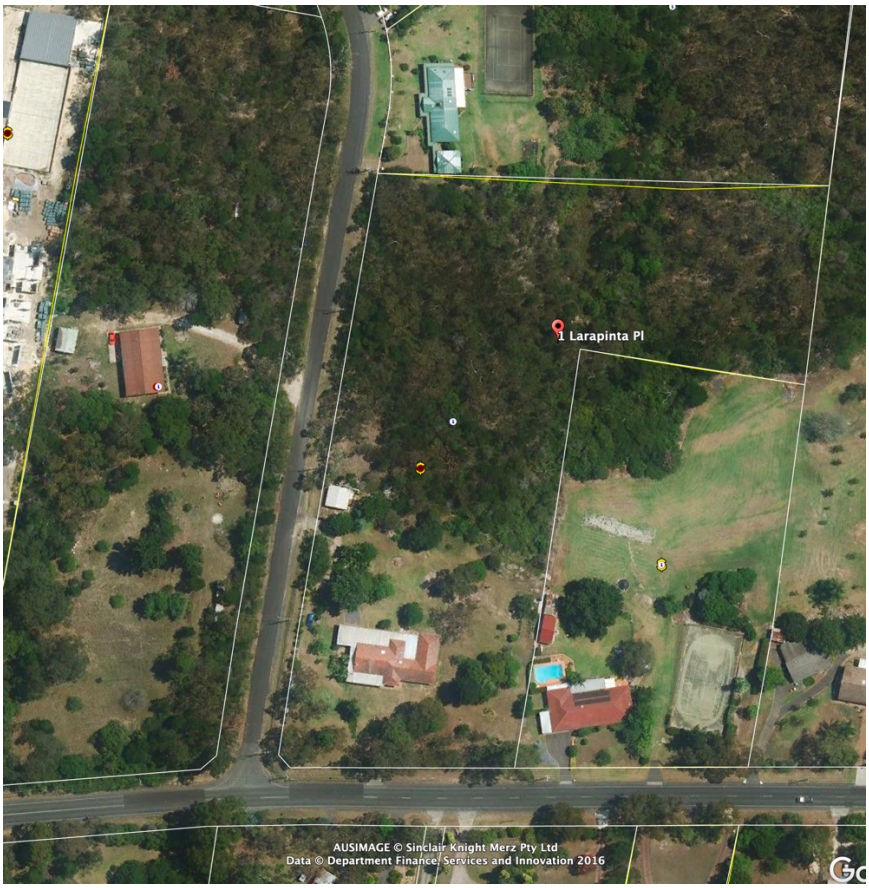
Biodiversity Development Assessment Report

for a

New Mosque

at

1 Larapinta Place, Glenhaven



By

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January 2019

Prepared for

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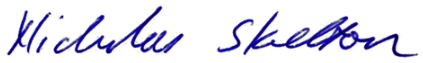

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Context

A. Background

This report describes the ecological values and constraints at the Development Site which is the southern part of Lot 7 DP 249716, known as 1 Larapinta Place, Glenhaven. The importance of the land to the conservation of Threatened flora and fauna species, and ecological communities and the likely impacts of the proposed development on terrestrial biodiversity are assessed as required by Federal, State and Local Government legislation. The northern part of 1 Larapinta Road will not be affected by the proposed development, however, it may be used as a future Biodiversity Offset Stewardship site.

An accurate description of the flora and fauna and an assessment of the ecological impact of the proposed development is required when submitting development applications to allow assessment of the application in relation to the following legislation; the NSW *Environmental Planning and Assessment Act 1979*, the *Biodiversity Conservation Act 2016*. In addition, the information in this report is likely to be needed to assess this development with respect to other acts, SEPPs, local government plans (LEPs, DCPs) regulations, orders and policies.

B. Aims of this Report

The aims of this Biodiversity Development Assessment Report are to:

- Determine the site context including native vegetation in the locality and landscape features on the Development Site.
- Record the **findings of an ecological survey** (flora, fauna and ecological communities, and their habitats and vegetation integrity) of the area likely to be impacted by the proposal;
- Provide **ecological information** and **assessment** regarding the importance of the habitat on the site to the conservation of native flora and fauna.
- Determine the ecological constraints of the site and provide advice to the applicant on ways the impact can be **avoided** and **minimised** before finalising the proposal plans as required by the mitigation hierarchy of the Biodiversity Conservation Act regulation 2017;
- To **Assess** the likely **impact** of the proposal on the ecological values of the site in particular the significance of the impact to Threatened species, populations and ecological communities or their habitats in accordance with the requirements of the *Environment Planning and Assessment Act* (EP&A Act) Sections 4.15 (1) a, b and c, the *Biodiversity Conservation Act 2016* and determination of compliance with other relevant NSW legislation including; Acts, regulations SEPPs, LEP and DCPs;
- Determine if the proposal needs **referral** to the Federal government for assessment under the EPBC Act;
- Assess if potential Serious and Irreversible Impacts (SAII) may result from the proposal.
- Determine areas that require **offsetting** under the Biodiversity Conservation Act and calculate the number of offsetting **credits** required and the **cost**.
- Recommend ways the ecological **impacts** can be further **ameliorated** and prescribe appropriate ecological management actions during construction and for the life of the development.
- This report addresses Council legislation (LEP, DCP), the “heads of consideration” in section 4.15 (1) a, b, c of the EP&A Act, SEPPs, other NSW environmental Acts and the Federal EPBC Act 1999.

