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Flora and Fauna Assessment

University of Wollongong

New Arts and Social Sciences Building

State Significant Development Application (SSD 8596)

October 2017



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environmental

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- this document has been prepared in accordance with the brief provided by the University of Wollongong and requirements pursuant to the Secretary's Environmental Assessment Requirements as provided by the Department of Planning.
- the information presented in this report is a true and accurate record of the study findings in the opinion of the authors.



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Glossary and abbreviations

Acronym / Term	Meaning
DPE	NSW Department of Planning and Environment
Subject site	The proposed development footprint of the new Arts and Social Sciences Building, including APZ. Survey Area (Figure 2)
EPBC Act	Commonwealth <i>Environment Protection and Biodiversity Conservation Act 1999</i>
LGA	Local Government Area
LPI	Land and Property Information
OEH	NSW Office of Environment and Heritage
PCT	Plant Community Type
SEARs	Secretary's Environmental Assessment Requirements
SSD	State Significant Development
m	Metres
km	Kilometres
ha	Hectares
TSC Act	NSW <i>Threatened Species Conservation Act 1995</i>

1. Introduction

1.1 Project background

This Flora and Fauna Assessment has been prepared to accompany a development proposal for the new Arts and Social Sciences Building ('The Western Building'), at the University of Wollongong, Keiraville, NSW, 2522 (Lot 1, DP1188267) (hereafter referred to as 'the Subject Site').

The proposed works have been classified as a State Significant Development (SSD), and will be assessed pursuant to the Secretary's Environmental Assessment Requirements (SEARs) provided by the NSW Department of Planning (DPE). There was no requirement in the SEARs for this SSD to be assessed in accordance with the Framework for Biodiversity Assessment (FBA). Instead, the SEARs stipulate that the '*Flora and fauna impacts related to the proposed development are to be assessed, including impacts on any riparian buffer zones.*' Flora and fauna impacts from the development are to be assessed in accordance with *Environmental Planning and Assessment Act 1979* (EP&A Act) and meet the minimum form and content requirements in clauses 6 and 7 of Schedule 2 of the *Environmental Planning and Assessment Regulation 2000* (OEH 2014).

Narla have produced this report in order to assess any potential impacts associated with the proposed development upon terrestrial ecology (biodiversity), particularly threatened species, populations and communities listed under the *Threatened Species Conservation Act 1995* (TSC Act) and recommend appropriate measures to mitigate any potential impacts in line with the requirements of the SEARs, all relevant State Environmental Planning Policies (SEPP) and the *Wollongong Local Environmental Plan 2009* (LEP) and Wollongong Development Control Plan (DCP).

1.2 Proposed development

The proposed development includes:

- A building footprint of approximately 3500 m², maintaining the opportunity to expand the building into the adjacent car park within the next 10 years;
- A building height of four or five storeys (approximately 25 m);
- An identifiable architectural presence of the campus;
- An external arrival forecourt in the Western Precinct to activate the adjacent buildings;
- Informal student amenity facilities, including options for future retail and student services;
- A building with multiple fronts, and success points from multiple directions;
- A building and precinct that supports the University's values and aspirations; and
- Sustainable facilities that balance economic, social and environmental factor.

The proposed development will include the removal of several existing demountable buildings, select removal of planted landscape trees, and select clearing and thinning of some small areas of degraded bushland that are dominated by planted, and self-sown regrowth trees and weeds.

An Arboriculture report produced for the 'Subject Site' and immediate surrounds (ATA 2017) identified one hundred and thirteen (113) trees for removal. These trees will be removed for the following reasons:

- Non-compatible with the University of Wollongong landscape masterplan (i.e. exotic species)
- Located within the proposed building footprint; and
- Poor Health.

The retention of one hundred and nineteen (119) trees will assist in achieving the University's tree management goals by maintaining the character of the site and will provide ongoing landscape amenity on the Subject Property (ATA 2017).

A Bushfire Asset Protection Zone (APZ) will be established and managed around the development in perpetuity.

1.3 Site Description and Location

1.3.1 Subject Site

The Subject Site is located within the University of Wollongong within the Wollongong Local Government Area (LGA). The University of Wollongong (hereafter referred to as 'the Subject Property') occupies approximately 82 ha of land zoned (Figure 1) as:

- E2 – Environmental Conservation;
- RE1 – Public Recreation;
- SP2 - Infrastructure: Educational Establishment; and
- SP2 – Infrastructure: Road.

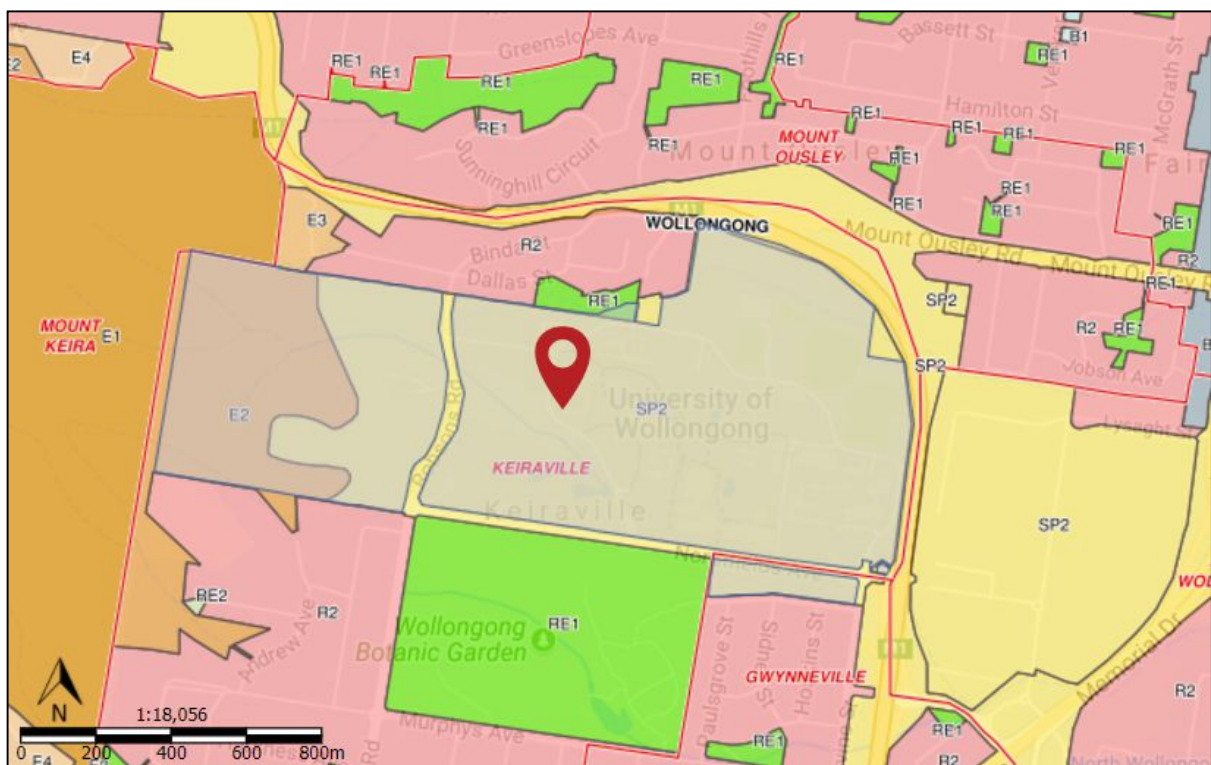


Figure 1. Subject Property (University of Wollongong) zoning (Wollongong LEP)

The location of the proposed building upgrade (the 'Subject Site') comprises approximately 1.7 ha of land situated entirely within land zoned as "SP2 – Infrastructure: Educational Establishment", currently occupied by existing buildings, carparks, lawns and a small patch of bushland comprised of remnant locally-indigenous species with a suite of planted native and exotic, ornamental trees and shrubs.

1.3.2 Geology and Soils

The Subject Site is situated within a transition between the Gwynneville Soil Landscape and 'Disturbed Terrain' (Hazleton and Tille 1990). Site soil appears as a combination of yellow earth of the lower Illawarra Escarpment and the organic soils of the coast sediments, and has a high organic matter content and reasonable drainage due to the local topography. The soil profile of the Subject Site has been disturbed by the construction of the existing buildings and road works and features commercial soil mixes introduced during the landscaping of the site (ATA 2017).

1.3.3 Hydrology

Overland stormwater flows across the site in a southerly direction into a nearby 'Category 2' watercourse within the University Grounds. In accordance with Chapter E23: *Riparian Land Management* of the Wollongong Development Control Plan (WDCP) 2009, a Category 2 watercourse comprises a 30m extent 'measured from the top of a watercourse bank away from the watercourse centreline', encompassing a 20m *Core Riparian Zone* and a further 10m *Vegetated Buffer*'.

This watercourse is also classified as a '3rd Order Stream' in accordance with the 'Strahler System' which is the preferred system for watercourse classification in line with the *Water Management Act 2000*. This requires the permanent protection/maintenance of a 60m wide Vegetated Riparian Zone (VRZ) + channel width as determined by the *Water Management Act 2000*. This equates to a 30m corridor either side of the upper banks of the channel.

Multiple existing pipelines and drains within throughout developed areas within the Subject Site (i.e. carparks) divert water into stormwater detention systems present throughout the University grounds.



Figure 2: Location map

1.4 Scope of assessment

The objectives of this Flora and Fauna Assessment were to:

- Establish the likelihood of occurrence of migratory species, threatened species, endangered populations and threatened ecological communities as listed under the New South Wales *Threatened Species Conservation Act 1995* (TSC Act) and/or the *Commonwealth Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and their potential to utilise or occur within the Subject Site during a point in their lifecycles;
- Assess any potential impacts to species and/ or communities listed under the TSC Act and EPBC Act;
- Address all requirements of the SEARs in relation to the project, biodiversity conservation and management;
- Identify and map the distribution of vegetation communities in the Subject Site and discuss patch size and condition;
- Record presence and the extent of any priority or environmental weeds and suggest management recommendations;
- Record presence and the extent of any known or potential fauna habitat features such as nests, drays, caves, crevices, culverts, pools, soaks, flowering trees, fruiting trees, hollow-bearing trees and provide recommendations for on-going management of these habitat features and any fauna present within;
- Determine ecological impacts or risks that may result due to the proposed works; and
- Provide recommendation of any controls or additional actions to be taken to ensure University of Wollongong can maintain or enhance environmental outcomes of the Subject Site through implementation of the proposed works.

1.5 Relevant Legislation and Policy

The following list of legislation and policy are addressed in this report. Relevant planning instruments and policy requiring more detailed address are discussed in the following sections.

Legislation/ Policy	Relevant Ecological Feature on Site	Triggered	Action Required
Environmental Planning and Assessment Act 1979 (EP&A Act)	All features	Yes	This Flora and Fauna Assessment and all subsequent recommendations relevant to the planning process.
Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)	No EPBC Act (Commonwealth) Threatened Ecological Communities (TEC) are represented within the Subject Site. Five <i>Syzygium paniculatum</i> (Magenta Lilly Pilly) were observed within the Subject Site. These trees have been planted within garden beds and have low biodiversity conservation significance. Suitable habitat for several EPBC Act (Commonwealth) threatened fauna species is present within the subject site and immediate surrounds.	Yes	An assessment of significance of impact from the proposed development on Matters of National Environmental Significance (MNES) EPBC Act <i>Assessment of Significant Impact Criteria</i>
Threatened Species Conservation Act 1995 (TSC Act)	No TSC Act (NSW) Threatened Ecological Communities (TEC) are represented within the Subject Site. Five <i>Syzygium paniculatum</i> (Magenta Lilly Pilly) were observed within the Subject Site. These trees have been planted within garden beds and have low biodiversity conservation significance. Suitable habitat for several other TSC Act threatened fauna species is present within the Subject Site and immediate surrounds.	Yes	An assessment of significance of impact from the proposed development on TSC Act listed threatened species (7-part Test of Impact Significance)
Biosecurity Act 2015 (Bio Act)	The following Priority Weeds were identified on the Subject Site: ▪ <i>Asparagus aethiopicus</i> ▪ <i>Asparagus plumosus</i>	Yes	Mandatory Measure: Must not be imported into the State or sold. Regional Recommended Measure: <i>Land managers should mitigate the risk of new weeds being introduced to their land.</i>
State Environmental Planning Policy No. 44 - Koala Habitat Protection (SEPP 44)	Wollongong LGA is listed under Schedule 1 of SEPP 44. No remnant native trees from schedule 2 occur on the Subject Site.	No	None

1.6 Wollongong Local Environmental Plan 2009

1.6.1 Zoning

The Subject Site is zoned Subject Site itself is situated entirely within land zoned as "SP2 – Infrastructure: Educational Establishment". The primary objectives of the zone include:

- To provide for infrastructure and related uses;
- To prevent development that is not compatible with or that may detract from the provision of infrastructure; and
- To provide for key transport corridors.

1.6.2 Natural Resource Sensitivity – Biodiversity

Section 7.2 'Natural Resource Sensitivity – Biodiversity' of the Wollongong Local Environmental Plan (WLEP 2009) applies to this proposal. The objective of this clause is to protect, maintain or improve the diversity and condition of the native vegetation and habitat, including;

- Protecting biological diversity of native flora and fauna;
- Protecting the ecological processes necessary for their continued existence; and
- Encouraging the recovery of threatened species, communities, populations and their habitats.

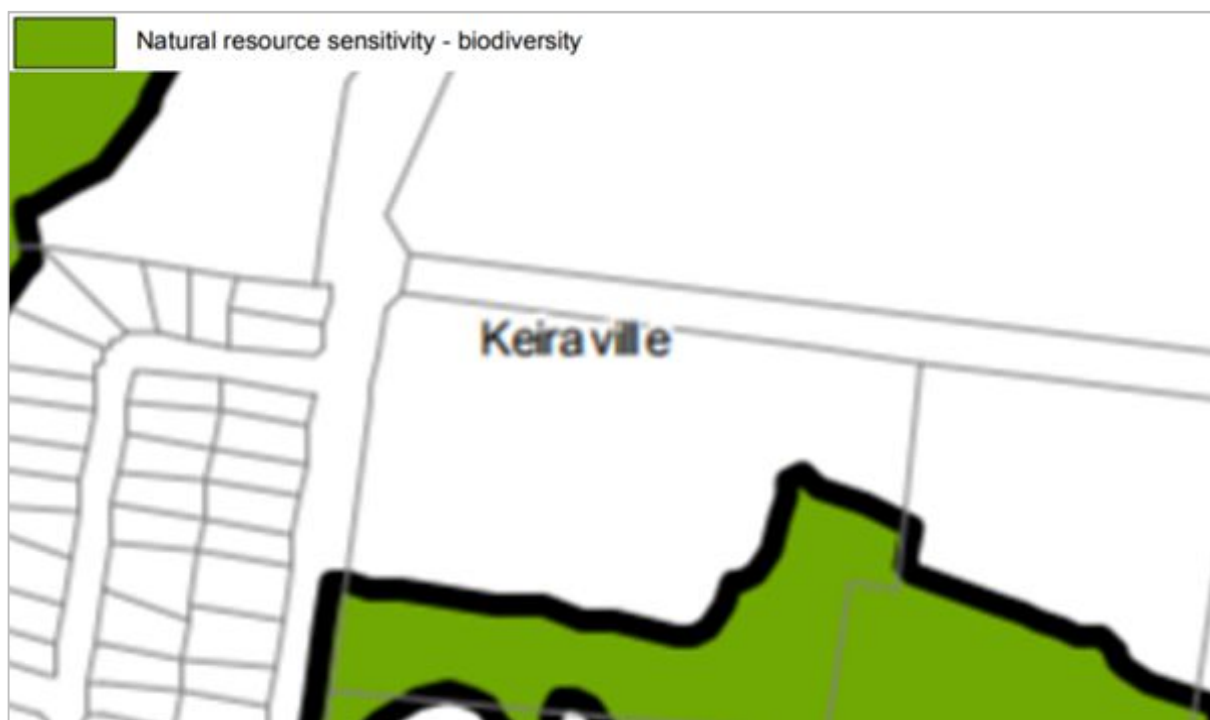


Figure 3. Wollongong Local Environmental Plan 2009 'Natural resource sensitivity – biodiversity' mapping

1.6.3 Riparian Lands

Clause 7.4 'Riparian Lands' of the WLEP 2009 applies to this proposal. The development must comply with the objective of this clause which is to ensure that development does not adversely impact upon riparian lands.

A 'Category 2' watercourse is located within the southern extent of the Subject Site, located approximately 40m from the proposed development. In accordance Chapter E23: *Riparian Land Management* of the Wollongong Development Control Plan (WDCP) 2009, a Category 2 watercourse comprises a 30m extent 'measured from the top of a watercourse bank away from the watercourse centreline', encompassing a 20m *Core Riparian Zone* and a further 10m *Vegetated Buffer*'.

Table 1. RCMS Categories and associated buffer distance (Relevant RCMS Category in bold)

RCMS Category	Associated Buffer Distance	Total Riparian Buffer Width (measured from top of bank along either side of the water course)
Category 1	40m CRZ + 10m VB	50m
Category 2	20m CRZ + 10m VB	30m
Category 3	10m CRZ (no VB)	10m

The development will abide by the 'Riparian Corridor Objectives' of a Category 2 watercourse, which are to:

- Maintain/restore the natural functions of watercourses;
- Maintain the viability of native riparian vegetation;
- Minimise 'edge effects' at the riparian corridor / urban interface by the provision of a suitable riparian corridor width;
- Maintain adequate riparian corridor width, based on geomorphological and environmental considerations and to maintain or improve bank stability;
- Protect water quality of the watercourse through an adequate riparian corridor width;
- Restore the vegetation, geomorphic structure, hydrology and water quality of the riparian corridor to its original (pre-European) state, where practicable;
- Minimise the number of road crossings and such crossings are designed to maintain riparian connectivity;
- Restrict the encroachment of flood compatible development (e.g. playing fields) to the edge of the riparian corridor rather than within the core riparian zone;
- Locate infrastructure or utility services (i.e. electricity, water, sewerage etc) outside the riparian corridor, wherever practicable; and
- Treat stormwater run-off outside the riparian corridor before discharge into the watercourse.

1.7 Wollongong Development Control Plan 2009

The development will abide by the environmental objectives of the Wollongong Development Control Plan (WDCP) which are:

- To ensure development conforms with the principles of Ecologically Sustainable Development;
- To ensure that development contributes to the quality of the natural and built environments;
- To ensure future development responds positively to the qualities of the site and the character of the surrounding locality;
- To ensure development is of a high design standard and energy efficient;
- To ensure new development is consistent with the desired character for the area;
- To ensure the threat of bushfire is assessed; and
- To protect areas of high scenic and aesthetic value.

1.7.1 Ecologically Sustainable Development

Wollongong Council encourages the application of ecologically sustainable development (ESD) for all development in the Wollongong LGA. Ecologically Sustainable Development requires that the development will comply with the following objectives;

- Greenhouse gas emissions will be reduced;
- Portable water use will be reduced;
- Development can adapt to climate change;
- Waste will be reduced;
- Recycling of waste and use of products from recycled sources will be increased;
- Energy that is used will be renewable and low carbon;
- Indoor environmental quality is improved;
- The environmental impacts from building materials will be reduced through reduction, reuse and recycling of materials, resources and building components; and
- Biodiversity values are improved.

The development must also aim to maintain, conserve and enhance indigenous species, populations and ecological communities present prior to, during and post construction. Consideration should also be given to:

- The use of local indigenous species to enhance wildlife corridors and contribute to the amenity of the area;
- Maintaining and enhancing existing vegetation. Landscaped areas should aim to enhance wildlife corridors onsite and adjacent to the site, and may include the preservation and reuse of topsoil;
- The use of deciduous trees to provide shade in summer and allow sunlight infiltration during winter;
- Increasing landscaped areas to enable water infiltration and decrease hard surfaces;
- For larger developments, the incorporation of green roofs and walls is encouraged. Greenroofs and walls assist in the regulation of the buildings temperature, as well as acting as insulation, improving air quality, enhancing biodiversity and reducing stormwater runoff.

