAS18019)

Bachelor Biological Sciences (Ecology)

Divisional Head, Total Earth Care.

Table of Contents

Tables

Figures

Acronyms and glossary

Term	Definition
Assessment area	Includes the subject land and the area of land within the 1500 m buffer zone surrounding the subject land.
BAM	Biodiversity Assessment Method
BAM-C	Biodiversity Assessment Method Calculator
BC Act	NSW *Biodiversity Conservation Act 2016*
Biosecurity Act	*Biosecurity Act 2015*
BOS	Biodiversity Offsets Scheme
CEEC	Critically Endangered Ecological Community
Construction footprint	The extent of all areas involving clearing and direct impacts relating to construction works and any temporary/ancillary construction facilities and infrastructure. For this proposal, the subject land is the same area as the construction footprint.
DPIE	NSW Department of Planning, Industry and Environment
EEC	Endangered Ecological Community
EP& A Act	*Environmental Planning and Assessment Act 1979*
EPBC Act	Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*
FM Act	*Fisheries Management Act 1994*
GIS	Geographic Information Systems
HI	Health Infrastructure NSW
IBRA	Interim Biogeographic Regionalisation for Australia
KTP	Key Threatening Processes
LGA	Local Government Area
MNES	Matters of National Environmental Significance
Operational footprint	The extent of the final development operational area of the development. For this proposal, the subject land is the same area as the operation footprint.
Vegetation patch	A patch is an area of native vegetation that occurs on the subject land and includes native vegetation that has a gap of less than 100m from the next area of native vegetation (or ≤ 30m for non-woody ecosystems). A patch may extend onto adjoining land.
PCT	Plant Community Type
SAII	Serious and Irreversible Impacts
SEARs	Secretary's Environmental Assessment Requirements
SSD	State Significant Development
SEPP SRD	*State Environmental Planning Policy (State and Regional Development) 2011*
Stage 1	Stage 1 Redevelopment of Nepean Hospital. This former stage of the project is currently in the construction phase.
Stage 2	Stage 2 Redevelopment of Nepean Hospital
Subject land	Land subject to a development, activity, clearing.
SYB08	Cumberland IBRA subregion
TBDC	Threatened Biodiversity Data Collection
TEC	Threatened Ecological Community

Term	Definition
TAM	Total Asset Management
Vagrant	Species with occasional records of species in NSW that are outside their normal distribution or habitat, including escaped animals and planted specimens.
Vegetation Zones	An area of native vegetation on the subject land that is the same Plant Community Type (PCT) and has a similar broad condition state.
Widely cultivated native species	A variety of a native species developed in cultivation, usually for the purposes of agriculture, forestry or horticulture, and which, when reproduced retains its distinguishing features, and any native species listed on the high threat weeds list published in the BAM-C.
WoNS	Weeds of National Significance
WSUD	Water Sensitive Urban Design

EXECUTIVE SUMMARY

Proposal summary

Health Infrastructure NSW (HI) is the applicant for the proposed Stage 2 Redevelopment of Nepean Hospital in Penrith Local Government Area (LGA).

The proposal is State Significant Development (SSD) for the purposes of the *Environmental Planning and Assessment Act 1979* (EP&A Act) and clause 14(a) of Schedule 1 of the *State Environmental Planning Policy (State and Regional Development) 2011* (SEPP SRD) as it involves development for the purposes of a hospital with a capital investment value in excess of $30 million.

The Stage 2 Redevelopment seeks to deliver significantly enhanced acute services, as well as a new campus main entry and drop-off area. It complements the recent Stage 1 Redevelopment (SSD 8766) approved in February 2019 and due for completion by early 2022.

The proposed Stage 2 Tower will be located west of, and connected to, the Stage 1 Tower. Portions of the North Block (north section) will be demolished with the remaining sections of the North Block (to the south of the Stage 2 Tower) to remain operational.

Departments to be provided in the Stage 2 Tower include:

- Front of House, including retail
- Education and Training Centre
- Transit Lounge
- Medical Imaging
- Interventional Radiology
- Intensive Care Unit and Close Observation Unit
- In-Centre Dialysis and Renal Inpatient Unit
- Paediatric In-patient Unit
- Plant areas
- Clinical Support areas
- Kitchen.

The Stage 2 Redevelopment project scope includes:

- The Stage 2 Tower, being predominantly a 7-storey building, with roof plant
- Demolition of parts of the existing North Block and other satellite buildings directly within the Stage 2 Tower footprint (excluding other buildings already approved under the Stage 1 SSD consent)
- Demolition of the Total Asset Management (TAM) facility
- Reconfiguration of the loading dock area and back of house functions
- Landscaping and other associated at-grade works within the Stage 2 Tower's immediate vicinity
- Barber Avenue upgrade and access road to the Stage 2 Tower's forecourt, porte-cochère, and front of house area.

The Stage 2 Redevelopment's Secretary's Environmental Assessment Requirements (SEARs) was issued by the Department of Planning, Industry and Environment on 22 April 2021.

In preparing this report, the following SEARs General Requirements, Key Issues, and Agency's Advice letters have been addressed. Table E-1 sets out the reference or location of these matters within this report.

Table E-1. Relevant SEARs

General Requirement or Key Issue or Agency Advice	Reference / Location within this report
Provide a Biodiversity Development Assessment Report (BDAR), that assesses the biodiversity impacts of the proposed development in accordance with the requirements of the *Biodiversity Conservation Act 2016*, *Biodiversity Conservation Regulation 2017* and Biodiversity Assessment Method, except where a BDAR waiver has been issued in relation to the development or the development is located on biodiversity certified land.	This report comprises the BDAR. The BDAR has been prepared in accordance with the relevant legislation and guidelines (refer to Section 1.8).

General Requirement or Key Issue or Agency Advice	Reference / Location within this report
• Where a BDAR is not required, because a BDAR waiver has been issued, in relation to the development, provide: - a copy of the BDAR waiver and demonstrate that the proposed development is consistent with that covered in BDAR waiver. - an assessment of flora and fauna impacts where significant vegetation or flora and fauna values would be affected by the proposed development.	

Landscape context and features

The subject land comprises about 2.6 ha within the Nepean Hospital campus boundary. It comprises the construction and operational footprints of the proposal. The subject land and surrounding area are highly developed urban areas with little remaining vegetation or habitat connectivity. The closet waterway is Werrington Creek (a first order stream) about 1km from the subject land.

The vegetation within the subject land is highly modified and generally comprises planted native and exotic species interspersed with few remnant native trees. The remnant trees are consistent with the Critically Endangered Ecological Community (CEEC) 'Cumberland Plain Woodland' (Plant Community Type (PCT) 849), as listed under the NSW *Biodiversity Conservation Act 2016* (BC Act), albeit in poor condition.

The subject land provides suitable habitat for some common bird and mammal species, yet little habitat for threatened fauna species. However, the availability of foraging resources provides opportunistic habitat for some threatened species as part of their broader range (i.e. Little Lorikeet, Grey-headed Flying-fox, Swift Parrot). Due to the highly modified landscape and soil profile, no suitable habitat is present for threatened flora. No threatened species were recorded in the subject land during the BDAR field surveys, or have been recorded in previous studies (Abel Ecology 2018, DPIE 2021a).

Biodiversity impacts

The proposal would require the permanent removal of the following vegetation:

- 589 m^2 (0.059 ha) of PCT 849 (Cumberland Plain Woodland CEEC)
- 1175 m^2 (0.112 ha) of planted native vegetation
- 671 m^2 (0.067 ha) of non-native vegetation.

The proposal would also result in modification and indirect impacts of a further 374 m^2 (0.037 ha) of PCT 849 (Cumberland Plain Woodland CEEC) in adjacent areas. No key habitat features (i.e. hollow bearing trees, bush rock) would be impacted.

The removal of vegetation would result in the direct loss of foraging habitat for local fauna and increase localised fragmentation within the subject land. Due to the small amount of vegetation removal and the highly modified landscape, the greater impacts to fragmentation on a landscape scale is negligible. Additional indirect impacts include increased noise, vibration, light spill and the spread of weeds and pathogens.

Avoid, minimise and offset

The location of the proposal, particularly the Stage 2 Tower, has been chosen to minimise impacts on native vegetation. The northern extent of the Stage 2 Tower has attempted to retain several remnant trees in PCT 849 (Cumberland Plain Woodland CEEC). Revegetation and landscaping works would be planned to increase the extent of PCT 849 (Cumberland Plain Woodland CEEC) by utilising relevant species and creating structural vegetation layers. Nevertheless, unavoidable impacts (vegetation removal) to PCT 849 (Cumberland Plain Woodland CEEC) would require offsetting.

1 INTRODUCTION

1.1 Background

Total Earth Care has been commissioned by Health Infrastructure NSW (HI), on behalf of CBRE, to prepare this Biodiversity Development Assessment Report (BDAR) for the proposed Stage 2 Redevelopment of Nepean Hospital.

The proposal is State Significant Development (SSD) for the purposes of the *Environmental Planning and Assessment Act 1979* (EP&A Act) and clause 14(a) of Schedule 1 of the *State Environmental Planning Policy (State and Regional Development) 2011* (SEPP SRD) as it involves development for the purposes of a hospital with a capital investment value in excess of $30 million.

The Stage 2 Redevelopment seeks to deliver significantly enhanced acute services, as well as a new campus main entry and drop-off area. It complements the recent Stage 1 Redevelopment (SSD 8766) approved in February 2019 and due for completion by early 2022.

1.2 Proposed development

The proposal generally involves the demolition of existing buildings for the construction of new hospital infrastructure namely the proposed Stage 2 Tower. The Stage 2 Tower would be located west of the Stage 1 Tower. Portions of the existing North Block (north section) will be demolished with the remaining sections of the existing North Block (to the south of the Stage 2 Tower) to remain operational.

The Stage 2 Redevelopment project scope includes:

- The Stage 2 Tower, being predominantly a 7-storey building, with roof plant
- Demolition of parts of the existing North Block and other satellite buildings directly within the Stage 2 Tower footprint (excluding other buildings already approved under the Stage 1 SSD consent)
- Demolition of the Total Asset Management (TAM) facility
- Reconfiguration of the loading dock area and back of house functions
- Landscaping and other associated at-grade works within the Stage 2 Tower's immediate vicinity
- Barber Avenue upgrade and access road to the Stage 2 Tower's forecourt, port cochere, and front of house area.

Key features of the proposal are shown in Figure 1-2.

1.2.1 Construction staging

A conceptual construction methodology has been developed based on the current proposal design (BVN 2021). Detailed construction planning, including programming, work methodologies, staging and work sequencing would be undertaken during detailed design.

Construction is expected to be undertaken between December 2022 and May 2025. This would be undertaken in five main stages, as follows:

- **Phase 1:** Demolition of satellite buildings, pathology building and portion of North Block
- **Phases 2a & b:** Construction of loading dock including new truck bays, waste area and associate rooms and hard stand areas, bulk storage and commissioning
- **Phase 3**: Establishment of Stage 2 Tower site and compound, installation of retention wall system, bulk excavation works, sub-structure piling
- **Phase 4:** Construction of Stage 2 Tower, commencement of progressive commissioning
- **Phase 5a & b**: Construct new internal road infrastructure, demolish temporary link between North Block and Stage 1, landscaping, external wayfinding, lighting and security.

1.3 Purpose and scope

The purpose of this BDAR is to:

- Identity the existing biodiversity values of the subject land
- Assess the potential impacts of the proposed development on biodiversity values
- Develop management measures to avoid or minimise the impact of the proposed development during construction and operation
- Specify the number and class of biodiversity credits that are required to be retired to offset the residual impacts on biodiversity values
- Satisfy the requirements of the SEARs.

This BDAR has been prepared and reviewed by Accredited Assessor William Thurston (BAAS18019).

This BDAR has been prepared based on the concept design available in October 2021. If future design changes alter the potential impacts to biodiversity, additional assessment may be required including changes to the biodiversity offset calculations.

1.4 Subject land

The subject land comprises the extent of the construction and operational footprint of the proposal (refer to Figure 1-1). The subject land is located within the Nepean Hospital campus boundary, located on Derby Street in Kingswood, NSW. The subject land comprises about 2.6 hectares (ha) within part of Lot 4/-/DP1238301. It is within the Penrith Local Government Area (LGA) and is zoned on SP2- Infrastructure land.

The subject land includes all areas involving clearing and direct impacts relating to construction works, temporary/ancillary construction facilities and the extent of the final development.

The location of the subject land and Nepean Hospital campus boundary is shown in Figure 1-1.

1.5 Assessment method

This BDAR has been prepared in accordance with the Biodiversity Assessment Method (BAM) (DPIE 2020) with sections assessed under both:

- Streamlined assessment module – Small area (site-based)
- Streamlined assessment module – Planted native vegetation.

The requirements of this BDAR under the two streamlined assessment modules are outlined in Table 1-1 and Table 1-2 in accordance with Biodiversity Assessment Method (BAM) (DPIE 2020). Further justification of the use of the planted native vegetation module is provided in Section 1.5.1.

Table 1-1. Streamlined assessment module – Small area requirements

Criteria	Requirement	Subject land
Is the land mapped on the Biodiversity Values Map as core koala habitat identified in a plan of management under the *State Environmental Planning Policy (Koala Habitat Protection) 2021*	No	No
Minimum lot size associated with the property	Less than 40 ha but not less than 1 ha	Lot 4 DP 1238301 is 14 ha.
Maximum area clearing limit for application of the small area development module	≤2 ha	~0.01ha

Table 1-2. Streamlined assessment module – Planted native vegetation decision making key

No.	Question	Yes/ No	Comment
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?	No	There are remnant native species located within the plantings which have been isolated and considered as a separate PCT (refer to Section 3). The remaining vegetation is obviously planted due to positioning, age and species. The composition of the species are not consistent with a local PCT. For further justification, refer to Section 3.2.2.
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 vegetation has been planted for aesthetic landscaping and is not consistent with a PCT.
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. a species recovery project b. Saving our Species project c. other types of government funded restoration project 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 Threatened Ecological Community (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*)?	No	No threatened flora species are present within the subject land.
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?	No	The vegetation has been planted for aesthetic landscaping and is not consistent with a PCT or for the purposes of conservation or rehabilitation.

No.	Question	Yes/ No	Comment
5	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?	**Yes**	The vegetation has been planted for aesthetic landscaping within the open areas of the hospital.
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)?	**Likely**	No list has been published to date, however the BAM states the definition of 'Widely cultivated native species' as: "a variety of a native species developed in cultivation, usually for the purposes of agriculture, forestry or horticulture, and which, when reproduced retains its distinguishing features, and any native species listed on the high threat weeds list published in the BAM Calculator (BAM-C)." The majority of the species within the planted area are cultivated native and exotic species frequently used for landscaping.

1.5.1 Further justification of approach

In a previous BDAR carried out for Stage 1 of the Nepean Hospital redevelopment (Abel Ecology 2018), the areas of planted native vegetation were classified as PCT 1083 - Red Bloodwood - scribbly gum heathy woodland on sandstone plateaux of the Sydney Basin Bioregion. However, this was arbitrarily chosen as it was the closest PCT within the IBRA subregion and the assessment was undertaken before the release of the streamlined assessment module.

This approach has not been followed in this BDAR as the streamlined assessment module is now available and the association of the planted species to PCT 1083 (or any other PCT) is very weak. For example, for PCT 1083, only one common species is present, *Banksia spinulosa*, which is the planted cultivar 'Birthday Candles'.

Other possible PCTs were considered (i.e. PCTs 830, 1395, 1250) due to location and species composition, however all were weak associations (1-2 associated species). This approach also dilutes the importance of the remnant trees (*Eucalyptus moluccana* and *Eucalyptus tereticornis*) as an indicator of the community naturally present on the site by providing equal weight to local planted species (i.e. *Corymbia maculata*, *Melaleuca styphelioides*).

Considering the above, and the decision key for the streamlined assessment module (refer to Section 1.5), the streamlined assessment module has been used to assess the planted native vegetation within the subject land.

Following the outcomes of questions 5 and 6 in Table 1-2, the planted native vegetation must be assessed for threatened species habitat. Description of the vegetation is provided in Section 3.2.2.

1.6 Sources of information

The following databases and Geographic Information Systems (GIS) layers were used in this assessment:

- Wildlife Atlas database (DPIE 2021a)
- EPBC Protected Matters search tool (DAWE 2021a)
- Vegetation mapping of the Cumberland Plain Region (DPIE 2015)
- Biodiversity Values Map (DPIE 2021b)
- Soil type mapping (DPIE 2021c)
- Area of Outstanding Biodiversity Value register (DPIE 2021d)
- National Flying-fox monitoring viewer (DAWE 2021b)
- Directory of Important Wetlands in Australia (DAWE 2021c)
- Aerial imagery (Nearmap 2021).

The following reports were also reviewed and relied on to provide additional information:

- Arboricultural Development Assessment Report (Moore Trees 2021)
- Biodiversity Development Assessment Report (BDAR) (Abel Ecology 2018).

1.7 Personnel

All personnel involved in the assessment and an overview of their qualifications and experience is provided in Table 1-3.

Table 1-3. Personnel involved in BDAR preparation

Personnel and accreditations	Role on project	Experience
William Thurston BAM Accredited Assessor (BAAS18019) Bachelor Biological Sciences, Ecology - (minor Geomorphology) 2006	BAM Accredited Assessor Field surveys Review and technical advice Internal QA procedures BAM calculations	William is the Divisional Head for the Environmental Consulting Division. He has over 15 years in the environmental industry and has extensive experience with a variety of environmental assessments and projects. William is an accredited BAM assessor and has a thorough knowledge of the relevant federal and state legislation as well as excellent plant identification skills. William also has extensive experience in the bush regeneration industry ensuring that all reports including management plans and any given mitigation measures are practical and achievable on-ground.
Kirsty Raines Master of Environmental Science and Management 2019 Bachelor of Zoology (major Animal Ecology) 2017	Field surveys Report preparation Project management	Kirsty contributes extensive experience in water, road, rail, energy, and telecommunications infrastructure planning. Kirsty is practiced in undertaking terrestrial flora and fauna surveys comprising BAM assessments, targeted species searches and preparation of the associated reports including assessments of significance.

Figure 1-1. Site map

Figure 1-2. Proposal features

1.8 Legislative requirements and strategic context

1.8.1 NSW Environmental Planning and Assessment Act 1979

The *Environmental Planning and Assessment Act 1979* (EP&A Act) establishes the system of environmental planning and assessment in NSW. The proposal is SSD under the EP&A Act and clause 14(a) of Schedule 1 of the SEPP SRD as it involves development for the purposes of a hospital with a capital investment value in excess of $30 million.