C. Legislation Addressed by the Report

I. Environment Planning and Assessment Act 1979

The NSW Environment Planning and Assessment Act 1979 is the framework for approval of development in NSW. The proposed development will be assessed under Part 4 of the NSW Environmental Planning and Assessment Act. Section 4.15 (a)(formerly 79C(a)) of the Act requires that consent authorities must take into consideration any environmental planning instruments, LEP, DCP, SEPPs and regulations. Section 4.15 (c) requires assessment of the suitability of the land for development.

Section 4.15 (b) (formerly 79C (b)) requires the assessment of the likely impacts of a development, including environmental impacts on both the natural and built environments including the BC Act threshold test and if necessary a BAM assessment and any required offsetting.

The *Biodiversity Conservation Act 2016* (s 7.13(6)) and the Biodiversity Offset Scheme do not limit the ability of the consent authority to require additional measures in relation to avoiding and minimising biodiversity impacts or to refuse an application on the basis of those impacts.

II. Biodiversity Conservation Act 2016

The primary requirement of the BC Act is that ecological impacts are to be Avoided and Minimised during the planning of a proposal and then any remaining impact are to be offset according to the Biodiversity Offset Scheme (BOS).

The Schedules of the BC Act list Threatened flora and fauna species and define Endangered ecological communities.

Section 7.2 of the BC Act states that a development is likely to have a significant and will require assessment and offsetting effect if any of the following triggers are met;

- the BOS threshold test is triggered (area of disturbance) (see below for details), or
- mapped as Biodiversity Value on the Biodiversity values map.
- a Test of Significance (5 part test) for potential threatened species or ecological communities is positive (see below for details), or
- an Area of Outstanding Biodiversity Value is affected by the proposal (see below for details).

The **BOS Threshold test** is triggered if the area of native vegetation (any plant native to NSW, as defined in the LLS Act) will be disturbed (including bushfire APZ and other disturbance) is more than 0.25ha where the LEP minimum lot size is less than 1ha or if the disturbance area is equal or greater than 0.5ha where the lot size is larger 1ha (section 7.2 of the BC Act regulation).

Mapped on the Biodiversity Values Map is triggered if the proposal will have a direct or indirect impact on an area mapped as "Biodiversity Value" on the Biodiversity Values map.

The **Test of Significance** (section 7.3 of the BC Act) is used to determine if a proposed development or activity is likely to significantly affect Threatened species or ecological communities, or their habitats. Section 7.3 (2) of the BC Act provides guidance on the assessment of the Test of Significance in a guideline document (2018). https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Animals-and-plants/Threatened-species/threatened-species-test-significance-guidelines-170634.pdf

Areas of Outstanding Biodiversity Value are currently mostly also mapped on the Biodiversity Values map.

If any of the triggers are met then the Biodiversity Assessment Method (BAM) must be applied, the ecological impact must be avoided and minimised then the residual impact of the proposal must be offset in accordance with the Biodiversity Offset Scheme and the Biodiversity Assessment Method (BAM) and these need to be applied to determine the types of surveys and assessment required and the amount of offset. Proposals also needs to be assessed to determine if they may cause a Serious And Irreversible Impacts may occur (SAII) as a result of the proposal.

If a Development Application does not meet the threshold or any other triggers, then a smaller ecological report is still required to address the ecologically relevant "heads of consideration" in the section 4.15 (formerly 79C) of the EP&A Act, SEPPs and LEP/DCP requirements. Other Acts such as Federal EPBC Act, Fisheries Act, Water Management Act and Local Land Service's Act requirements may also require an ecological assessment report.

III. Northern Beaches Council (Pittwater) LEP (2014) and (Pittwater 21) DCP (2014)

The Northern Beaches Local Council (Pittwater) Local Environment Plan (PLEP 2014) aims to protect the environment and the quality of life in the Northern Beaches while promoting sustainable development. Both the PLEP and the PDCP 21 must be considered when a determining authority assesses development in this area.