1.7.2 Preservation and Management of Trees and Vegetation

Chapter E17; 'Preservation and Management of Trees and Vegetation' of the Wollongong Local Environmental Plan (WLEP 2009) applies to this proposal. The objectives of this part of the WDCP are to:

- Protect trees within the City of Wollongong Local Government Area;
- Protect and enhance native vegetation, habitat for native fauna and biodiversity;
- Protect and enhance native vegetation for its scenic values and to retain the unique visual identity of the landscape;
- Conserve trees of ecological, heritage, aesthetic and cultural significance;
- Conserve significant stands of remnant vegetation;
- Manage non-native vegetation in accordance with its cultural heritage and landscape significance;
- Ensure that any new development considers and maximises the protection of existing vegetation in the site planning, design, development, construction and operation of the development; and
- Identify trees and other vegetation that may be pruned or removed with the necessity for a Tree Management Permit or development consent.

1.7.3 Bushfire Prone Lands

The Wollongong *Bush Fire Prone Land* Map designates the escarpment bushland to the west of the site, as a bushfire hazard. The Subject Site however, is not located within mapped Bushfire Prone Land. Where a site is mapped as containing bush fire prone vegetation a bushfire report is required with the development application. The proposal must be referred to the Rural Fire Service, who then make formal recommendations concerning both construction standards for bushfire protection and may make recommendations concerning the management of the site in general.

Should the bushfire report require native vegetation removal or modification the impacts would need to be addressed in the Flora and Fauna report.

In regard to ecological issues, it is critical that the bushfire report specifically addresses issues of site vegetation management required to comply with the relevant bushfire guidelines. In particular, the extent of vegetation removal or pruning recommended should be identified and quantified in the report.

Such recommendations from the Rural Fire Service may have significant implications ecologically, such as the maintenance of the site as an Inner Protection Area (IPA), in accordance with *Planning for Bushfire Protection* (RFS 2010). The maintenance of a site as an IPA may involve works including maintenance of understorey vegetation and the pruning or removal of trees.

Where there is ongoing maintenance proposed or where appropriate rehabilitation works within such communities are to be undertaken Wollongong Council may require a Vegetation Management Plan (VMP) to be prepared for the Subject Site.

1.7.4 Landscaping

Chapter E6: 'Landscaping' of the Wollongong DCP (2009) applies to this proposal. The objectives of this chapter are:

- To define the landscaping provisions necessary for the Development Application process;
- To ensure that landscaping is appropriate to characteristics of its locality, preserving and contributing to its natural, cultural, heritage and visual character;
- Minimise the impacts from development on natural site features in particular retaining existing trees where feasible; and
- Facilitate long term improvements to the landscape of the Wollongong LGA.

As per Chapter E6 'Landscaping' the Wollongong DCP; *Any sites adjoining any natural areas or creek lines with native vegetation must use locally indigenous species (no cultivars) in the landscape plan and must have regard to any impacts of water flows and flooding.*

2. Methodology

2.1 Desktop Assessment and Literature Review

A thorough literature review of local information relevant to the University of Wollongong and the general Wollongong Local Government Area was undertaken. Online databases were searched to obtain threatened species and biodiversity data recorded from, or modelled for the site and its surrounds to an area of approximately 10 km².

Searches utilising NSW Wildlife Atlas (Bionet) and the Commonwealth Protected Matters Search Tool were conducted to identify all current threatened and migratory flora and fauna records within a 10 km² search area centred on the Subject Site. This data was used to assist in establishing the presence or likelihood of any such ecological values as occurring on or adjacent the Subject Site, and helped inform our Ecologist on what to look for during the site assessment.

Soil landscape and geological mapping was examined to gain an understanding of the environment on the Subject Site and assist in determining whether any threatened flora or ecological communities may occur there (Hazelton and Tille 1990).

2.2 Ecological Site Assessment

A site assessment was performed by Narla Environmental Ecologist, Alexander Graham on 30th August and Guy Smith on the 10th October 2017. A total of 12 hours was spent surveying the Subject Site across its entire area.

During the site assessment, the following activities were undertaken:

- Identifying and recording the vegetation communities present on the Subject Site, with focus on identifying any threatened ecological communities (TEC);
- Recording a detailed list of flora species encountered on the Subject Site, with a focus on threatened species, species diagnostic of threatened ecological communities and priority weeds;
- Recording opportunistic sightings of any fauna species seen or heard on or within the immediate surrounds of the Subject Site;
- Identifying and recording the locations of notable fauna habitat such as important nesting, roosting or foraging microhabitats;
- Targeting the habitat of any threatened and regionally significant fauna including:
 - Tree hollows (habitat for threatened large forest owls, parrots, cockatoos and arboreal mammals);
 - Caves and crevices (habitat for threatened reptiles, small mammals and microbats);
 - Termite mounds (habitat for threatened reptiles and the echidna);
 - Soaks (habitat for threatened frogs and dragonflies);
 - Wetlands (habitat for threatened fish, frogs and water birds);
 - Drainage lines (habitat for threatened fish and frogs);
 - Fruiting trees (food for threatened frugivorous birds and mammals);
 - Flowering trees (food for threatened nectarivorous mammals and birds);
 - Trees and shrubs supporting nest structures (habitat for threatened birds and arboreal mammals); and
 - Any other habitat features that may support fauna (particularly threatened) species.
- Assessing the connectivity and quality of the vegetation within the Subject Site and surrounding area.

All trees and shrubs within the Subject Site were inspected for their ecological value including foraging and nesting/roosting value, with a particular focus on trees 'to be removed' (as listed in the Arboricultural Impact Assessment (ATA 2017).

2.3 Weather Conditions

A summary of the prevailing weather conditions during the Subject Site survey and the lead-up to the survey is presented (**Table 2**). This data was collected from the nearest weather station of 'Wollongong'. The weather conditions experienced are considered typical of the conditions experienced during that time of the year. This information is provided by the Bureau of Meteorology (2017).

Table 2. Weather conditions taken from the nearest weather station (Wollongong) in the lead up and during the field survey (BOM 2017) (Survey dates in bold)

Survey date	Minimum Temp. °C	Maximum Temp. °C	Rainfall (mm)
24/08/2017	11.0	13.4	3.0
25/08/2017	8.8	16.4	43.2
26/08/2017	7.8	15.6	0
27/08/2017	8.7	18.4	0
28/08/2017	10.3	18.9	0
19/08/2017	9.7	18.7	0
30/08/2017	13.7	19.2	0

2.4 Study Limitations

This study was not intended to provide a complete inventory of all flora and fauna species with potential to occur on the Subject Site. Rather this study was undertaken in order to:

- provide an assessment into the likelihood of occurrence of any significant terrestrial and aquatic ecological features particularly vertebrate fauna and vascular plants or ecological communities listed under state and/or commonwealth legislation (e.g. migratory species, threatened species, threatened ecological communities and endangered populations);
- assess the potential for impacts from the proposed works on any of those ecological features;
- identify the presence of any habitat features that provide foraging or shelter for threatened or protected fauna.

The species list provided for the site in this report was restricted to what was observed during the Subject Site visit by the Narla Ecologists.

The timing of the survey may not have coincided with emergence times of some species of flora and fauna, such as seasonally flowering ground orchids, seasonal migratory fauna or nocturnal fauna.

To account for those species that could not be identified during the field survey, detailed habitat assessments were combined with desktop research and local ecological knowledge to establish an accurate prediction of the potential for such species to occur on or adjacent the Subject Site.

The Subject Site has been historically landscaped and planted with trees, shrubs and ground covers from across the world, including different parts of Australia. This study acknowledges the historical planting efforts and diversity of those plantings; however, this study was not meant to provide a detailed list of these plants but rather focus on those that provide habitat for threatened or protected fauna.

3. Results and Discussion

Following desktop analysis and site assessment, Narla were satisfied that the proposed development of the 'Western Building' and its associated ancillary structures could be developed on the Subject Site. If the appropriate recommendations in this report are followed, the project will progress with minimal ecological loss.

In situations where the habitat on or around the Subject Site was deemed potentially suitable for certain species which could not have been surveyed-for during the field assessment, the precautionary principle applied and those species were assumed present.

To assess any potential for impacts of the proposed development upon any migratory species, threatened species and communities, Narla conducted Assessments of Significance pursuant to section 5A of the EP&A Act (7-part test) (**Appendix C**) and assessments in accordance with the EPBC Act 'Significant Impact Guidelines' (**Appendix D**). The results revealed that the proposed works will have no significant impact on any ecological community, threatened or migratory species.

3.1 Historically Mapped Vegetation Communities

The existing vegetation mapping produced for the subject site '*Native Vegetation of the Illawarra Escarpment and Coastal Plain* (VIS_ID 3778)' (NPWS 2002) had designated vegetation within the Subject Site as 'Cleared' and 'Weeds and Exotics' (**Figure 4**).

3.2 Confirmed Vegetation and Ecological Communities

Field survey conducted by Narla Environmental, revealed a highly disturbed landscape, that has been subject to historical vegetation clearing. Vegetation throughout the Subject Site was composed of a mixture of native and exotic plantings, commonly planted throughout the Illawarra landscape (**Figure 5**).

Many of the plants found within the boundaries of the University of Wollongong, including the Subject Site, have been planted for ornamental purposes. This includes native and exotic tree, shrub and groundcover species. Large expanses of grassland surrounding the Subject Site, and forming parts of the Subject Site (i.e. manicured lawns) were comprised of common exotic pasture grasses and herbs.

All areas of 'bushland' remaining within the Subject Site were considered fragmented and disturbed by historical land usage including classrooms, pedestrian access, weed infestation and infill planting with non-indigenous Australian and exotic flora species used for aesthetic purposes.

3.2.1 Escarpment Moist Blue Gum Forest

A patch of remnant bushland covering approximately 1.24 ha was identified within the riparian corridor in the southern extent of the Subject Site. This patch was dominated by a mesic flora assemblage comprised of species characteristic of '*Escarpment Moist Blue Gum Forest*' (NSW NPWS 2002). The identification of this vegetation community was based on the number of 'positive diagnostic' species for this community (11 species in total) which were represented in assemblages of diagnostic species from each stratum.

Within the larger landscape, vegetation approximately 130m north of the Subject Site has also been identified as Escarpment Moist Blue Gum Forest (NPWS 2002).

The presence of remnant *Eucalyptus saligna* (Sydney Blue Gum) throughout the historically cleared parts of the site, indicates that Escarpment Moist Blue Gum Forest likely, historically occupied part or all of the proposed development site prior to the development of the university.

The condition of the remnant vegetation across the Subject Site was 'moderate - good' with localised areas of weed infestation. Overstorey species included mature *Eucalyptus botyroides* (Bangalay), and *Ficus rubiginosa* (Port-Jackson Fig) and *Polyscias elegans* (Celery Wood), while understorey species comprised *Acmena smithii* (Lillipilli), *Pittosporum undulatum* (Sweet Pittosporum), *Ficus coronata* (Sandpaper Fig), *Scolopia braunii* (Flintwood), *Cryptocarya* spp. and *Synoum glandulosum* subsp. *glandulosum* (Scentless Rosewood).

Several self-sown, or historically planted landscaping trees were also identified within this patch of native vegetation. These species have been historically planted throughout adjoining landscaped areas, and have potentially spread by native birds and mammals, including *Eucalyptus microcorys* (Tallowwood), and *Pinus radiata* (Radiata Pine). Aside from minor fauna foraging habitat values, these trees contribute little to the biodiversity value of the site.

Throughout the remainder of the Subject Site, vegetation was comprised of mature, planted landscaping trees, comprising both locally-indigenous species and ornamental exotic species. A broad range of native and exotic species have been planted throughout the University and the Subject Site itself.

A diagnostic summary of this vegetation community is presented in the following section and **Table 3**.



Plate 1: Escarpment Moist Blue Gum Forest within the southern portion of the Subject Site

Table 3. Nomenclature and brief description of the vegetation community determined to be present within the Subject Site.

Community	Area of Coverage on Subject Site (m ²)	Description	TSC Act	EPBC Act
Escarpment Moist Blue Gum Forest	1,000 m ²	Escarpment Moist Blue Gum Forest is a very tall Eucalypt forest with a prominent subcanopy of rainforest trees and mesic shrubs. The canopy is dominated by Blue Gums (<i>Eucalyptus saligna</i> x <i>botryoides</i> , <i>E. saligna</i>) with co-dominant species that include <i>E. quadrangulata</i> , <i>Syncarpia glomulifera</i> subsp. <i>glomulifera</i> and <i>E. pilularis</i> . The rainforest subcanopy is tall, attaining heights of twenty metres. The rainforest trees present include subtropical influences such as <i>Diploglottis australis</i> and <i>Toona ciliata</i> as well as typical warm temperate species such as <i>Acmena smithii</i> , <i>Cryptocarya</i> spp., <i>Doryphora sassafras</i> and the palm <i>Livistona australis</i> . Shade tolerant ferns such as <i>Doodia aspera</i> , <i>Adiantum</i> spp. and <i>Calochlaena dubia</i> provide a low cover across the forest floor. Escarpment Moist Blue Gum Forest is closely related to Moist Coastal White Box Forest that dominates south of Mt. Kembla. Generally, these wet Eucalypt forests grade into Illawarra Escarpment Subtropical Rainforests where shelter is greatest. Escarpment Moist Blue Gum Forest occurs on escarpment slopes, benches and in moist gullies where combinations of deep soil, high rainfall and protected aspects prevail.	Not Listed	Not Listed

Table 4: Mapped Plant Community Types and other features

Vegetation type	Plant Community Type	Total area (m ²)
Escarpment Moist Blue Gum Forest	Within Riparian Corridor in south of Subject Site.	1,000
Landscaped Vegetation	Native and Exotic Landscaping (including trees, shrubs)	7,285
Total area (m ²)		8,285

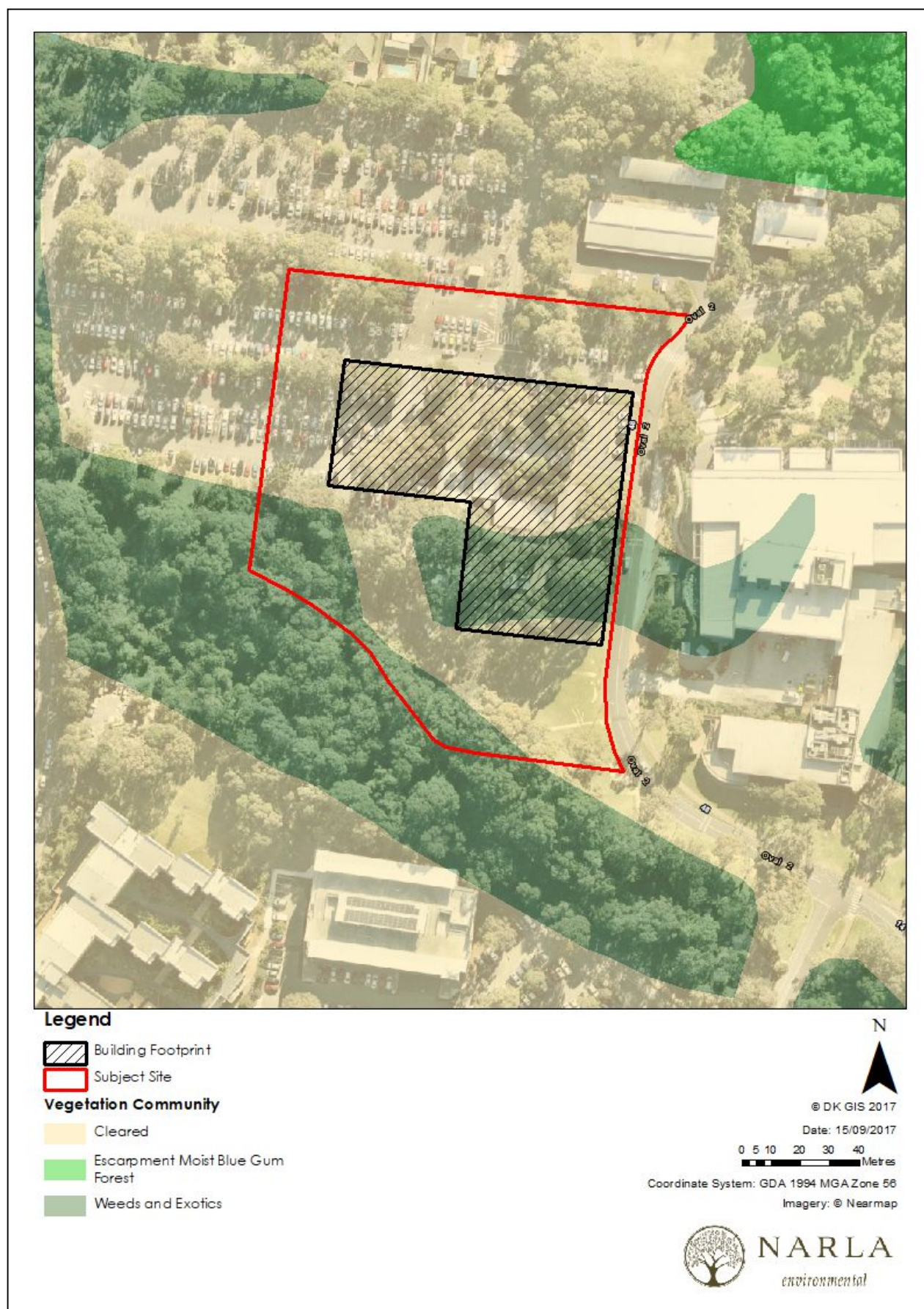


Figure 4. Mapped vegetation (NPWS 2002)

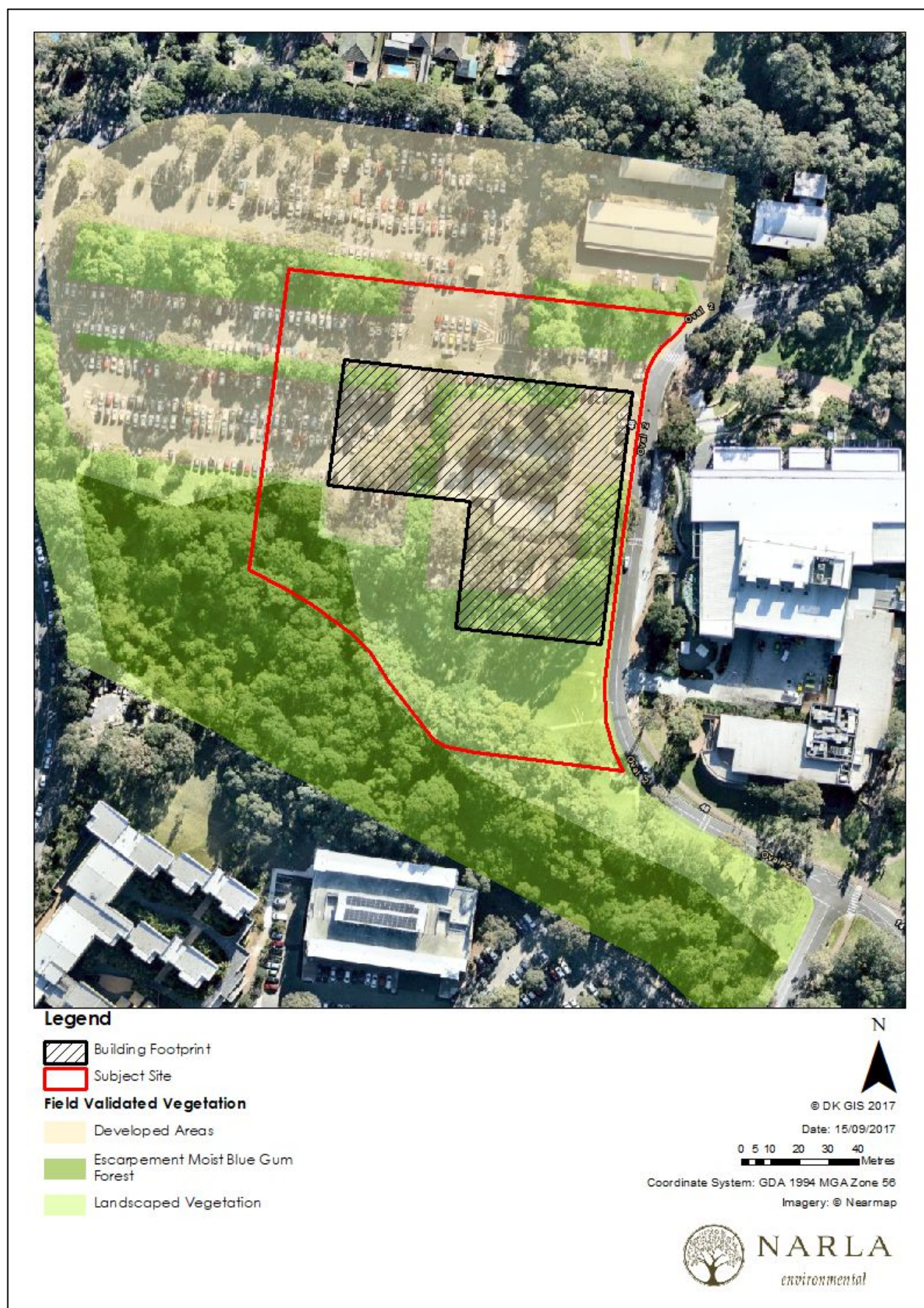


Figure 5: Native vegetation and landscaping areas as validated in the Field by Narla Environmental

3.3 Flora

A total of 108 flora species were identified within the Subject Site, comprising 82 native species and 26 classified as exotic (**Appendix A**). Nomenclature follows PlantNet (2017).