As the proposal is SSD, a BDAR is required to assess the biodiversity impacts under the EP&A Act. The BDAR must be prepared by an accredited assessor in accordance with the BAM (refer to Section 1.8.2). The preparation of a BDAR is one of the Secretary's Environmental Assessment Requirements (SEARs).

1.8.2 NSW Biodiversity Conservation Act 2016

The *Biodiversity Conservation Act 2016* (BC Act) seeks to conserve biological diversity and promote ecologically sustainable development, to prevent extinction and promote recovery of threatened species, populations and ecological communities and to protect areas of outstanding biodiversity value.

Under the BC Act, Biodiversity Offsets Scheme (BOS), a framework to avoid, minimise and offset impacts on biodiversity from development and clearing. As the project is SSD, a BDAR is required to assess the biodiversity impacts. The BDAR must be prepared by an accredited assessor in accordance with the BAM. The BAM provides a methodology for identifying the existing biodiversity values, assessing impacts and determining the number and type of biodiversity credits required to offset unavoidable impacts.

This BDAR has been specifically prepared to address the BAM (DPIE 2020a) and associated guidance documents to enable development approval under Part 5 of the EP&A Act. The *Biodiversity Conservation Regulation 2017* provides further framework for assessment of biodiversity under the BAM.

Several threatened species and one CEEC are present, or have suitable habitat, within the subject land (refer to Section 3 and 4). As such, the residual impacts of the proposal would require the offsetting of credits (refer to Section 7).

1.8.3 Commonwealth Environment Protection and Biodiversity Conservation Act 1999

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) provides a legal framework to protect and manage nationally and internationally important flora, fauna, ecological communities and heritage places defined in the Act as Matters of National Environmental Significance (MNES). Under the EPBC Act, approval is required for actions that have, will have, or are likely to have a significant impact on MNES.

The bilateral agreement has been made under EPBC Act which allows NSW to assess development applications on behalf of the Australian Government, removing the need for a separate assessment and reducing duplicative processes. The BOS has been endorsed by the Commonwealth Government and enables like-for-like offsetting under the BOS to also offset Commonwealth listed threatened species and communities.

Several MNES are present within 5km of the subject land (refer to Section 4.8). However, the proposal is not likely to have a significant impact on any MNES, as such no referral the Minister for Environment is required.

1.8.4 Fisheries Management Act 1994

The *Fisheries Management Act 1994* (FM Act) aims to conserve, develop and share the fisheries resources of the State for the benefit of present and future generations.

Although the BAM does not specifically address the aquatic species, environment and impacts under the FM Act, these factors have been included in the BDAR for consideration of all biodiversity impacts of the proposal. Nevertheless, as the subject land is located about 1km from the nearest waterway, no impacts to waterways or fisheries are likely. No permits or approvals under the FM Act are required.

1.8.5 Draft Cumberland Plain Conservation Plan 2020

The subject land is within the Draft Cumberland Plain Conservation Plan (NSW Government 2020) area. The Cumberland Plain Woodland vegetation within the subject land (refer to Section 3.2) and is mapped on the Draft Cumberland Plain Conservation Plan. However, this vegetation is excluded land from the plan and is not part of the Strategic Conservation Area.

2 LANDSCAPE CONTEXT AND FEATURES

2.1 IBRA Bioregions and subregions

The subject land and assessment area (a 1.5km buffer around the subject land) is within the Sydney Basin Interim Biogeographic Regionalisation for Australia (IBRA) bioregion which is characterised by Mesozoic sandstones and shales and dissected plateaus (DEE 2018, Environment Australia 2000). Vegetation in this bioregion typically consists of forest, woodlands and heaths. The IBRA sub-region for the area is the Cumberland (SYB08) which is characterised by Triassic Wianamatta group shales and sandstones (DEE 2012). The landform is typically low rolling hills and wide valleys in a rain shadow area below the Blue Mountains. The vegetation is characterised by woodlands on shale hills and on alluvial sands and gravels (Morgan 2001 and DPIE 2019b).

2.2 NSW (Mitchell) Landscape

The subject land forms part of the 'Cumberland Plain' NSW landscape. Within the greater assessment area, the Cumberland Plain Landscape comprises the majority of the area with the' Hawkesbury - Nepean Channels and Floodplains' landscape in the west quarter (DPIE 2016).

The Cumberland Plain landscape is characterised by low rolling hills and wide 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. General elevation is 30 to 120m and the local relief is about 50m. The vegetation is characterised by woodlands and open forests (Mitchell 2002). This landscape is representative of the subject land.

The Hawkesbury - Nepean Channels and Floodplains landscape is characterised by meandering channel and moderately wide floodplain of the Hawkesbury and Nepean rivers on Quaternary sand and gravel. Soils vary from undifferentiated alluvial sand to poorly structured gradation profiles of sandy loam or clay loams. General elevation is 0 to 20m with a local relief of <10m (Mitchell 2002). This landscape is not strongly representative of the subject land notably due to soils, geology, elevation and hydrology.

2.3 Topography, soils and geology

The topography of the subject land is flat with a slight slope to the east and south. It is at about 50m above sea level. The subject land and the majority of the assessment area is mapped on the Luddenham soil landscape. These soils are typically silty or sandy clay loams that are shallow to moderately deep (<100mm to 150mm deep). They are subject to water erosion, localised mass movement hazard, shallow soils, and surface movement potential. The subsoil is moderately reactive. This soil type is underlain by Wianamatta Group Ashfield Shale and Bringelly Shale geologies.

2.4 Percentage native vegetation cover

The assessment area around the subject land contains approximately 37.4ha of native woody vegetation which equates to approximately 5.2% of the assessment area (707ha) (cover class 0-10%). Much of the surrounding land is occupied by residential areas, roadways and development. As a result, the vegetation within the 1500m buffer area is significantly fragmented. The extent of vegetation was manually amended from the existing vegetation mapping (DPIE 2015). Isolated street trees and planted vegetation were excluded. The distribution of native vegetation cover is shown in Figure 2-1.

2.5 Rivers, streams and wetlands

There are no wetlands located within or adjacent to the subject land. A drainage line is located about 400m to the south-east. This comprises a daylit stormwater channel which leads into Werrington Creek (a first order stream) about 1km downstream. There are no wetlands located within the subject land or the assessment area including wetlands listed on the Directory of Important Wetlands in Australia (DIWA). The Nepean River is located about 3km to the west of the subject land.

2.6 Habitat connectivity

The subject land is within a highly developed urban area with little habitat connectivity. The small patch of vegetation within the north of the subject land is fragmented from other street trees and urban vegetation by the hospital infrastructure and roadways. The nearest patches of vegetation are at Kanagra Reserve, about 650m to the north, and the riparian corridor of Werrington Creek, about 1.6km to the north-east. As such, there is limited habitat connectivity for ground dwelling and arboreal mammal species and would be more suited to mobiles species, such as urban birds.

2.7 Areas of geological significance and soil hazard features

There are no karsts, caves, crevices, cliffs or other areas of geological significance within the subject land or the assessment area. No soil hazard features, such as acid sulphate soils, are mapped within the assessment area. However, the soil type is prone to water erosion, localised mass movement hazard and surface movement (refer to Section 2.3).

The subject land is not listed on known contaminated land (EPA 2021a, EPA 2021b).

2.8 Areas of Outstanding Biodiversity Values

The subject land and assessment area are not within any areas of Outstanding Biodiversity Values.

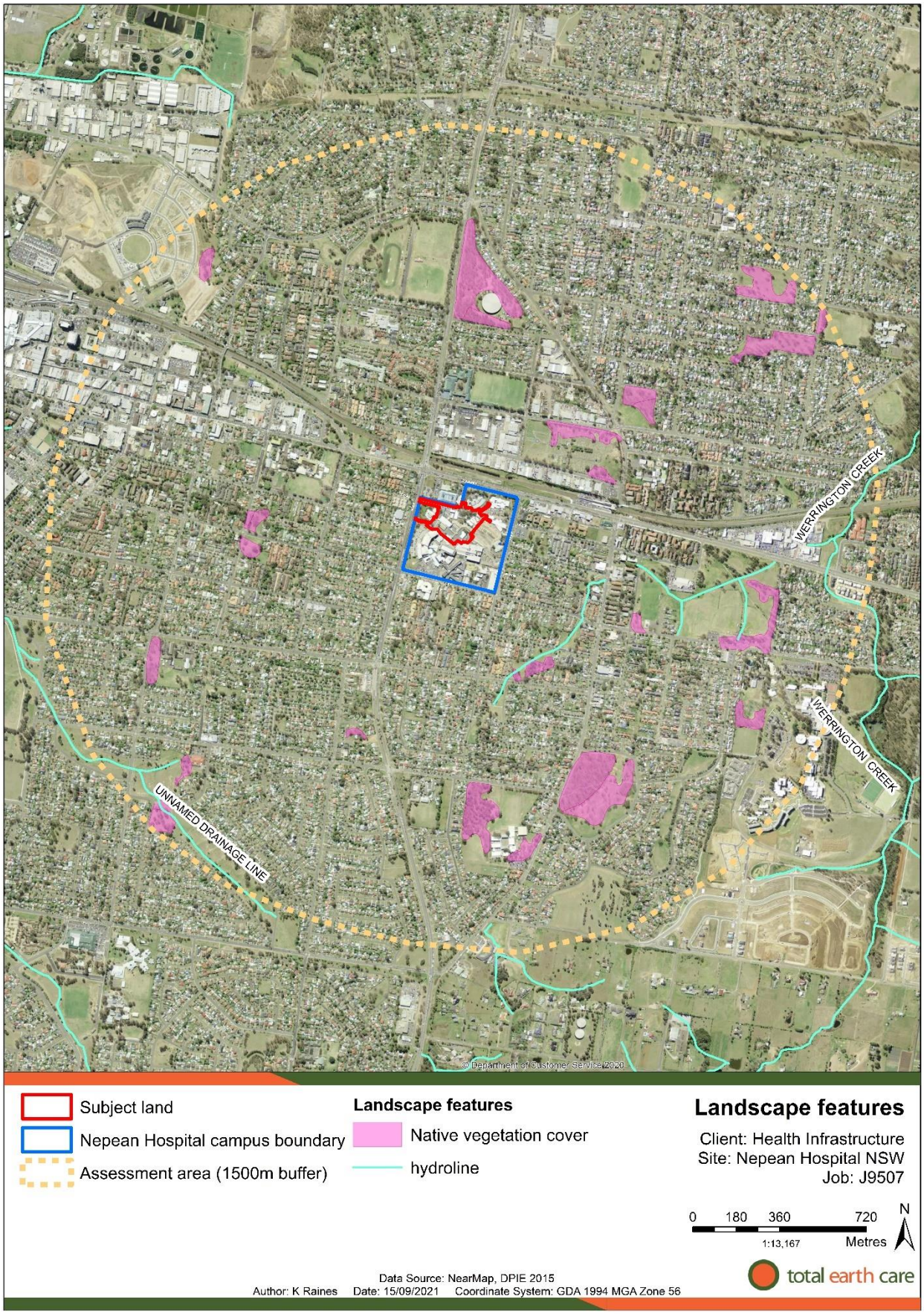


Figure 2-1. Landscape features

3 NATIVE VEGETATION

3.1 Vegetation integrity survey methodology

3.1.1 Stratification

The native vegetation within the subject land was stratified into vegetation zones. Vegetation zones comprise an area of native vegetation on the subject land that is the same Plant Community Type (PCT) and has a similar broad condition state (DPIE 2020). The site was initially stratified using the existing vegetation mapping (DPIE 2015; Abel Ecology 2020), aerial photos of the site, and condition based on local knowledge.

The subject land was ground-truthed by random meander transects and plot-based surveys. Any mapped vegetation outside of the subject land was not field verified.

3.1.2 Survey effort and timing

The survey was conducted by two of Total Earth Care's Ecologists over 16 person-hours on the 7th of September 2021. Weather conditions were sunny and ~16ºC.

3.1.3 BAM Plots

Due to the small size of the subject land, one full floristic plot (BAM plot) was undertaken. This provided a single BAM plot for the one vegetation zone (Figure 3-4). This plot extended beyond the boundaries of the subject land, however, was positioned in the best available chosen location to collect BAM plot data. The location was not randomised due to spatial constraints. The small sections of the plot that extended outside the subject land were included in the data.

The BAM plot was conducted in accordance with the BAM (DPIE 2020a) and consisted of:

- One 400m^2 plot (standard 20m x 20m) to assess species composition and structure attributes
- One 1000 m^2 (standard 20m x 50m) to assess the function attributes: number of large trees, stem, stem size class, tree regeneration and length of logs
- Five 1m^2 sub-plots to assess average litter cover, bare ground cover, cryptogram cover and rock cover.

It should be noted that as this BDAR is streamlined (refer to Section 1.5), BAM plots are not required, and existing information can be utilised. Information from a previous BDAR (Abel Ecology 2018) was considered in this assessment, however, was not directly utilised in the collection of the plot-based data.

BAM Plot 1 is shown in Figure 3-1 and the BAM data sheets are provided in Appendix A.

3.1.4 Vegetation classification and mapping

Following the review of vegetation mapping (DPIE 2015), aerial photography, the BAM plot and random meander around the subject land, the extent and classification of vegetation was decided based on:

- NSW Plant Community Type profiles accessed from BioNet Vegetation Classification database (DPIE 2021e).
- Definitions under the relevant final determination under the BC Act or conservation listing advice under the EPBC Act
- Sydney Metropolitan Catchment Management Authority Community Descriptions (OEH 2016).

Figure 3-1. BAM Plot 1

3.1.5 Survey limitations

Due to the small size of the subject land and patches of native vegetation, only a single BAM plot was undertaken. Random meander was undertaken across the entire subject land to collect data outside of BAM plots due to spatial limitations. Additionally, as the survey was undertaken over one day in early spring, some species may not have been observable due to flowering periods.

When reviewing maps please note that the hand-held GPS equipment used is only accurate to 3 metres.

3.2 Vegetation description

The subject land is highly modified and generally comprises planted native and exotic species interspersed with few remnant native trees. As the composition of the vegetation is highly modified with many species not local to NSW or the Sydney Basin, native vegetation on the site has been mapped in small patches to capture the vegetation native to the locality. The remaining planted native species were assigned the closest representative PCT, as required by the BAM. Details and justifications for the PCTs are provided in the following sections.

3.2.1 PCT 849 - Cumberland shale plains woodland

PCT 849 generally comprises the isolated patches of remnant eucalypts including *Eucalyptus moluccana* (Grey Box) and *Eucalyptus tereticornis* (Red Forest Gum). There is no native middle stratum and the ground stratum comprises a mixture of native and exotic grasses and herbs such as *Lolium perenne* (Perennial Ryegrass) and *Cynodon dactylon* (Common Couch). This PCT classification is consistent with previous mapping of the site (Abel Ecology 2018) and is classified as a CEEC (refer to Section 3.2.4).

A summary of PCT 849 is provided in Table 3-1 and an example of the PCT is shown in Figure 3-2. The full flora inventory is provided in Appendix B.

Table 3-1. Summary of PCT 849 present on the subject land

PCT Common name	Cumberland shale plains woodland
PCT Scientific name	Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion
PCT number	849
Alternative mapping units	S_GW03 (OEH 2016)
Formation	Grassy Woodlands
Class (Keith 2004)	Coastal Valley Grassy Woodlands
PCT % Cleared	93%
Associated Threatened Ecological Community (TEC)	Cumberland Plain Woodland in the Sydney Basin Bioregion
SAII entity	Yes
BC Act Status	Endangered Ecological Community (EEC)
EPBC Act Status	N/A. This vegetation within the subject land does not meet the requirements of the EPBC Act listing (refer to Section 3.2.4). However, under the Act it is listed as a Critically Endangered Ecological Community (CEEC).
Extent within subject land	963 m^2 (0.096 ha)

3.2.2 Planted native vegetation

The majority of the subject land comprises planted native vegetation including landscaped gardens and open spaces. Indications that the vegetation is planted include the planting alignments (i.e. in straight lines), locations within garden beds and the use of common horticultural species that are not local to the area. Common native species include *Melia azedarach* (White Cedar), *Corymbia maculata* (Spotted Gum), *Grevillea robusta* (Silky Oak), *Banksia integrifolia* (Coast Banksia), *Melaleuca styphelioides* (Prickly-leaved Tea Tree) and various Grevillia cultivars. Many of these planted species are not local to the area, however, are native to NSW. An example of this vegetation is shown in Figure 3-3.

The full flora inventory is provided in Appendix B.

3.2.3 Non-native vegetation

Within the centre of the subject land is a planted garden of non-native vegetation. This area comprises commonly planted landscaping species including *Photinia x fraseri* (Photinia), *Jacaranda mimosifolia* (Jacaranda) and *Strelitzia nicolai* (Bird of Paradise). Some other non-native species are sporadically planted in other parts of the subject land, however, are considered outliers within areas of PCT 849 and native planted vegetation. The biodiversity values of this non-native vegetation are considered as 'prescribed impacts' in Section 4.7 and 5.2.3.

The full flora inventory is provided in Appendix B.

3.2.4 Threatened Ecological Communities

PCT 849 is classified as the 'Critically Endangered' TEC 'Cumberland Plain Woodland in the Sydney Basin Bioregion' under both the BC Act and EPBC Act, herein referred to as 'Cumberland Plain Woodland CEEC'. Consistency with the listings under the BC Act and EPBC Act are outlined in the following sections.

3.2.4.1 BC Act listing

Although the patch of PCT 849 is small and in poor condition, it is considered consistent with the Cumberland Plain Woodland CEEC BC Act listing. The final determination (DPIE 2019b) does not state that there is minimum number of species required for consistency and that 'derived' native grasslands which result from removal of the woody strata from the woodlands and forests can be included. Although there is little suitable vegetation remaining, the few remnant *Eucalyptus moluccana* (Grey Box) and *Eucalyptus tereticornis* (Red

Forest Gum) trees are representative of the community and the landscape features (i.e. topography, soil type) are consistent.

3.2.4.2 EPBC Act listing

The patch of PCT 849 within the subject land is not consistent with the EPBC Act listing. This is due to the patch not meeting the minimum size requirements of at least 0.05 ha and the perennial understorey vegetative cover present is not made up of at least 50% native species (DEWHA 2010).