The parts of PDCP 21 and PLEP 2014 that are relevant to the proposed development are as follows:

Clause 7.6 Biodiversity

The site is mapped as containing "biodiversity" on the Biodiversity Figure and therefore this report addresses 7.6 of the Pittwater LEP.

B4.7 Pittwater Spotted Gum Forest Endangered Ecological Community

The site is mapped as containing Pittwater Spotted Gum forest EEC and therefore this report addresses section B4.7 of the PDCP 21.

B4.3 Flora and Fauna Enhancement Category 2 Land

This report is required to address this required as specified in the Pre DA meeting notes from Northern Beaches Council (PLM2018/0084)

IV. Federal Environment Protection and Biodiversity Conservation Act, EPBC Act

This report also identifies "matters of national environmental significance", relevant to the site that are listed under Part 13 Division 1 of the *Environment Protection & Biodiversity Conservation Act 1999 (Cwlth)* (EPBC). Species or communities listed in the Act are considered to be "matters of national environmental significance" and consideration needs to be given as to whether the proposed development will or is likely to have a "significant impact" on any "matters of national environmental significance". In determining whether a "significant impact" will occur, consideration is given to the EPBC Act Administrative guidelines on significance (DEH 2006)

Should the assessment in this report determine that a "significant impact" will occur or is likely to occur on "matters of national environmental significance" the proposed development will need to be referred to the Minister (Cwlth) to determine as to whether or not the proposed development is a "controlled action".

Assessment of a Development Application with respect to the EPBC Act 1999 is not a Council issue but is the responsibility of the proponent. Proponents should be advised by their ecological consultant whether a referral is necessary.

This report addresses the requirements of this legislation.

D. Definitions and Acronyms

5-Part Test of Significance (5-Part Test) - Assessment under Section 7.3 of the BC ACT to determine whether a proposed development or activity is likely to significantly affect threatened species or ecological communities, or their habitats. Only used in the BOS Threshold Test.

APZ – Bushfire hazard fuel reduction Asset Protection Zone, defined in the document '*Planning for Bushfire Protection 2006*' by the NSW Rural Fire Service. Usually consisting of an Inner Protection Area (**IPA**) and an Outer Protection Area (**OPA**)

BAM - Biodiversity Assessment Method is the ecological survey and assessment technique that is required to be used for the **BOS** and it is described in a document by Office of Environment and Heritage **OEH** (August 2017) and referred to by the **BC Act** regulation. The Biodiversity Assessment Reports (**BAR**) that the BAM method produces are a **BDAR**, **BSSAR** and a **BCAR**.

BC Act - NSW Biodiversity Conservation Act 2016 contains the lists of threatened species, the definitions of the threatened ecological communities, the 5-part Test of Significance and the BOS. There are associated Biodiversity Conservation regulations which refers to the BAM.

BOS – Biodiversity Offset Scheme the system of trading biodiversity offset credits or paying for offsets to the Biodiversity Trust.

DCP - Development Control Plan, a local planning guideline for each LGA.

Development Site (Subject Land, property): an area of land that is subject to a proposed **Development Application** for works or an activity within the meaning under Part 4 and Part 5 of the EP&A Act. The term development also includes establishment or maintenance of a bushfire hazard reduction APZ area or environment management area. The Development Site includes the development footprint and any area that is part of the DA(s), including areas that will have lot boundaries adjusted.

Development Footprint: the area of land that is directly impacted on by a proposed development, including access roads, and areas used to store construction materials. The term *development footprint* is also taken to include clearing footprint except where the reference is to a small area development or a major project development.

Ecosystem Credits: a measurement of the value of threatened ecological communities, threatened species habitat for species that can be reliably predicted to occur with a PCT, and PCTs generally. Ecosystem credits measure the loss in biodiversity values at a development site and the gain in biodiversity values at a biodiversity stewardship site.

Direct Impacts - are impacts that directly affect habitat, ecosystems and individuals. They include but are not limited to, death, trampling, poisoning of the animal/plant itself and the removal of vegetation and suitable habitat. When applying each factor, consideration must be given to all of the likely direct impacts

of the proposed activity or development during construction. As defined by the 2006 DECC Assessment of significance guidelines.

Indirect Impacts - occur when project-related activities affect species, populations or ecological communities in a manner other than direct loss. Indirect impacts can include loss of individuals through starvation, exposure, predation by domestic and/or feral animals, loss of breeding opportunities, loss of shade/shelter, deleterious hydrological changes, increased soil salinity, erosion, inhibition of nitrogen fixation, weed invasion, fertiliser drift, or increased human activity within or directly adjacent to sensitive habitat areas. Indirect impacts may occur after construction during the life of the development, e.g. escape of garden plants, excess nutrients and changes in fire frequency and grazing. As with direct impacts, consideration must be given, to all of the likely indirect impacts of the proposed activity or development (2006 DECC Assessment of Significance Guidelines)

DPI – NSW government of Department of Primary Industries

EPA Act (EP&A Act) – NSW Environment Planning and Assessment Act 1979, controls development in NSW.