Two of the identified weeds are classed as 'Priority' within the Wollongong Local Government Area. These species must be controlled to prevent their further spread and not propagated or knowingly distributed. This issue is discussed further in **section 3.6.2**.

3.3.1 Threatened and Conservation Significant Flora

Where suitable habitat for threatened flora occurred within the Subject Site, extensive survey was undertaken to determine its presence. No remnant or naturally occurring threatened flora was detected; however, this does not rule out the potential for some threatened species to still exist on the Subject Site in a state of dormancy. Sensitive herbs such as ferns and terrestrial orchids may only emerge after suitable rainfall, and at certain times of the year such as spring and early summer, as such they could not be surveyed for during the site visit in August and October 2017.

Assessments of Significance (7-part tests and MNES) were conducted on all potentially occurring species. It was deemed that the proposed works will have no significant impact on these species. Therefore, SIS and/or EPBC Act Referral to Commonwealth are not required.

Assessments of Significance (7-part tests and MNES) were conducted on all potentially occurring species (**Table 5**).

Table 5. Threatened flora deemed as having potential to occur on the Subject Site

Species	TSC Act	EPBC Act
<i>Pultenaea aristata</i>	Vulnerable	Vulnerable
<i>Cynanchum elegans</i>	Endangered	Endangered
<i>Gossia acmenoides</i>	Endangered	-

3.3.2 *Syzygium paniculatum* (Magenta Lilly Pilly)

Magenta Lilly Pilly is listed as Endangered under the TSC Act, and Vulnerable under the EPBC Act. Magenta Lilly Pilly is also listed under "Rare or Threatened Australian Plants" (RoTAP) (Briggs and Leigh 1996). This species is listed '3VCI', meaning its geographical range is >100km and is Vulnerable – at risk over a longer period (20 – 50 years). This species is known to occur within a proclaimed reserve, however, is considered to be inadequately reserved. Approximately four specimens were identified within a small patch in the eastern extent of the Subject Site (**Figure 6**) within a manicured garden bed, adjacent to the existing building (**Plate 2**). Historically, Magenta Lilly Pilly has been planted within gardens throughout Sydney and Wollongong. The endangered shrub has been widely planted throughout and beyond its known range, making it difficult to identify naturally occurring individuals based on provenance (OEH 2012). The removal of this plant from the site will have no impact on the survival of the species.



Plate 2. *Syzygium paniculatum* (Magenta Lilly Pilly) planted within the Subject Site



Figure 6. Location of threatened flora within the Subject Site

3.3.3 Habitat and Landscape Connectivity

The University of Wollongong is bounded to the west by Robsons Road and Northfields Road to the south. To the north it is bordered by an urban residential landscape.

West of the University lies the Illawarra Escarpment State Conservation Area, which is zoned *E1 – National Parks and Nature Reserves*. Although Robsons Road, dissects the vegetation of the Illawarra Escarpment State Conservation Area, and vegetation of the Subject Site, this is not considered a significant barrier to connectivity. In addition, the Wollongong Botanic Garden, situated to the south of the Subject Site, is likely to contain valuable foraging and nesting habitat that may attract a suite of fauna from within the Illawarra Escarpment State Conservation Area.

In addition to the value for fauna passage and foraging, connectivity of the vegetation on the Subject Site enables the transfer of genetic material and propagules of locally indigenous flora across the landscape.

3.4 Fauna

The Narla Environmental Ecologist encountered nineteen fauna species on the Subject Site during site assessment. All fauna species encountered were listed as 'protected' under the NSW *National Parks and Wildlife Act 1974*.

Fauna encountered were typical of a transition between urban and bushland landscapes, as reflected by the presence of sensitive woodland birds (i.e. *Pardalotus punctatus* [Spotted Pardalote]). The presence of several *Psophodes olivaceus* (Eastern Whipbird) and *Ptilonorhynchus violaceus* (Satin Bowerbird) amongst understorey vegetation within the eastern extent of the Subject Site was noteworthy as it reflects the habitat values of the site. These species have declined as a result of competition and harassment by the overabundant, and aggressive *Manorina melanocephala* (Noisy Miner) and other aggressive birds.

No reptiles or frogs were recorded during the survey. This was expected, owing to the cool weather conditions at the time of survey, and the highly disturbed nature of the Subject Site.

The list of fauna species recorded during the site visit was produced opportunistically and thus only represents a subset of the species that may occur on the Subject Site at any one time. The full list of fauna recorded on site is presented in **Appendix B**.

3.4.1 Fauna Habitat

A thorough assessment of fauna habitat availability across the Subject Site was conducted as a priority. The habitat assessment provided an understanding of the fauna species that may potentially occur on the Subject Site during part of their lifecycle.

Abundant sheltering habitat for a wide range of local and highly-mobile fauna was identified throughout the Subject Site particularly within the bushland to the south, including:

- Two hollow-bearing trees identified within the south-east of the Subject Site, that may provide habitat for reptiles, birds, frogs, arboreal mammals and microchiropteran bats (microbats),
 - A total of five medium-sized hollows (5-10cm) and one large-sized hollow (>10cm) were identified within the Subject Site,
- Deep leaf-litter, that may provide foraging habitat for the invertebrates and small reptiles and frogs,
- Fallen woody debris that provide suitable shelter for small mammals, reptiles, frogs and invertebrates,

- A single Possum Drey, used by the *Pseudocheirus peregrinus* (Common Ringtail Possum), identified within a *Callistemon* spp. in the developed areas of the Subject Site,
- A single nesting box installed within the south of the site, that may be utilised by hollow nesting birds and scansorial mammals,
- Three Satin Bowerbird bowers were observed within the south of the site, currently maintained by immature and mature breeding males (**Plate 3**).

A suite of foraging habitat may provide valuable foraging habitat for local and vagrant fauna, including:

- Nectar-producing plants (*Eucalyptus botryoides* [Bangalay], *Eucalyptus saligna* [Sydney Blue Gum] and *Melaleuca quinquenervia* [Broad-leaved Paperbark]), may attract parrots and highly mobile mammals (*Pteropus poliocephalus* [Grey-headed Flying Fox]).
- Native and exotic fleshy fruit-bearing plants (*Ficus rubiginosa*, *Pittosporum undulatum*, *Glochidion ferdinandi* and *Syzygium paniculatum*, may attract for parrots, bowerbirds, honeyeaters and pigeons.

Flower and fruit-bearing trees and shrubs are considered likely to attract additional species into the area with changes in seasonal fruit/nectar availability.

Significant fauna habitat features identified within the subject site were mapped (**Figure 7**).



Plate 3. *Ptilonorhynchus violaceus* (Satin Bowerbird) tending to a one of a series of display bowers located within the southern extent of the Subject Site.



Figure 7. Fauna habitat trees and structures recorded within the subject site.

3.4.2 Threatened Fauna Species

Desktop analysis and habitat assessment revealed a suite of threatened fauna species had potential to utilise habitat on the Subject Site during a part of their lifecycles.

Abundant fleshy fruit-bearing trees provide suitable foraging habitat for the *Pteropus poliocephalus* (Grey-headed Flying Fox). No suitable roosting habitat was identified for the Grey-headed Flying Fox. No known camps occur within the locality.

Tall, mature, nectar-producing trees provided foraging habitat for *Glossopsitta pusilla* (Little Lorikeet), *Lathamus discolor* (Swift Parrot). It is unlikely that the remnant trees within the subject site provide important foraging habitat for either species, however they may occasionally provide stopover foraging habitat when flowering occurs.

A suite of medium to large-sized hollows provided potential roosting habitat for a suite of threatened hollow-roosting microchiropteran bats including:

- *Mormopterus norfolkensis* (Eastern Freetail-bat);
- *Saccolaimus flaviventris* (Yellow-bellied Sheath-tail-bat);
- *Falsistrellus tasmaniensis* (Eastern False Pipistrelle);
- *Miniopterus australis* (Little Bentwing-bat);
- *Myotis macropus* (Southern Myotis); and
- *Scoteanax rueppellii* (Greater Broad-nosed Bat).

Common small to medium-sized mammals that occupy the site, including Brush-tailed Possum are potential prey for threatened carnivorous owl species including the *Ninox strenua* (Powerful Owl). Potential roosting habitat was observed throughout sheltered areas within the south of the Subject Site. Due to a lack of very large hollows, this large owl species will not nest within the Subject Site.

Fruiting, planted *Casuarina cunninghamiana* (River Oak) provide foraging habitat for the *Calyptorhynchus lathami* (Glossy Black-Cockatoo). Glossy Black Cockatoos require large hollows over 10-15cm in diameter for nesting habitat, as such they are unable to nest within the Subject Site.

The Subject Site provided foraging habitat for three large raptors, including *Lophoictinia isura* (Square-tailed Kite), *Hieraaetus morphnoides* (Little Eagle) and *Haliaeetus leucogaster* (White-bellied Sea Eagle). These large carnivorous birds may intermittently hunt small birds and mammals within vegetated areas across the Subject Site. Due to the disturbed landscape, it is considered unlikely that these species will nest within the site.

The Ecologist also assessed the site for suitable habitat pertaining to the following species:

- Threatened Amphibians
 - *Pseudophryne australis* (Red-crowned Toadlet),
 - *Heleioporus australiacus* (Giant Burrowing Frog),
 - *Litoria aurea* (Green and Golden Bell Frog),
- Threatened Mammals
 - *Dasyurus maculatus* (Spotted-tailed Quoll),
 - *Isodon obesulus* (Southern Brown Bandicoot),
 - *Phascogale cinerea* (Koala),
 - *Cercartetus nanus* (Eastern Pygmy Possum),
- Threatened Birds
 - *Anthochaera phrygia* (Regent Honeyeater),
 - *Petroica phoenicea* (Flame Robin),
 - *Callocephalon fimbriatum* (Gang-gang Cockatoo)
 - *Artamus cyanopterus cyanopterus* (Dusky Woodswallow)
 - Varied Sittella (*Daphoenositta chrysoptera*)

Due to a lack of proximal records or suitable habitat within the Subject Site, the proposed development will not impact upon these species.

The total list of threatened species deemed as having potential to occur in the Subject Site is presented (Table 6).

Table 6. Threatened fauna with potential to occur on the Subject Site during part of their lifecycles

Species	TSC Act	EPBC Act
Eastern False Pipistrelle (<i>Falsistrellus tasmaniensis</i>)	Vulnerable	-
Greater Broad-nosed Bat (<i>Scoteanax rueppellii</i>)	Vulnerable	-
Eastern Bent-wing Bat (<i>Miniopterus schreibersii oceanensis</i>)	Vulnerable	-
Eastern Free-tailed Bat (<i>Mormopterus nofolkensis</i>)	Vulnerable	-
Little Bent-wing Bat (<i>Miniopterus australis</i>)	Vulnerable	-
Southern Myotis (<i>Myotis macropus</i>)	Vulnerable	-
Grey-headed Flying Fox (<i>Pteropus poliocephalus</i>)	Vulnerable	Vulnerable
Powerful Owl (<i>Ninox stenua</i>)	Vulnerable	-
Glossy Black-Cockatoo (<i>Calyptorhynchus lathami</i>)	Vulnerable	-
Square-tailed Kite (<i>Lophoictinia isura</i>)	Vulnerable	-
Little Eagle (<i>Hieraaetus morphnoides</i>)	Vulnerable	-
White-bellied Sea Eagle (<i>Haliaeetus leucogaster</i>)	Vulnerable	-
Swift Parrot (<i>Lathamus discolor</i>)	Endangered	Critically Endangered
Little Lorikeet (<i>Glossopsitta pusilla</i>)	Vulnerable	-

The potential for significant impact upon all potentially occurring TSC Act listed threatened species was assessed against under the '7-Part Test Assessment of Significance'.

The potential for significant impact upon all potentially occurring EPBC Act listed threatened species was assessed against under the 'EPBC Act Significant Guidelines'.

It was deemed that the proposed works will have no significant impact such that a local viable population of a species will be placed at risk of extinction. Therefore, no SIS or EPBC Act Referral to Commonwealth are required for the proposed development.

3.4.3 Migratory Fauna Species

A list of five EPBC Act listed migratory fauna species were considered likely to occasionally use habitat within the Subject Site for foraging or passage, these were:

- Satin Flycatcher (*Myiagra cyanoleuca*)
- Black-faced Monarch (*Monarcha melanopsis*)
- Rufous Fantail (*Rhipidura rufifrons*)
- Fork-tailed Swift (*Apus pacificus*)
- White-throated Needletail (*Hirundapus caudacutus*)

It was deemed that the proposed works will have no significant impact on these species. Therefore, an EPBC Act Referral to Commonwealth is not required.

3.5 Other State and Federal Conservation Matters

3.5.1 Critical Habitat

No Critical Habitat, as declared under the TSC Act, was mapped on the Subject Site at the time of survey.

3.5.2 Other Matters of National Environmental Significance

No other EPBC Act MNES (in addition to those listed in previous paragraphs) were identified as having potential to occur on the Subject Site.

3.5.3 State Environmental Planning Policy 44 (SEPP 44) - Koala Habitat Protection

SEPP 44 - Koala Habitat Protection only applies to land which:

- has an area of more than 1 hectare; or
- has, together with any adjoining land in the same ownership, an area of more than 1 hectare whether or not the development application applies to the whole, or only part, of the land.
- Contains tree species from schedule 2 of SEPP 44.

The subject site contains no remnant SEPP44 trees, subsequently this SEPP does not apply to the proposed development.

3.6 Threats and Disturbances

3.6.1 Key Threatening Processes

The proposed development may introduce or exacerbate the following six Key Threatening Processes (KTP) (as listed under the TSC Act). The latter five KTP are already action within the Subject Site:

1. Clearing of native vegetation;
2. Invasion and establishment of exotic vines and scramblers;
3. Invasion of native plant communities by exotic perennial grasses;
4. Invasion of native plant communities by African Olive *Olea europaea* subsp. *cuspidata*
5. Loss and degradation of native plant and animal habitat by invasion of escaped garden plants, including aquatic plants; and
6. Aggressive exclusion of birds from woodland and forest habitat by abundant Noisy Miners, *Manorina melanocephala*.

Bushland restoration (weed removal) efforts that will be made post construction works on the Subject Site will aim to control these KTP and restore native vegetation communities as effectively as possible.

3.6.2 Priority and Environmental Weeds

A total of 26 exotic flora species were recorded in the Subject Site, including two species listed as 'priority' within the Wollongong LGA. Priority weeds must be managed in accordance with the Biosecurity Act 2015:

- Mandatory Measure and Regional Recommended Measure:
 - *Asparagus aethiopicus*;
 - *Asparagus plumosus*.

Control Measure: These weeds must not be imported into the State or sold. Land managers should mitigate the risk of new weeds being introduced to their land. Plant should not be bought, sold, grown, carried or released into the environment. Land managers should mitigate spread from their land.

These species are also listed as Weeds of National Significance (WoNS) due to their debilitating impacts and widespread extent (DPI 2015).

Weed removal efforts should prioritise the eradication of all 'Priority' Weed and WoNS from the Subject Site as they pose a significant risk to the viability to native canopy, shrub and groundcovers. Weed infestations were largely confined to south of the Subject Site, prevalent throughout the understory of the native vegetation. Many of these species were identified as annuals, and undergo seasonal boom and bust cycles which allow for natural succession.

No dense or well-established weed infestations were observed at the time of survey.

3.6.3 Feral Pests

No declared pest fauna was recorded on the Subject Site, but the habitat is likely to support Rabbit (*Oryctolagus cuniculus*), Feral Cat (*Felis catus*) and Fox (*Vulpes vulpes*) for all or part of their lifecycles. Feral Cat and Fox are the biggest threat as they actively hunt and kill wildlife, including sensitive and uncommon species that may occur on the Subject Site.

The proposed development is unlikely to contribute to enhanced activity or effect of pest fauna.

3.7 Landscaping

A Landscape Plan, has been produced by TaylorBrammer (2017). Landscaping of the Subject Site will consist of a mix of paved areas, manicured gardens and lawns surrounding the proposed building.

In accordance with the University of Wollongong's Landscape Master Plan, the following objectives will be achieved:

- Site landscaping is to include 100% Australian native species;
- 50% of native planting are to be species endemic to the Illawarra region; and
- Exotic species are generally not considered suitable for retention.

Where possible, all non-native species should be systematically removed and replaced with locally-indigenous equivalent species (e.g. nectar-producing trees).

As per Chapter E6 'Landscaping' the Wollongong DCP; *Any sites adjoining any natural areas or creek lines with native vegetation must use locally indigenous species (no cultivars) in the landscape plan and must have regard to any impacts of water flows and flooding.*

All native plants used in plantings should be sourced from a local provenance nursery. Effort should be taken to ensure flora species will provide the same or increased optimal habitat functions as locally indigenous fauna. The proposed landscaping species are listed in **Table 7**. Narla is satisfied that this species list meets the requirements of the Wollongong DCP.

3.8 Bushfire Hazard Assessment

A Bushfire Protection Assessment of the Proposed Western Building has been produced by Stephen Houghton of 'Eco Logical Australia' (ELA 2017). The proposed APZ will not encroach upon any remnant native vegetation.

Table 7. Proposed Landscape Plantings (TaylorBrammer 2017)

INDICATIVE PLANT LIST- GROUND FLOOR			INDICATIVE PLANT LIST- LEVEL 3		
Symbol	Botanical Name	Common Name	Symbol	Botanical Name	Common Name
GRASSES AND GROUNDCOVERS			GRASSES AND GROUNDCOVERS		
	Anigozanthus 'Bush Gem'	Kangaroo Paw		Anigozanthus 'Bush Gem'	Kangaroo Paw
	Carex appressa	Tall Sedge		Hibbertia scandens	Golden Guinea Flower
	Dianella caerulea	Flax Lilly		Scleranthus biflorus	Cushion Bush
	Grevillea lanigera	Wolly Grevillea		Viola hederacea	Ivy Leaved Violet
	Lomandra longifolia	Spiny Head mat Rush			
	Lomandra 'Tanika'	Tanika			
	Viola hederacea	Ivy Leaved Violet			
SHRUBS			SHRUBS		
	Banksia ericifolia	Heath Leafed Banksia		Banksia spinulosa 'Birthday Candles'	Banksia
	Banksia spinulosa 'Birthday Candles'	Banksia		Correa reflexa	Native fuchsia
	Callistemon 'White Anzac'	Bottlebrush		Cordyline fruticosa 'Rubra'	Palm Lilly
	Correa reflexa	Native fuchsia		Kunzea ambigua	Tick Bush
	Doryanthes reflexa	Gymea Lily		Russelia equisetiformis	Coral Plant
	Hakea salicifolia	Willow Leaved hakea			
FERNS AND PALMS			TREES		
	Archontophoenix cunninghamiana	Bangalow Palm		Olea europea	European Olive
	Asplenium australasicum	Birds Nest Fern		Plumeria rubra	Frangipanni
	Cycas revoluta	Sago Palm			
	Dicksonia antarctica	Soft Tree Fern			
	Doodia aspera	Prickly Rasp Fern			
	Livistona australis	Cabbage Tree Palm			
TREES					
	Acmena smithii	Lilly Pilly			
	Alphitonia excelsa	Red Ash			
	Backhousia myrtifolia	Grey Myrtle			
	Brachychiton acerifolius	Illawarra Flame Tree			
	Corymbia maculata	Spotted Gum			
	Eucalyptus pilularis	Blackbutt			
	Eucalyptus saligna	Sydney Blue Gum			
	Syncarpia glomulifera	Turpentine			
	Syzygium australe	Brush Cherry			

3.9 Arboriculture

An Arboricultural Impact Assessment (AIA) has been produced by Ian Hills of 'Accurate Tree Assessment' (ATA 2017). As a part of the AIA, an arboriculture assessment of all trees within and immediately surrounding the Subject Site was undertaken. A total of two hundred and twenty-nine (229) were assessed within the Subject Site.