Figure 3-2. Example of PCT 849 - Cumberland shale plains woodland, demonstrating individual canopy trees of the community

Figure 3-3. Example of planted native vegetation

3.2.5 Weeds

During the vegetation survey, 19 exotic species were recorded. One of which, *Eragrostis curvula* (African Lovegrass), is a high threat exotic weed. No weed species listed under the *Biosecurity Act* or Weeds of National Significance (WoNS) were recorded.

3.3 Vegetation integrity

The following sections consider the characteristics of PCT 849 within the subject land. As the areas of planted native vegetation do not conform to a PCT and are for the purposes of landscaping (refer to Section 1.5), these areas are not assessed in detail in the following sections. Additionally, the non-native vegetation is considered a 'prescribed impact' (refer to Section 4.7 and 5.2.3).

3.3.1 Vegetation zones

A vegetation zone is an area of the same PCT with the same broad condition state. A vegetation zone may have discontinuous (fragmented) patches of vegetation (DPIE 2020a, DPIE 2020b). Condition states are classified as either good, moderate or poor based on the level of degradation, weed prevalence and strata layers present.

One vegetation zone is present within the subject land comprising poor condition PCT 849 (Zone 1). Zone 1 generally comprises tree species of PCT 849 and the extent of their canopy. Zone 1 is discontinuous and has no middle stratum and a ground stratum of native and exotic grasses and herbs. The extent of Zone 1 is shown in Figure 3-4.

The vegetation zones report generated by the BAM-C is provided in Appendix C.

3.3.2 Patch size

A patch is an area of native vegetation that occurs on the subject land and includes native vegetation that has a gap of less than 100m from the next area of native vegetation (or ≤ 30m for non-woody ecosystems). A patch may extend onto adjoining land and multiple vegetation zones can be included in a single patch.

The subject land has a single patch which is 0.06 ha (Patch 1). Patch 1 comprises all of Zone 1 (refer to Section 3.3.1). As vegetation in adjoining lands is highly fragmented and minimal in extent, the extent of Patch 1 is within the boundaries of the subject land as shown in Figure 3-4.

3.3.3 Vegetation integrity score

The vegetation integrity score was determined using the BAM-C. The data collected from the BAM plot was entered to give a score for Zone 1 including species composition, vegetation structure and function condition. See Appendix A for plot field data sheets. The vegetation integrity scores are provided in Table 3-2.

Table 3-2. Summary of vegetation integrity scores

NSW PCT No.	Veg Zone	Area (ha)	Patch size (ha)	Plot	Composition Condition Score	Structure Condition Score	Function Condition Score	Vegetation Integrity Score
849	724_ Poor	0.06	<5	1	22	40.6	71.4	39.9

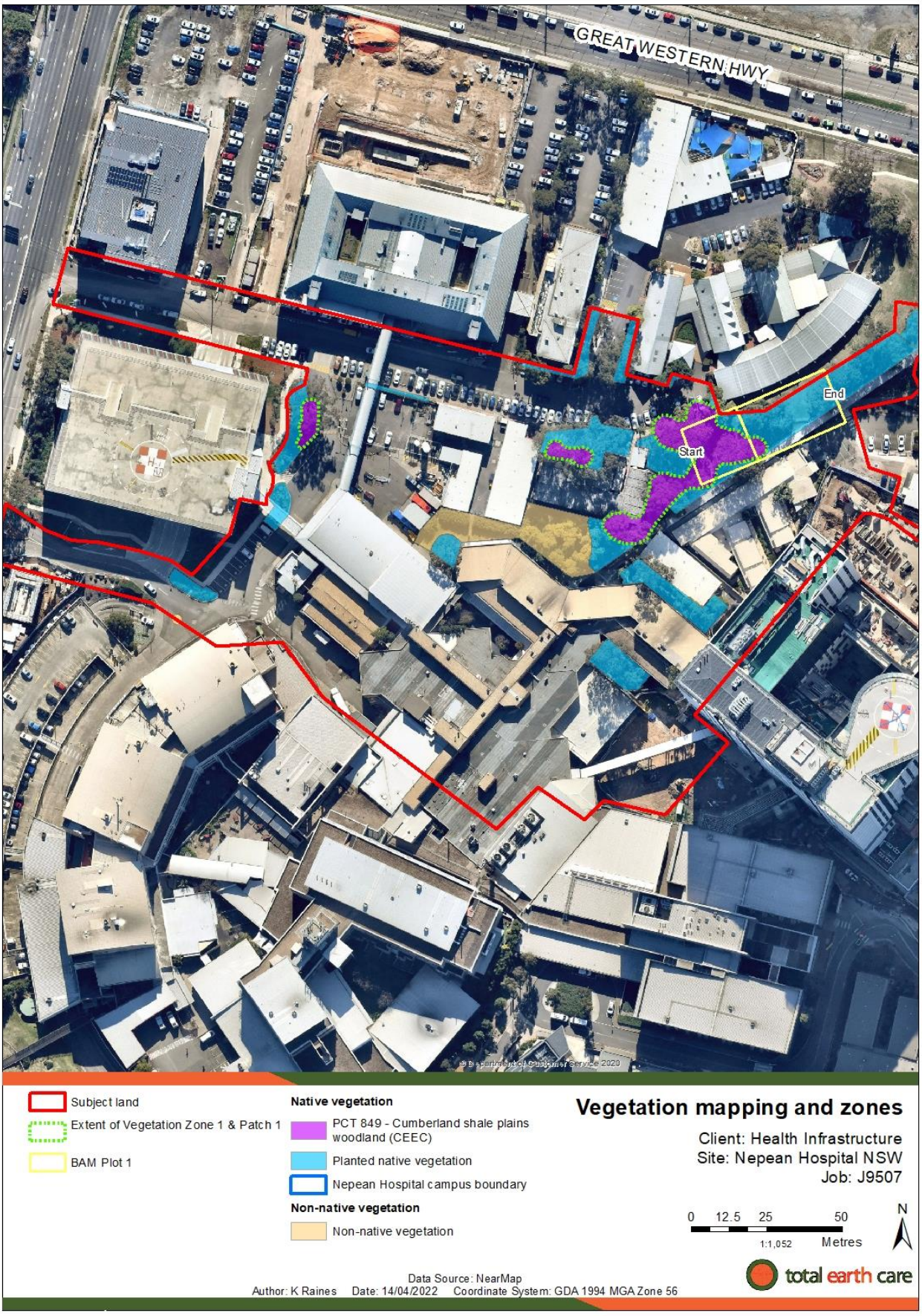


Figure 3-4. Vegetation mapping and zones

4 THREATENED SPECIES AND HABITAT

4.1 Overview

Overall, the subject land provides little available habitat for threatened species. The native vegetation present, both within PCT 849 and areas of planted native vegetation (i.e. eucalypts, *Callistemon* spp., *Melaleuca spp*.), provides potential foraging resources for some birds and mammals (i.e. Little Lorikeet, Grey-headed Flying-fox, Swift Parrot). However, due to the small patch of native vegetation within the subject land and its fragmentation, the use of these resources is limited. The subject land does not provide suitable breeding habitat for local threatened fauna species due to the lack of suitable features including hollow bearing trees and caves.

Due to the highly disturbed nature of the site, altered hydrology, microclimates and the lack of a natural soil profile, it is highly unlikely threatened flora species are present within the subject land or within the soil bank. Moreover, previous BAM surveys have been conducted within the subject land over summer of 2017/2018 in which no threatened species were recorded (Abel Ecology 2018).

The following sections detail the features of specific threatened species and provides justification for their inclusion or exclusion from further assessment.

4.2 Predicted threatened species (ecosystem credit species)

Ecosystem credit species are threatened species which are predicted to occur by vegetation surrogates and/or landscape features, or that have a low probability of detection using targeted surveys.

The BAM-C produced a list of ecosystem credit species based on a number of attributes including IBRA bioregion and subregion, patch size and the vegetation and habitat data collected in the field. Targeted survey is not required for these species.

The ecosystem credit species for this proposal and their justification for inclusion or exclusion are provided in Table 4-1. These include:

- Little Lorikeet (*Glossopsitta pusilla*), Vulnerable under the BC Act
- White-throated Needletail (*Hirundapus caudacutus*), Vulnerable and migratory under the EPBC Act
- Swift Parrot (foraging) (*Lathamus discolor*), Endangered and Critically Endangered under the BC Act and EPBC Act, respectively
- Eastern Coastal Free-tailed Bat (*Micronomus norfolkensis*), Vulnerable under the BC Act
- Little Bent-winged Bat (foraging) (*Miniopterus australis*), Vulnerable under the BC Act
- Large Bent-winged Bat (foraging) (*Miniopterus orianae oceanensis*), Vulnerable under the BC Act
- Grey-headed Flying-fox (foraging) (*Pteropus poliocephalus*), Vulnerable under the BC Act and EPBC Act.

The predicted species report generated by the BAM-C is provided in Appendix D.

4.3 Candidate threatened species (species credit species)

Species credit species are threatened species or elements of their habitat that cannot be confidently predicted by vegetation surrogates and landscape features. Targeted surveys are required for these species if the subject land contains suitable habitat components and is within the predicted range of the species.

Following targeted field surveys, no species credit species were identified to be present on the subject land, as such none are at risk of SAII. Their justification for inclusion or exclusion and requirement for survey are provided in Table 4-2.

The candidate species report generated by the BAM-C is provided in Appendix E.

Table 4-1. Predicted threatened species (ecosystem credit species)

Scientific Name	Common Name	Habitat constraints	Geographic limitations	Sensitivity to gain class	BC Act status	EPBC Act status	Confirmed Ecosystem Credit Species	Justification
Anthochaera phrygia	Regent Honeyeater (foraging)			High	CE	CE	No	Vagrant to the area. Highly fragmented and degraded landscape, little connective habitat and negligible suitable foraging habitat (not preferred) within the subject land. No records within 5km.
Artamus cyanopterus cyanopterus	Dusky Woodswallow			Moderate	V	NL	No	Highly fragmented and degraded landscape, little connective habitat and negligible suitable foraging habitat (not preferred) within the subject land. Three records within 5km.
Chthonicola sagittata	Speckled Warbler			High	V	NL	No	Highly fragmented and degraded landscape, little connective habitat and negligible suitable foraging habitat within the subject land. Three records within 5km.
Climacteris picumnus victoriae	Brown Treecreeper (eastern subspecies)			Moderate	V	NL	No	Vagrant to the area. Due to the highly fragmented landscape, little connective habitat and negligible suitable foraging habitat within the subject land, the site is unlikely to occur.
Dasyurus maculatus	Spotted-tailed Quoll			High	V	E	No	Three records within 5km. Due to the highly fragmented landscape within the locality, no suitable den sites or foraging arboreal or ground habitat (i.e. hollows, fallen logs)
Glossopsitta pusilla	Little Lorikeet			High	V	NL	**Yes**	Some suitable foraging habitat present, although highly degraded.
Haliaeetus leucogaster	White-bellied Sea-Eagle (foraging)	Waterbodies or within 1km of a rivers, lakes, large dams or creeks, wetlands and coastlines		High	V	NL	No	Werrington Creek (a first order stream) is located over 1km away, although there are smaller day-lit stormwater drains leading into the creek, this is not considered suitable foraging habitat. One record within 5km.
Hirundapus caudacutus	White-throated Needletail			High	NL	V	**Yes**	No records within 5km. Some suitable foraging habitat present including aerial habitat.
Lathamus discolor	Swift Parrot (foraging)			Moderate	E	CE	**Yes**	Some suitable foraging habitat present, although highly degraded. Various surrounding areas are important foraging habitat for the species. Although the subject land does not provide preferred habitat.
Melanodryas cucullata cucullata	Hooded Robin (south-eastern form)			Moderate	V	NL	No	Vagrant to the area. Due to the highly fragmented landscape, little connective habitat and negligible suitable foraging habitat within the subject land, the site is unlikely to occur.
Micronomus norfolkensis	Eastern Coastal Free-tailed Bat			High	V	NL	**Yes**	Some suitable foraging habitat present, although highly degraded.
Miniopterus australis	Little Bent-winged Bat (foraging)			High	V	NL	**Yes**	Some suitable foraging habitat present, although highly degraded.

Scientific Name	Common Name	Habitat constraints	Geographic limitations	Sensitivity to gain class	BC Act status	EPBC Act status	Confirmed Ecosystem Credit Species	Justification
Miniopterus orianae oceanensis	Large Bent-winged Bat (foraging)			High	V	NL	**Yes**	Some suitable foraging habitat present, although highly degraded.
Petroica boodang	Scarlet Robin			Moderate	V	NL	No	Highly fragmented and degraded landscape, little connective habitat and negligible suitable foraging habitat notably due to a lack of fallen logs and timber within the subject land. No records within 5km.
Petroica phoenicea	Flame Robin			Moderate	V	NL	No	Vagrant to the area. Highly fragmented and degraded landscape, little connective habitat and negligible suitable foraging habitat within the subject land. No records within 5km.
Phascolarctos cinereus	Koala (foraging)			High	V	V	No	Highly fragmented and degraded urban landscape, little connective habitat and negligible suitable foraging habitat within the subject land. No records within 5km.
Pteropus poliocephalus	Grey-headed Flying-fox (foraging)			High	V	V	**Yes**	Suitable foraging habitat present, although highly degraded. The subject land is within the foraging range of the Emu Plains and Penrith flying fox camps about 5km to the north west.
Stagonopleura guttata	Diamond Firetail			Moderate	V	NL	No	Vagrant to the area. Highly fragmented and degraded landscape, little connective habitat and negligible suitable foraging habitat within the subject land. No records within 5km.

NL: Not Listed, V: Vulnerable, E: Endangered, CE: Critically Endangered

Table 4-2. Candidate threatened species (species credit species)

Scientific Name	Common Name	Habitat constraints	Habitat degraded	Geographic limitations	Sensitivity to gain class	BC Act status	EPBC Act status	Targeted survey	Confirmed Species Credit Species	Justification
Acacia bynoeana	Bynoe's Wattle				High	E	V	Yes	No	Suitable habitat present, survey during correct period of September – not recorded. No records within 5km.
Acacia pubescens	Downy Wattle				High	V	V	Yes	No	Suitable habitat present, survey during correct period of September – not recorded. No records within 5km.
Anthochaera phrygia	Regent Honeyeater	As per mapped areas			High	CE	CE	No	No	Not within a mapped area. Vagrant to the area. Highly fragmented and degraded landscape, little connective habitat and negligible suitable foraging habitat (not preferred) within the subject land. No records within 5km.
Caladenia tessellata	Thick Lip Spider Orchid		Yes		Moderate	E	V	No	No	Suitable habitat present, survey during correct period of September – not recorded. No records within 5km.
Cynanchum elegans	White-flowered Wax Plant				High	E	E	Yes	No	Suitable habitat present, survey during correct period of September – not recorded. No records within 5km
Dillwynia tenuifolia					Moderate	V	NL	Yes	No	Suitable habitat present, survey during correct period of September – not recorded. 5 recent records within 5km.
Dillwynia tenuifolia - endangered population	Dillwynia tenuifolia, Kemps Creek			Bounded by Western Road, Elizabeth Drive, Devonshire Road and Cross Street, Kemps Creek in the Liverpool LGA	High	EP	NL	No	No	Not within the area of the endangered population.
Eucalyptus benthamii	Camden White Gum				High	V	V	Yes	No	Suitable habitat present, survey during correct period of September – not recorded. No records within 5km.
Grevillea juniperina subsp. juniperina	Juniper-leaved Grevillea				Moderate	V	NL	Yes	No	Suitable habitat present, survey during correct period of September – not recorded. 156 recent records within 5km.

Scientific Name	Common Name	Habitat constraints	Habitat degraded	Geographic limitations	Sensitivity to gain class	BC Act status	EPBC Act status	Targeted survey	Confirmed Species Credit Species	Justification
Haliaeetus leucogaster	White-bellied Sea-Eagle	Living or dead mature trees within suitable vegetation within 1km of a rivers, lakes, large dams or creeks, wetlands and coastlines			High	V	NL	No	No	Werrington Creek (a first order stream) is located over 1km away, although there are smaller day-lit stormwater drains leading into the creek, this is not considered suitable foraging habitat. No suitable trees within proximity to waterways. One record within 5km.
Lathamus discolor	Swift Parrot (breeding)	As per mapped areas			Moderate	E	CE	No	No	The subject land is not within a mapped area. The species does not breed in NSW.
Litoria aurea	Green and Golden Bell Frog	Semi-permanent/ephemeral wet areas, within 1km of wet areas, swamps, within 1km of swamp waterbodies, within 1km of waterbody			High	E	V	No	No	Werrington Creek (a first order stream) is located over 1km away, although there are smaller day-lit stormwater drains leading into the creek, this is not considered suitable foraging habitat.
Marsdenia viridiflora subsp. viridiflora - endangered population	*Marsdenia viridiflora* R. Br. subsp. *viridiflora* population in the Bankstown, Blacktown, Camden, Campbelltown, Fairfield, Holroyd, Liverpool and Penrith local government areas		Yes	Blacktown, Camden, Campbelltown, Canterbury-Bankstown, Cumberland, Fairfield, Liverpool and Penrith LGAs	Moderate	EP	NL	No	No	Highly degraded habitat without a native soil profile. 719 records within 5km, however none on the subject land and not identified in previous surveys (Abel Ecology 2018).
Meridolum corneovirens	Cumberland Plain Land Snail				High	E	NL	Yes	No	Some suitable habitat present, survey during correct period of September – not recorded. 72 recent records within 5km. Unlikely to migrate into the site due to fragmentation. High presence of common garden snails on site (*Cornu aspersum*).
Miniopterus australis	Little Bent-winged Bat (Breeding)	Caves, cave, tunnel, mine, culvert or other structure known or suspected to be used for breeding including species records in			Very High	V	NL	No	No	No suitable breeding habitat present. Habitat constraints of caves, tunnels, culverts etc. are not present. No records within 5km.