EPBC Act – Federal Environment Protection and Biodiversity Conservation Act 1999

IBRA region: a bioregion identified under the Interim Biogeographic Regionalisation for Australia (IBRA) system3, which divides Australia into bioregions on the basis of their dominant landscape-scale attributes.

IBRA subregion: a subregion of a bioregion identified under the IBRA system.

IPA – Bushfire hazard Inner Protection Area, defined in the document '*Planning for Bushfire Protection 2006*'.

LEP – Local Environment Plan, a local planning instrument for each LGA.

LGA- Local Government Area.

OEH – NSW Office of Environment and Heritage, formerly NPWS, DEC, DECC and DECCW. The department responsible for the conservation of native flora and fauna.

OPA – Bushfire hazard Outer Protection Area, defined in the document '*Planning for Bushfire Protection 2006*'.

Property – Adjacent or nearby lot(s) that have the same ownership.

Protected Fauna - refers to any native bird, mammal, reptile or frog in NSW.

TBDC – Threatened Biodiversity Data Collection, OEH database within Bionet.

Threatened Species or Ecological Community - refers to those biotas listed in the schedules of the Biodiversity Conservation Act 2016 as "Critically Endangered ", "Endangered" or "Vulnerable".

The Impact Mitigation Hierarchy

The mitigation hierarchy is a fundamental requirement of the Biodiversity Conservation Act, where the proponent needs to consider, in order, actions to avoid, mitigate and offset impacts. This Hierarchy is described in the Biodiversity Assessment Method document and is established by case law.

> The Chief Justice of the NSW Land and Environment Court has made the following statement (Preston, B J, Biodiversity offsets: adequacy and efficacy in theory and practice (2016) 33 EPLJ 93 at 95-96)
>
> *Avoidance and mitigation measures should be the priority strategies for managing the potential adverse impacts of a proposed development. Avoidance and mitigation measures directly reduce the scale and intensity of the potential impacts of the development. Only then are offsets used to address the residual impacts that remain after avoidance and mitigation measures have been put in place. Adherence to the mitigation hierarchy is central to biodiversity offsetting. Without prior application of the mitigation hierarchy, conservation actions would not qualify as offsets.*

Application of the mitigation hierarchy is also described in the LEC cases Bulga Milbrodale Progress Association Inc v Minister for Planning and Infrastructure and Warkworth Mining Limited 2013 NSW LEC 48 (Bulga) at 147 – 153.

E. Assumptions and Limitations

- This report only addresses the impacts of the proposal described in this report and shown in the maps in this report. If there are changes to the DA plans that alter the ecological impact of the proposal, then this report is likely to require recalculating and updating.

- This report describes the habitat and species in the Development Site at the time of the field survey. Vegetation and habitat will change over time, as does legislation. Therefore, the findings of this report are likely to be out of date in 12 months.
- There may be flora and/or fauna species present within the study area that may not have been recorded because they are seasonal, cryptic and/or have large home ranges. Some threatened species may only use the study area as habitat at some time. Assessment of habitat potential is used to address this uncertainty. The conclusions drawn in this report are a result of testing, observation and experience.
- This report assesses only the current proposal and does not consider the cumulative impact of other developments on this property or on adjacent land or the potential edge effects or impacts caused by the occupation of the land.
- This report should be read in its entirety and no part should be taken out of context.
- No responsibility is accepted for the use of any part of this report in any other context or for any other purpose or by third parties.
- This report makes recommendations for protection of bushland habitat, weed control, re-establishment of the bushland in part of the site, planting local native species and applying erosion and nutrient control measures. This report assumes these initial and on-going works will be carried out during and on-going for the life of the development.
- It is assumed that there will be no sediment, nutrients or weeds spreading into the adjacent bushland habitat.
- This report assumes that there will be no direct and indirect impact beyond the development footprint.

F. Qualifications and Experience of the Field Ecologist and Authors

Nicholas Skelton's formal qualifications include a Bachelor of Science with Honours (B. Sc. (Hons) USyd) and a Masters in Applied Science (M. App. Sc. in Vegetation Management UNSW). Nick has been an environmental scientist for 25 years, including a university lecturer, research ecologist and a bush regenerator for 8 years. His work is focused on the Sydney bioregion and he has published many papers in independently reviewed journals on the ecology of NSW. He has expert knowledge of the local soils, the climate of this area and the local indigenous plants and animals as a result of over 900 ecological surveys. Nick is a member of the relevant professional organisations including a practising member of the Ecological Consultants Association of NSW and Royal Zoological Society. He is licensed by NSW OEH and NSW Department of Primary Industries to carry out surveys on threatened plants and animals and he is a qualified Biodiversity Assessor under the BC Act 2016. Nick was the principal ecologist on all field surveys and was responsible for map making and report editing. Further details can be found at www.ecology.net.au.