"The removal of one hundred and thirteen (113) trees that will be subject to major TPZ encroachment will be required to allow the proposed development to proceed in its current format; there is adequate space to provide replacement planting on the subject property to offset the canopy loss that will be caused by the removals."

"The retention of the remaining one hundred and nineteen (119) trees will assist in achieving the University's tree management goals by maintaining the character of the site and will provide ongoing landscape amenity on the Subject Property"

One hundred and thirteen (113) trees have been nominated for removal due to the following:

- Non-compatible with the University of Wollongong landscape masterplan (i.e. exotic species)
- Located within the proposed building footprint; and
- Poor Health.

Where possible, all non-indigenous native and planted trees and shrubs in the south of the Subject Site, within mapped Escarpment Moist Blue Gum Forest, should be removed. All non-indigenous flora must be removed using the cut and paint technique to prevent disturbance to the soil within mapped watercourse and Core Riparian Zone. Root balls must not be removed to avoid disturbance to the soil or impact the riparian corridor.

Tree protection measures are to be implemented to protect all trees to be retained within the Subject Site. Implementation of these measures will ensure that retained trees are not damaged during construction.

4. Environmental Impact Summary

A summary of the proposed area of vegetation clearance and habitat loss are presented.

4.1 Tree Removal

A total of one hundred and thirteen (113) trees require removal to facilitate the construction of the proposed Western Building. These trees have been nominated for removal due to the following:

- Non-compatible with the University of Wollongong landscape masterplan (i.e. exotic species)
- Located within the proposed building footprint; and
- Poor Health.

All non-indigenous flora will be removed using the cut and paint technique to prevent disturbance to the soil within mapped watercourse and Core Riparian Zone. Root balls must not be removed to avoid disturbance to the soil or impact the riparian corridor (particularly the VRZ). This is a requirement of the *NSW Water Management Act 2000*.

4.2 Fauna habitat to be removed or modified

Each of the trees proposed for removal provide some degree of intermittent foraging resources for highly mobile fauna, however, it is unlikely that their removal will significantly impact the foraging behaviours of any locally occurring threatened fauna species.

The removal of these trees may reduce the availability of intermittently occupiable Powerful Owl roosting habitat on the Subject Site. It is important to note that the loss of sole trees will have negligible impact on wide-ranging species, including the Powerful Owl. This large forest owl is likely to continue utilising the Subject Site and surrounding area, owing to the continued presence of abundant roosting

The removal of these trees will not result in a significant reduction in food resources for nectarivorous and frugivorous species such as Grey-headed Flying Fox, due to larger availability of fruit-bearing and nectar-bearing trees within the subject site (*Ficus spp.* and *Melaleuca spp.*) and throughout the greater landscape. All hollow-bearing trees will be retained during the proposed works.

It is expected that no hollow-bearing trees will be lost as a result of the proposed development. In the unlikely event, any tree hollow is removed, the Project Ecologist will advise the proponent on the design and location to erect replacement hollows (Nest Boxes). Hollows will be replaced at a ratio of three new hollows for every one hollow removed.

5. Impact Mitigation Recommendations

The following measures will be implemented by the proponent to mitigate impacts of the proposed works on biodiversity.

5.1 Assigning a Project Ecologist

Prior to obtaining construction certificate, the proponent must commission the services of a qualified and experienced Ecologist Consultant (minimum 3 years' experience) with a minimum tertiary degree in Science, Conservation, Biology, Ecology, Natural Resource Management, Environmental Science or Environmental Management.

The Ecologist will be commissioned to:

- Advise the proponent on best practice methods for managing the biodiversity of the Subject
- Assist the proponent in identifying and assigning an appropriate skilled bushland restoration professional to implement vegetation restoration;
- Monitoring and reporting on any ecological management efforts to be implemented by the proponent.

5.2 Assigning a Qualified Bushland Restoration professional

The Bush Regeneration Contractor selected to complete the project works must as a minimum:

- Provide a statutory declaration stating their compliance with provisions of the National Gardening & Landscaping Services Award 2010;
- Provide completed and signed Subcontractor Statement regarding payment of worker's compensations, payroll tax and remuneration;
- Provide established Workplace Health & Safety and Environmental Management Systems. Preferably the company has third-party accredited systems in place;
- Demonstrate implementation of safe workplace and appropriate environmental management practices and procedures (e.g. appropriate transport and management of herbicides);
- Provide Public Liability (min \$10M) and Workers Compensation Insurance;
- Have previous experience undertaking bushland restoration works within the Illawarra region. Contractor references are to be contacted;
- Provide supervisor with minimum qualifications and experience including Certificate III Conservation & Land Management and two years full-time equivalent experience as a trained Bushland Restoration Professional;
- Provide a minimum of one trained Bushland Restoration Professional per team of four (minimum qualifications and experience including Certificate III Conservation & Land Management and one year full -time equivalent experience as a Bushland Restoration Professional.
- Provide a minimum of two trained Bushland Restoration Professionals per team of five/six (minimum qualifications and experience including Certificate III Conservation & Land Management and one year full – time equivalent experience as a trained Bushland Restoration Professional);
- Schedule appropriately resourced regular site visits for the duration of the contract period;
- All herbicide usage, including storage and transport, to be in accordance with the NSW Pesticides Act 1999, WorkCover NSW (2006) and all other relevant legislation;
- All bush regeneration crew members undertaking herbicide spray applications must hold a current chemicals application training certificate to AQF level III.

5.1 Preparation of a VMP

Where the proposed development impacts on land within a mapped riparian corridor, or requires the alteration of Vegetated Riparian Corridor to meet the requirements of an APZ (for Bushfire Hazard Management). Wollongong Council and Department of Primary Industries (DPI 2012) requires that a Vegetation Management Plan (VMP) is produced for the Subject Site.

5.1.1 Controlled Activities on Waterfront Land (DPI 2012)

Controlled activities carried out in, on or under waterfront land are regulated by the Water Management Act 2000 (WM Act). The NSW Office of Water administers the WM Act and is required to assess the impact of any proposed controlled activity to ensure that no more than minimal harm will be done to waterfront land.

Water front land include the bed and bank of any river, lake or estuary and all land within 40 metres of the highest bank of the river, lake or estuary.

A controlled activity approval must be obtained from the NSW Office of Water before commencing the controlled activity.

When a proposed controlled activity disturbs or substantially modifies the riparian corridor, its restoration or rehabilitation will be a requirement of the controlled activity approval. A vegetation management plan (VMP) details how the restoration or rehabilitation will be carried out.

5.2 Ecologist Pre-clearing Survey

Before any vegetation is damaged or removed, the Project Ecologist with fauna survey experience should be assigned to undertake a pre-clearing survey to determine the presence of any suitable habitat for nesting birds or other fauna in the area of the Subject Site due to be cleared. This will include assessing tree canopies, shrub-layer, leaf litter and outcrops for any residing fauna including nesting or sheltering birds, reptiles and bats. The findings of the pre-clearing survey should be compiled in a short report signed-off by an Ecologist and provided to the proponent as a record, before any clearing works commence in this area.

5.3 Removal of Trees / Clearing of Vegetation

During the clearing of any vegetation, it is important that landowners are aware of potential for indirect harm to native animals and loss of their natural habitat (regardless of whether vegetation is native or exotic). Landowners who clear trees and vegetation are not exempt from prosecution under the *National Parks and Wildlife Act 1974* for harm to protected fauna, or for deliberate cruelty to animals under the *Prevention of Cruelty to Animals Act 1979*.

A qualified Project Ecologist with experience in handling wildlife should be present on the Subject Site during all vegetation clearing in order to supervise clearing and to capture and relocate any displaced, healthy animals, or care for / rehabilitate any injured or orphaned animals.

All trees (including dead trees) should be felled by qualified Arborists using chainsaw and pulleys. No heavy machinery is permitted for vegetation removal.

Temporary fencing should be installed around all vegetation and trees to be retained in order to prevent accidental damage or removal of native plants.

Where possible, all existing logs and fallen dead wood should be retained within Subject Site as fauna habitat. If APZ management, requires the removal of dead wood from within the Subject Site, the Project Ecologist should supervise its relocation to a suitable site within the University Grounds in order to continue to provide fauna habitat.

No disturbance to soil surface can take place within any mapped core riparian corridor or buffer areas. Removal of trees must not disturb the soil surface. This is required to prevent erosion and ensure all controls relevant to riparian corridor management are upheld.

5.3.1 Threatened Flora

It is understood that all *Syzygium paniculatum* (Magenta Lilly Pilly), on the Subject Site were planted from commercial, nursery-reared stock, therefore it is not considered important to provide added protection to the plants. If any of these plants are removed during construction, they should be replaced with local provenance native flora that provide similar habitat values. In the unlikely event any naturally occurring threatened flora are identified on the Subject Site in the lead up, or during the vegetation clearing or construction stage, a Project Ecologist should be notified to provide the best course of action.

5.3.2 Threatened Fauna Habitat

In the unlikely event, any tree hollow is removed, the Project Ecologist will advise the proponent on the design and location to erect replacement hollows (Nest Boxes). Hollows will be replaced at a ratio of three new hollows for every one hollow removed.

5.4 Storage, Stockpiling and Laydown Construction

All areas of topsoil that exist under the proposed dwellings, associated landscaping and construction footprint, should be stripped and stockpiled following best practice methodology (Landcom 2004) to ensure the seed bank and biology of the topsoil remains viable, stockpile all topsoil away from subsoil and fill, and minimise duration of stockpiling to no more than 6 weeks. Any longer and soil should be 'turned' and watered as advised by the Project Ecologist, this is required in order to maintain soil biota.

Allocate all storage, stockpile and laydown sites away from any native vegetation that is planned to be retained. All laydown areas should occur in the centre of the site, away from native vegetation and land adjoining the Category 2 watercourse.

Topsoil should be spread back on the Subject Site, or 'donated' to a 'recipient site' for use in bushland restoration. A topsoil 'recipient site' may be organised with the assistance of Council and a qualified Bush Regeneration Professional. The proposed 'recipient site' must be considered as being likely to support the flora species assemblage present on the Subject Site. Only import certified, clean soil and fill from outside the site, as uncertified, contaminated soil can introduce weeds and pathogens to the site.

5.5 Erosion and Sedimentation

Ensure that adequate erosion and sediment measures are in place at all times during construction activity. No excavation or fill should occur within mapped 'core' or 'buffer' riparian lands. Any tree removal activities proposed within these areas must not involve soil disturbance or removal of the root ball.

Appropriate erosion and sediment control must be erected and maintained at all times during construction. As minimum such measures should comply with the relevant industry guidelines such as 'the Blue Book' (Landcom 2004).

5.6 Managing Priority Weeds and Exotic Flora

All environmental weeds must be removed from the Subject Site, particularly weeds listed as 'Priority' (DPI 2015). All weed removal works are to be implemented by a fully qualified and experienced Bush Regeneration Contractor. It is advised that the proponent assigns an experienced and qualified

Ecologist to regularly monitor weed incursions and maintain a regular weed management control program.

Some weeds on the Subject Site may currently provide prey, nectar, fruit or shelter for fauna such as small birds. Examples of such weeds include Mickey Mouse Plant and Common Passionfruit. Since they are environmental weeds, these plants should still be removed from the Subject Site. In order to reduce any potential negative influence on fauna, weeds should be progressively removed and replaced with ecological-equivalent indigenous native indigenous flora species known to occur naturally within the area. This will take place through implementation of the Landscape Plan (TaylorBrammer 2017).

All native plants used in plantings should be sourced from a local provenance nursery. The proponent should plant flora species representative of indigenous vegetation communities with a focus on plants that will provide the same or increased optimal habitat functions as the weeds proposed for removal.

5.7 Native Revegetation and Landscape Plantings

The proposed works specified within the Landscape Design (TaylorBrammer 2017) will enhance the potential for fauna utilisation within the Subject Site. This will be achieved through planting a suite of locally-indigenous species that will provide foraging and sheltering habitat throughout the Subject Site. The proposed works will also involve select thinning of trees and shrubs which will improve growing conditions for the locally-indigenous trees remaining on the Subject Site post development.

Plants used in landscaping must be sourced from a local provenance nursery. This is particularly important due to the proximity of the Subject Site to nearby significant habitat areas (e.g. mapped riparian corridor). Select species that will provide the same or increased optimal habitat functions as locally-indigenous fauna, such as structural diversity and foraging resources.

As per Chapter E6 'Landscaping' the Wollongong DCP; *Any sites adjoining any natural areas or creek lines with native vegetation must use locally indigenous species (no cultivars) in the landscape plan and must have regard to any impacts of water flows and flooding.*

Many of the flora species found naturally on the Subject Site can also be used as attractive, habitat-providing components of the landscape design. This includes *Alphitonia excelsa* (Red Ash), *Eucalyptus pilularis* (Blackbutt), *Eucalyptus saligna* (Sydney Blue Gum) and *Syncarpia glomulifera* (Turpentine).

5.8 Sewerage

The proposed development is to be connected to the existing sewerage reticulation system. It is unlikely there will be any adverse effects to local ecology from the sewerage system.

5.9 Storm-water

Stormwater flow from the proposed dwellings and hard surfaces will be directed to existing paths of stormwater runoff. Prior to any release, all stormwater is to be piped through any tanks that may be required by the regulating authorities.

The proposed development is unlikely to result in significant changes to storm-water runoff so it is expected there will be no exacerbated impact on native species of flora and fauna.

5.10 Domestic and Feral Animals

Surrounding properties currently keep domestic pets, including free roaming cats, and will in all likelihood continue to do so. The keeping of domestic pets on the Subject Site can be continued without fear of significant, adverse ecological effect. No feral fauna were recorded on the Subject Site and no feral pest management is required.

6. Conclusion

This assessment indicates that the requirements of the SEARS (SSD 8596), EP&A Act, TSC Act, EPBC Act, and the relevant provisions of the Wollongong LEP 2009 and DCP 2009 have been satisfied, subject to the implementation of the recommendations in the report the proposed development should be granted approval.

Assessment of Significance (7-part tests) conducted in the preparation of this report revealed that the project will incur no significant impact on any threatened species or ecological communities that occur, or have potential to occur on the Subject Site.

In summary, the proposed development will require the:

- Demolition of existing buildings to make way for the proposed redevelopment and associated facilities;
- Removal of one hundred and thirteen (113) trees in order to facilitate the development of the proposed Western Building;
 - This will result in the loss of minor foraging habitat for nectarivorous and frugivorous fauna, however, this will be mitigated by locally-indigenous planting included within the Landscape Plan (Taylor Brammer 2017).
 - No hollow-bearing trees are expected to be lost as a result of the development. Any tree hollows identified post clearance, will be replaced at a ratio of 3:1.
- Removal of all priority and environmental weeds from within the Subject Site; and
- Removal of exotic and ornamental garden beds to make way for the proposed Western Building and associated landscaping.

Where possible, no works are to be carried out within mapped riparian corridors. If unavoidable, the preparation of a Vegetation Management Plan by a qualified Ecologist will guide the protection and restoration of the Vegetated Riparian Corridor and aide in improving biodiversity values across the Subject Site.

A detailed suite of impact mitigation recommendations has been provided to ensure that the findings of the Impact Assessment process remain correct (**Section 5**).

After carrying-out a 7-part Test Assessment of Significance under the EP&A Act for any potential impacts to TSC Act listed threatened species, ecological communities and populations it was deemed the proposed works will have no significant impact on any threatened species, ecological communities or populations such that a viable local population will be placed at risk of extinction (**Appendix C**).

Similarly, after carrying out an Impact Assessment under the EPBC Act Significant Impact Guidelines, it was determined that the proposed works will have no significant impact on any MNES (threatened and migratory species) (**Appendix D**).

The proposed building and facilities upgrade should progress without further impact assessment or offset, as there will be no significant impact/effect to threatened species, populations or communities.

7. References

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8. Appendices

Appendix A – Site Flora List

Appendix B – Site Fauna List

Appendix C - EP&A Act/ TSC Act Assessment of Significance (7-part Test)

Appendix D - EPBC Act Significant Impact Guidelines Assessment

Appendix A. Site Flora List

Scientific Name	Exotic	Status	Landscaped Vegetation	Riparian	Developed Area
<i>Acacia maidenii</i>					
<i>Acer palmatum</i>	*				
<i>Acmena smithii</i>					
<i>Adiantum formosum</i>					
<i>Agonis flexuosa</i>					
<i>Alphitonia excelsa</i>					
<i>Araucaria cunninghamii</i>					
<i>Araujia sericifera</i>	*				
<i>Archontophoenix cunninghamiana</i>					
<i>Asparagus aethiopicus</i>	*	Priority Weed			
<i>Asparagus plumosus</i>	*	Priority Weed			
<i>Backhousia myrtifolia</i>					
<i>Banksia integrifolia</i>					
<i>Banksia integrifolia</i>					
<i>Brachychiton acerifolius</i>					
<i>Callistemon salignus</i>					
<i>Camellia spp.</i>	*				
<i>Cassine australis</i>					
<i>Cassytha pubescens</i>					
<i>Castanospermum australe</i>					
<i>Casuarina cunninghamiana</i>					
<i>Cayratia clematidea</i>					
<i>Cissus antarctica</i>					
<i>Clerodendrum tomentosum</i>					
<i>Commelina cyanea</i>					
<i>Corymbia citriodora</i>					
<i>Corymbia eximea</i>					
<i>Corymbia maculata</i>					
<i>Cryptocarya glaucescens</i>					
<i>Cynodon dactylon</i>					
<i>Datura stramonium</i>	*				
<i>Dianella caerulea</i>					
<i>Dianella longifolia</i>					
<i>Dichondra repens</i>					
<i>Dietes grandiflora</i>					
<i>Diploglottis australis</i>					

Scientific Name	Exotic	Status	Landscaped Vegetation	Riparian	Developed Area
<i>Ehrharta erecta</i>	*				
<i>Elaeocarpus reticulatus</i>					
<i>Eucalyptus botryoides</i>					
<i>Eucalyptus elata</i>					
<i>Eucalyptus fibrosa</i>					
<i>Eucalyptus longifolia</i>					
<i>Eucalyptus microcorys</i>					
<i>Eucalyptus mollucana</i>					
<i>Eucalyptus paniculata</i>					
<i>Eucalyptus punctata</i>					
<i>Eucalyptus saligna</i>					
<i>Eucalyptus sideroxylon</i>					
<i>Eucalyptus sieberi</i>					
<i>Euphorbia peplus</i>	*				
<i>Ficus coronata</i>					
<i>Ficus rubiginosa</i>					
<i>Fumaria officinalis</i>	*				
<i>Geranium homeanum</i>					
<i>Grevillea robusta</i>					
<i>Grevillea spp.</i>					
<i>Guioa semiglauc</i>					
<i>Gymnostachys anceps</i>					
<i>Hakea salicifolia</i>					
<i>Harpephyllum kaffrum</i>	*				
<i>Homalanthus populifolius</i>					
<i>Jacaranda mimosifolia</i>	*				
<i>Ligustrum lucidum</i>	*				
<i>Livistona australis</i>					
<i>Lomandra longifolia</i>					
<i>Lophostemon confertus</i>					
<i>Maclura cochinchinensis</i>					
<i>Marsdenia rostrata</i>					
<i>Medicago sativa</i>	*				
<i>Melaleuca armillaris subsp. armillari</i>					
<i>Melaleuca bracteata</i>					
<i>Melaleuca decora</i>					
<i>Melaleuca linariifolia</i>					
<i>Melaleuca quinquinervia</i>					
<i>Melia azederach</i>					
<i>Modiola caroliniana</i>	*				