Scientific Name	Common Name	Habitat constraints	Habitat degraded	Geographic limitations	Sensitivity to gain class	BC Act status	EPBC Act status	Targeted survey	Confirmed Species Credit Species	Justification
		BioNet with microhabitat code 'IC – in cave', observation type code 'E nest-roost', with numbers of individuals >500, or from the scientific literature								
Miniopterus orianae oceanensis	Large Bent-winged Bat (Breeding)	Caves, Cave, tunnel, mine, culvert or other structure known or suspected to be used for breeding including species records with microhabitat code "IC - in cave, " observation type code "E nest-roost, " with numbers of individuals >500			Very High	V	NL	No	No	No suitable breeding habitat present. Habitat constraints of caves, tunnels, culverts etc. are not present. 15 recent records within 5km.
Myotis macropus	Southern Myotis	Hollow bearing trees, Within 200 m of riparian zone, Bridges, caves or artificial structures within 200 m of riparian zone, waterbodies, this include rivers, creeks, billabongs, lagoons, dams and other waterbodies on or within 200m of the site			High	V	NL	No	No	No suitable breeding habitat present. Habitat constraints of hollow bearing trees, caves, tunnels, culverts etc in proximity to waterways are not present. Four recent records within 5km.
Persoonia bargoensis	Bargo Geebung				High	E	V	No	No	Populations not known to the area. Survey during correct period of September – not recorded. No recent records within 5km.
Petaurus norfolcensis	Squirrel Glider				High	V	NL	No	No	Although some suitable habitat present, it is highly fragmented and degraded with little connective habitat. No hollow bearing trees observed. No wild records within 5km. As the subject land is over 600m from a notable patch of bushland (Kanangra Reserve) and highly fragmented from it, it is unlikely the species would forage in the

Scientific Name	Common Name	Habitat constraints	Habitat degraded	Geographic limitations	Sensitivity to gain class	BC Act status	EPBC Act status	Targeted survey	Confirmed Species Credit Species	Justification
										subject land as it is further than a typical home range in urban areas (Goldingay et al. 2010).
Phascolarctos cinereus	Koala (Breeding)	Areas identified via survey as important habitat (see comments).			High	V	V	No	No	Highly fragmented and degraded urban landscape, little connective habitat and negligible suitable foraging habitat within the subject land. No records within 5km.
Pimelea curviflora var. curviflora	*Pimelea curviflora var. curviflora*		Yes		High	V	V	No	No	Highly degraded habitat without a native soil profile. No records within 5km.
Pimelea spicata	Spiked Rice-flower		Yes		High	E	E	No	No	Highly degraded habitat without a native soil profile. 380 records within 5km, however none on the subject land and not identified in the current or previous surveys (Abel Ecology 2018).
Pommerhelix duralensis	Dural Land Snail				High	E	E	Yes	No	Some suitable habitat present, survey during September – not recorded. No records within 5km. Unlikely to migrate into the site due to fragmentation.
Pteropus poliocephalus	Grey-headed Flying-fox (Breeding)	Breeding camps, other			High	V	V	No	No	No breeding camps present. Closest camp is the 'Emu Plains' camp about 5km to the north west.
Pterostylis saxicola	Sydney Plains Greenhood		Yes		Moderate	E	E	No	No	Highly degraded habitat without a native soil profile. No records within 5km. Not near a known population.
Pultenaea pedunculata	Matted Bush-pea				High	E	NL	Yes	No	Suitable habitat present, however populations not known to the area. Survey during September – not recorded. No recent records within 5km.
Thesium australe	Austral Toadflax				Moderate	V	V	No	No	Highly degraded habitat without a native soil profile. No records within 5km. Not identified in previous surveys (Abel Ecology 2018).

NL: Not Listed, V: Vulnerable, E: Endangered, EP: Endangered Population, CE: Critically Endangered
'recent records' refers to records since 2000.

4.4 Targeted threatened species surveys

4.4.1 Survey effort and timing

Targeted surveys were undertaken for relevant species credit species as listed in Table 4-2. Surveys were conducted by two of Total Earth Care's Ecologists over 16 person-hours on the 7th of September 2021. Weather conditions were sunny and ~16ºC. Surveys were conducted under Total Earth Care's Scientific Licence and Animal Research Authority Licence.

4.4.2 Threatened flora survey

Targeted survey for the species credit species, which were identified as requiring survey (Table 4-2.), were undertaken over the subject land.

Threatened flora were surveyed in accordance with *Surveying threatened plants and their habitats* (DPIE 2020c) and with review of the most recent scientific research for each particular species. As the subject land comprises open vegetation (as described in DPIE 2020c), survey transect distances were at least 10m apart to capture all possible plant forms. If a potential threatened species was found and could not be identified using diagnostic details, a specimen would be collected and sent to the Royal Botanic Gardens in accordance with their protocols.

Native and exotic plant species were identified according to *Field Guide to the Native Plants of Sydney* (Robinson, 2003), *Weeds of the south-east: an identification guide for Australia* (Richardson et al. 2016) and PlantNET (RBG 2021) with reference to recent taxonomic changes.

The survey included identification of Key Threatening Processes as listed under the *BC Act* or *EPBC Act* that are in operation that are affecting, or have potential to affect the flora of the site. Any "weed infestations" found during the survey were recorded using a hand held GPS. Weed infestations are defined as:

- Areas where weeds make up > 80% percentage foliage cover
- Weeds of National Significance (WONs)
- Weeds are weeds listed under the *Biosecurity Act 2015*.

4.4.3 Threatened fauna survey

The fauna survey was designed based on results from the desktop study, local knowledge of the area. All threatened species with suitable habitat present were surveyed. Prior to planning the survey, each threatened species was researched to ensure current and effective survey methods were used. The survey methods were in accordance with the *Working Draft Threatened Biodiversity Survey and Assessment Guidelines* (DECC 2004). As no targeted surveys for amphibians and microbats were undertaken, additional current guidelines were not specifically utilised (DPIE 2018, DPIE 2020d).

In general, the fauna survey included:

- Targeted surveys for the Cumberland Plain Land Snail (*Meridolum corneovirens*) and Dural Land Snail (*Pommerhelix duralensis*) (diurnal habitat search)
- Identifying fauna habitats, assessing their condition and assessing their value to threatened fauna species including the recording of hollow bearing trees, where relevant
- Incidental observations of animal activity and searches for indirect evidence of fauna (such as scats, nests, burrows, hollows, tracks, scratches and diggings)
- Survey for avifauna involving visual detection and aural recognition of bird calls
- Identification of Key Threatening Processes (KTPs) as listed under the BC Act and the EPBC Act that are in operation that are affecting, or have potential to affect the fauna of the subject land.

4.4.4 Targeted survey limitations

The surveys were based on relevant current guidelines (DPIE 2020c, DECC 2004) and undertaken in September 2021. As stated by the DECC (2004), 'The absence of a species from survey data does not necessarily mean it does not inhabit the survey area. It may simply mean that the species was not detected at that time with the survey method adopted and the prevailing seasonal or climatic conditions.' As such, the relative brevity of the survey and its timing means that the full spectrum of fauna species and ecological processes likely to occur on the site cannot be fully quantified or described in this report. These limitations have been partly addressed by identifying potential habitats for fauna species and assessing the potential for these species to occur on the site based on previous records, the type and condition of habitats present, the land use throughout the subject land, surrounds and the landscape context.

However as minimum survey requirements have been met and due to the poor quality habitat present within the subject land, it is unlikely that any other species credit species would utilised the area. Nevertheless,

incidental usage of the subject land may be possible as part of larger foraging areas, yet this would be captured by the assessment of 'ecosystem credit species'.

During the survey, Stage 1 construction works were underway to the east of the subject land. Ongoing noise, vibration and emissions impacts may have impacted the diversity of fauna species observed.

When reviewing maps please note that the hand-held GPS equipment used is only accurate to 3 metres.

4.5 Targeted threatened species results

No threatened flora or fauna species were recorded within the subject land. As such, no species credit species were identified for the subject land and no species polygons have been prepared for this assessment.

However, the subject land does provide potential habitat (mostly foraging) for seven threatened species including the Little Lorikeet (*Glossopsitta pusilla*), three microbat species and the Grey-headed Flying-fox (foraging) (*Pteropus poliocephalus*). These resources are captured as ecosystem credit species and were not subject to targeted surveys (refer to Section 4.2).

Additionally, two planted Magenta Lilly Pilly's (*Syzygium paniculatum*) are within the Nepean Hospital campus boundary (Moore Trees 2021). These plants are listed as vulnerable under the BC Act. However, as these plants are not within the subject land and would not be impacted by the proposal, they are not considered further in this assessment.

4.6 Non-threatened species and habitat

Although the subject land provides minimal suitable habitat for threatened species, it still provides habitat for more common species. These species are typical of urban areas and are more resilient of the highly modified and fragmented landscape. Twelve fauna species were recorded during the survey including nine birds, one mammal, one invertebrate and one reptile. Of the 12 species, two were exotic.

4.7 Identification of prescribed impacts

Prescribed additional biodiversity impacts (prescribed impacts) are the impacts identified in clause 6.1 of the BC Regulation. These can be direct or indirect impacts and are additional to the impacts of native vegetation clearing (i.e. PCT 849). In general, prescribed impacts are habitats or features of the environment that are irreplaceable (DPIE 2020b).

Prescribed impacts relevant the subject land and assessment area are provided in Table 4-3. Assessment of prescribed impacts are provided in Section 5.2.3.

Table 4-3. Identification of prescribed impacts

Feature	Present	Description	Potential impact	Threatened species or community using or dependent on feature
Karst, caves, crevices, cliffs, rocks or other geological features of significance	No	None in assessment area	N/A	N/A
Human-made structures	Yes	Several permanent and temporary buildings would be removed for the construction of the proposal.	Demolition of roosting site for microbats and some birds.	Eastern Coastal Free-tailed Bat
Non-native vegetation	Yes	An area of about 671m^2 within a landscaped garden would require removal.	Removal of foraging habitat.	Grey-headed Flying-fox
Habitat connectivity	Yes	Removal of vegetation and construction of new Stage 2 Tower.	Increase localised fragmentation.	None specifically impacted.
Waterbodies, water quality and hydrological processes	Yes	Surface water runoff and changes to hydrology.	Altered hydrology and water quality impacts	None specifically impacted.
Wind farm development	No	Not a wind farm proposal.	N/A	N/A

Feature	Present	Description	Potential impact	Threatened species or community using or dependent on feature
Vehicle strikes	No	Vehicle traffic would not be notably increased.	N/A	N/A

4.8 EPBC Matters of National Environmental Significance

Under the EPBC Act, approval is required for actions that have, will have, or are likely to have a significant impact on MNES (refer to Section 1.8.3). The MNES and their relevance to the proposal are outlined in Table 4-4. The EPBC protected matters search report (5km radius) (DAWE 2021a) is provided in Appendix F.

Table 4-4. MNES relevant to the proposal

MNES	Features (or potential habitat) within 5km of the subject land	Relevance to proposal
National Heritage Places	None	N/A
World Heritage Properties	None	N/A
Wetlands of International Importance	None	N/A
Great Barrier Reef Marine Park	None	N/A
Commonwealth Marine Area	None	N/A
Listed Threatened Ecological Communities	7	No EPBC listed Threatened Ecological Communities are within the subject land, or would be impacted by the proposal. The patch of Cumberland Plain Woodland on site does not meet requirements of the EPBC Act listing (refer to Section 3.2.4.2).
Listed Threatened Species	41	Three species listed under the EPBC Act are considered ecosystem credit species, including: • White-throated Needletail (*Hirundapus caudacutus*), Vulnerable and migratory under the EPBC Act • Swift Parrot (foraging) (*Lathamus discolor*), Critically Endangered under EPBC Act • Grey-headed Flying-fox (foraging) (*Pteropus poliocephalus*), Vulnerable EPBC Act. The potential impacts on these species due to the removal of foraging habitat is assessed in Section 5.
Listed migratory species	15	One migratory species, the White-throated Needletail (*Hirundapus caudacutus*), is considered ecosystem credit species. The potential impacts on these species due to the removal of foraging habitat is assessed in Section 5.

5 IMPACT ASSESSMENT

This section assessed the potential impacts of the proposal on the biodiversity values of the subject land. The assessment of impacts considered measures which have already been taken (Section 5.1) and additional reasonable mitigation and management measures to further avoid and minimise impacts on biodiversity within and adjacent to the subject land. Assessment of the degree of impacts have assumed the implementation of mitigation and management measures listed in Section 6 where there is a high level of certainty the measures would be observed and be achievable. Where uncertainty remains in the achievability of any mitigation and management measures, they are not assumed in the assessment of impacts.

5.1 Avoid and minimise impacts

5.1.1 Proposal location

The positioning of the proposal is limited due to the confines of the Nepean Hospital campus boundary. As considerable biodiversity data has been available since the early stages of design (as informed by the data collected during Stage 1), the location of the proposal was initially selected to avoid biodiversity impacts, particularly areas of the Cumberland Plain Woodland CEEC (PCT 849). The BDAR (Abel Ecology 2018) and arborist report (Moore Trees 2018) completed for the Stage 1 project covered the majority of the subject land and enabled design to consider key biodiversity values.

Furthermore, the location of the Stage 2 Tower is positioned within mostly within area of planted exotic and native vegetation. As such, some areas of Cumberland Plain Woodland CEEC (PCT 849) have been avoided.

5.1.2 Design development

5.1.2.1 Minimising construction impacts

Construction staging has been planned to minimise disturbances and keep them localised as much as possible. This aims to minimise disruption to the hospital operations, and consequently noise and vibration impacts to local fauna. For example, the majority of high vibration works would occur in the early stages of construction due to demolition works (refer to Section 1.2). Currently, engineering approaches to minimise structural borne vibrations (i.e. saw cutting slabs before demolition) are being investigated. However, as these methodologies are not yet confirmed they cannot be included in the impact assessment at this stage.

The major vegetation disturbance is planned for the middle of the construction phase (phase 3) during the establishment of the site around the Stage 2 Tower. This would endeavour to retain much of the mature vegetation for the early part of the construction works.

5.1.2.2 Revegetation and landscaping

The planned revegetation of the subject land has considered the importance of the existing Cumberland Plain Woodland community and aims to incorporate it in the vegetation of the area. Revegetation and landscaping have been planned on the principles of retaining existing character (retained mature trees), support connective corridors, implementing Water Sensitive Urban Design (WSUD) features and connecting people with nature (Arcadia 2021).

Landscape areas shall be planted with a mixture of endemic shrubs, grasses, and groundcovers which feature in the local Cumberland Plain Woodland community. Canopy species include *Eucalyptus moluccana* (Grey Box) and *Eucalyptus tereticornis* (Red Forest Gum) with shrubs and ground storey species including *Bursaria spinosa* (Native Blackthorn), *Acacia decurrens* (Black Wattle), *Daviesia ulicifolia* (Gorse bitter pea), *Asperula conferta* (Common Woodruff), *Lomandra filiformis* (Wattle mat-rush) and *Microlaena stipoides* (Weeping grass). A planting composition is planned to encourage natural competition and to create structured vegetation (Arcadia 2021).

5.2 Assessment of impacts

This section discusses the potential direct and indirect impacts resulting from construction and operation of the proposal.

5.2.1 Direct impacts

5.2.1.1 Vegetation clearing

During construction, the proposal would require the permanent removal of the following vegetation:

- 589 m^2 (0.059 ha) of PCT 849 (Cumberland Plain Woodland CEEC)
- 1175 m^2 (0.112 ha) of planted native vegetation

- 671 m^2 (0.067 ha) of non-native vegetation (refer to Section 5.2.3).

The location of this vegetation removal is shown in Figure 5-1. It would comprise the removal of all stratum layers within these areas including groundcovers, shrubs and mature trees which would result in the future vegetation integrity scores of zero. No notable fauna habitat (i.e. hollow bearings trees, bush rock or fallen logs) would be removed in these areas however it would reduce available foraging habitat.

5.2.1.2 Vegetation modification

Although some areas of PCT 849 would be retained they may be disturbed due to the proximity to the works and further fragmentation. These areas of vegetation modification comprise 374 m^2 (0.037 ha) of PCT 849 and are shown in Figure 5-1. In these areas, increased foot traffic, vegetation trimming and weed incursion may increase degradation of the vegetation during construction and operation. It is expected that only the mature trees would be permanently retained in these areas with potential impacts to the ground and mid-stratum.

As these areas would only be modified and not cleared, a reduced future vegetation integrity score for this area would have been calculated (DPIE 2020c). However, the smallest management zones in the BAM-C can only be 0.1 ha, which is about the site of all the PCT 849 within the subject land. As such, the separate areas of vegetation clearing (Section 5.2.1.1) and vegetation modification cannot be divided in the BAM-C. Therefore, all area of vegetation modification have also be counted as vegetation clearing for the purposes of the BAM-C inputs and have a future vegetation integrity score of zero (a total reduction of 39.9). This approach enables offsetting for the areas of clearing and is considered a better overall outcome for the vegetation impacts.

5.2.1.3 Loss of fauna forging habitat

The clearing and modification of native vegetation, including both PCT 849 and the planted native vegetation, permanently impact a small amount (~0.21 ha) of foraging habitat for bird and mammal species. This would include the loss of native flowering trees including *Corymbia maculata* (Spotted Gum), *Banksia integrifolia* (Coast Banksia) and *Melaleuca styphelioides* (Prickly-leaved Tea Tree) which provide feeding resources for common urban species as well as ecosystem credit species such as Grey-headed Flying-fox, Little Lorikeet and Swift Parrot.

Although foraging resources would be reduced by the works, due to the small nature of vegetation impacts and fragmentation of the subject land from preferred habitat, the importance of the habitat to threatened species is considered low and impacts would be minor.

5.2.2 Indirect impacts

5.2.2.1 Inadvertent impacts on adjacent habitat or vegetation

During construction, clearing and construction activities would have a minor temporary impact to adjacent vegetation throughout the entire construction period. This is particularly likely for areas of ground storey planted native vegetation within the subject land which may be trampled by increased foot and vehicular traffic. As this vegetation provides minor foraging habitat, the potential impacts to adjacent habitat are negligible. Due to all works being ground based, no impacts to aerial habitats of passing birds (i.e. White-throated Needletail) are expected.

During operation, permanent minor impacts are expected due to increased foot and vehicular traffic. However, this would be marginal due to the current ongoing operations of the active hospital.

5.2.2.2 Reduced viability of adjacent habitat due to edge effects

During construction and operation, the proposal is expected to have negligible impact on habitat due to edge effects (i.e. altered composition, increased predation, microclimate). This is primarily due to the subject land already being highly fragmented and modified and subject to persistent edge effects of the active hospital. Furthermore, the vegetation currently provides minimal habitat, opportunistically utilised by fauna.