Sophia Mueller Sewell has a Bachelor of Science (Environmental Biology UTS). Sophia has been working with GIS Environmental Consultants for over 2 years and has assisted with many ecological surveys and written over 50 reports. Sophia was responsible for project management, assisting with fauna survey, application of the BAM method, recording data for field surveys and report writing.

G. BOS Threshold Assessment

The Biodiversity Conservation Act Regulation (Aug 2017) requires that the Biodiversity Offset Scheme (BOS) threshold test (section 7.1 to 7.3) be applied to all development applications, to determine if the requirement to enter the BOS is triggered. If triggered then the Biodiversity Assessment Method (BAM) needs to be applied and a Biodiversity Development Assessment Report (BDAR) is required to accompany the application.

The Biodiversity Offsets Scheme applies to local developments, major projects or the clearing of native vegetation where the *State* Environmental Planning Policy (Vegetation in Non-Rural Areas) 2017 applies.

This proposal as described in this report is considered to meet the BC Act threshold as;

- The proposal will impact an area mapped a containing "biodiversity value" of the BC Act 2016 Biodiversity Values Map.

Therefore, the proposal requires a BAM assessment, a BDAR report and BOS offsetting.

H. BAM Assessment Type

There are two types of BAM assessment that can be used for Part 4 assessments (local developments or DA's); the General Module and the Streamlined Module (which includes Small Area and Paddock Trees sub types).

The general Assessment Module had to be used for this proposal as the site is mapped on the Biodiversity Values Map**.**

Stage 1: Biodiversity Assessment

1 Introduction

1.1 Description of Existing Site

For this proposal the Development Site (Site) (shown on the maps on Figures 1.4 and 1.5) is the southern part of the Property that is Lot 7 DP 249716 known as 1 Larapinta Place, Glenhaven in the Hill Shire LGA. The Development Site is approximately 1.2ha in size and currently contains a single storey brick dwelling, a small shed, areas of cleared lawn and areas of disturbed remnant bushland. There is an old quarry site with access track in the northern part of the site. The Development Site will be accessed from Larapinta Place to the west and only pedestrian access from Glenhaven Road to the south. A recent aerial photograph of the Development Site is provided on the cover of this report and the map on Figure 1.1.

1.1.1 Location Geographic Co-ordinates

The latitude and longitude of the Study Area is -33.694749° S and 151.982852°E.

1.1.2 Topography

The Site slopes to the north. 10m contours of the locality are shown in Figure 1.3.

1.1.3 Drainage

There is an old quarry in the northern part of the property that has formed a pond that runs into a tributary of Dooral Dooral Creek north of the site. Runoff drains into the bushland north of the site along a drainage line at the eastern boundary of the property. Drainage in the locality is shown in light blue on Figure 1.2 and 1.3.

1.1.4 Riparian Land

The site does not contain any Riparian Land.

1.1.5 Geology and Soils

The soils in the locality are shown in thick light blue outline on Figure 2.1.

1.1.6 Fire History

Recent aerial photography (Google Earth) show a fire across the northern part of the property in 2003 that is likely to have been a hazard reduction burn.

1.1.7 Disturbance History

The southern part of the development site has had a long history of disturbance and has been cleared in the past for the construction of a single residential dwelling with surrounding lawns, garden and a shed.

The majority of the northern bushland part of the site has had some past disturbance and the vegetation condition is patchy. Aerial photographs show there was disturbance due to a fire in 2003, in 2015 there was some clearing, fill and introduction of weeds and 2016 there was some clearing around the shed and in the eastern part of the site.