Scientific Name	Exotic	Status	Landscaped Vegetation	Riparian	Developed Area
<i>Myrsine variabilis</i>					
<i>Ochna serrulata</i>	*				
<i>Oplismenus aemulus</i>					
<i>Oxalis exilis</i>					
<i>Pandorea pandorana</i>					
<i>Pararchidendron pruinatum</i>					
<i>Parsonsia straminea</i>					
<i>Passiflora edulis</i>	*				
<i>Pennisetum clandestinum</i>	*				
<i>Pinus radiata</i>	*				
<i>Pittosporum multiflorum</i>					
<i>Pittosporum undulatum</i>					
<i>Plantago lanceolata</i>	*				
<i>Platanus X hybrida</i>	*				
<i>Podocarpus elatus</i>					
<i>Polyscias elegans</i>					
<i>Polyscias sambucifolia</i>					
<i>Populus deltoides</i>	*				
<i>Scolopia braunii</i>					
<i>Sida rhombifolia</i>	*				
<i>Solanum nigrum</i>	*				
<i>Sonchus oleraceus</i>	*				
<i>Stellaria media</i>	*				
<i>Stenocarpus sinuatus</i>					
<i>Stephania japonica</i>					
<i>Syncarpia glomulifera</i>					
<i>Synoum glandulosum</i> subsp. <i>glandulosum</i>					
<i>Syzygium paniculatum</i>		TSC: Endangered EPBC: Vulnerable			
<i>Toona ciliata</i>					
<i>Tradescantia fluminensis</i>	*				
<i>Tristaniaopsis laurina</i>					
<i>Veronica plebeia</i>					

Appendix B. Site Fauna List

Class	Scientific Name	Common Name
Aves	<i>Accipiter novaehollandiae</i>	Grey Goshawk
Aves	<i>Alisterus scapularis</i>	Australian King-Parrot
Aves	<i>Anthochaera chrysoptera</i>	Little Wattlebird
Aves	<i>Cacatua galerita</i>	Sulphur-crested Cockatoo
Aves	<i>Cacatua galerita</i>	Sulphur-crested Cockatoo
Aves	<i>Chenonetta jubata</i>	Australian Wood Duck
Aves	<i>Corvus coronoides</i>	Australian Raven
Aves	<i>Cracticus tibicen</i>	Australian Magpie
Aves	<i>Cracticus torquatus</i>	Grey Butcherbird
Aves	<i>Dacelo novaeguineae</i>	Laughing Kookaburra
Aves	<i>Grallina cyanoleuca</i>	Magpie-lark
Aves	<i>Hirundo neoxena</i>	Welcome Swallow
Aves	<i>Manorina melanocephala</i>	Noisy Miner
Aves	<i>Pardalotus punctatus</i>	Spotted Pardalote
Aves	<i>Platycercus elegans</i>	Crimson Rosella
Aves	<i>Psophodes olivaceus</i>	Eastern Whipbird
Aves	<i>Ptilonorhynchus violaceus</i>	Satin Bowerbird
Aves	<i>Strepera graculina</i>	Pied Currawong
Aves	<i>Trichoglossus haematodus</i>	Rainbow Lorikeet
Aves	<i>Vanellus miles</i>	Masked Lapwing

Appendix C. EP&A Act/ TSC Act Assessment of Significance (7-part Test)

Environmental Planning and Assessment Act 1979 and Threatened Species Conservation Act 1995 – Assessment of Significance (7-part Test) for Grey-headed Flying-Fox (<i>Pteropus poliocephalus</i>)	
TSC Act Status: Vulnerable	
Species Ecology	Grey-headed Flying-fox forage opportunistically, often at distances up to 30 km from camps, and occasionally up to 60-70 km per night, in response to patchy food resources. This species is a canopy-feeding frugivore, blossom-eater and nectarivore of rainforests, open forests, woodlands, Melaleuca swamps and Banksia woodlands. As such, the species contributes important ecosystem function by providing a means of seed dispersal and pollination for many indigenous tree species. Grey-headed Flying-fox feed on introduced trees including commercial fruit crops. Grey-headed Flying-foxes congregate in large numbers at roosting sites (camps) that may be found in rainforest patches, Melaleuca stands, mangroves, riparian woodland or modified vegetation in urban areas. Individuals generally exhibit a high fidelity to traditional camps and return annually to give birth and rear offspring. The Grey-headed Flying-fox show a regular pattern of seasonal movement. Much of the population concentrates in May and June in northern NSW and Queensland where animals exploit winter-flowering trees such as Swamp Mahogany <i>Eucalyptus robusta</i>, Forest Red Gum <i>E. tereticornis</i> and Paperbark <i>Melaleuca quinquenervia</i>.
Habitat present on Subject Site	The Ecologist confirmed the presence of a suite of flower and fruit-bearing trees within the Subject Site. It is expected that many of these trees have been planted as a part of the University Master Landscape Plan, however, they offer valuable foraging resources.
(a) in the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction,	The proposed action is unlikely to adversely effect upon the life cycle of the species. At the time of preparing this report there were no known roosts or camps of Grey-headed Flying-fox within the Subject Site or in the surrounding area. However, the Subject Site may provide intermittent potential foraging habitat to this species when habitat trees are flowering and fruiting. Based on the University of Wollongong development concept plan, approximately 113 flowering and fruit-bearing trees and shrubs are predicted to be removed for the proposed development. While these trees provide potential foraging and shelter for the species, many of these trees have been planted and are located in highly-disturbed areas with a high level of human traffic. As a result, it is likely that these trees provide sub-optimal ecological value to the species. A detailed pre-clearing survey and assessment will be required to quantify the exact number of fruit-bearing and flowering trees lost. Pre-clearing data will be maintained in a database. The loss of these trees will be mitigated by the planting of trees and shrubs suitable for the species. Extensive suitable potential habitat for the species will remain within the broader Subject Site and in the adjacent Illawarra Escarpment Foothills to the west of the site, which provides over < 3,000 ha of suitable potential habitat for the species. The proposed action will not cause a net loss in habitat resources and therefore will not have an adverse effect such that will be likely to reduce the viability of a local population, such that the species is likely to be placed at risk of extinction.
(b) in the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction,	Not applicable –species does not belong to an Endangered Population

Environmental Planning and Assessment Act 1979 and Threatened Species Conservation Act 1995 – Assessment of Significance (7-part Test) for Grey-headed Flying-Fox (<i>Pteropus poliocephalus</i>)		
TSC Act Status: Vulnerable		
(c) in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:	(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or	Not applicable – this species does not constitute an Endangered Ecological Community
	(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,	
(d) in relation to the habitat of a threatened species, population or ecological community:	(i) the extent to which habitat is likely to be removed or modified as a result of the action proposed, and	i) Based on the University of Wollongong concept plan, approximately 113 flowering and fruit-bearing trees and shrubs are predicted to be removed for the proposed development. While these trees provide potential foraging and shelter for the species, many of these trees have been planted and are located in highly-disturbed areas with a high level of human traffic. As a result, it is likely that these trees provide sub-optimal ecological value to the species. A detailed pre-clearing survey and assessment will be required to quantify the exact number of fruit-bearing and flowering trees lost. Pre-clearing data will be maintained in a database. The loss of these trees will be mitigated by the planting of trees and shrubs suitable for the species. Extensive suitable potential habitat for the species will remain within the broader Subject Site and in the adjacent Illawarra Escarpment Foothills located to the west of the site, which provides over 3,000ha of suitable potential habitat for the species. ii) The habitat available on the Subject Site for this species will not become fragmented from other areas as a result of the proposed development. As the species is highly mobile, minor loss of select trees and shrubs from within the Subject Site is not considered likely to significantly affect the species. Habitat connectivity will continue to occur in the nearby section of the Illawarra Escarpment Foothills to the west of the Subject Site. iii) The proposed development will be situated predominantly in a disturbed and altered landscape containing a large proportion of planted and self-sown trees which provide sub-optimal foraging habitat for the species in comparison to the extensive potential foraging habitat provided by the nearby Illawarra Escarpment Foothills.
	(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and	
	(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality,	
(e) whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly),		Under the TSC Act, the Director-General maintains a register of critical habitat. To date, no critical habitat has been declared for the species.

Environmental Planning and Assessment Act 1979 and Threatened Species Conservation Act 1995 – Assessment of Significance (7-part Test) for Grey-headed Flying-Fox (<i>Pteropus poliocephalus</i>)	
TSC Act Status: Vulnerable	
(f) whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan	OEH (2006) has listed priority actions to help recover the Grey-headed Flying-fox. Including the following: ▪ Increase the extent and viability of foraging habitat for the Grey-headed Flying-fox that is productive during winter and spring through dedicated habitat creation and restoration using guides published by OEH (in preparation). ▪ Planting new roost trees, managing understorey vegetation to maintain suitable microclimate conditions, establishing buffers between roost camps and nearby human settlements to minimise conflict Where possible, the proposed action will protect large foraging trees that have the potential to support the species. Trees to be lost as a result of the development will be replaced with suitable foraging resources as a part of the Subject Site landscape plan.
(g) whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the effect of, a key threatening process.	The following Key Threatening Processes (KTPs) listed under Schedule 3 of the TSC Act are relevant to the protection of potential habitat within the Subject Site for these species: ▪ Clearing of native vegetation ▪ Loss and degradation of native plant and animal habitat by invasion of escaped garden plants, including aquatic plants ▪ Invasion of native plant communities by African Olive <i>Olea europaea</i> subsp. <i>cuspidata</i> (Wall. ex G. Don) Cif. ▪ Invasion and establishment of exotic vines and scramblers ▪ Predation by the Feral Cat <i>Felis catus</i> Foraging trees to be removed will be replaced as a part of the site landscape plan. Specific management actions relevant to the protection of this species will be listed in the VMP. All environmental and noxious weed species present within the subject site will be removed and replaced with native flora. Feral cats will be trapped and destroyed if recorded within the Subject Site.
Conclusion There will be no significant effect on the Grey-headed Flying Fox, therefore the proposed action should not warrant the producing of a Species Impact Statement (SIS).	
References NSW Office of Environment and Heritage (2017) Grey-headed Flying-fox (<i>Pteropus poliocephalus</i>) – Species Conservation Project http://www.environment.nsw.gov.au/savingourspeciesapp/project.aspx?ProfileID=10697 NSW Government (2017) NSW Legislation: Threatened Species Conservation act 1995 No 101, Section 3: Key Threatening Processes http://www.legislation.nsw.gov.au/#/view/act/1995/101/full	

Environmental Planning and Assessment Act 1979 and Threatened Species Conservation Act 1995– Assessment of Significance (7-part Test) for Nomadic Nectivorous Birds Swift Parrot (<i>Lathamus discolor</i>)¹ Little Lorikeet (<i>Glossopsitta pusilla</i>)²	
TSC Act Status: ¹ Endangered, ² Vulnerable	
Species Ecology	The Swift Parrot breeds in tree hollows in Tasmanian Blue Gum forest on Tasmania and migrates to the NSW coast for the autumn and winter each year. During this time flocks of Swift Parrot become nomadic as they follow irruptions of food resources, including flowering trees including <i>Eucalyptus</i>, <i>Angophora</i>, <i>Corymbia</i>, Mistletoes and lerp (leaf psyllid insect exudate). Every few years non-breeding flocks are seen foraging in flowering coastal Swamp Mahogany and Spotted Gum forests, particularly on the central coast and occasionally on the upper north coast. Swift Parrot has been recorded throughout the Sydney region wherever suitable food sources are present. It forages predominantly on lerps on all Eucalyptus and Angophora that grow in this area. The Little Lorikeet mostly occurs in dry, open eucalyptus forests and woodlands. The species does not undergo regular migration, but instead is considered nomadic with irregular large or small influxes of individuals occurring at any time of year. This is usually in response to seasonal variations in food supply. Little Lorikeets often forage in small groups with other species of lorikeet, feeding primarily on nectar and pollen from tall eucalyptus species. The Little Lorikeet may also forage within melaleucas and mistletoes. Breeding activity is largely known from the western slopes, where birds utilise small hollows (~3cm) within living smooth barked trees.
Habitat present on Subject Site	The Ecologist confirmed the presence of a suite of flower-bearing trees within the Subject Site. It is expected that many of these trees have been planted as a part of the University Master Landscape Plan, however, they offer valuable foraging resources.
(a) in the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction,	The proposed action is unlikely to adversely effect upon the life cycle of the species. Based on the University of Wollongong concept plan, it is predicted that no hollow-bearing trees will be lost as a result of the proposed development. In the unlikely event of the removal of a hollow-bearing tree, lost hollows will be replaced by augmented hollows. Swift Parrot does not nest in mainland Australia. Relative to the broader landscape, a small number of flowering and fruit-bearing trees and shrubs may be removed for the proposed development. While these trees provide potential foraging and shelter for the species, the number of suitable trees is low and insignificant to the habitat available for these highly mobile birds. Many of these trees have been planted and all are located in highly-disturbed areas with a high level of human traffic. As a result, it is likely that these trees provide sub-optimal ecological value to these species. A detailed pre-clearing survey and assessment will be undertaken to quantify the exact number of fruit-bearing and flowering trees lost. Pre-clearing data will be maintained in a database. The loss of these trees will be mitigated by the planting of trees and shrubs suitable for the species. Extensive suitable potential habitat for the species will remain within the broader Subject Site and in the nearby Illawarra Escarpment Foothills, which provides over 3,000ha of suitable potential habitat for the species.
(b) in the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction,	Not applicable – these species do not belong to an Endangered Population

Environmental Planning and Assessment Act 1979 and Threatened Species Conservation Act 1995– Assessment of Significance (7-part Test) for Nomadic Nectivorous Birds Swift Parrot (<i>Lathamus discolor</i>)¹ Little Lorikeet (<i>Glossopsitta pusilla</i>)²		
TSC Act Status: ¹ Endangered, ² Vulnerable		
(c) in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:	(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or	Not applicable – these species do not constitute an Endangered Ecological Community
	(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,	
(d) in relation to the habitat of a threatened species, population or ecological community:	(i) the extent to which habitat is likely to be removed or modified as a result of the action proposed, and	i) Based on the University of Wollongong concept plan, it is predicted that no hollow-bearing trees will be lost as a result of the proposed development. In the unlikely event of the removal of a hollow-bearing tree, lost hollows will be replaced by augmented hollows. Relative to the broader landscape, a small number of flowering and fruit-bearing trees and shrubs are predicted to be removed for the proposed development. While these trees provide potential foraging and shelter for the species, many of these trees have been planted and are located in highly-disturbed areas with a high level of human traffic. As a result, it is likely that these trees provide sub-optimal ecological value to the species. A detailed pre-clearing survey and assessment will be required to quantify the exact number of hollows and fruit-bearing and flowering trees lost. The loss of these trees will be mitigated by the planting of trees and shrubs suitable for the species. Extensive suitable potential habitat for the species will remain within the broader Subject Site and in the nearby Illawarra Escarpment Foothills located to the west of the Subject Site, which provides over 3,000 ha of suitable potential habitat for the species. ii) The habitat available on the Subject Site for this species will not become fragmented from other areas as a result of the proposed development. As the species is highly mobile, minor loss of select trees and shrubs from within the Subject Site is not considered likely to significantly affect the species. Habitat connectivity will continue to occur in the nearby section of the Illawarra Escarpment Foothills. iii) The proposed development will be situated predominantly in a disturbed and altered landscape containing a large proportion of planted and self-sown trees which provide sub-optimal foraging habitat for the species in comparison to the extensive potential foraging habitat provided by the nearby Illawarra Escarpment Foothills.
	(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and	
	(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality,	
(e) whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly),		Under the TSC Act, the Director-General maintains a register of critical habitat. To date, no critical habitat has been declared for these species.

Environmental Planning and Assessment Act 1979 and Threatened Species Conservation Act 1995– Assessment of Significance (7-part Test) for Nomadic Nectivorous Birds Swift Parrot (<i>Lathamus discolor</i>)¹ Little Lorikeet (<i>Glossopsitta pusilla</i>)²	
TSC Act Status: ¹ Endangered, ² Vulnerable	
(f) whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,	The following conservation activities were taken from the Swift Parrot recovery plan (OEH 2017), however are relevant supporting the recovery of all three species. ▪ To identify and prioritise habitats and sites used by the species across its range, on all land tenures. ▪ To implement management strategies to protect and improve habitats and sites on all land tenures ▪ To monitor and manage the incidence of collisions, competition and Beak and Feather Disease (BFD) ▪ To monitor population trends and distribution throughout the range Although the proposed development has not identified the required removal of any hollow bearing trees, any hollow bearing trees lost will be replaced by augmented hollows. The number of replacement habitat features required will be determined by the pre-clearing survey. Where possible, the proposed action will protect large foraging trees that have the potential to support the species. In the event that any flowering and fruit-bearing trees are lost as a result of the proposed development, the proponent will replace all trees lost with a suitable replacement that provides the same habitat values.
(g) whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the effect of, a key threatening process.	The following Key Threatening Processes (KTPs) listed under Schedule 3 of the TSC Act are relevant to the protection of potential habitat within the subject site for these species: ▪ Clearing of native vegetation ▪ Competition from feral honey bees, <i>Apis mellifera</i> L. ▪ Aggressive exclusion of birds from woodland and forest habitat by abundant Noisy Miners <i>Manorina melanoccephala</i> ▪ Infection by Psittacine Circoviral (beak and feather) Disease affecting endangered psittacine species and populations ▪ Invasion and establishment of exotic vines and scramblers ▪ Invasion of native plant communities by African Olive <i>Olea europaea</i> subsp. <i>cuspidata</i> (Wall. ex G. Don) Cif. ▪ Predation by the Feral Cat <i>Felis catus</i> (Linnaeus, 1758) The proposed action is considered unlikely to result in a significant increase to KTP. There will be no significant effect to these species, under the provision that the mitigation recommendations outlined in this report are followed. These mitigations include retaining all hollow-bearing trees, and replacing lost foraging trees. Proposed planting strategies will provide maintained or improved foraging habitat for these birds.