5.2.2.3 Reduced viability of adjacent habitat due to noise, dust or light spill

During construction, clearing and construction activities would have a minor temporary impact to adjacent vegetation due to noise, vibration, dust and light spill. Impacts would be persistent throughout the entire construction period. The intensity of which would be dependent on specific construction activities, for example increased noise and vibration during piling works during standard construction hours. Minor light spill can be anticipated during day and night within the subject land. However, as much of the vegetation comprises landscaped plantings and due to the fragmented nature of the remaining vegetation across the Nepean Hospital campus boundary, impacts would be minor.

During operation, permanent minor impacts are expected due to increased foot and vehicular traffic. However, this would be marginal due to the current ongoing operations of the active hospital.

5.2.2.4 Transport of weeds and pathogens from the site to adjacent vegetation

During construction, the increased foot and vehicular movement of workers, plant and equipment would temporarily increase the spread of weeds and pathogens to a minor degree throughout the entire construction period. This increases the risk of vegetation degradation and loss of species diversity. However, due to the areas of PCT 849 comprising only remnant trees (with little native ground cover), the planted native vegetation being primarily in landscaped garden beds, and ongoing landscape management work being undertaken on the Nepean Hospital campus grounds, the risk is considered low.

During operation, permanent minor impacts are expected due to increased foot and vehicular traffic. However, this would be marginal due to the current ongoing operations of the active hospital and ongoing landscape management work.

5.2.2.5 Increased risk of starvation, exposure and loss of shade or shelter

During construction and operation, the proposal would increase shade from the eastern side of the subject land. The construction of new Stage 2 Tower would increase morning shade due to the seven-storey building. However, increased shade has been increasing across the Nepean Hospital campus in the recent year due to the current construction of the Stage 1 components including the Stage 1 Tower (to the east) and new multi-storey carpark (to the west). Nevertheless, the vegetation species to be retained are considered resilient to this alteration in light availability. There are no sensitive species recorded within the subject land that would likely be impacted by these permanently changed conditions.

5.2.2.6 Loss of breeding habitats

During construction and operation, the proposal is not expected to remove breeding habitat associated with native vegetation. No hollow bearing trees or other key habitat features (i.e. bush rock, fallen logs) would be removed. Nevertheless, the vegetation may be utilised for nesting of some urban species such as Noisy Minors (*Manorina melanocephala*), Australian Magpies (*Gymnorhina tibicen*) and Common Ringtail Possum (*Pseudocheirus peregrinus*). The subject land is not considered suitable to support breeding habitat for threatened species.

5.2.2.7 Trampling of threatened flora species

During construction and operation, the proposal would not increase the risk of trampling of threatened flora species as none are present within the subject land. Additionally, it is unlikely and that any threatened flora species would appear in the subject land (unless intentionally planted) in the future due to the highly disturbed nature of the site and lack of natural soil profiles.

5.2.2.8 Inhibition of nitrogen fixation and increased soil salinity

During construction, contaminated surface runoff from construction activities has the potential to temporarily impact soil microflora and thus inhibit nitrogen fixation. However, with the observation of standard management measures, the risk of this is low. No impact to salinity is expected.

During operation, reduced microclimates due to increased shading of the Stage 2 Tower may support minor long-term improvements to surface soil biota, particularly during periods of drought and high temperatures increasingly common in western Sydney. Nevertheless, ongoing landscape management work is likely to override any minor atmospheric alterations (i.e. by provision of fertiliser, soil improvers and watering)

5.2.2.9 Fertiliser drift

During construction and operation, no change to current fertiliser drift is expected. The extent of the landscaping works during operation would be similar to the current extent and thus is expected to be similar to current usage. The utilisation of native species local to the area would moderate the requirement of fertilisers.

5.2.2.10 Rubbish dumping

During construction and operation, the proposal would not increase the risk of impacts relating to rubbish dumping. The current land usage as an active hospital would continue which would limit opportunities for rubbish dumping with the subject land. Volumes and types of waste during construction would be managed appropriately and would not indirectly impact flora and fauna. During operation, the provision of bins would manage the disposal of domestic waste.

5.2.2.11 Wood collection

There is no fallen timber within the subject land and due to the site as an active hospital, the collection of live trees as timber is not possible. During construction and operation, the proposal would not increase the risk of wood collection.

5.2.2.12 Bush rock removal and disturbance

There is no bush rock within the subject land. During construction and operation, the proposal would not increase the risk of bush rock removal and disturbance.

5.2.2.13 Increase in predatory species populations

The subject land and assessment area is already highly urbanised and already subject to impacts from predatory species (i.e. cats). During construction and operation, the proposal is not expected to increase predatory species populations as the works would not support habitat for these species or notably increase stress on native prey species. This is primarily due to the operational land use in which no animals (except specifically trained support animals) are permitted on the subject land.

5.2.2.14 Increased risk of fire

During construction, hot works have the potential to temporarily increase fire risk to a minor degree. However, with the observation of standard management measures, the risk of this is low. Due to the landscaped nature of planned vegetation and the lack of considerable understory, no change to fire risk is expected during operation.

5.2.2.15 Disturbance to specialist breeding and foraging habitat

No species with specialist breeding or forging habitats are likely to utilise the subject land. As such, during construction and operation, the proposal would not impact specialist species.

5.2.3 Prescribed impacts

The following sections discuss the relevant prescribed impacts identified in Section 4.7.

5.2.3.1 Human-made structures

Several permanent and temporary buildings would be removed for the construction of the proposal. These include the existing north block, pathology buildings and Hope Cottage (refer to Section 1.2 and Figure 1-2). These human-made structures provide possible roosting and nesting habitat for several species including Welcome Swallows, Common Brushtail Possums and the threatened Eastern Coastal Free-tailed Bat. Although the Eastern Coastal Free-tailed Bat has not been recorded on site, the removal of human-made structures is considered a potential impact to the species as it is known to move breeding sites regularly (every few days) (DPIE 2021a).

The removal of this habitat is temporary as new structures would replace the buildings removed during operation. However, if fauna is forced to vacate the buildings during demolition and discouraged from the area during construction, it is possible they would not relocate in the new buildings. Additionally, due to the height of the Stage 2 Tower and modern condition of building, the accessibility for fauna to utilise it as habitat is low. Nevertheless, due to the lack of evidence of the species currently utilising the structures, and the active nature of the buildings, the potential impact is low.

5.2.3.2 Non-native vegetation

During construction, about 671 m^2 (0.067 ha) of non-native vegetation would be removed. This comprises of commonly planted landscaping species including *Photinia x fraseri* (Photinia), *Jacaranda mimosifolia* (Jacaranda) and *Strelitzia nicolai* (Bird of Paradise). The removal of this vegetation would be permanent and occur during a single event (prior to construction of the Stage 2 Tower). The removal of this vegetation would permanently remove opportunistic foraging and feeding resources for urban fauna. It is not considered suitable habitat for threatened species, expect for positional foraging resources for the Grey-headed Flying-fox.

During operation, no vegetation would be re-planted in this area as it is the planned location for the Stage 2 Tower. However, in surrounding areas new plantings would be established with native species (Arcadia 2021) which are considered more suitable habitat for local fauna. Nevertheless, this overall change is negligible.

5.2.3.3 Habitat connectivity

During construction, vegetation clearing, temporary fencing and construction activities would temporarily reduce localised connectivity within the subject land. However, as the campus is already highly fragmented and the fauna species known to utilise the subject land are highly mobile (i.e. birds and few arboreal mammals), the impact is considered low.

During operation, connectivity of the subject land would remain largely similar to the present condition in the long-term. Revegetation and landscaping aim to enhance connectivity within the subject land with structured plantings of all canopy layers (Arcadia 2021). On the assessment area scale, the impact of the proposal on

connectivity would be negligible. The works would not alter landscape scale movement of fauna and fauna or impact migration, breeding, genetic diversity of populations or resource availability within the locality.

5.2.3.4 Waterbodies, water quality and hydrological processes

During construction, installation of temporary bunding and hard stand areas would temporarily alter surface and ground hydrology within the subject land. This is already evident as part of the Stage 1 construction works with several swales and new stormwater infrastructure being recently installed in the eastern end of the subject land (within the patch pf PCT 849). Due to the highly modified nature of the vegetation and intentional landscape plantings, much of the vegetation is resilient to minor changes in hydrology. However, during high rainfall events, increased surface flows (including the movement of contaminated surface water) may damage ground stratum vegetation and increase sedimentation in low point of the landscape, yet to a minor degree.

During operation, increased hard stand surface area would result in a minor permanent increased volume and velocity of local surface water. It would also reduce the surface availability for infiltration of groundwater. However, due to the installation of stormwater infrastructure and the ongoing landscape management work, the impacts are considered negligible. Permanent changes in hydrology are not expected to impact the native vegetation within the subject land. Due to the distance of the proposal from waterways, no short or long-term impacts to waterbodies or waterways are expected.

5.2.3.5 Vehicle strikes

During construction, increased light and heavy vehicle movements would be required for the delivery and transport of staff and materials. This would temporarily increase the risk of vehicle strikes to fauna within the subject land and on surrounding roads. However, with the implementation of low speed limits and exclusion fencing within the construction site, the risk of vehicle strikes to fauna is considered low.

During operation, vehicle movements are expected to increase to a minor degree within the subject land due to the installation of the new internal loop road. However, due to the lack of large ground-based fauna (i.e. wallabies) utilising the subject land and the low speed limit (10-20 km/hr) implemented, the long term risk of vehicle strikes to fauna is considered negligible.

5.2.4 Key Threatening Processes

Key Threatened Processes (KTPs) are processes that threaten the survival, abundance or evolutionary development of a native species or ecological communities. Several KTPs are listed under the BC Act, FM Act and EPBC Act. Relevant KTPs are described in Table 4-4.

Table 5-1. KTPs impacting the subject land

KTP	Relevant Acts	Likelihood of the project directly or indirectly contributing to the KTP
Aggressive exclusion of birds from woodland and forest habitat by abundant Noisy Miners, *Manorina melanocephala*	BC Act, EPBC Act	Low: the subject land is already highly fragmented and within an urbanised environment. The works are not expected to have a considerable impact on the local populations or abundance of noisy miners.
Anthropogenic Climate Change	BC Act, EPBC ACt	Low: Although the proposal would have a considerable addition to local emissions, particularly during construction, the direct impact on climatic habitat is considered low due to the highly urbanised area of the existing hospital.
Clearing of native vegetation	BC Act, EPBC Act	Low: The proposal would result in the removal of about 0.16 ha of native vegetation. This comprises a native community (PCT 849) and planted native vegetation. This would remove foraging habitat for several bird and mammal species.

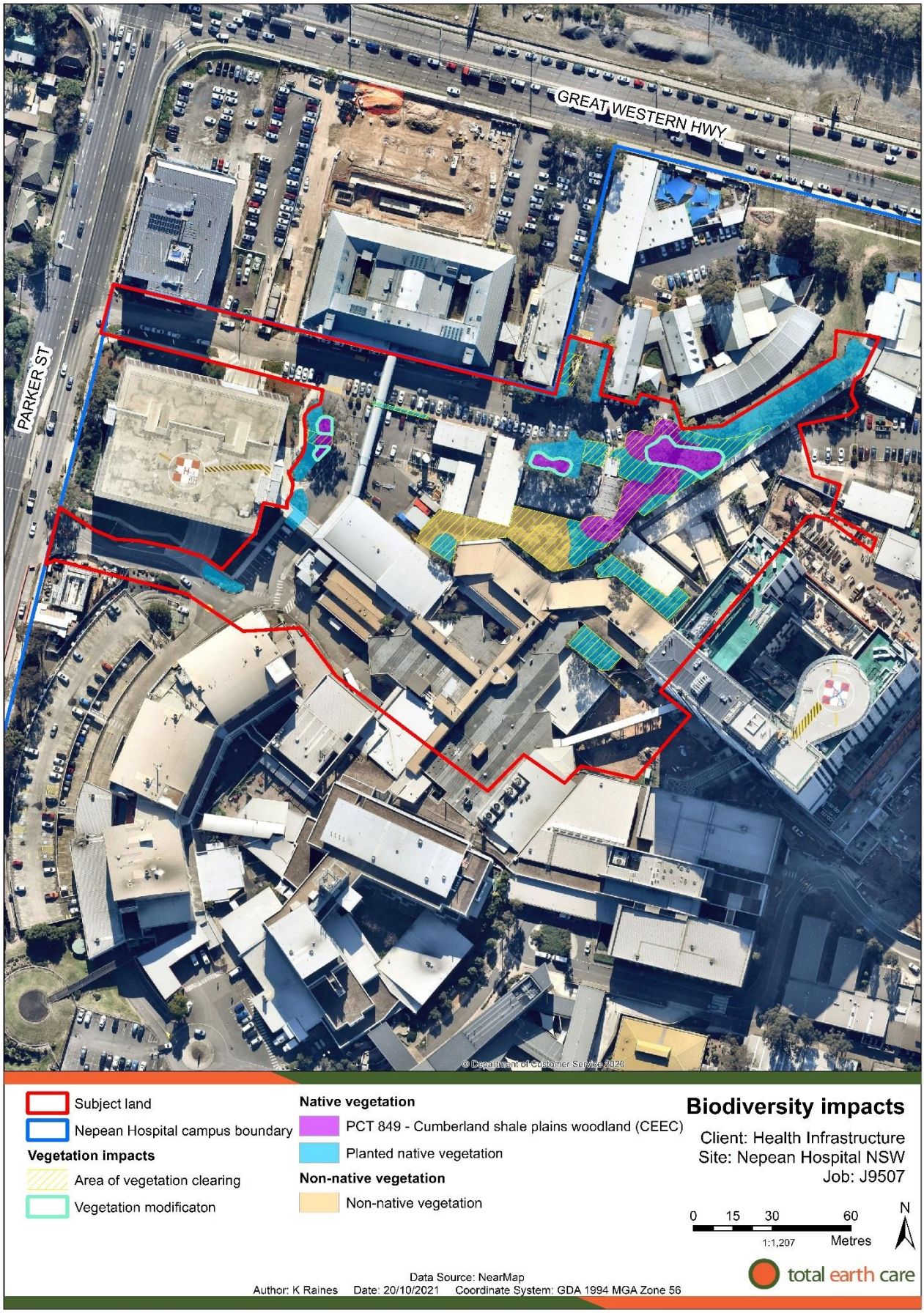


Figure 5-1. Biodiversity impacts

6 MITIGATION AND MANAGEMENT MEASURES

A list of reasonable mitigation and management measures are provided in Table 6-1 to minimise impacts described in Section 5.2.

Table 6-1. Mitigation and management measures

ID	Action	Purpose	Timing	Responsibility
B1	Should the detailed design or construction planning determine the need for additional clearing of vegetation within mapped areas of PCT 849, revision of the BDAR would be required to determine if offsetting is adequate.	Offsetting the loss of PCT 849 (Cumberland Plain Woodland)	Detailed design, construction	Construction contractor
B2	A flora and fauna sub-plan will be implemented into the CEMP. It will address protocols for vegetation clearing, hygiene, weed management, unexpected finds and inductions/ toolbox talks. It will outline the responsibilities for key staff including the Project Ecologist and Project Arborist.	Manage risks to flora and fauna during construction activities.	Pre-construction	Construction contractor
B3	Erosion and sediment control must be detailed in an Erosion and Sediment Management Plan sub plan in the CEMP. This will include types of control, method of installation, locations, maintenance regime, responsibilities, and stockpile storage. These may include, but are not limited to, silt fencing, vehicle shake-down, floating silt boom, and stabilisation access for machinery.	Avoid spread of sediment into retained vegetation	Pre-construction	Construction contractor
B4	Disturbance of vegetation will be limited to the smallest degree possible to construct the project. All trees nominated for removal will be clearly demarked (with paint or flagging tape) by the Project Ecologist or Project Arborist prior to removal.	Minimising impact to trees	Pre-construction, construction	Construction contractor
B5	No rubbish, debris, or vegetation waste is to be dumped in the retained vegetation. All waste must be stored in ancillary areas and removed from site to a suitably licenced waste facility.	Minimise impacts to vegetation.	Pre-construction, construction	Construction contractor
B6	Where space restrictions allow, Tree Protection Zones (TPZs) will be installed around trees (over 100mm DBH, or otherwise specified by the Project Arborist) to be retained using appropriate demarcation in accordance with AS 4970-2009 Protection of Trees on Development Sites. Where TPZs are not feasible, alternative measures will be implemented including branch and trunk protection in consultation with the Project Arborist.	Minimise impacts to trees	Pre-construction, construction	Construction contractor
B7	Plant and equipment will be turned off when not in use to avoid noise and air quality impacts to nearby fauna.	Minimise impacts to fauna	Construction	Construction contractor
B8	A qualified and experienced Project Ecologist will be engaged to inspect trees prior to and during removal and relocate fauna if required. This process will be documented for record keeping and be in accordance with the Biodiversity Guidelines (RTA 2011).	Minimise impacts to fauna	Construction	Construction contractor
B9	If any fauna are identified during works and require rescue, the Project Ecologist, or fauna rescue volunteer, is to be notified. Rescue volunteers include either Sydney Metro Wildlife on 9413 4300 or WIRES on 1300 094 737.	Minimise impacts to fauna	Construction	Construction contractor
B10	Implement best practice for hygiene to prevent the spread of invasive weeds. Inspect vehicles and plants for mud and soils before entering and leaving site.	Minimise risk of weed spread	Construction	Construction contractor

ID	Action	Purpose	Timing	Responsibility
	Stockpiles of materials containing invasive weed plant matter should be covered and bunded to prevent spread. Manage biosecurity in accordance with: • *Biosecurity Act 2015* (see NSW Weedwise). • Best practise bush regeneration techniques, including disposal of sealed bagged weeds to a licenced waste disposal facility.			
B11	Landscape planning will include the use of local provenance species consistent with PCT 849 and in accordance with the Master Plan (Arcadia 2021).	Support the persistence of PCT 849 (Cumberland Plain Woodland)	Construction, post construction	Construction contractor
B12	The approaches for ongoing management of the landscaped areas and remaining vegetation will be implemented into the Nepean Hospital's landscape management plan (or equivalent).	Support the persistence of PCT 849 (Cumberland Plain Woodland)	Post construction	HI Infrastructure

7 IMPACT SUMMARY

7.1 Identification and assessment of Serious and Irreversible Impacts (SAII)

To identify if an impact is considered 'serious or irreversible', assessment must be made to specific entities at risk of Serious and Irreversible Impacts (SAII) under the principles set out in clause 6.7 of the *Biodiversity Conservation Regulation 2017*. The principles are aimed at capturing impacts which are likely to contribute significantly to the risk of extinction of a threatened species or ecological community in NSW.