Aerial Photograph
NSW Government Six Maps

Legend

- 1 Larapinta Pl, Property
- Development Site

Figure 1.1
Aerial Photograph of the Site

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by Nicholas Skelton

Date: 21/01/2019

1:1,000 at A3

0 10 20 40 Meters

N

Figure 1.2
Locality Aerial Photograph

1 Larapinta Pl, Glenhaven

Date: 29/01/2019

Legend

- 1 Larapinta Pl, Glenhaven
- 1500m Buffer
- National Park

N

0 125 250 500 Meters

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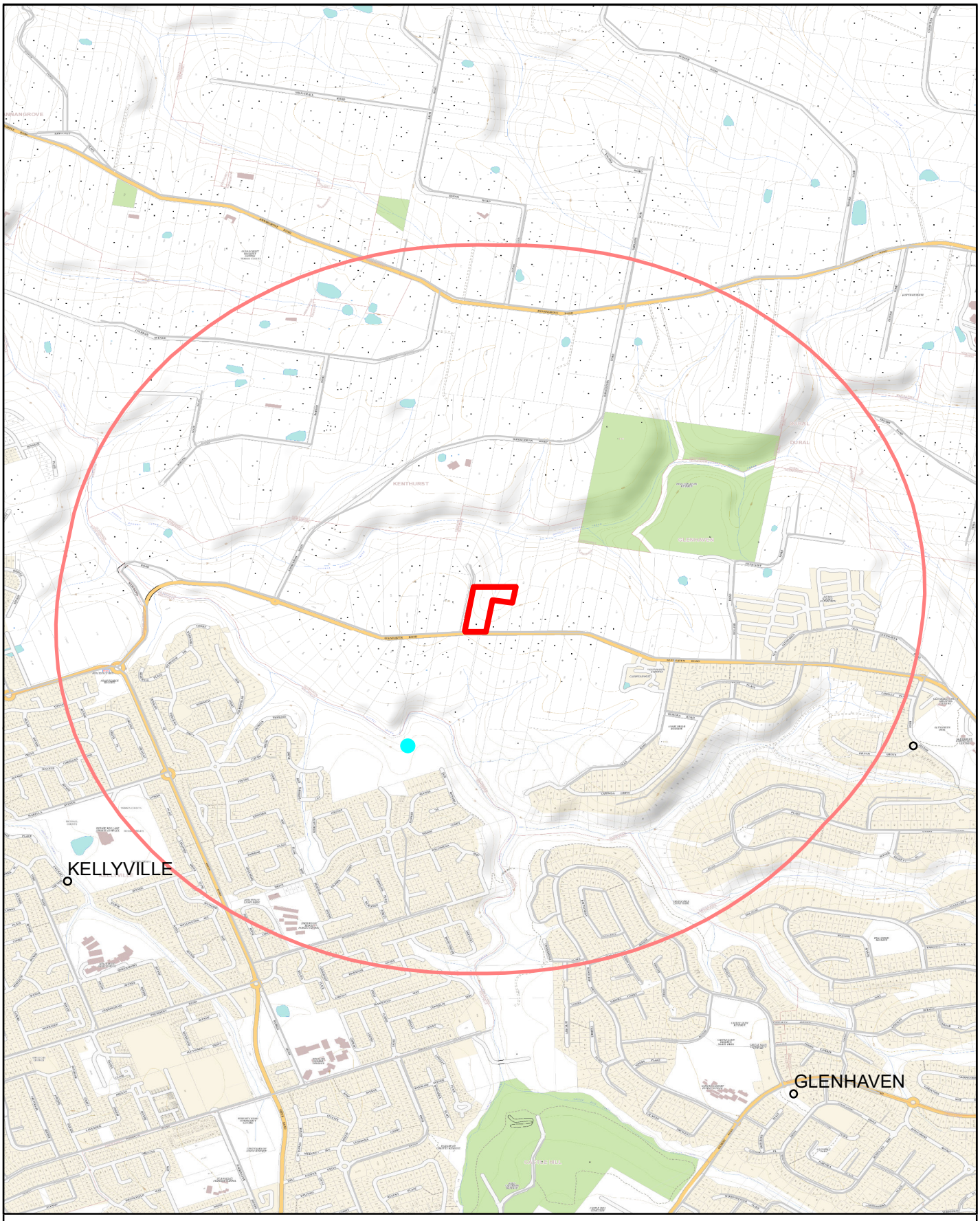

Figure 1.3
Locality, Topography and Features

1 Larapinta Pl, Glenhaven

Date: 29/01/2019

Disclaimer: Mapping is indicative and may contain errors from the source of the data. Information on these maps should only be used at the scale provided. Dimensions need to be determined by a registered surveyor.

Legend

1 Larapinta Pl, Glenhaven

1500m Buffer

N

0 125 250 500 Meters

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1.2 Development Footprint

The Development Footprint is the area that will be directly impacted by the proposal which for this proposal will be the same as the Development Site. The northern part of the property that contains bushland is not likely to be directly or indirectly impacted by the proposal and is therefore not included in the Development Site or Development Footprint. The development footprint includes an 85m bushfire Asset Protection Zone.

The development footprint is approximately 11700m^2 in size and is shown in the maps in Figure 1.3.

The operational footprint is not likely to extend further than the development footprint for this development.