Environmental Planning and Assessment Act 1979 and Threatened Species Conservation Act 1995– Assessment of Significance (7-part Test) for Nomadic Nectivorous Birds Swift Parrot (<i>Lathamus discolor</i>)¹ Little Lorikeet (<i>Glossopsitta pusilla</i>)²	
TSC Act Status: ¹ Endangered, ² Vulnerable	
	All environmental and priority weeds will be removed and replaced with habitat-providing locally indigenous flora where possible. Feral bee hives within the Subject Site will be removed. Feral cats will be trapped and destroyed if recorded within the Subject Site.
Conclusion There will be no significant effect on the Swift Parrot (<i>Lathamus discolor</i>) or Little Lorikeet (<i>Glossopsitta pusilla</i>) therefore the proposed action should not warrant the producing of a Species Impact Statement (SIS).	
References: Commonwealth of Australia Department of the Environment (DoE) (2015) Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) (s266B) Approved Conservation Advice (including listing advice) for Conservation Advice Anthochaera phrygia regent honeyeater Commonwealth of Australia Department of the Environment (DoE) (2017) Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) (s266B) Approved Conservation Advice (including listing advice) for Conservation Advice Lathamus discolor swift parrot NSW Office of Environment and Heritage (2017) Regent Honeyeater (<i>Anthochaera phrygia</i>)- Conservation Projects http://www.environment.nsw.gov.au/savingourspeciesapp/ViewFile.aspx?ReportProjectID=148 [September 2017] NSW Office of Environment and Heritage (2017) Saving our Species. Regent Honeyeater (<i>Anthochaera phrygia</i>) http://www.environment.nsw.gov.au/savingourspeciesapp/project.aspx?ProfileID=10841 [September 2017] NSW Office of Environment and Heritage (2017a) Saving our Species. Swift Parrot (<i>Lathamus discolor</i>) http://www.environment.nsw.gov.au/savingourspeciesapp/project.aspx?ProfileID=10455 [September 2017]	

Environmental Planning and Assessment Act 1979 and Threatened Species Conservation Act 1995– Assessment of Significance (7-part Test)

for

Tree Roosting Microbats

Eastern False Pipistrelle (*Falsistrellus tasmaniensis*)

Eastern Freetail-bat (*Mormopterus norfolkensis*)

Greater Broad-nosed Bat (*Scoteanax rueppellii*)

Yellow-bellied Sheath-tail Bat (*Saccolaimus flaviventris*)

Southern Myotis (*Myotis macropus*)

Little Bent-wing Bat (*Miniopterus australis*)

Eastern Bent-wing Bat (*Miniopterus schreibersii oceanensis*)

TSC Act Status: Vulnerable

Species Ecology	The Eastern False Pipistrelle is found on the south-east coast and ranges of Australia, from southern Queensland to Victoria and Tasmania. Prefers moist habitats, with trees taller than 20 m. The Eastern Freetail-bat is found along the east coast from south Queensland to southern NSW. Occur in dry sclerophyll forest, woodland, swamp forests and mangrove forests east of the Great Dividing Range. Usually solitary but also recorded roosting communally. The Greater Broad-nosed Bat is found mainly in the gullies and river systems that drain the Great Dividing Range, from north-eastern Victoria to the Atherton Tableland. It extends to the coast over much of its range. It utilises a variety of habitats from woodland through to moist and dry eucalypt forest and rainforest, though it is most commonly found in tall wet forest. Forages after sunset, flying slowly and directly along creek and river corridors at an altitude of 3 - 6 m. Open woodland habitat and dry open forest suits the direct flight of this species. The Yellow-bellied Sheath-tail Bat roosts singly or in groups of up to six, in tree hollows and buildings; in treeless areas, they are known to utilise mammal burrows. When foraging for insects, flies high and fast over the forest canopy, but lower in more open country. Forages in most habitats across its very wide range, with and without trees; appears to defend an aerial territory. Breeding has been recorded from December to mid-March, when a single young is born. The Eastern Bentwing-Bat primary roosting habitat is caves; however, they also use derelict mines, storm-water tunnels, buildings and other man-made structures. This is the most common cave-roosting species in the area. The Little Bent-wing has highest potential to utilise the subject site as it is known from habitat not dissimilar to that that occurs in the locality, and has previously been recorded within both Kur-ring-gai and Garigal National Parks. The Southern Myotis generally roosts in groups of 10 - 15 close to water in caves, mine shafts, hollow-bearing trees, storm water channels, buildings, under bridges and in dense foliage. Forage over streams and pools catching insects and small fish by raking their feet across the water surface. All species generally roosts in eucalypt hollows, but have been found under loose bark on trees or in the crevices of buildings. All species are largely insectivorous, however Greater Broad-nosed bats have been known to eat other smaller bats.
Habitat present on Subject Site	Minor foraging habitat throughout the Subject Site
(a) in the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction,	The proposed action is unlikely to adversely effect upon the life cycle of these tree roosting microbats. Based on the University of Wollongong concept plan, it is predicted that no hollow-bearing trees will be lost as a result of the proposed development. In the unlikely event of the removal of a hollow-bearing tree, lost hollows will be replaced by augmented hollows. In addition, if hollow-bearing trees are required for removal, a qualified Ecologist must be on site to conduct a pre-clearing survey to check for any tree-roosting microbats that may be inhabiting a hollow tree. If any microbats are located, the supervising Ecologist will advise the best course of action which may include capture and relocation. Extensive suitable potential habitat for the species will remain within the broader Subject Site and in the nearby Illawarra Escarpment Foothills located to the west of the Subject Site, which provides over 3,000ha of suitable potential habitat for the species. The proposed action will not cause a net loss in habitat resources and therefore will not have an adverse effect such that will be likely to reduce the viability of a local population, such that the species is likely to be placed at risk of extinction.

Environmental Planning and Assessment Act 1979 and Threatened Species Conservation Act 1995– Assessment of Significance (7-part Test) for Tree Roosting Microbats Eastern False Pipistrelle (<i>Falsistrellus tasmaniensis</i>) Eastern Freetail-bat (<i>Mormopterus norfolkensis</i>) Greater Broad-nosed Bat (<i>Scoteanax rueppellii</i>) Yellow-bellied Sheath-tail Bat (<i>Saccolaimus flaviventris</i>) Southern Myotis (<i>Myotis macropus</i>) Little Bent-wing Bat (<i>Miniopterus australis</i>) Eastern Bent-wing Bat (<i>Miniopterus schreibersii oceanensis</i>)		
TSC Act Status: Vulnerable		
(b) in the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction,	Not applicable – these species do not belong to an Endangered Population	
(c) in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:	(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or	Not applicable – these species do not constitute an Endangered Ecological Community
	(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,	
(d) in relation to the habitat of a threatened species, population or ecological community:	(i) the extent to which habitat is likely to be removed or modified as a result of the action proposed, and	i) Based on the University of Wollongong concept plan, it is predicted that no hollow-bearing trees will be lost as a result of the proposed development. In the unlikely event of the removal of a hollow-bearing tree, lost hollows will be replaced by augmented hollows. Extensive suitable potential habitat for the species will remain within the broader Subject Site and in the nearby Illawarra Escarpment Foothills located to the west of the Subject Site, which provides over 3,000ha of suitable potential habitat for the species. ii) The habitat available on the Subject Site for this species will not become fragmented from other areas as a result of the proposed development. As

Environmental Planning and Assessment Act 1979 and Threatened Species Conservation Act 1995– Assessment of
Significance (7-part Test)
for

Tree Roosting Microbats

Eastern False Pipistrelle (*Falsistrellus tasmaniensis*)

Eastern Freetail-bat (*Mormopterus norfolkensis*)

Greater Broad-nosed Bat (*Scoteanax rueppellii*)

Yellow-bellied Sheath-tail Bat (*Saccolaimus flaviventris*)

Southern Myotis (*Myotis macropus*)

Little Bent-wing Bat (*Miniopterus australis*)

Eastern Bent-wing Bat (*Miniopterus schreibersii oceanensis*)

TSC Act Status: Vulnerable

	(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and	the species is highly mobile, minor loss of the available use of some trees and shrubs for foraging within the Subject Site is not considered likely to significantly affect the species. Habitat connectivity will continue to occur in the nearby section of the Illawarra Escarpment Foothills, where extensive suitable habitat is available. iii) No hollow-bearing trees are to be removed from the Subject Site. The proposed development will be situated predominantly in a disturbed and altered landscape containing a large proportion of planted and self-sown trees which provide sub-optimal foraging habitat for the species in comparison to the extensive potential foraging habitat provided by the nearby Illawarra Escarpment Foothills.
	(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality,	
(e) whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly),	Under the TSC Act, the Director-General maintains a register of critical habitat. To date, no critical habitat has been declared for these species.	
(f) whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,	Mitigation measures have been development in line with conservation actions as relevant to all species. These include: ▪ Revegetation which focuses on expanding existing smaller areas of suitable habitat and connecting areas of suitable habitat to create corridors for movement. ▪ Retention of stands of native vegetation, especially those with hollow-bearing trees (including dead trees), or which is floristically and structurally diverse ▪ Retain a buffer of vegetation around potential roost sites ▪ Minimizing the use of pesticides within the subject site ▪ Encourage regeneration and replanting of local flora species to maintain bat foraging habitat. This report provides recommendation for site management aimed at achieving all give of these actions.	

Environmental Planning and Assessment Act 1979 and Threatened Species Conservation Act 1995– Assessment of Significance (7-part Test)
for

Tree Roosting Microbats

Eastern False Pipistrelle (*Falsistrellus tasmaniensis*)

Eastern Freetail-bat (*Mormopterus norfolkensis*)

Greater Broad-nosed Bat (*Scoteanax rueppellii*)

Yellow-bellied Sheath-tail Bat (*Saccolaimus flaviventris*)

Southern Myotis (*Myotis macropus*)

Little Bent-wing Bat (*Miniopterus australis*)

Eastern Bent-wing Bat (*Miniopterus schreibersii oceanensis*)

TSC Act Status: Vulnerable

	- No hollow-bearing trees will be removed from the subject site as a result of the proposed development. In the event that hollow-bearing trees are removed as a result of the development, these habitat values will be replaced with augmented hollows. - If any trees and shrubs are removed for the proposed development, the proponent will replace all trees lost with a suitable replacement that provides the same habitat values.
(g) whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the effect of, a key threatening process.	The Key Threatening Processes relevant to the survival of these hollow-roosting bats in NSW are the following:- - Clearing of native vegetation - Loss of hollow-bearing trees - Infection of native plants by <i>Phytophthora cinnamomi</i> - Invasion, establishment and spread of <i>Lantana camara</i> - Loss and degradation of native plant and animal habitat by invasion of escaped garden plants, including aquatic plants - Removal of dead wood and dead trees - Predation by the European Red Fox <i>Vulpes vulpes</i> - Predation by the Feral Cat <i>Felis catus</i> Under the provision that the mitigation recommendations outlined in this report are followed, the proposed action is considered unlikely to cause a significant adverse effect on the listed hollow-roosting bats. These mitigation actions include hygiene protocols, habitat protection via maximum tree/ native vegetation retention and bush management, no loss of hollow bearing trees.
Conclusion There will be no significant effect on any of these vulnerable tree roosting bats therefore the proposed action should not warrant the producing of a Species Impact Statement (SIS).	

Environmental Planning and Assessment Act 1979 and Threatened Species Conservation Act 1995– Assessment of
Significance (7-part Test)
for

Tree Roosting Microbats

Eastern False Pipistrelle (*Falsistrellus tasmaniensis*)

Eastern Freetail-bat (*Mormopterus norfolkensis*)

Greater Broad-nosed Bat (*Scoteanax rueppellii*)

Yellow-bellied Sheathtail Bat (*Saccolaimus flaviventris*)

Southern Myotis (*Myotis macropus*)

Little Bent-wing Bat (*Miniopterus australis*)

Eastern Bent-wing Bat (*Miniopterus schreibersii oceanensis*)

TSC Act Status: Vulnerable

References:

NSW Office of Environment and Heritage (2017) Eastern False Pipistrelle (*Falsistrellus tasmaniensis*) – Conservation Projects and Species Profile <http://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=10331>
NSW Office of Environment and Heritage (2017) Eastern Free-tailed Bat (*Mormopterus norfolkensis*) – Conservation Projects and Species Profile <http://www.environment.nsw.gov.au/threatenedSpeciesApp/profile.aspx?id=10544>
NSW Office of Environment and Heritage (2017) Greater Broad-nosed Bat (*Scoteanax rueppellii*) – Conservation Projects and Species Profile <http://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=10748>
NSW Office of Environment and Heritage (2017) Yellow-bellied Sheathtail Bat (*Saccolaimus flaviventris*) – Conservation Projects and Species Profile <http://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=10748>
NSW Government (2017) Threatened Species Conservation Act 1995 101- Schedule 3: Key Threatening Processes, NSW Legislation <http://www.legislation.nsw.gov.au/#/view/act/1995/101/full>

Environmental Planning and Assessment Act 1979 and Threatened Species Conservation Act 1995– Assessment of Significance (7-part Test) for Powerful Owl (<i>Ninox strenua</i>)	
TSC Act Status: Vulnerable	
Species Ecology	The Powerful Owl is found in tall forests across eastern Australia, south of the tropics. It is mostly found east of the Great Dividing Range. The species is not common but it is widespread in NSW. The Species usually requires large hollows to nest in. The Powerful Owl nests in large tree hollows (at least 0.5 m deep), in large eucalypts (diameter at breast height of 80-240 cm) that are at least 150 years old. While the female and young are in the nest hollow the male Powerful Owl roosts nearby (10-200 m) guarding them, often choosing a dense "grove" of trees that provide concealment from other birds that harass him. Pairs of Powerful Owls demonstrate high fidelity to a large territory, the size of which varies with habitat quality and thus prey densities. In good habitats, a mere 400 ha can support a pair; where hollow trees and prey have been depleted the owls need up to 4000 ha.
Habitat present on Subject Site	The Ecologist confirmed the presence foraging and roosting habitat within the riparian corridor in the south of the Subject Site. It is expected that most (if not all) of this vegetation will be retained.
(a) in the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction,	No Powerful Owls were recorded on the Subject Site during the site survey. However, this species may occur intermittently on the Subject Site. Use of the Subject Site would mainly be for intermittent hunting and temporary roosting. Breeding is unlikely to take place on the Subject Site, owing to the high level of human traffic and disturbance within the Subject Site. The proposed action is unlikely to adversely effect upon the life cycle of the species. Based on the University of Wollongong concept plan, it is predicted that no hollow-bearing trees will be lost as a result of the proposed development. In the unlikely event of the removal of a hollow-bearing tree, lost hollows will be replaced by augmented hollows. A small number of trees and shrubs suitable for intermittent roosting by this species are predicted to be removed for the proposed development, however the exact number has not been identified. While these trees provide potential foraging and shelter for the species, many of these trees have been planted and are located in highly-disturbed areas with a high level of human traffic. As a result, it is likely that these trees provide sub-optimal ecological value to the species. A detailed pre-clearing survey and assessment will be required to quantify the exact number of fruit-bearing and flowering trees lost. The loss of these trees will be mitigated by the planting of trees and shrubs suitable for the species. Extensive suitable potential habitat for the species will remain within the broader Subject Site and in the nearby Illawarra Escarpment Foothills located to the west of the Subject Site, which provides over 3,000ha of suitable potential habitat for the species. No effects to the movement of this highly mobile species across the Subject Site, and between the broader subject property and the nearby Illawarra Escarpment Foothills outside of the Subject Site will occur. The proposed action will not cause a net loss in habitat resources and therefore will not have an adverse effect such that will be likely to reduce the viability of a local population, such that the species is likely to be placed at risk of extinction.
(b) in the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction,	Not applicable – these species do not belong to an Endangered Population

Environmental Planning and Assessment Act 1979 and Threatened Species Conservation Act 1995– Assessment of Significance (7-part Test) for Powerful Owl (<i>Ninox strenua</i>)		
TSC Act Status: Vulnerable		
(c) in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:	(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or	Not applicable – these species do not belong to an Endangered Ecological Community or Critically Endangered Ecological Community
	(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,	
(d) in relation to the habitat of a threatened species, population or ecological community:	(i) the extent to which habitat is likely to be removed or modified as a result of the action proposed, and	i) Based on the University of Wollongong concept plan, it is predicted that no hollow-bearing trees will be lost as a result of the proposed development. In the unlikely event of the removal of a hollow-bearing tree, lost hollows will be replaced by augmented hollows. Extensive suitable potential habitat for the species will remain within the broader Subject Site and in the nearby Illawarra Escarpment Foothills located the west of the site, which provides over 3,000ha of suitable potential habitat for the species. ii) The habitat available on the Subject Site for this species will not become fragmented from other areas as a result of the proposed development. As the species is highly mobile, minor loss of select trees and shrubs from within the subject site is not considered likely to significantly affect the species. Habitat connectivity will continue to occur in the nearby section of the adjacent Illawarra Escarpment Foothills. iii) The proposed development will be situated predominantly in a disturbed and altered landscape containing a large proportion of planted and self-sown trees which provide sub-optimal foraging habitat for the species in comparison to the extensive potential foraging habitat provided by the nearby Illawarra Escarpment Foothills.
	(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and	
	(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality,	
(e) whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly),		Under the TSC Act, the Director-General maintains a register of critical habitat. To date, no critical habitat has been declared for these species.

Environmental Planning and Assessment Act 1979 and Threatened Species Conservation Act 1995– Assessment of Significance (7-part Test) for Powerful Owl (<i>Ninox strenua</i>)	
TSC Act Status: Vulnerable	
(f) whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,	OEH has listed priority actions to help recover the Powerful Owl. The following actions are relevant to the subject site and proposed development project. • Retain large stands of native vegetation, especially those containing hollow-bearing trees. • Protect hollow-bearing trees for nest sites. Younger recruitment trees should also be retained to replace older trees in the long-term. • Retain at least a 200 metre buffer of native vegetation around known nesting sites. Recommendations have been put forward to adhere to the proposed actions to minimise the effect of development on this species. No hollow-bearing trees will be removed as a result of the proposed development. In the unlikely event of the removal of a hollow-bearing tree, lost hollows will be replaced by augmented hollows. Prior to works detailed preclearing must also be carried out. An important mitigation measure is the requirement for a qualified Ecologist to be present on site during tree removal to supervise works and provide assistance to any birds directly affected.
(g) whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the effect of, a key threatening process.	The main key threatening processes to Powerful Owls include the following: ▪ Clearing of native vegetation ▪ Removal of hollow-bearing trees ▪ Aggressive exclusion of birds from woodland and forest habitat by abundant Noisy Miners <i>Manorina melanocephala</i> Potential effects are to be mitigated through the measures outlined in this report including the requirement for a qualified Ecologist to be present on site during tree removal to supervise works and provide assistance to any Powerful Owl directly affected (e.g. displaced). No hollow-bearing trees are proposed for removal. In the event that any native vegetation is lost as a result of the proposed development, the proponent will replace all trees lost with a suitable replacement that provides the same habitat values. Additional Powerful Owl nesting boxes or hollow augmentation may be undertaken within the University grounds.
Conclusion There will be no significant effect on the Powerful Owl (<i>Ninox strenua</i>) therefore the proposed action should not warrant the producing of a Species Impact Statement (SIS).	
References NSW Office of Environment and Heritage (2017) Saving Our Species. Powerful Owl (<i>Ninox strenua</i>) (Profile) http://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=10562 [September 2017]	

**Environmental Planning and Assessment Act 1979 and Threatened Species Conservation Act 1995– Assessment of
Significance (7-part Test)**

for

Threatened Birds of Prey

Square-tailed Kite (*Lophoictinia isura*)

White-bellied Sea Eagle (*Haliaeetus leucogaster*)

Little Eagle (*Hieraaetus morphnoides*)

TSC Act Status: Vulnerable

Species Ecology	The Square-tailed Kite is found in a range of timbered habitats including dry woodlands and open forests, displaying a particular preference for watercourses with dense tree cover. Its range includes coastal and subcoastal areas from south-western to northern Australia, NSW, Queensland and Victoria. In NSW scattered records suggest the species is a consistent resident; however, in other areas further south it is migratory returning to areas for summer breeding. The Square-tailed Kite is a specialist hunter of passerines, especially honeyeaters, and most particularly nestlings, and insects in the tree canopy, picking most prey items from the outer foliage. Likely because of this prey specialisation, individuals will often occupy large hunting ranges of more than 100m². Breeding is from July to February, with nest sites generally located along or near watercourses, in a fork or on large horizontal limbs. The White-bellied Sea Eagle's habitats are characterised by the presence of large areas of open water including larger rivers, swamps, lakes, and the sea. Occurs at sites near the sea or sea-shore, such as around bays and inlets, beaches, reefs, lagoons, estuaries and mangroves; and at, or in the vicinity of freshwater swamps, lakes, reservoirs, billabongs and saltmarsh. Terrestrial habitats include coastal dunes, tidal flats, grassland, heathland, woodland, and forest (including rainforest). Breeding habitat consists of mature tall open forest, open forest, tall woodland, and swamp sclerophyll forest close to foraging habitat. Nest trees are typically large emergent eucalypts and often have emergent dead branches or large dead trees nearby which are used as 'guard roosts'. Nests are large structures built from sticks and lined with leaves or grass. There are abundant local records of the White-bellied Sea Eagle from within local area. However there are no confirmed breeding records on the subject site. The Little Eagle occupies open eucalypt forest, woodland or open woodland. Sheoak or Acacia woodlands and riparian woodlands of interior NSW are also used. Nests in tall living trees within a remnant patch, where pairs build a large stick nest in winter. Lays two or three eggs during spring, and young fledge in early summer. Preys on birds, reptiles and mammals, occasionally adding large insects and carrion.
Habitat present on Subject Site	The Ecologist confirmed the presence minor foraging and roosting habitat within the Subject Site. It is expected that most (if not all) tall eucalypts, suitable for nesting will be retained within the Subject Site.
(a) in the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction,	Although no individuals of either species were recorded on the Subject Site on the day of the site survey, the Subject Site does provide some intermittent foraging and nesting habitat for these species. The proposed action is unlikely to adversely effect upon the life cycle of the species. Based on the University of Wollongong concept plan, it is predicted that few suitable large nesting trees will be lost as a result of the proposed development. Existing nesting trees on the subject site are considered to hold sub-optimal habitat for these species due to the high disturbance to the site, and high level of human traffic, which is likely to reduce the likelihood of the species to use such trees. The loss of these trees will be mitigated by the planting of trees and shrubs suitable for the species. Extensive suitable potential nesting habitat for the species will remain within the broader Subject Site and in the nearby Illawarra Escarpment Foothills located to the west, which provides over 3,000ha of suitable potential habitat for the species. The proposed action will not cause a net loss in habitat resources and therefore will not have an adverse effect such that will be likely to reduce the viability of a local population, such that the species is likely to be placed at risk of extinction.