Of the threatened species and communities identified in this BDAR (Section 4), Cumberland Plain Woodland CEEC is the only entity at risk of Serious and Irreversible Impacts (SAII). Table 7-1 provides the assessment of SAII for the Cumberland Plain Woodland CEEC under the requirements Section 9.1.1 of the BAM (DPIE 2020a).

Table 7-1. Assessment of SAII for the Cumberland Plain Woodland CEEC

Criteria	Sub criteria	Response
Data in the Threatened Biodiversity Data Collection (TBDC)	Threshold:	Under development
	Threshold condition:	Under development
The impact on the geographic extent of the TEC	Hectares	589 m^2 (0.059 ha) resulting from clearing. Due to existing condition of the TEC, minor indirect impacts are expected from fragmentation, altered hydrology etc (refer to Section 5.2)
	Percentage of the current geographic extent in NSW.	There is estimated 6800 ha remining in NSW (DPIE 2021a). The subject land contains about 0.001% of this extent.
The extent that the proposed impacts are likely to contribute to further environmental degradation or the disruption of biotic processes	Estimate the size of any remaining, but now isolated, areas of the TEC	374 m^2 (0.037 ha) would remain within the subject land. This comprises of a few remnant isolated trees (Figure 7-1).
	Describe the impacts on connectivity and fragmentation of the remaining areas of TEC	The removal of about 60% (589m^2) of the TEC within the subject land would increase the current fragmentation of the patch. However, the patch is already highly fragmented from the surrounding area and comprises only remnant canopy trees. The nearest notable patch of vegetation is at Kanagra Reserve, about 650m to the north. Between this, the landscape is highly urbanised with few remnant or planted species consistent with the TEC.
	Describing the condition of the TEC according to the vegetation integrity score for the relevant vegetation zone(s)	The current condition of the TEC is low due to few of ground and mid-storey species consistent with the TEC (39.9). The patch consists of a few remnant trees (refer to Section 3.2.1). Due to the small size of the patch proposed to be retained (374 m^2), the BAM- C cannot distinguish between the vegetation to be removed and that to be retained (refer to Section 5.2.1.2). As such, the future vegetation integrity score for all the TEC within the subject land has been calculated at zero.

7.2 Impacts that require offsetting

The impacts (clearing and modification) of all PCT 849 (Cumberland Plain Woodland CEEC) within the subject land (Zone 1) will require offsets. Although only 589 m^2 (0.059 ha) is proposed to be cleared, a total of 0.1 ha has been calculated to require offsetting. This is due to the BAM-C rounding up to a minimum size of 0.1 ha and the inability to distinguish between clearing and modification impacts below a size of 0.1 ha (refer to Section 5.2.1).

The extent of the area requiring offsetting is shown in Figure 7-1.

7.3 Impacts that do not require offsetting

The following impacts do not require offsetting:

- removal of 1175 m^2 (0.112 ha) of planted native vegetation
- removal of 671 m^2 (0.067 ha) of non-native vegetation*
- prescribed impacts.

*the areas of non-native vegetation do not require assessment for ecosystem credit species (DPIE 2020a).

Due to the relative minor nature of indirect impacts and prescribed impacts, it is not necessary for additional credits to be retired.

The extent of the areas not requiring offsetting are shown in Figure 7-1.

7.4 Applying the no net loss standard

This section outlines the ecosystem credits and species credits generated from the BAM-C.

7.4.1 Ecosystem credits

Ecosystem credits are calculated to offset the impacts on TECs, threatened species habitat for species that can be reliably predicted to occur with a PCT. The calculation is made based on the change in vegetation integrity score, the biodiversity risk weighting for the PCT and the area being impacted.

The ecosystem credits required to be offset are provided in Table 7-2.

Table 7-2. Ecosystem credits

Entity	Status	SAII entity	No. of credits	Biodiversity risk rating	Like-for-like options
PCT 849 - Cumberland shale plains woodland	Cumberland Plain Woodland in the Sydney Basin Bioregion TEC – CEEC under BC Act	Yes	2	2.5	Cumberland Plain Woodland in the Sydney Basin Bioregion (PCT 849, 850). In Cumberland, Burragorang, Pittwater, Sydney Cataract, Wollemi and Yengo IBRA regions or any IBRA subregion that is within 100 km of the outer edge of the impacted site.

The credit summary report, biodiversity credit reports and payment report are provided in Appendix G, Appendix H and Appendix I, respectively.

7.4.2 Species credits

Species credits are required to offset impacts on individual threatened species or their area of habitat.

No species credits are required for this proposal.

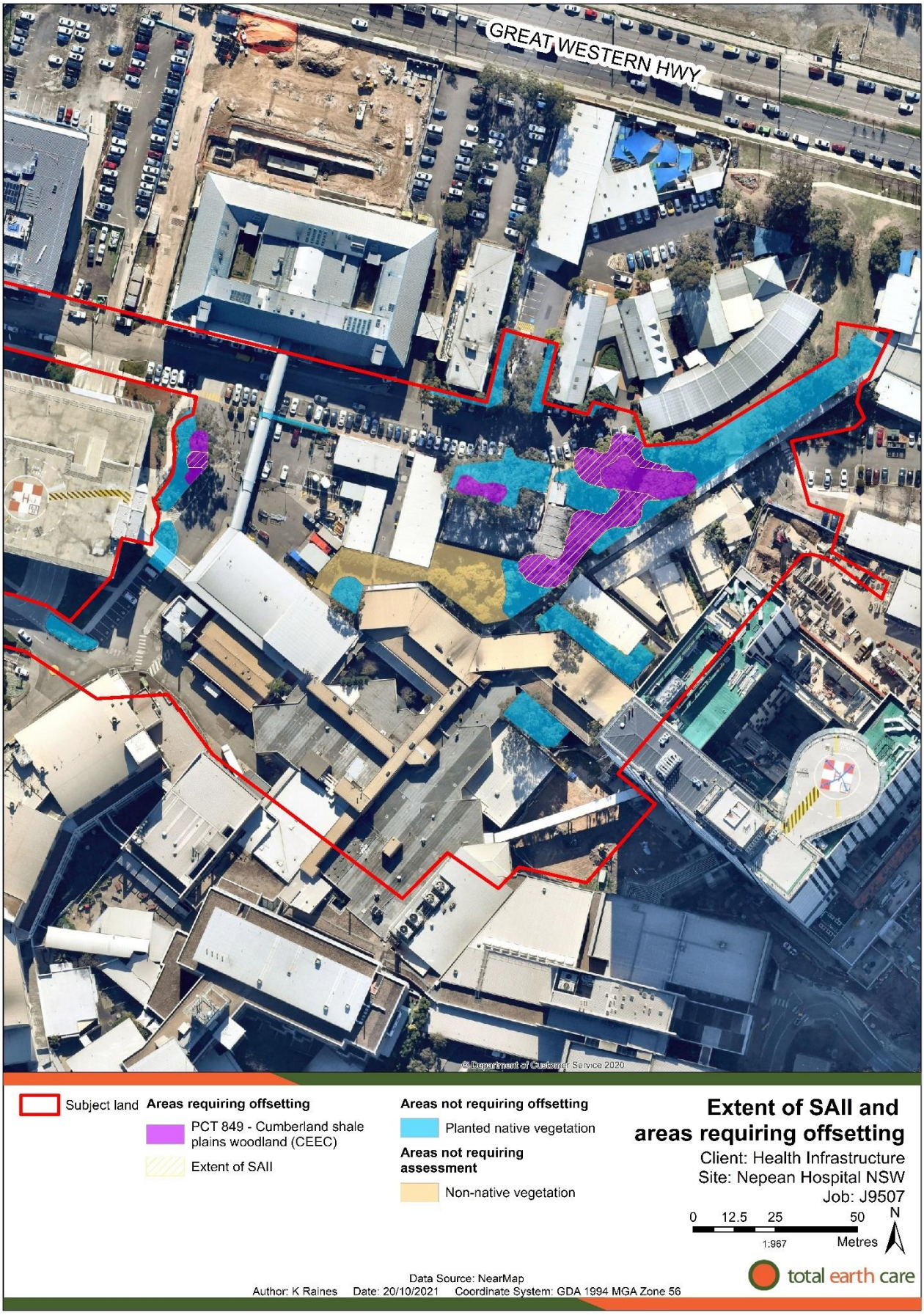


Figure 7-1. Extent of SAII and areas requiring offsetting

REFERENCES

Abel Ecology (2018). *Biodiversity Development Assessment Report*. Prepared for For Health Infrastructure NSW, CBRE

Arcadia (2021). Nepean Hospital Masterplan. *Stage 2 landscape SSDA Landscape report*. Draft August 2021.

BVN Architecture (2021). *2109-01 SSDA Construction Staging Planning*. Issues A [drawings].

Cropper, S.C. (1993). *Management of Endangered Plants*. CSIRO Publications Victoria

Department of Agriculture, Water and Environment (DAWE) (2021a). *EPBC Act Protected Matters Report Tool*. Available at: http://www.environment.gov.au/webgis-framework/apps/pmst/pmst.jsf

Department of Agriculture, Water and Environment (DAWE) (2021b). *National Flying-fox monitoring viewer.* Available at: https://www.environment.gov.au/webgis-framework/apps/ffc-wide/ffc-wide.jsf

Department of Agriculture, Water and Environment (DAWE) (2021c). *Directory of Important Wetlands in Australia.* Available at: https://www.environment.gov.au/water/wetlands/australian-wetlands-database/directory-important-wetlands

Department of Agriculture and Water Resources (DAWR) (2017). *Australian Weeds Strategy*. Commonwealth of Australia, Canberra.

Department of Environment and Climate Change (DECC) (2004). *Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities. Working Draft.* NSW Department of Environment and Climate Change, Sydney.

Department of the Environment and Energy (DEE) (2012). *Interim Biogeographic Regionalisation for Australia (Subregions - States and Territories) v.7* (IBRA)

Department of the Environment and Energy (DEE) (2018). *Interim Biogeographic Regionalisation for Australia (Regions) v.7* (IBRA)

Department of the Environment, Water, Heritage and the Arts (DEWHA) (2010). *Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest.* Available at: https://www.environment.gov.au/system/files/resources/3c01d3d1-c135-4d91-a605-f5730975d78c/files/cumberland-plain-shale-woodlands.pdf

Department of Planning, Industry and Environment (DPIE) (2021a). *Atlas of NSW Wildlife Bionet Database [Online].* Available at https://www.environment.nsw.gov.au/atlaspublicapp/UI_Modules/ATLAS_/AtlasSearch.aspx

Department of Planning, Industry and Environment (DPIE) (2021b). Biodiversity Values Map. [Online]. Available at: https://www.lmbc.nsw.gov.au/Maps/index.html?viewer=BOSETMap

Department of Planning, Industry and Environment (DPIE) (2021c). *eSPADE* [Online]. Available at: https://www.environment.nsw.gov.au/eSpade2WebApp#

Department of Planning, Industry and Environment (DPIE) (2021d). *Area of Outstanding Biodiversity Value register* [online]. Available at: https://www.environment.nsw.gov.au/topics/animals-and-plants/biodiversity/areas-of-outstanding-biodiversity-value/area-of-outstanding-biodiversity-value-register

Department of Planning, Industry and Environment (DPIE) (2021e). *BioNet Vegetation Classification* [online] Available at: www.environment.nsw.gov.au/research/Visclassification.htm

Department of Planning, Industry and Environment (DPIE) (2020a). *Biodiversity Assessment Method*.

Department of Planning, Industry and Environment (DPIE) (2020b). *Biodiversity Assessment Method 2020 Operational Manual – Stage 1*

Department of Planning, Industry and Environment (DPIE) (2020c). *Surveying threatened plants and their habitats.* Available at: https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Animals-and-plants/Biodiversity/surveying-threatened-plants-and-habitats-nsw-survey-guide-biodiversity-assessment-method-200146.pdf

Department of Planning, Industry and Environment (DPIE) (2020cd). *NSW Survey Guide for Threatened Frogs - A guide for the survey of threatened frogs and their habitats for the Biodiversity Assessment Method.* Available at: https://www.environment.nsw.gov.au/research-and-publications/publications-search/nsw-survey-guide-for-threatened-frogs

Department of Planning, Industry and Environment (DPIE) (2019a). *Sydney Basin - subregions*. [online] Available at: https://www.environment.nsw.gov.au/bioregions/SydneyBasin-Subregions.htm [Accessed 28 July 2021].

Department of Planning, Industry and Environment (DPIE) (2019b). *Cumberland Plain Woodland in the Sydney Basin Bioregion - critically endangered ecological community listing.* Available at: https://www.environment.nsw.gov.au/topics/animals-and-plants/threatened-species/nsw-threatened-species-scientific-committee/determinations/final-determinations/2008-2010/cumberland-plain-woodland-critically-endangered-ecological-community-listing

Department of Planning, Industry and Environment (DPIE) (2019c). *Biodiversity Assessment Method Operational Manual – Stage 2.*

Department of Planning, Industry and Environment (DPIE) (2018). '*Species credit' threatened bats and their habitats NSW survey guide for the Biodiversity Assessment Method*. Available at: https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Animals-and-plants/Threatened-species/species-credit-threatened-bats-survey-guide-180466.pdf

Department of Planning, Industry and Environment (DPIE) (2016). *NSW (Mitchell) Landscapes* - version 3.1. Available at: https://datasets.seed.nsw.gov.au/dataset/nsw-mitchell-landscapes-version-3-1

Department of Planning, Industry and Environment (DPIE) (2015). *Remnant Vegetation of the western Cumberland subregion, 2013 Update. VIS_ID 4207* [dataset].

Department of Planning, Industry and Environment (DPIE) (2020). *Biodiversity Assessment Method*. Available at: https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Animals-and-plants/Biodiversity/biodiversity-assessment-method-2020-200438.pdf

Environment Australia (2000). *Revision of the Interim Biogeographic Regionalisation of Australia (IBRA) and the Development of Version 5.1.–Summary Report.*

Environment Protection Authority (EPA) (2021a). *Search the contaminated land record*. Available at: https://apps.epa.nsw.gov.au/prclmapp/searchregister.aspx

Environment Protection Authority (EPA) (2021b). *List of notified sites*. Available at: https://www.epa.nsw.gov.au/your-environment/contaminated-land/notified-and-regulated-contaminated-land/list-of-notified-sites

Goldingay, Sharpe & Dobson (2010). Variation in the home-range size of the squirrel glider (*Petaurus norfolcensis*). Australian Mammalogy 32(2) 183-188

Keith D. (2004) *Ocean Shores to Desert Dunes. The native vegetation of New South Wales and the ACT.* Department of Environment and Conservation (NSW), Hurstville

Local Land Services (LLS) (2019). *Greater Sydney Regional Strategic Weed Management Plan 2017-2022*. Greater Sydney Local Land Services

Mitchell, P. (2002). *Descriptions for NSW (Mitchell) landscapes Version 2.* Department of Environment and Climate Change: Sydney, Australia.

Morgan, G. (2001). *Delineation and description of the Eastern Environmental Subregions (provinces) in New South Wales Study*. NSW National Parks & Wildlife Service.

Moore Trees (2018). *Aborcultural Development Assessment Report. Nepean Hospital and Integrated Ambulatory Services Redevelopment.* Final, July 2018.

Moore Trees (2021). *Aborcultural Development Assessment Report.* Draft 1, June 2021. Prepared for Health Infrastructure.

Nearmap (2021). *Nearmap* [online]. Retrieved 15/07/2021, from: http://maps.au.nearmap.com/

NSW Government (2020). *Draft Cumberland Plain Woodland Plan. A conservation plan for Western Sydney to 2056.* Published by the Department of Planning, Industry and Environment, August 2020.

Office of Environment and Heritage (OEH) (2016). *The Native Vegetation of the Sydney Metropolitan Area. Volume 2: Vegetation Community Profiles.* Version 3.0. Office of Environment and Heritage, Department of Premier and Cabinet, Sydney.

Richardson, F.J., Richardson, R.G. and Shepherd, R.C.H. (2016). *Weeds of the south-east: an identification guide for Australia* (No. Ed. 3). CSIRO.

Road and Traffic Authority (RTA) (2011). *Biodiversity Guidelines*. Available at: https://roads-waterways.transport.nsw.gov.au/business-industry/partners-suppliers/documents/guides-manuals/biodiversity_guidelines.pdf

Robinson L (2003). *Field Guide to the Native Plants of Sydney*. Kangaroo Press, Sydney.

Royal Botanic Gardens (RBG) (2021). *PlantNet* [online]. Royal Botanic Gardens and Domain Trust Version 2.0. Available at: https://plantnet.rbgsyd.nsw.gov.au/

APPENDIX A – BAM PLOT FIELD DATA SHEETS

-This document has not been endorsed or approved by Office of Environment and Heritage or Muddy Boots Environmental Training-

BAM Site – Field Survey Form

Site Sheet no: 1/2

		Survey Name	Zone ID	Recorders		
Date	7 9 21	NH1	Zone 1	KR, WT		
Zone: 56	Datum: GDA 94	Plot ID	1	Plot dimensions	50x20	Photo #
Easting: 288246	Northing: 6262242	IBRA region	Cumb?	Midline bearing from 0 m	60°	
Vegetation Class		Poor			Confidence: H M L (M)	
Plant Community Type		849		EEC:	Confidence: H M L (L)	

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

20x20 C

BAM Attribute (400 m² plot)		Sum values
Count of Native Richness	Trees	6
	Shrubs	4
	Grasses etc.	1
	Forbs	2
	Ferns	0
	Other	0
Sum of Cover of native vascular plants by growth form group	Trees	49.1
	Shrubs	7.6
	Grasses etc.	1
	Forbs	0.1
	Ferns	0
	Other	0
High Threat Weed cover		0.02

50x20

BAM Attribute (1000 m² plot)		
DBH	# Tree Stems Count	# Stems with Hollows
80 + cm		0
50 – 79 cm	II	0
30 – 49 cm	I	0
20 – 29 cm	IIIII	0
10 – 19 cm	IIII	0
5 – 9 cm	~~IIII~~ I	0
< 5 cm	I	n/a
Length of logs (m) (≥10 cm diameter, >50 cm in length)	0 no logs present.	