1.3 General Description of the Proposal

The proposal is shown in Figure 1.4, includes;

- Demolition of existing structures including the dwelling and shed
- Removal of 39 trees
- Construction of a new storey Mosque building
- Construction of a new 50 car space above ground parking area and 83 car space underground parking area
- Driveway access from Larapinta Place
- Landscaping around the new building including screen planting and lawn
- Bushfire Asset Protection Zone
- Threatened Tree Protection Area with fencing and signage
- Onsite wastewater disposal areas
- Leaky Wall Nutrient Retention Wetland to improve water quality leaving the site

The location and extent of these features and the adjacent context are shown on Figure 1.4.

1.3.1 Bushfire Hazard Reduction

The Bushfire Protection Assessment by Graham Swain (18/04/18) assessed the bushfire risk for previous plans for the same DA on this property. The same Bushfire Protection Assessment has been used for the new plans. The Bushfire Protection Assessment requires and Asset Protection Zone to be established and managed 85m to the north and south of the proposed new building (Figure 1.4).

The Asset Protection Zone on the site will be separated into the northern part of the site that will also be bushland habitat and the southern part that will be landscaped gardens. The northern bushland part of the APZ and the southern landscaped part of the APZ will be separated by concrete block wall edging that will be 500mm above the finished soil level on the southern side.

The APZ may be able to be achieved by the following actions adapted from Standards for Asset Protection Zones (NSW Rural Fire Service) for establishing and maintaining an APZ:

1. ***Raking or manual reduction of fine fuels***

   Ground fuels such as fallen leaves, twigs (less than 6 mm in diameter) and bark should be reduced on a regular basis. This flash fuel burns quickly and increases the intensity of a fire. Fine fuels should be removed by hand. Fine fuel does not include logs or hollows. The leaf litter reduction is not to expose bare earth that may lead to erosion and weed invasion. This does not apply to the southern part of the site that is to be retained as bushland; or,

2. ***Mowing or grazing of grass in the southern part of APZ only***

   Where there is lawn, the grass needs to be kept short and, where possible, green. This only applied to previously cleared areas (southern part of the site) and not to intact bushland. This does not apply to the northern part of the site that is to be maintained as bushland habitat; or,

3. ***Removal or pruning of trees, shrubs and understorey***

All weeds are to be removed every three months by qualified bush regenerators. The control of existing vegetation involves both selective fuel reduction (removal, thinning and pruning) and the retention of vegetation. Prune or remove trees so that you do not have a continuous tree canopy leading from the hazard to the asset. This can be achieved by separating tree crowns by two to five metres, tree canopy should not overhang within two to five metres of a dwelling. Native trees and shrubs can be retained as clumps or islands and can maintain a covering of up to 20% of the area. All weeds are to be removed then there is to be removal of dead material then thinning of native vegetation if necessary to meet the fuel load requirements.

The fenced area around the Threatened Eucalyptus sp. Cattai will not be established or managed as Asset Protection Zone this will be managed for the Threatened trees that occur in this area and will be called the Threatened Tree Protection Area.