Environmental Planning and Assessment Act 1979 and Threatened Species Conservation Act 1995– Assessment of Significance (7-part Test) for Threatened Birds of Prey Square-tailed Kite (<i>Lophoictinia isura</i>) White-bellied Sea Eagle (<i>Haliaeetus leucogaster</i>) Little Eagle (<i>Hieraaetus morphnoides</i>)		
TSC Act Status: Vulnerable		
(b) in the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction,	Not applicable – these species do not belong to an Endangered Population	
(c) in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:	(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or	Not applicable – these species do not constitute an Endangered Ecological Community
	(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,	
(d) in relation to the habitat of a threatened species, population or ecological community:	(i) the extent to which habitat is likely to be removed or modified as a result of the action proposed, and	i) The proposed action is unlikely to adversely effect upon the life cycle of the species. Based on the University of Wollongong concept plan, it is predicted that few suitable large nesting trees will be lost as a result of the proposed development. Existing trees on the subject site are considered to hold sub-optimal nesting habitat for these species due to the high-levels of historical disturbance to the site, and high level of human traffic, which is likely to reduce the likelihood of the species to use such trees. Extensive suitable potential nesting habitat for the species will remain within the broader Subject Site

Environmental Planning and Assessment Act 1979 and Threatened Species Conservation Act 1995– Assessment of Significance (7-part Test) for Threatened Birds of Prey Square-tailed Kite (<i>Lophoictinia isura</i>) White-bellied Sea Eagle (<i>Haliaeetus leucogaster</i>) Little Eagle (<i>Hieraaetus morphnoides</i>)		
TSC Act Status: Vulnerable		
	(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and	and in the nearby Illawarra Escarpment Foothills located to the west of the Subject Site, which provides over 3,000ha of suitable potential nesting and foraging habitat for the species. ii) The habitat available on the Subject Site for these species will not become fragmented from other areas as a result of the proposed development. As these species are highly mobile, minor loss of select trees and shrubs from within the subject site is not considered likely to significantly affect the species. Habitat connectivity will continue to occur in the nearby section of the Illawarra Escarpment Foothills. iii) The proposed development will be situated predominantly in a disturbed and altered landscape containing a large proportion of planted and self-sown trees which provide sub-optimal foraging habitat for the species in comparison to the extensive potential foraging and breeding habitat provided by the nearby Illawarra Escarpment Foothills.
	(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality,	
(e) whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly),		Under the TSC Act, the Director-General maintains a register of critical habitat. To date, no critical habitat has been declared for this species.
(f) whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,		The relevant recovery objectives for these species include the following: - Protect known habitat from fires of a frequency greater than that recommended for the retention of biodiversity. - Retain and protect nesting and foraging habitat, particularly along watercourses. Recommendations have been put forward to adhere to the proposed actions to minimise the effect of development on these species. Nesting habitat quality within the Subject Site is considered sub-optimal due to the disturbance and the high-level of human traffic within the Subject Site. Prior to works detailed preclearing must also be carried out. An important mitigation measure is the requirement for a qualified Ecologist to be present on site during tree removal to supervise works and provide assistance to any birds directly affected.

Environmental Planning and Assessment Act 1979 and Threatened Species Conservation Act 1995– Assessment of Significance (7-part Test) for Threatened Birds of Prey Square-tailed Kite (<i>Lophoictinia isura</i>) White-bellied Sea Eagle (<i>Haliaeetus leucogaster</i>) Little Eagle (<i>Hieraaetus morphnoides</i>)	
TSC Act Status: Vulnerable	
	No burning of habitat will be permitted on the subject site.
(g) whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.	The following Key Threatening Processes (KTPs) listed under Schedule 3 of the TSC Act are relevant to the protection of potential Bird of Prey habitat within the subject site: ▪ Clearing of native vegetation ▪ Infection by Psittacine Circoviral (beak and feather) Disease affecting endangered psittacine species and populations ▪ Aggressive exclusion of birds from woodland and forest habitat by abundant Noisy Miners <i>Manorina melanoccephala</i> Psittacine Circoviral disease will not be exacerbated by the development. Limited clearing of native vegetation will occur, and any confirmed nests will be protected. Few (if any) trees suitable for nesting will be removed. Potential effects are to be mitigated through the measures outlined in this report including the requirement for a qualified Ecologist to be present on site during tree removal to supervise works and provide assistance to any bird directly affected (e.g. displaced). In the event that any native vegetation is lost as a result of the proposed development, the proponent will replace all trees lost with a suitable replacement that provides the same habitat values.
Conclusion There will be no significant impact on the Square-tailed Kite (<i>Lophoictinia isura</i>), White-bellied Sea Eagle (<i>Haliaeetus leucogaster</i>) or Little Eagle (<i>Hieraaetus morphnoides</i>) therefore the proposed action should not warrant the producing of a Species Impact Statement (SIS).	
References: NSW Office of Environment and Heritage (2014) Square-tailed Kite (<i>Lophoictinia isura</i>) – Conservation Projects and Species Profile http://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=10495 NSW Government (2017) Threatened Species Conservation Act 1995 101- Schedule 3: Key Threatening Processes, NSW Legislation http://www.legislation.nsw.gov.au/#/view/act/1995/101/full NSW Office of Environment and Heritage (2015) Little Eagle (<i>Hieraaetus morphnoides</i>) – Conservation Projects and Species Profile http://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=20131 NSW Office of Environment and Heritage (2017) White-bellied Sea Eagle (<i>Haliaeetus leucogaster</i>) – Conservation Projects and Species Profile http://www.environment.nsw.gov.au/threatenedSpeciesApp/profile.aspx?id=20322	

Environmental Planning and Assessment Act 1979 and Threatened Species Conservation Act 1995– Assessment of Significance (7-part Test) for Glossy Black-Cockatoo (<i>Calyptorhynchus lathami</i>)		
TSC Act Status: Vulnerable		
Species Ecology	The Glossy Black Cockatoo is uncommon although widely distributed in open forest and woodlands from the central Queensland coast to East Gippsland in Victoria, and inland to the southern tablelands and central western plains of NSW. Feeds almost exclusively on <i>Casuarina</i> spp. and <i>Allocasuarina</i> spp. seeds, with Swamp Oak (<i>Casuarina glauca</i>), Black Sheoak (<i>Allocasuarina littoralis</i>) and Forest She-oak (<i>A. torulosa</i>) particularly important are important food sources in the Sydney coastal regions. This species, like many large cockatoos requires large hollow-bearing eucalyptus trees within which it nests. In order to be suitable for breeding sites, hollows must have a diameter of >15cm. Breeding takes place between March and May, when a single egg is laid.	
Habitat present on Subject Site	The Ecologist confirmed the presence minor foraging habitat within the Subject Site. It is expected that most (if not all) <i>Casuarina</i> spp., suitable for foraging will be retained within the Subject Site.	
(a) in the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction,	The proposed action is unlikely to adversely effect upon the life cycle of the species. Based on the University of Wollongong concept plan, it is predicted that no hollow-bearing trees will be lost as a result of the proposed development. In the unlikely event of the removal of a hollow-bearing tree, lost hollows will be replaced by augmented hollows. Only a small number of scattered <i>Casuarina</i> spp./<i>Allocasuarina</i> spp. are located within the Subject Site. Most of these trees have been planted. These trees were observed to have a low fruiting capability. A small amount (if any) of these trees are proposed for removal. While these trees provide potential foraging and shelter for the species, many of these trees have been planted and are located in highly-disturbed areas with a high level of human traffic. As a result, it is likely that these trees provide sub-optimal ecological value to the species. Extensive suitable potential habitat for the species will remain within the broader Subject Site and in the nearby Illawarra Escarpment Foothills located to the west of the Subject Site, which provides over 3,000ha of suitable potential habitat for the species. The proposed action will not cause a net loss in habitat resources and therefore will not have an adverse effect such that will be likely to reduce the viability of a local population, such that the species is likely to be placed at risk of extinction.	
(b) in the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction,	Not applicable – these species do not belong to an Endangered Population	
(c) in the case of an endangered ecological community or critically endangered ecological community,	(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or	Not applicable – this species does not constitute an Endangered Ecological Community

Environmental Planning and Assessment Act 1979 and Threatened Species Conservation Act 1995– Assessment of Significance (7-part Test) for Glossy Black-Cockatoo (<i>Calyptorhynchus lathami</i>)		
TSC Act Status: Vulnerable		
whether the action proposed:	(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,	
(d) in relation to the habitat of a threatened species, population or ecological community:	(i) the extent to which habitat is likely to be removed or modified as a result of the action proposed, and	i) Based on the concept plan, it is predicted that no hollow-bearing trees will be lost as a result of the proposed development. In the unlikely event of the removal of a hollow-bearing tree, lost hollows will be replaced by augmented hollows. As these trees are located in a highly-disturbed area with high human activity, it is unlikely these hollows are suitable for the species to use as nesting hollows. Only a small number of scattered <i>Casuarina</i> spp. are located within the subject site. These trees were observed to have a low fruiting capability. A small amount (if any) of these trees are proposed for removal. While these trees provide potential foraging and shelter for the species, many of these trees have been planted and are located in highly-disturbed areas with a high level of human traffic. As a result, it is likely that these trees provide sub-optimal ecological value to the species. Extensive suitable potential habitat for the species will remain within the broader Subject Site and in the nearby Illawarra Escarpment Foothills located to the west of the Subject Site, which provides approximately 3,000ha of suitable potential habitat for the species. ii) The habitat available on the Subject Site for these species will not become fragmented from other areas as a result of the proposed development. A small amount (if any) feed trees for this species (<i>Casuarina</i> spp.) are proposed for removal. Habitat connectivity will continue to occur in the nearby section of the Illawarra Escarpment Foothills. iii) The proposed development will be situated predominantly in a disturbed and altered landscape containing a large proportion of planted and self-sown trees which provide sub-optimal foraging habitat for the species in comparison to the extensive potential foraging and breeding habitat provided by the nearby Illawarra Escarpment Foothills.
	(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and	
	(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality,	
(e) whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly),		Under the TSC Act, the Director-General maintains a register of critical habitat. To date, no critical habitat has been declared for these species.

Environmental Planning and Assessment Act 1979 and Threatened Species Conservation Act 1995– Assessment of Significance (7-part Test) for Glossy Black-Cockatoo (<i>Calyptorhynchus lathami</i>)	
TSC Act Status: Vulnerable	
(f) whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,	The Glossy Black-Cockatoo Recovery Plan (OEH, 2017) identified seven recovery objectives. Of these three were relevant to the subject site: ▪ Protect large old trees and smaller trees that contain large hollows, including from the effects of fire. Ensure the recruitment of large old trees by retaining medium-sized trees, facilitating regeneration, and undertaking replanting. ▪ Identify sites where hollows are limiting and develop and implement strategies to increase hollow availability that have clear objectives and include monitoring, maintenance, and reporting requirements. Actions include nest box installation, the humane control of introduced species, and the protection of trees having the potential to develop hollows. ▪ Increase the quality and extent of foraging habitat within a region. This report provides recommendation for site management aimed at achieving these actions. No hollow bearing trees will be removed.
(g) whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the effect of, a key threatening process.	The Key Threatening Processes relevant to the Glossy Black-Cockatoo within NSW are the following: ▪ Clearing of native vegetation ▪ Loss of hollow-bearing trees ▪ Loss and degradation of native plant and animal habitat by invasion of escaped garden plants, including aquatic plants ▪ Infection by Psittacine Circoviral (beak and feather) Disease affecting endangered psittacine species and populations ▪ Aggressive exclusion of birds from woodland and forest habitat by abundant Noisy Miners <i>Manorina melanoccephala</i> Limited clearing of native vegetation will occur, and any confirmed nests will be protected. Potential effects are to be mitigated through the measures outlined in this report including the requirement for a qualified Ecologist to be present on site during tree removal to supervise works and provide assistance to any bird directly affected (e.g. displaced). No hollow-bearing trees suitable for nesting by Glossy Black Cockatoo will be removed. In the event that any native vegetation is lost as a result of the proposed development, the proponent will replace all trees lost with a suitable replacement that provides the same habitat values. This report addresses all KTPs in detail, ensuring there is no increase in their effect which may result

Environmental Planning and Assessment Act 1979 and Threatened Species Conservation Act 1995– Assessment of Significance (7-part Test) for Glossy Black-Cockatoo (<i>Calyptrorhynchus lathami</i>)	
TSC Act Status: Vulnerable	
	for the proposed development works. No hollow-bearing trees will be removed.
Conclusion There will be no significant impact on the Glossy Black-Cockatoo (<i>Calyptrorhynchus lathami</i>) therefore no Species Impact Statement (SIS) is warranted for this species.	
References: NSW Office of Environment and Heritage (2017) Glossy Black-Cockatoo (<i>Calyptrorhynchus lathami</i>)– Conservation Projects and Species Profile http://www.environment.nsw.gov.au/savingourspeciesapp/project.aspx?ProfileID=10140 NSW Government (2017) Threatened Species Conservation Act 1995 101- Schedule 3: Key Threatening Processes, NSW Legislation http://www.legislation.nsw.gov.au/#/view/act/1995/101/full	

Environmental Planning and Assessment Act 1979 and Threatened Species Conservation Act 1995– Assessment of Significance (7-part Test) for <i>Pultenaea aristata</i> (Prickly Bush-Pea)¹ <i>Cynanchum elegans</i> (White-flowered Wax Plant)² <i>Gossia acmenoides</i> (Scrub Ironwood)³	
TSC Act Status: Vulnerable ¹ , Endangered ² , Endangered Population ³	
Species Ecology	Prickly Bush-pea is a small shrub, usually less than 40 cm tall. Its unmistakable, sharp-tipped leaves are narrow and concave, to 22 mm long and 2 mm wide. There is a pair of stipules (leafy bracts) at the base of each leaf. The yellow pea-shaped flowers have red markings and a red keel (the pair of petals beneath the flower). The are clustered at the ends of the branches. Each flower is attached to a pair of enlarged stipules, and is covered with long white hairs. Prickly Bush-pea is restricted to the Woronora Plateau, a small area between Helensburgh, south of Sydney, and Mt Kiera above Wollongong. The species occurs in either dry sclerophyll woodland or wet heath on sandstone. Flowering has been recorded in winter and spring. White-flowered Wax Plant is a climber or twiner with a highly variable form. It is a clonal species with underground suckering stems, and is rarely stoloniferous. Mature stems have a fissured corky bark and can grow to 10 m high and 3.5 cm thick. Leaves are opposite, rarely in whorls of three, broadly ovate to ovate, 1.5–15 cm long, 1.5–7.5 cm wide and exude a milky sap when damaged. Juvenile leaves are lanceolate to narrow lanceolate. Flowers are white, tubular, up to 4 mm long, 6–12 mm wide and occur in cymo-umbels, few flowered clusters or umbels on branched peduncles. The fruit is a narrow-ovoid pointed follicle, 4–8 cm long and contains up to 45 seeds. Seeds are 3–6 mm long with a long coma of silky hairs arising at one end. Fruit can take four to six months to mature following flowering. <i>Gossia acmenoides</i> - Shrub or small crooked tree to 18m found in sub-tropical and dry rainforest. Bark is smooth mottled brown, shedding in thin papery patches. Young shoots are glabrous. Leaves ovate to lanceolate or elliptic, 4-8 cm long with apex tapered or narrowed. Mid-vein strongly raised above and oil dots distinct. Inflorescences mostly 2–4-flowered, on a short lateral axis; pedicels 5–12 mm long. Fruit 4–6 mm diameter black berry crowned by calyx. Known from Shellharbour, Wollongong and Kiama LGAs and encompasses all occurrences south of the Georges River. This population is the southern most occurrence of the species and is approximately 175 km from the nearest population to the north in the Hunter region of NSW. Found in subtropical and dry rainforest on the ranges and coastal plain of eastern Australia. Estimated less than 100 mature plants, through approximately 30 sites. Occurring often as a single individual or small group. Flowers late spring to early autumn.
(a) in the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction,	The proposed actions were considered to have low risk to adversely affecting the life cycle of these plant in a way that could increase risk to the viability of any local populations. Targeted searches of the species within the subject site were performed by the Narla Ecologist during the site survey and found no individuals of these species within the Subject Site. A small area of potential habitat for the species (between 141m² – 343 m²) will be modified for the construction of the Western Building. Other areas within the subject site were landscaped and contained mostly planted with landscaped areas, reducing the suitability and likelihood of these species occurring in these areas. A pre-clearing survey should be undertaken by a qualified ecologist prior to any construction works within this area as well as the wider Subject Site. If the species is found during the pre-clearing survey, it will be retained and protected within the Subject Site by the use of appropriate fencing around any individuals of the species.
(b) in the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction	The proposed actions were considered to have low risk to adversely affecting the life cycle of these plant in a way that could increase risk to the viability of any endangered populations. Targeted searches of the species within the subject site were performed by the Narla Ecologist during the site survey and found no individuals belonging to the <i>Gossia acmenoides</i> within the Subject Site. A small area of potential habitat for the species (between 141m² – 343 m²) will be modified for the construction of the Western Building. Other areas within the subject site were landscaped and contained mostly planted with landscaped areas, reducing the suitability and likelihood of these species occurring in these areas. A pre-clearing survey should be undertaken by a qualified ecologist prior to any construction works within this area as well as the wider Subject Site. If the species is found during the pre-clearing survey, it will be retained and protected within the Subject Site by the use of appropriate fencing around any individuals of the species.