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)	20	15	30	20	15	50	70	5	20	5	0	0	0	2	0	20	8	2	2	0
Average of the 5 subplots	22					30					0.4					6.4				

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	artificial drainage stormwater + altered landform + major roadways
Lithology		Soil Surface Texture		Soil Colour	light grey brown	Soil Depth	
Slope	15° western slope	Aspect	west	Site Drainage		Distance to nearest water and type	TBC

Plot Disturbance	Severity code	Age code	Observational evidence:
Clearing (inc. logging)	3	O	
Cultivation (inc. pasture)	0	—	
Soil erosion	1	NR	
Firewood / CWD removal	0	—	
Grazing (identify native/stock)	0	—	
Fire damage	0	—	
Storm damage	1	NR	
Weediness			
Other	1	NR	Planted exotics + exotic grasses

Severity: 0=no evidence, 1=light, 2=moderate, 3=severe
Age: R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

Planted area w/ few remnant natives, various small patches of memorial gardens w/ plaques & signs. Not natural landform due to development

400 m² plot: Sheet 2 of 2	Survey Name	Plot Identifier	Recorders
Date / /			KR. WT

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
	Eucalyptus moluccana	N	15%	1		
	Eucalyptus tereticornis	N	25%	2		
	E. sideroxylon	N	2	1		
	Melia azedarach	N	5	2		
	Callistemon salignus	N	5	1		
	Allocasuarina torulosa	N	2	4		
	Lupanthopsis anacardioides	N	0.1	1		
	Melaleuca decora	N	2	3		
	Nandina domestica	E	1	2		
	Grevillia "Moon light"	E	0.1	1		
	Lolium perenne	E	30	100		
	Ehrharta erecta	E	0.1	20		
	Poa annua	E	1	200		
	Cynodon dactylon	N	1	200		
	Eragrostis curvula	E	0.1	1		
	Dianella caerulea	N	0.1	1		
	Sonchus oleraceus	E	0.1	4		
	Callistemon viminalis (C.V.)	N	0.5	2		
	medicago sp.	E	0.01	5		
	Malva sp	E	0.01	4		
	Capsella bursa-pastoris	E	0.01	30		
	Plantago lanceolata	E	0.01	2		

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 B – SPECIES RECORDED ON SITE

Flora inventory

Table A 1. Flora species recorded during site surveys

Scientific Name	Common Name	Exotic	BC Status	EPBC Status	Within Plot 1
Acacia falcata	Sickle wattle				
Acmena smithii	Lilly Pilly				
Allocasuarina torulosa	Forest Oak				*
Banksia integrifolia	Coast Banksia				
Banksia spinulosa	Banksia cultivar 'Birthday Candles'				
Brachyscome angustifolia	Stiff Daisy				
Breynia oblongifolia	Coffee Bush				
Brunfelsia spp.	Yesterday, Today and Tomorrow	*			
Callistemon salignus	Willow Bottlebrush				*
Callistemon viminalis	Weeping Bottlebrush				*
Capsella bursa-pastoris	Shepherd's Purse	*			*
Clivia spp.	Bush lily	*			
Cordyline spp.		*			
Corymbia citriodora	Lemon-scented Gum	*			
Corymbia maculata	Spotted Gum				
Cupaniopsis anacardioides	Tuckeroo				*
Cynodon dactylon	Common Couch				*
Cyperus gracilis	Slender Flat-sedge				
Dianella caerulea	Blue Flax-lily				*
Dichondra repens	Kidney Weed				
Dietes bicolor		*			
Dodonaea viscosa	Sticky Hop-bush				
Doryanthes excelsa	Gymea Lily		P		
Ehrharta erecta	Panic Veldtgrass	*			*
Einadia hastata	Berry Saltbush				
Eragrostis curvula	African Lovegrass	*			*
Eucalyptus grandis	Flooded Gum				
Eucalyptus microcorys	Tallowwood				
Eucalyptus moluccana	Grey Box				*
Eucalyptus sideroxylon	Mugga Ironbark				*
Eucalyptus tereticornis	Forest Red Gum				*
Goodenia ovata	Hop Goodenia				
Grevillea robusta	Silky Oak				
Grevillea spp.	Grevillea cultivar 'Moonlight'				*
Grevillea spp.	Grevillea cultivar ' Robyn Gordon'				
Hardenbergia violacea	False Sarsaparilla				
Hibiscus spp.	Roselle	*			
Hymenosporum flavum	Native Frangipani				
Indigofera australis	Australian Indigo				

Scientific Name	Common Name	Exotic	BC Status	EPBC Status	Within Plot 1
Jacaranda mimosifolia	Jacaranda	*			
Juncus usitatus					
Lolium perenne	Perennial Ryegrass	*			*
Lomandra hystrix					
Lomandra longifolia	Spiny-headed Mat-rush				
Lophostemon confertus	Brush Box				
Malva spp.	Mallow				*
Medicago spp.	A Medic	*			*
Melaleuca decora					*
Melaleuca linariifolia	Flax-leaved Paperbark				
Melaleuca styphelioides	Prickly-leaved Tea Tree				
Melia azedarach	White Cedar				*
Nandina domestica	Japanese Sacred Bamboo	*			*
Photinia x fraseri		*			
Plantago lanceolata	Lamb's Tongues	*			*
Poa annua	Winter Grass	*			*
Poa labillardierei var. labillardierei	Tussock				
Sonchus oleraceus	Common Sowthistle	*			*
Strelitzia nicolai		*			
Themeda triandra					
Tibouchina spp.		*			

P: Protected under BC Act

Fauna inventory

Table A 2. Fauna species recorded during site surveys.

Scientific Name	Common Name	Exotic	BC Status	EPBC Status	Obs Type
Anthochaera carunculata	Red Wattlebird		P		O
Cacatua galerita	Sulphur-crested Cockatoo		P		W
Cornu aspersum	Garden Snail	*			O
Cracticus tibicen	Australian Magpie		P		O
Grallina cyanoleuca	Magpie-lark		P		O
Hirundo neoxena	Welcome Swallow		P		O
Lampropholis guichenoti	Pale-flecked Garden Sunskink		P		O
Manorina melanocephala	Noisy Miner		P		O
Strepera graculina	Pied Currawong		P		O
Sturnus tristis	Common Myna	*			O
Trichoglossus haematodus	Rainbow Lorikeet		P		O
Trichosurus vulpecula	Common Brushtail Possum		P		F

O:Observed, W:Heard call, F: Tracks/ scratchings

APPENDIX C – VEGETATION ZONES REPORT

BAM Vegetation Zones Report

Proposal Details

Assessment Id
00028078/BAAS18019/21/00028080

Assessment name
Stage 2 Redevelopment of Nepean Hospital

BAM data last updated *
10/06/2021

Assessor Name
William Thurston

Report Created
11/11/2021

BAM Data version *
45

Assessor Number
BAAS18019

Assessment Type
Major Projects

BAM Case Status
Finalised

Assessment Revision
0

Date Finalised
11/11/2021

* 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.

Vegetation Zones

#	Name	PCT	Condition	Area	Minimum number of plots	Management zones
1	849_Poor	849-Cumberland shale plains woodland	Poor	0.1	1	

APPENDIX D – PREDICTED SPECIES REPORT

BAM Predicted Species Report

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00028078/BAAS18019/21/00028080	Stage 2 Redevelopment of Nepean Hospital	10/06/2021
Assessor Name	**Report Created**	**BAM Data version ***
William Thurston	11/11/2021	45
Assessor Number	**Assessment Type**	**BAM Case Status**
BAAS18019	Major Projects	Finalised
Assessment Revision		**Date Finalised**
0		11/11/2021

* 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)
Eastern Coastal Free-tailed Bat	Micronomus norfolkensis	849-Cumberland shale plains woodland
Grey-headed Flying-fox	Pteropus poliocephalus	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
Little Lorikeet	Glossopsitta pusilla	849-Cumberland shale plains woodland
Swift Parrot	Lathamus discolor	849-Cumberland shale plains woodland
White-throated Needletail	Hirundapus caudacutus	849-Cumberland shale plains woodland

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

Common Name	Scientific Name	Plant Community Type(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
Flame Robin	Petroica phoenicea	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
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
White-bellied Sea-Eagle	Haliaeetus leucogaster	849-Cumberland shale plains woodland

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
Brown Treecreeper (eastern subspecies)	Climacteris picumnus victoriae	Species is vagrant
Diamond Firetail	Stagonopleura guttata	Species is vagrant
Dusky Woodswallow	Artamus cyanopterus cyanopterus	Refer to BAR
Flame Robin	Petroica phoenicea	Species is vagrant
Hooded Robin (south-eastern form)	Melanodryas cucullata cucullata	Species is vagrant
Koala	Phascolarctos cinereus	Refer to BAR
Regent Honeyeater	Anthochaera phrygia	Species is vagrant
Scarlet Robin	Petroica boodang	Refer to BAR
Speckled Warbler	Chthonicola sagittata	Refer to BAR
Spotted-tailed Quoll	Dasyurus maculatus	Refer to BAR
White-bellied Sea-Eagle	Haliaeetus leucogaster	Habitat constraints

APPENDIX E – CANDIDATE SPECIES REPORT

BAM Candidate Species Report

Proposal Details

Assessment Id 00028078/BAAS18019/21/00028080	Proposal Name Stage 2 Redevelopment of Nepean Hospital	BAM data last updated * 10/06/2021
Assessor Name William Thurston	Report Created 11/11/2021	BAM Data version * 45
Assessor Number BAAS18019	Assessment Type Major Projects	BAM Case Status Finalised
Assessment Revision 0	Date Finalised 11/11/2021	

* 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
Acacia bynoeana Bynoe's Wattle	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☑ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Acacia pubescens Downy Wattle	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☑ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Cynanchum elegans White-flowered Wax Plant	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☑ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?

Dillwynia tenuifolia Dillwynia tenuifolia	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☑ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Eucalyptus benthamii Camden White Gum	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☑ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Grevillea juniperina subsp. juniperina Juniper-leaved Grevillea	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☑ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Meridolum corneovirens Cumberland Plain Land Snail	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☑ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Pommerhelix duralensis Dural Land Snail	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☑ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Pultenaea pedunculata Matted Bush-pea	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☑ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?

BAM Candidate Species Report

Threatened species assessed as not on site

Refer to BAR for detailed justification

Common name	Scientific name	Justification in the BAM-C
Austral Toadflax	Thesium australe	Habitat degraded
Bargo Geebung	Persoonia bargoensis	Habitat degraded
Dillwynia tenuifolia, Kemps Creek	Dillwynia tenuifolia - endangered population	Refer to BAR
Green and Golden Bell Frog	Litoria aurea	Habitat constraints
Grey-headed Flying-fox	Pteropus poliocephalus	Habitat constraints
Koala	Phascolarctos cinereus	Habitat constraints
Large Bent-winged Bat	Miniopterus orianae oceanensis	Habitat constraints
Little Bent-winged Bat	Miniopterus australis	Habitat constraints
Marsdenia viridiflora R. Br. subsp. viridiflora population in the Bankstown, Blacktown, Camden, Campbelltown, Fairfield, Holroyd, Liverpool and Penrith local government areas	Marsdenia viridiflora subsp. viridiflora - endangered population	Habitat degraded Geographic limitations
Pimelea curviflora var. curviflora	Pimelea curviflora var. curviflora	Habitat degraded
Regent Honeyeater	Anthochaera phrygia	Habitat constraints
Southern Myotis	Myotis macropus	Habitat constraints
Spiked Rice-flower	Pimelea spicata	Habitat degraded
Squirrel Glider	Petaurus norfolcensis	Habitat degraded
Swift Parrot	Lathamus discolor	Habitat constraints
Sydney Plains Greenhood	Pterostylis saxicola	Habitat degraded
Thick Lip Spider Orchid	Caladenia tessellata	Habitat degraded
White-bellied Sea-Eagle	Haliaeetus leucogaster	Habitat constraints

APPENDIX F – EPBC PROTECTED MATTERS SEARCH REPORT

Australian Government

Department of Agriculture, Water and the Environment

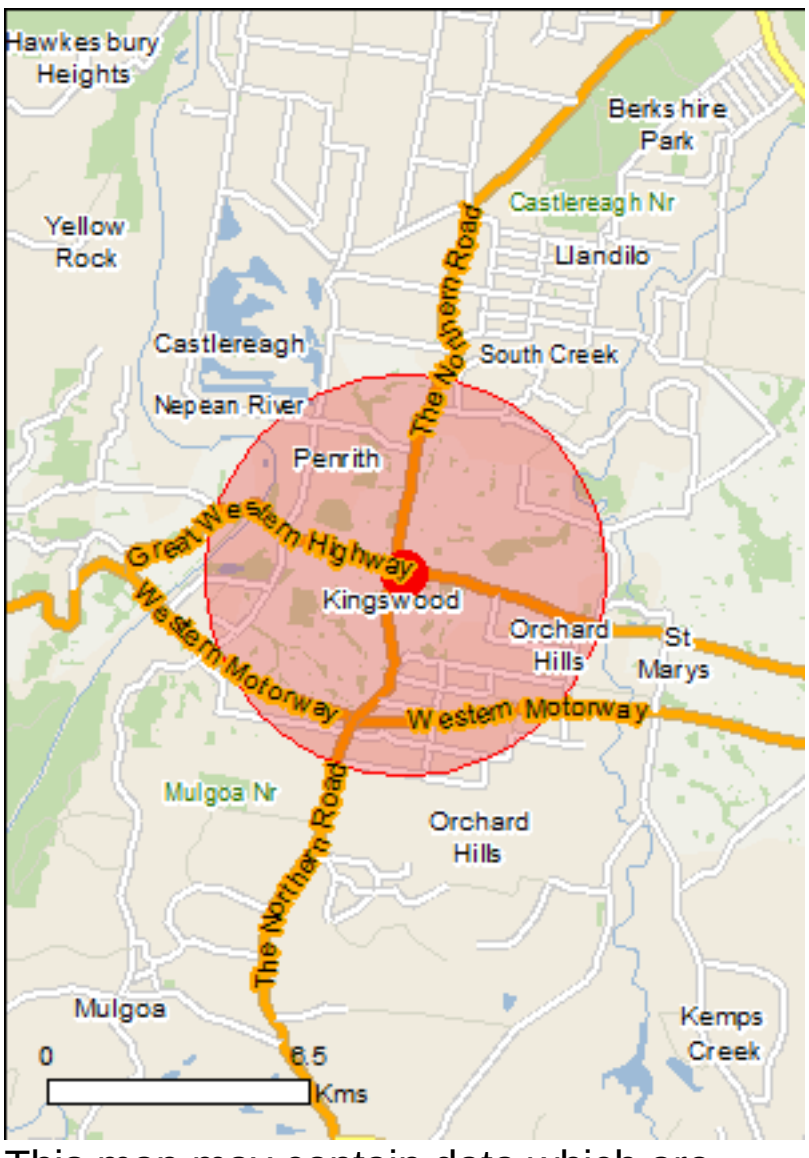
EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about Environment Assessments and the EPBC Act including significance guidelines, forms and application process details.

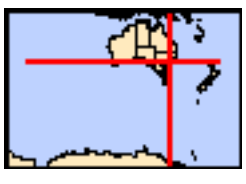
Report created: 24/09/21 12:47:47



This map may contain data which are ©Commonwealth of Australia (Geoscience Australia), ©PSMA 2015

Coordinates

Buffer: 5.0Km



Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	7
Listed Threatened Species:	41
Listed Migratory Species:	15

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at http://www.environment.gov.au/heritage

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Land:	11
Commonwealth Heritage Places:	1
Listed Marine Species:	20
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

State and Territory Reserves:	1
Regional Forest Agreements:	None
Invasive Species:	50
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Listed Threatened Ecological Communities [Resource Information]

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Name	Status	Type of Presence
Castlereagh Scribbly Gum and Agnes Banks Woodlands of the Sydney Basin Bioregion	Endangered	Community may occur within area
Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland ecological community	Endangered	Community may occur within area
Cooks River/Castlereagh Ironbark Forest of the Sydney Basin Bioregion	Critically Endangered	Community may occur within area
Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest	Critically Endangered	Community likely to occur within area
River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria	Critically Endangered	Community likely to occur within area
Shale Sandstone Transition Forest of the Sydney Basin Bioregion	Critically Endangered	Community may occur within area
Western Sydney Dry Rainforest and Moist Woodland on Shale	Critically Endangered	Community may occur within area

Listed Threatened Species [Resource Information]

Name	Status	Type of Presence
Birds		
Anthochaera phrygia Regent Honeyeater [82338]	Critically Endangered	Species or species habitat known to occur within area
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to occur within area
Falco hypoleucos Grey Falcon [929]	Vulnerable	Species or species habitat likely to occur within area
Grantiella picta Painted Honeyeater [470]	Vulnerable	Species or species habitat likely to occur within area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat known to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species

Name	Status	Type of Presence
		habitat may occur within area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area
Fish		
Macquaria australasica Macquarie Perch [66632]	Endangered	Species or species habitat may occur within area
Prototroctes maraena Australian Grayling [26179]	Vulnerable	Species or species habitat likely to occur within area
Frogs		
Heleioporus australiacus Giant Burrowing Frog [1973]	Vulnerable	Species or species habitat likely to occur within area
Litoria aurea Green and Golden Bell Frog [1870]	Vulnerable	Species or species habitat likely to occur within area
Mammals		
Chalinolobus dwyeri Large-eared Pied Bat, Large Pied Bat [183]	Vulnerable	Species or species habitat likely to occur within area
Dasyurus maculatus maculatus (SE mainland population) Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (southeastern mainland population) [75184]	Endangered	Species or species habitat known to occur within area
Petauroides volans Greater Glider [254]	Vulnerable	Species or species habitat likely to occur within area
Petrogale penicillata Brush-tailed Rock-wallaby [225]	Vulnerable	Species or species habitat may occur within area
Phascolarctos cinereus (combined populations of Qld, NSW and the ACT) Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104]	Vulnerable	Species or species habitat known to occur within area
Pseudomys novaehollandiae New Holland Mouse, Pookila [96]	Vulnerable	Species or species habitat may occur within area
Pteropus poliocephalus Grey-headed Flying-fox [186]	Vulnerable	Roosting known to occur within area
Plants		
Acacia bynoeana Bynoe's Wattle, Tiny Wattle [8575]	Vulnerable	Species or species habitat likely to occur within area
Acacia pubescens Downy Wattle, Hairy Stemmed Wattle [18800]	Vulnerable	Species or species habitat likely to occur within area
Allocasuarina glareicola [21932]	Endangered	Species or species habitat likely to occur within area
Cynanchum elegans White-flowered Wax Plant [12533]	Endangered	Species or species habitat likely to occur within area
Eucalyptus aggregata Black Gum [20890]	Vulnerable	Species or species habitat may occur within area