Environmental Planning and Assessment Act 1979 and Threatened Species Conservation Act 1995– Assessment of Significance (7-part Test) for <i>Pultenaea aristata</i> (Prickly Bush-Pea)¹ <i>Cynanchum elegans</i> (White-flowered Wax Plant)² <i>Gossia acmenoides</i> (Scrub Ironwood)³		
TSC Act Status: Vulnerable ¹ , Endangered ² , Endangered Population ³		
(c) in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:	(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or	Not applicable – species does not belong to an Endangered Ecological Community or Critically Endangered Ecological Community
	(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,	
(d) in relation to the habitat of a threatened species, population or ecological community:	(i) the extent to which habitat is likely to be removed or modified as a result of the action proposed, and	i) A small area of potential habitat for the species (between 141m² – 343 m²) will be modified for the establishment of APZs. A pre-clearing survey should be undertaken by a qualified ecologist prior to any construction works within this area as well as the wider Subject Site. If any individuals of the species are found during the pre-clearing survey, they will be retained and protected within the Subject Site by the use of appropriate fencing around any individuals of the species. Alternatively, they will be relocated elsewhere within the University grounds and then subsequently protected. The modification of this small area is considered insignificant as extensive suitable habitat remains available for the species within the nearby Illawarra Escarpment Foothills. ii) The proposed action was considered unlikely to further fragment or isolated from other areas of habitat. A small area of potential habitat for the species (between 140m² – 340 m²) will be modified for the establishment of APZs around the proposed Western Building. This will reduce the suitability of the habitat for this species, however as no individuals of the species occurred within the Subject Site, the species will not become fragmented or isolated. The modification of this small area is considered insignificant as extensive suitable habitat remains available for the species within the nearby Illawarra Escarpment Foothills. iii) The habitat on the Subject Site is not considered important to these plants, as the species has never been recorded on the Subject Site. The habitat to be affected by the proposed works will only be the small area (between 140m² – 340 m²) used for the establishment of the APZs for the proposed Western Building. The modification of this small area is considered insignificant as extensive suitable habitat remains available for the species within the nearby Illawarra Escarpment Foothills.
	(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and	
	(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality,	

Environmental Planning and Assessment Act 1979 and Threatened Species Conservation Act 1995– Assessment of Significance (7-part Test) for <i>Pultenaea aristata</i> (Prickly Bush-Pea)¹ <i>Cynanchum elegans</i> (White-flowered Wax Plant)² <i>Gossia acmenoides</i> (Scrub Ironwood)³	
TSC Act Status: Vulnerable ¹ , Endangered ² , Endangered Population ³	
(e) whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly),	Under the TSC Act, the Director-General maintains a register of critical habitat. To date, no critical habitat has been declared for the species.
(f) whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan	To date, no recovery plan or threat abatement plan exists for these species
(g) whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.	The main Key Threatening Processes (KTP) of relevance to <i>Cynanchum elegans</i> are: ▪ Alteration to the natural flow regimes of rivers and streams and their floodplains and wetlands (through earth work) ▪ Anthropogenic climate change (changes to sea levels) ▪ Clearing native vegetation ▪ High frequency fire resulting in the distribution of life cycle processes in plants and animals and loss of vegetation structure and composition ▪ Competition and grazing by the feral European Rabbit (<i>Oryctolagus cuniculus</i>) All weeds within the Subject Site will be removed and replaced with locally indigenous native flora. Weeds will be continually suppressed. The proposed works are considered unlikely to result in an increased impact, under the provision that the mitigation recommendations outlined in this report are followed, particularly the mitigation that an Ecologist is able to conduct a pre-clearing assessment of the site. If any specimens are located during the pre-clearing assessment, they will be retained and protected.
Conclusion There will be no significant impact on the <i>Pultenaea aristata</i> (Prickly Bush-Pea), <i>Cynanchum elegans</i> (White-flowered Wax Plant) and <i>Gossia acmenoides</i> (Scrub Ironwood), therefore the proposed action should not warrant the producing of a Species Impact Statement (SIS).	

Environmental Planning and Assessment Act 1979 and Threatened Species Conservation Act 1995– Assessment of Significance (7-part Test)

for

***Pultenaea aristata* (Prickly Bush-Pea)¹
Cynanchum elegans (White-flowered Wax Plant)²
Gossia acmenoides (Scrub Ironwood)³**

TSC Act Status: Vulnerable¹, Endangered², Endangered Population³

References

NSW Office of Environment and Heritage (2017a) *Pultenaea aristata* (Prickly Bush-Pea) – profile
<http://www.environment.nsw.gov.au/savingourspeciesapp/project.aspx?ProfileID=10129> [September 2017]
NSW Office of Environment and Heritage (2017b) *Cynanchum elegans* (White-flowered Wax Plant) – profile
<http://www.environment.nsw.gov.au/savingourspeciesapp/project.aspx?ProfileID=10129> [September 2017]
NSW Office of Environment and Heritage (2017c) *Gossia acmenoides* - profile
<http://www.environment.nsw.gov.au/threatenedSpeciesApp/profile.aspx?id=10798>
NSW Office of Environment and Heritage (2017) List of Key Threatening Processes
<http://www.environment.nsw.gov.au/threatenedspecies/KeyThreateningProcessesByDoctype.htm> [September 2017]

Appendix D. EPBC Act Significant Impact Guidelines Assessment

Commonwealth Environment Protection and Biodiversity Conservation Act 1999 Assessment of Significant Impact Criteria for the Grey-headed Flying Fox (<i>Pteropus poliocephalus</i>)	
EPBC Act Status: Vulnerable	
Significant Impact criteria An action is likely to have a significant Impact on a vulnerable species if there is a real chance or possibility that it will:	
• lead to a long-term decrease in the size of a population	The proposed action is not likely to lead to a long-term decrease in the size of a population. No known camps or roosts occur within the Subject Site. It is considered that the species have potential to utilise the subject site as an intermittent foraging resource. Based on the University of Wollongong development concept plan, a small number of flowering and fruit-bearing trees and shrubs are predicted to be removed for the proposed development (approximately one hundred and thirteen [113]), however the exact number has not been identified. While these trees provide potential foraging and shelter for the species, many of these trees have been planted and are located in highly-disturbed areas with a high level of human traffic. As a result, it is likely that these trees provide sub-optimal ecological value to the species. A detailed pre-clearing survey and assessment will be undertaken to quantify the exact number of fruit-bearing and flowering trees lost. Pre-clearing data will be maintained in a database and used to inform the proponent on the number of appropriate habitat replacement plantings required within the landscaping plan for those lost due to the proposed development. Extensive suitable potential habitat for the species will remain within the broader Subject Site and in the nearby Illawarra Escarpment Foothills located to the west of the Subject Site, which provides over 3,000ha of suitable potential habitat for the species.
• reduce the area of occupancy of the species	The proposed action is unlikely to adversely impact upon the area of occupancy of the species. Based on the University of Wollongong concept plan, approximately one hundred and thirteen (113) flowering and fruit-bearing trees and shrubs are predicted to be removed for the proposed development. While these trees provide potential foraging and shelter for the species, many of these trees have been planted and are located in highly-disturbed areas with a high level of human traffic. As a result, it is likely that these trees provide sub-optimal ecological value to the species. A detailed pre-clearing survey and assessment will be required to quantify the exact number of fruit-bearing and flowering trees lost. Pre-clearing data will be maintained in a database. The loss of these trees will be mitigated by the planting of trees and shrubs suitable for the species. Extensive suitable potential habitat for the species will remain within the broader Subject Site and in the adjacent Illawarra Escarpment Foothills to the west of the site, which provides over < 3,000 ha of suitable potential habitat for the species.
• fragment an existing population into two or more populations	The habitat available on the Subject Site for this species will not become fragmented from other areas as a result of the proposed development. As the species is highly mobile, minor loss of select trees and shrubs from within the Subject Site is not considered likely to significantly affect the species. Habitat connectivity will continue to occur in the nearby section of the Illawarra Escarpment Foothills.
• adversely affect habitat critical to the survival of a species	The action will not adversely affect habitat critical to the survival of this species.

Commonwealth Environment Protection and Biodiversity Conservation Act 1999 Assessment of Significant Impact Criteria for the Grey-headed Flying Fox (<i>Pteropus poliocephalus</i>)	
EPBC Act Status: Vulnerable	
	No existing roost camps exist within the Subject Site or in the immediately surrounding area. As the Subject Site only provides limited and intermittent foraging resources, it is not considered critical habitat for the survival of the species.
• disrupt the breeding cycle of a population	There will be no disruption to the breeding cycle of a population as these species do not breed locally.
• modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The proposed action is unlikely to adversely impact upon the life cycle of the Grey-headed Flying-fox. Based on the University of Wollongong development concept plan, approximately 113 flowering and fruit-bearing trees and shrubs are predicted to be removed for the proposed development. While these trees provide potential foraging and shelter for the species, many of these trees have been planted and are located in highly-disturbed areas with a high level of human traffic. As a result, it is likely that these trees provide sub-optimal ecological value to the species. A detailed pre-clearing survey and assessment will be required to quantify the exact number of fruit-bearing and flowering trees lost. Pre-clearing data will be maintained in a database. The loss of these trees will be mitigated by the planting of trees and shrubs suitable for the species. Extensive suitable potential habitat for the species will remain within the broader Subject Site and in the adjacent Illawarra Escarpment Foothills located to the west of the site, which provides over 3,000ha of suitable potential habitat for the species.
• result in invasive species that are harmful to the species becoming established in species' habitat	It is unlikely that the proposed action will result in invasive species that are harmful to the species becoming established in species' habitat.
• introduce disease that may cause the species to decline, or	The proposed action presents a very low risk of introducing a novel disease which will affect the Grey-headed Flying-fox.
• interfere with the recovery of the species.	OEH (2006) has listed priority actions to help recover the Grey-headed Flying-fox. Including the following: ▪ Increase the extent and viability of foraging habitat for the Grey-headed Flying-fox that is productive during winter and spring through dedicated habitat creation and restoration using guides published by OEH (in preparation). ▪ Negotiate agreements with landholders, particularly in-perpetuity covenants or stewardship agreements that promote the protection and retention of high quality foraging habitat and roost sites for grey-headed flying-foxes. ▪ Planting new roost trees, managing understorey vegetation to maintain suitable microclimate conditions, establishing buffers between roost camps and nearby human settlements to minimise conflict. Where possible, the proposed action will protect large foraging trees that have the potential to support the species. In the event that any flowering and fruit-bearing trees are lost as a result of the proposed development, the proponent will replace all trees lost with a suitable replacement that provides the same habitat values.

Commonwealth Environment Protection and Biodiversity Conservation Act 1999 Assessment of Significant Impact Criteria for the Grey-headed Flying Fox (<i>Pteropus poliocephalus</i>)
EPBC Act Status: Vulnerable
Conclusion There will be no significant Impact on Grey-headed Flying Fox (<i>Pteropus poliocephalus</i>) therefore, the proposed action should not warrant a Commonwealth EPBC Act Referral.
References Commonwealth Department of Environment (DoE) (2001) Advice to the Minister for the Environment and Heritage from the Threatened Species Scientific Committee (TSSC) on Amendments to the list of Threatened Species under the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) NSW Department of Environment, Climate Change and Water (NSW DECCW) (2010). Draft National Recovery Plan for the Grey-headed Flying-fox <i>Pteropus poliocephalus</i>. [Online]. Prepared by Woodhead, A. and P. Eby. Sydney: NSW DECCW. Available from: http://www.environment.nsw.gov.au/resources/threatenedspecies/08214dnrpflyingfox.pdf. NSW Office of Environment and Heritage (OEH) (2014). Grey-headed Flying-fox - profile. [Online]. Available from: http://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=10697. NSW Scientific Committee (2001). Grey-headed Flying-fox vulnerable species listing, final determination. [Online]. Available from: http://www.environment.nsw.gov.au/determinations/GreyheadedFlyingFoxVulSpListing.htm.

Commonwealth Environment Protection and Biodiversity Conservation Act 1999 Assessment of Significant Impact Criteria for the Swift Parrot (<i>Lathamus discolor</i>)	
EPBC Act Status: Critically Endangered	
Significant Impact criteria An action is likely to have a significant Impact on a critically endangered or endangered species if there is a real chance or possibility that it will:	
Lead to a long-term decrease in the size of a population	The proposed action is not likely to lead to a long-term decrease in the size of a population. Based on the University of Wollongong concept plan, it is predicted that no hollow-bearing trees will be lost as a result of the proposed development. In the unlikely event of the removal of a hollow-bearing tree, lost hollows will be replaced by augmented hollows. Swift Parrot does not nest in mainland Australia. Relative to the broader landscape, a small number of flowering and fruit-bearing trees and shrubs may be removed for the proposed development. While these trees provide potential foraging and shelter for the species, the number of suitable trees is low and insignificant to the habitat available for these highly mobile birds. Many of these trees have been planted and all are located in highly-disturbed areas with a high level of human traffic. As a result, it is likely that these trees provide sub-optimal ecological value to these species. A detailed pre-clearing survey and assessment will be undertaken to quantify the exact number of fruit-bearing and flowering trees lost. Pre-clearing data will be maintained in a database. The loss of these trees will be mitigated by the planting of trees and shrubs suitable for the species. Extensive suitable potential habitat for the species will remain within the broader Subject Site and in the nearby Illawarra Escarpment Foothills, which provides over 3,000ha of suitable potential habitat for the species.
Reduce the area of occupancy of the species	Based on the University of Wollongong concept plan, it is predicted that no hollow-bearing trees will be lost as a result of the proposed development. In the unlikely event of the removal of a hollow-bearing tree, lost hollows will be replaced by augmented hollows. A small number of flowering and fruit-bearing trees and shrubs are predicted to be removed for the proposed development (approximately 113), however the exact number has not been identified. While these trees provide potential foraging and shelter for the species, many of these trees have been planted and are located in highly-disturbed areas with a high level of human traffic. As a result, it is likely that these trees provide sub-optimal ecological value to the species. A detailed pre-clearing survey and assessment will be required to quantify the exact number of hollows and fruit-bearing and flowering trees lost. The loss of these trees will be mitigated by the planting of trees and shrubs suitable for the species.
Fragment an existing population into two or more populations	The habitat available on the Subject Site for this species will not become fragmented from other areas as a result of the proposed development. As the species is highly mobile, minor loss of select trees and shrubs from within the Subject Site is not considered likely to significantly affect the species. Habitat connectivity will continue to occur in the adjoining section of the nearby Illawarra Escarpment Foothills.
Adversely affect habitat critical to the survival of a species	The action will not adversely affect habitat critical to the survival of either of these species.
Disrupt the breeding cycle of a population	There will be no disruption to the breeding cycle of a population. Although no individuals were observed on the site during field surveys, if the species were to pass

Commonwealth Environment Protection and Biodiversity Conservation Act 1999 Assessment of Significant Impact Criteria for the Swift Parrot (<i>Lathamus discolor</i>)	
EPBC Act Status: Critically Endangered	
	through or utilise the Subject Site for breeding, extensive suitable breeding and foraging habitat will remain on the Subject Site and within the Illawarra Escarpment Foothills post-development.
▪ Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The action will not modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline. The proposed development will be situated predominantly in a disturbed and altered landscape containing a large proportion of planted and self-sown trees which provide sub-optimal foraging habitat for the species in comparison to the extensive potential foraging habitat provided by the adjacent Sydney Harbour National Park in Bradleys Head.
▪ Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat	It is unlikely that the proposed action will result in invasive species that are harmful to the species becoming established in species' habitat.
▪ Introduce disease that may cause the species to decline, or	The proposed action will not introduce disease that may cause the species to decline.
▪ Interfere with the recovery of the species.	While some potential habitat trees may be removed as a result of the proposed action, it is not deemed that this removal of minor, intermittent habitat will interfere with the recovery of the species which roam over most of eastern and central NSW in search of optimal food resources. Potential Impacts are to be mitigated through the measures outlined in this report including the replacement of potential feed trees removed, and the requirement for a qualified Ecologist to be present on site during tree removal to supervise works and provide assistance to any birds directly Impacted.
Conclusion There will be no significant Impact on Swift Parrot (<i>Lathamus discolor</i>) therefore the proposed action should not warrant a Commonwealth EPBC Act Referral.	
References NSW Office of Environment and Heritage (2017) Swift Parrot– profile http://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=10455 [September 2017]	

Commonwealth Environment Protection and Biodiversity Conservation Act 1999 Assessment of Significant Impact Criteria for the <i>Pultenaea aristata</i> (Prickly Bush-pea)¹ & <i>Cynanchum elegans</i> (White-flowered Wax Plant)²	
EPBC Act Status: Vulnerable¹, Endangered²	
Significant impact criteria An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:	
• lead to a long-term decrease in the size of a population	The proposal will not lead to a long-term decrease in the size of a population. No individuals were found within the Subject Site, and no important local populations are known from the area. A small area of potential habitat for the species (between 141 m² – 343 m²) will be modified for the construction of the Western Building. Other areas within the subject site were landscaped and contained mostly planted with landscaped areas, reducing the suitability and likelihood of these species occurring in these areas. Extensive suitable habitat remains available for the species within the nearby Illawarra Escarpment Foothills.
• reduce the area of occupancy of the species	The proposal will not reduce the area of occupancy of the species. No individuals were found within the subject site, and no important local populations are known from the area. A small area of potential habitat for the species (between 141 m² – 343 m²) will be modified for the construction of the Western Building. Other areas within the subject site were landscaped and contained mostly planted with landscaped areas, reducing the suitability and likelihood of these species occurring in these areas. Extensive suitable habitat remains available for the species within the nearby Illawarra Escarpment Foothills.
• fragment an existing population into two or more populations	The proposed action will not fragment an existing population into two or more populations. No individuals were found within the Subject Site, and no important local populations are known from the area. A small area of potential habitat for the species (between 141 m² – 343 m²) will be modified for the construction of the Western Building. Other areas within the subject site were landscaped and contained mostly planted with landscaped areas, reducing the suitability and likelihood of these species occurring in these areas. A pre-clearing survey should be undertaken by a qualified ecologist prior to any construction works within this area as well as the wider subject site. If the species is found during the pre-clearing survey, it will be retained and protected within the subject site by the use of appropriate fencing around any individuals of the species. Extensive suitable habitat remains available for the species within the nearby Illawarra Escarpment Foothills.
• adversely affect habitat critical to the survival of a species	The proposal will not adversely affect habitat critical to the survival of a species. A small area of potential habitat for the species (between 141 m² – 343 m²) will be modified for the construction of the Western Building.
• disrupt the breeding cycle of a population	There will be no disruption to the breeding cycle of a population. The works should have no impact.
• modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	A small area of potential habitat for the species (between 141 m² – 343 m²) will be modified for the construction of the Western Building. A pre-clearing survey should be undertaken by a qualified ecologist prior to any construction works within this area as well as

Commonwealth Environment Protection and Biodiversity Conservation Act 1999 Assessment of Significant Impact Criteria for the <i>Pultenaea aristata</i> (Prickly Bush-pea)¹ & <i>Cynanchum elegans</i> (White-flowered Wax Plant)²	
EPBC Act Status: Vulnerable¹, Endangered²	
	the wider subject site. If the species is found during the pre-clearing survey, it will be retained and protected within the subject site by the use of appropriate fencing around any individuals of the species. Extensive suitable habitat remains available for the species within the nearby Illawarra Escarpment Foothills.
• result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat	It is unlikely that the proposed action will result in invasive species that are harmful to the species becoming established in species' habitat. No invasive species will be planted. Existing weeds will be managed and removed.
• introduce disease that may cause the species to decline, or	The proposed action presents a very low risk of introducing a novel disease which will affect these species.
• interfere with the recovery of the species.	No actions associated with the proposed works or landscape plan will interfere with the recovery of the species.
Conclusion There will be no significant impact on the Prickly Bush Pea or the White-flowered Wax Plant therefore, the proposed action should not warrant a Commonwealth EPBC Act Referral.	
References NSW Office of Environment and Heritage (2017a) <i>Pultenaea aristata</i> (Prickly Bush-Pea) – profile http://www.environment.nsw.gov.au/savingourspeciesapp/project.aspx?ProfileID=10129 [September 2017] NSW Office of Environment and Heritage (2017b) <i>Cynanchum elegans</i> (White-flowered Wax Plant) – profile http://www.environment.nsw.gov.au/savingourspeciesapp/project.aspx?ProfileID=10129 [September 2017]	

**Commonwealth Environment Protection and Biodiversity Conservation Act 1999
Assessment of Significant Impact Criteria
for the**

White-throated Needletail (*Hirundapus caudacutus*)

Fork-tailed Swift (*Apus pacificus*)

Satin Flycatcher (*Myiagra cyanoleuca*)

Rufous Fantail (*Rhipidura rufifrons*)

Black-faced Monarch (*Monarcha melanopsis*)

EPBC Act Status: Migratory

Given these birds have widespread distributions and occupancy of relatively broad habitats, these species or their habitats are often detected during surveys for environmental Impact assessments. Guidelines were developed to outline those circumstances where a significant Impact on one or more of these species is likely. In most cases, significant Impacts on these five birds are unlikely to occur and consideration for them in a referral is not required (Commonwealth of Australia 2015).

Urban areas are unlikely to contain important habitat or ecologically significant proportions of the population for any of the species (Commonwealth of Australia 2015).

References

Commonwealth of Australia (2015) 'Draft referral guideline for 14 birds listed as migratory species under the EPBC Act'



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