Name	Status	Type of Presence
Genoplesium baueri Yellow Gnat-orchid, Bauer's Midge Orchid, Brittle Midge Orchid [7528]	Endangered	Species or species habitat may occur within area
Haloragis exalata subsp. exalata Wingless Raspwort, Square Raspwort [24636]	Vulnerable	Species or species habitat may occur within area
Melaleuca deanei Deane's Melaleuca [5818]	Vulnerable	Species or species habitat may occur within area
Micromyrtus minutiflora [11485]	Vulnerable	Species or species habitat known to occur within area
Persicaria elatior Knotweed, Tall Knotweed [5831]	Vulnerable	Species or species habitat may occur within area
Persoonia hirsuta Hairy Geebung, Hairy Persoonia [19006]	Endangered	Species or species habitat likely to occur within area
Persoonia nutans Nodding Geebung [18119]	Endangered	Species or species habitat likely to occur within area
Pimelea curviflora var. curviflora [4182]	Vulnerable	Species or species habitat may occur within area
Pimelea spicata Spiked Rice-flower [20834]	Endangered	Species or species habitat known to occur within area
Pomaderris brunnea Rufous Pomaderris, Brown Pomaderris [16845]	Vulnerable	Species or species habitat may occur within area
Pterostylis saxicola Sydney Plains Greenhood [64537]	Endangered	Species or species habitat likely to occur within area
Pultenaea parviflora [19380]	Vulnerable	Species or species habitat known to occur within area
Rhizanthella slateri Eastern Underground Orchid [11768]	Endangered	Species or species habitat may occur within area
Rhodamnia rubescens Scrub Turpentine, Brown Malletwood [15763]	Critically Endangered	Species or species habitat may occur within area
Syzygium paniculatum Magenta Lilly Pilly, Magenta Cherry, Daguba, Scrub Cherry, Creek Lilly Pilly, Brush Cherry [20307]	Vulnerable	Species or species habitat may occur within area
Thesium australe Austral Toadflax, Toadflax [15202]	Vulnerable	Species or species habitat may occur within area

Listed Migratory Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Migratory Marine Birds		
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area

Name	Threatened	Type of Presence
Migratory Terrestrial Species		
[Cuculus optatus](#) Oriental Cuckoo, Horsfield's Cuckoo [86651]		Species or species habitat may occur within area
[Hirundapus caudacutus](#) White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area
[Monarcha melanopsis](#) Black-faced Monarch [609]		Species or species habitat known to occur within area
[Motacilla flava](#) Yellow Wagtail [644]		Species or species habitat likely to occur within area
[Myiagra cyanoleuca](#) Satin Flycatcher [612]		Species or species habitat known to occur within area
[Rhipidura rufifrons](#) Rufous Fantail [592]		Species or species habitat known to occur within area
Migratory Wetlands Species		
[Actitis hypoleucos](#) Common Sandpiper [59309]		Species or species habitat likely to occur within area
[Calidris acuminata](#) Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area
[Calidris ferruginea](#) Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to occur within area
[Calidris melanotos](#) Pectoral Sandpiper [858]		Species or species habitat may occur within area
[Gallinago hardwickii](#) Latham's Snipe, Japanese Snipe [863]		Species or species habitat known to occur within area
[Numenius madagascariensis](#) Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
[Pandion haliaetus](#) Osprey [952]		Species or species habitat known to occur within area
[Tringa nebularia](#) Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area

Other Matters Protected by the EPBC Act

Commonwealth Land [Resource Information]

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Name
Commonwealth Land -
Commonwealth Land - Australian Postal Commission
Commonwealth Land - Australian Postal Corporation
Commonwealth Land - Australian Telecommunications Commission
Commonwealth Land - Defence Housing Authority
Commonwealth Land - Defence Service Homes Corporation
Commonwealth Land - Director of War Service Homes
Commonwealth Land - Telstra Corporation Limited
Defence - 1CAD ORCHARD HILLS KINGSWOOD
Defence - PENRITH DEPOT (Army Stores)
Defence - SIGNAL STRS DEPOT-KINGSWOOD

Commonwealth Heritage Places [Resource Information]

Name	State	Status
Natural		
Orchard Hills Cumberland Plain Woodland	NSW	Listed place

Listed Marine Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Birds		
Actitis hypoleucos		
Common Sandpiper [59309]		Species or species habitat likely to occur within area
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea ibis		
Cattle Egret [59542]		Species or species habitat may occur within area
Calidris acuminata		
Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area
Calidris ferruginea		
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to occur within area
Calidris melanotos		
Pectoral Sandpiper [858]		Species or species habitat may occur within area
Chrysococcyx osculans		
Black-eared Cuckoo [705]		Species or species habitat likely to occur within area
Gallinago hardwickii		
Latham's Snipe, Japanese Snipe [863]		Species or species habitat known to occur within area
Haliaeetus leucogaster		
White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area
Hirundapus caudacutus		
White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area
Lathamus discolor		
Swift Parrot [744]	Critically Endangered	Species or species

Name	Threatened	Type of Presence
		habitat known to occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat known to occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat likely to occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat known to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pandion haliaetus Osprey [952]		Species or species habitat known to occur within area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat known to occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat likely to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area

Extra Information

State and Territory Reserves	[Resource Information]
Name	State
Wianamatta	NSW

Invasive Species	[Resource Information]

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resouces Audit, 2001.

Name	Status	Type of Presence
Birds		
Acridotheres tristis Common Myna, Indian Myna [387]		Species or species habitat likely to occur within area
Alauda arvensis Skylark [656]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
Anas platyrhynchos Mallard [974]		Species or species habitat likely to occur within area
Carduelis carduelis European Goldfinch [403]		Species or species habitat likely to occur within area
Carduelis chloris European Greenfinch [404]		Species or species habitat likely to occur within area
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Lonchura punctulata Nutmeg Mannikin [399]		Species or species habitat likely to occur within area
Passer domesticus House Sparrow [405]		Species or species habitat likely to occur within area
Passer montanus Eurasian Tree Sparrow [406]		Species or species habitat likely to occur within area
Pycnonotus jocosus Red-whiskered Bulbul [631]		Species or species habitat likely to occur within area
Streptopelia chinensis Spotted Turtle-Dove [780]		Species or species habitat likely to occur within area
Sturnus vulgaris Common Starling [389]		Species or species habitat likely to occur within area
Turdus merula Common Blackbird, Eurasian Blackbird [596]		Species or species habitat likely to occur within area
Frogs		
Rhinella marina Cane Toad [83218]		Species or species habitat likely to occur within area
Mammals		
Bos taurus Domestic Cattle [16]		Species or species habitat likely to occur within area
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Feral deer Feral deer species in Australia [85733]		Species or species habitat likely to occur within area
Lepus capensis Brown Hare [127]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur

Name	Status	Type of Presence
		within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Rattus norvegicus Brown Rat, Norway Rat [83]		Species or species habitat likely to occur within area
Rattus rattus Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Alternanthera philoxeroides Alligator Weed [11620]		Species or species habitat likely to occur within area
Anredera cordifolia Madeira Vine, Jalap, Lamb's-tail, Mignonette Vine, Anredera, Gulf Madeiravine, Heartleaf Madeiravine, Potato Vine [2643]		Species or species habitat likely to occur within area
Asparagus aethiopicus Asparagus Fern, Ground Asparagus, Basket Fern, Sprengi's Fern, Bushy Asparagus, Emerald Asparagus [62425]		Species or species habitat likely to occur within area
Asparagus asparagoides Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473]		Species or species habitat likely to occur within area
Asparagus plumosus Climbing Asparagus-fern [48993]		Species or species habitat likely to occur within area
Cabomba caroliniana Cabomba, Fanwort, Carolina Watershield, Fish Grass, Washington Grass, Watershield, Carolina Fanwort, Common Cabomba [5171]		Species or species habitat likely to occur within area
Chrysanthemoides monilifera Bitou Bush, Boneseed [18983]		Species or species habitat may occur within area
Chrysanthemoides monilifera subsp. monilifera Boneseed [16905]		Species or species habitat likely to occur within area
Cytisus scoparius Broom, English Broom, Scotch Broom, Common Broom, Scottish Broom, Spanish Broom [5934]		Species or species habitat likely to occur within area
Dolichandra unguis-cati Cat's Claw Vine, Yellow Trumpet Vine, Cat's Claw Creeper, Funnel Creeper [85119]		Species or species habitat likely to occur within area
Eichhornia crassipes Water Hyacinth, Water Orchid, Nile Lily [13466]		Species or species habitat likely to occur within area
Genista monspessulana Montpellier Broom, Cape Broom, Canary Broom, Common Broom, French Broom, Soft Broom [20126]		Species or species habitat likely to occur within area
Genista sp. X Genista monspessulana Broom [67538]		Species or species habitat may occur within area
Lantana camara Lantana, Common Lantana, Kamara Lantana, Large-leaf Lantana, Pink Flowered Lantana, Red		Species or species habitat likely to occur

Name	Status	Type of Presence
Flowered Lantana, Red-Flowered Sage, White Sage, Wild Sage [10892]		within area
Lycium ferocissimum African Boxthorn, Boxthorn [19235]		Species or species habitat likely to occur within area
Nassella neesiana Chilean Needle grass [67699]		Species or species habitat likely to occur within area
Nassella trichotoma Serrated Tussock, Yass River Tussock, Yass Tussock, Nassella Tussock (NZ) [18884]		Species or species habitat likely to occur within area
Opuntia spp. Prickly Pears [82753]		Species or species habitat likely to occur within area
Pinus radiata Radiata Pine Monterey Pine, Insignis Pine, Wilding Pine [20780]		Species or species habitat may occur within area
Rubus fruticosus aggregate Blackberry, European Blackberry [68406]		Species or species habitat likely to occur within area
Sagittaria platyphylla Delta Arrowhead, Arrowhead, Slender Arrowhead [68483]		Species or species habitat likely to occur within area
Salix spp. except S.babylonica, S.x calodendron & S.x reichardtii Willows except Weeping Willow, Pussy Willow and Sterile Pussy Willow [68497]		Species or species habitat likely to occur within area
Salvinia molesta Salvinia, Giant Salvinia, Aquarium Watermoss, Kariba Weed [13665]		Species or species habitat likely to occur within area
Senecio madagascariensis Fireweed, Madagascar Ragwort, Madagascar Groundsel [2624]		Species or species habitat likely to occur within area
Ulex europaeus Gorse, Furze [7693]		Species or species habitat likely to occur within area
Reptiles		
Hemidactylus frenatus Asian House Gecko [1708]		Species or species habitat likely to occur within area

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World and National Heritage properties, Wetlands of International and National Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species distributions have been derived through a variety of methods. Where distributions are well known and if time permits, maps are derived using either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc) together with point locations and described habitat; or environmental modelling (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where very little information is available for species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc). In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More reliable distribution mapping methods are used to update these distributions as time permits.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Coordinates

-33.75902 150.71427

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Department of Land and Resource Management, Northern Territory
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Australian Tropical Herbarium, Cairns
-eBird Australia
-Australian Government – Australian Antarctic Data Centre
-Museum and Art Gallery of the Northern Territory
-Australian Government National Environmental Science Program
-Australian Institute of Marine Science
-Reef Life Survey Australia
-American Museum of Natural History
-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
-Tasmanian Museum and Art Gallery, Hobart, Tasmania
-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the Contact Us page.

Department of Agriculture Water and the Environment
GPO Box 858
Canberra City ACT 2601 Australia
+61 2 6274 1111

APPENDIX G – CREDIT SUMMARY REPORT

BAM Credit Summary Report

Proposal Details

Assessment Id
00028078/BAAS18019/21/00028080

Proposal Name
Stage 2 Redevelopment of Nepean Hospital

BAM data last updated *
10/06/2021

Assessor Name
William Thurston

Report Created
11/11/2021

BAM Data version *
45

Assessor Number
BAAS18019

BAM Case Status
Finalised

Date Finalised
11/11/2021

Assessment Revision
0

Assessment Type
Major Projects

* 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.

Ecosystem credits for plant communities types (PCT), ecological communities & threatened species habitat

Zone	Vegetation zone name	TEC name	Current Vegetation integrity score	Change in Vegetation integrity (loss / gain)	Area (ha)	BC Act Listing status	EPBC Act listing status	Species sensitivity to gain class (for BRW)	Biodiversity risk weighting	Potential SAII	Ecosystem credits

Cumberland shale plains woodland											
1	849_Poor	Cumberland Plain Woodland in the Sydney Basin Bioregion	39.9	39.9	0.1	Critically Endangered Ecological Community	Critically Endangered	High Sensitivity to Potential Gain	2.50	TRUE	2
										Subtotal	**2**
										Total	**2**

Species credits for threatened species

Vegetation zone name	Habitat condition (Vegetation Integrity)	Change in habitat condition	Area (ha)/Count (no. individuals)	BC Act Listing status	EPBC Act listing status	Biodiversity risk weighting	Potential SAII	Species credits

APPENDIX H – BIODIVERSITY CREDIT REPORTS

BAM Biodiversity Credit Report (Like for like)

Proposal Details

Assessment Id
00028078/BAAS18019/21/00028080

Proposal Name
Stage 2 Redevelopment of Nepean Hospital

BAM data last updated *
10/06/2021

Assessor Name
William Thurston

Assessor Number
BAAS18019

BAM Data version *
45

Proponent Names
Health Infrastructure NSW Health Infrastructure NSW

Report Created
11/11/2021

BAM Case Status
Finalised

Assessment Revision
0

Assessment Type
Major Projects

Date Finalised
11/11/2021

* 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
Cumberland Plain Woodland in the Sydney Basin Bioregion	Critically Endangered Ecological Community	849-Cumberland shale plains woodland

Species
Nil

Additional Information for Approval

PCTs With Customized Benchmarks

PCT
No Changes

Predicted Threatened Species Not On Site

Name
Climacteris picumnus victoriae / Brown Treecreeper (eastern subspecies)
Dasyurus maculatus / Spotted-tailed Quoll
Petroica phoenicea / Flame Robin
Petroica boodang / Scarlet Robin
Artamus cyanopterus cyanopterus / Dusky Woodswallow
Haliaeetus leucogaster / White-bellied Sea-Eagle
Melanodryas cucullata cucullata / Hooded Robin (south-eastern form)
Phascolarctos cinereus / Koala
Chthonicola sagittata / Speckled Warbler
Stagonopleura guttata / Diamond Firetail
Anthochaera phrygia / Regent Honeyeater

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

BAM Biodiversity Credit Report (Like for like)

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	Cumberland Plain Woodland in the Sydney Basin Bioregion	0.1	0	2	2

849-Cumberland shale plains woodland

Like-for-like credit retirement options

Name of offset trading group	Trading group	Zone	HBT	Credits	IBRA region
Cumberland Plain Woodland in the Sydney Basin Bioregion This includes PCT's: 849, 850	-	849_Poor	No	2	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 (Variations)

Proposal Details

Assessment Id
00028078/BAAS18019/21/00028080

Proposal Name
Stage 2 Redevelopment of Nepean Hospital

BAM data last updated *
10/06/2021

Assessor Name
William Thurston

Assessor Number
BAAS18019

BAM Data version *
45

Proponent Name(s)
Health Infrastructure NSW Health Infrastructure NSW

Report Created
11/11/2021

BAM Case Status
Finalised

Assessment Revision
0

Assessment Type
Major Projects

Date Finalised
11/11/2021

* 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
Cumberland Plain Woodland in the Sydney Basin Bioregion	Critically Endangered Ecological Community	849-Cumberland shale plains woodland

Species
Nil

Additional Information for Approval

PCTs With Customized Benchmarks

PCT
No Changes

BAM Biodiversity Credit Report (Variations)

Predicted Threatened Species Not On Site

Name
Climacteris picumnus victoriae / Brown Treecreeper (eastern subspecies)
Dasyurus maculatus / Spotted-tailed Quoll
Petroica phoenicea / Flame Robin
Petroica boodang / Scarlet Robin
Artamus cyanopterus cyanopterus / Dusky Woodswallow
Haliaeetus leucogaster / White-bellied Sea-Eagle
Melanodryas cucullata cucullata / Hooded Robin (south-eastern form)
Phascolarctos cinereus / Koala
Chthonicola sagittata / Speckled Warbler
Stagonopleura guttata / Diamond Firetail
Anthochaera phrygia / Regent Honeyeater

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	Cumberland Plain Woodland in the Sydney Basin Bioregion	0.1	0	2	2.00

849-Cumberland shale plains woodland

Like-for-like credit retirement options

Class	Trading group	Zone	HBT	Credits	IBRA region

	Cumberland Plain Woodland in the Sydney Basin Bioregion This includes PCT's: 849, 850	-	849_Poor	No	2	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 options

APPENDIX I – PAYMENT REPORT

Biodiversity payment summary report

Assessment Id	Payment data version	Assessment Revision	Report created
00028078/BAAS18019/21/00028080		0	11/11/2021

Assessor Name	Assessor Number	Proposal Name	BAM Case Status
William Thurston	BAAS18019	Stage 2 Redevelopment of Nepean Hospital	Finalised

Assessment Type	Date Finalised
Major Projects	11/11/2021

PCT list

Price calculated	PCT common name	Credits
Yes	**849 -** Cumberland shale plains woodland	2

Species list

Price calculated	Species	Credits

Ecosystem credits for plant communities types (PCT), ecological communities & threatened species habitat

Biodiversity payment summary report

IBRA sub region	PCT common name	Threat status	Offset trading group	Risk premium	Administrative cost	Methodology adjustment factor	Price per credit	No. of ecosystem credits	Final credits price
Cumberland	**849 -** Cumberland shale plains woodland	Yes	Cumberland Plain Woodland in the Sydney Basin Bioregion	18.83%	$ 1,097.37	1.6350	$ 33,697.42	2	$67,394.84

Subtotal (excl. GST)	**$67,394.84**
GST	**$6,739.48**
Total ecosystem credits (incl. GST)	**$74,134.32**

Species credits for threatened species

Species profile ID	Species	Threat status	Price per credit	Risk premium	Administrative cost	No. of species credits	Final credits price

No species available

Grand total	**$74,134.32**