1.3.2 Threatened Tree Protection Area

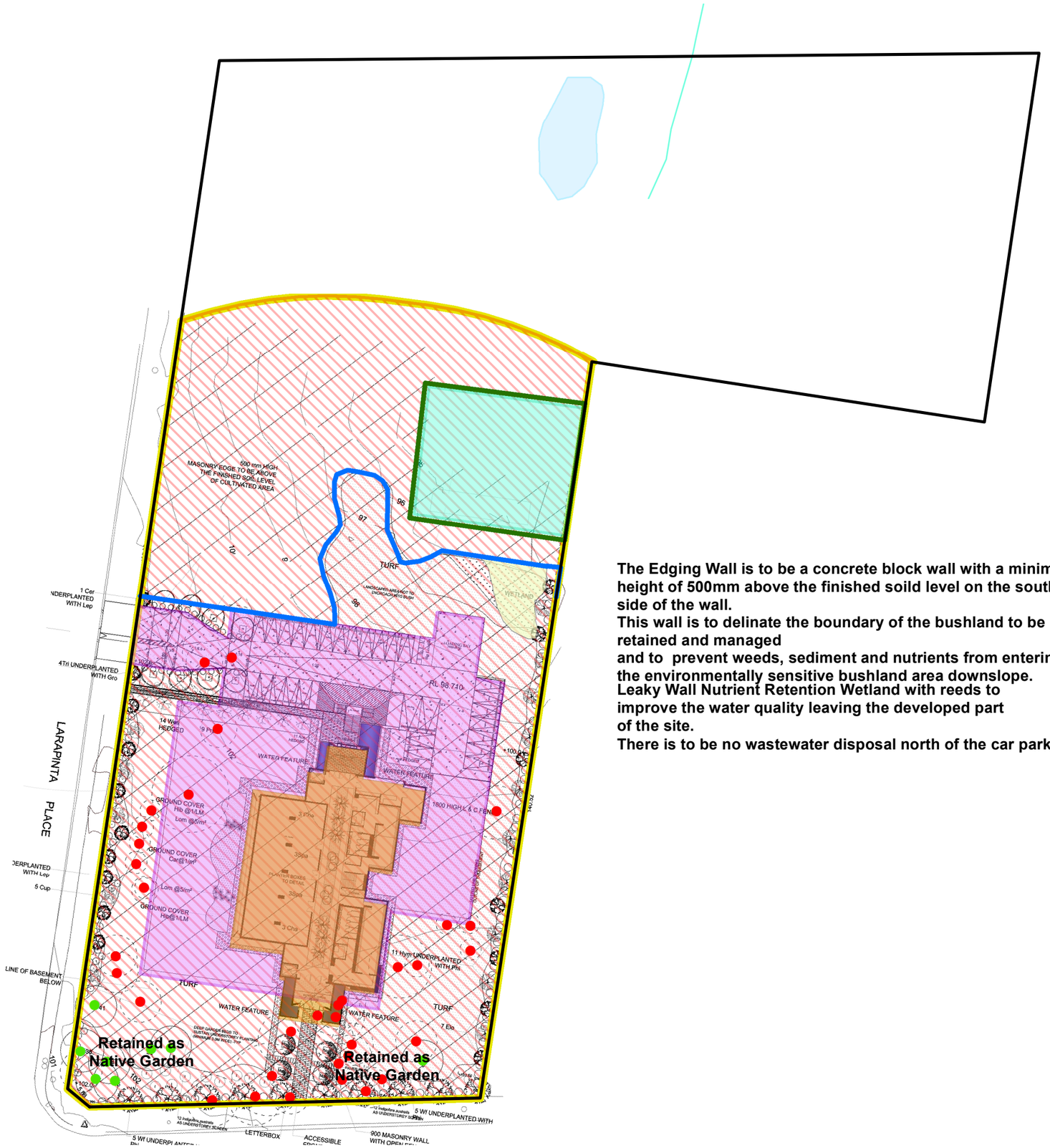
A 711m^2 Threatened Tree Protection Area (Figure 1.4) that encompasses the 8 tree trunks that are the Critically Endangered tree *Eucalyptus sp. Cattai* will be established prior to construction and permanently protected and permanently fenced with signage. This area is within the 85m Asset Protection Zone, however, after consultation with the bushfire consultant it was agreed that this area would be retained and no disturbance of the native vegetation in this area will be required. The only works that are to occur in the Threatened Tree Protection Area are weed control by qualified Bush Regenerators and ecological monitoring.

1.3.3 Leaky Wall Nutrient Retention Wetland

The Leaky Wall Nutrient Retention Wetland will be located at the lower end of the landscaped area along the eastern boundary of the property, just south of the Threatened Tree Protection Area. The wetland will retain nutrients from: the Carparks, the landscaped area and the first flow bypass of the roof water.
The main roof water will not flow into this wetland but will be piped to below the wetland to be discharged.
The wetland will not store water it will only hold water for the few days after a rain event while the water is cleaned by the vegetation and leaks to the downhill bushland. The wetland will be planted with appropriate local native wetland species.The wetland will help remove nutrients that would ham the threatened tree excess nutrients to prevent them from entering the downslope bushland and Critically endangered tree and other habitat that is downhill.

1.3.4 Plans and Documents Used for this Report

Title	Author	Rev	DWG./Doc. No./Ref.	Date
Site Plan	IDRAFT Architects	-	1001	29/01/19
Arborist Report	Bradley Magus	-	-	04/06/18
Bushfire Protection Assessment	Grahame Swain	Final	B183137	18/04/18
Landscape Plan	Earth Matters Consulting	R3	LD01	21/01/19
Site Sewage Management Letter	Imran Sandhu	-	180511	14/12/18
Email from ecologist	Rohan Mellick	-	-	16/03/18



The Edging Wall is to be a concrete block wall with a minimum height of 500mm above the finished soild level on the southern side of the wall.
This wall is to delinate the boundary of the bushland to be retained and managed
and to prevent weeds, sediment and nutrients from entering the environmentally sensitive bushland area downslope.
Leaky Wall Nutrient Retention Wetland with reeds to improve the water quality leaving the developed part of the site.
There is to be no wastewater disposal north of the car park.

Legend

1 Larapinta Pl, Property

- **1 Larapinta Pl, Property**
- Creek
- Old Quarry Pond
- Edging 500mm above highest side soil level
- Leaky Wall Nutrient Retension Wetland
- Fence and Signs Environmental Protection

Action

- Tree to Keep
- Tree to be Removed
- Threatened Tree Protection Area 711sqm
- Building Footprint
- Carpark Footprint
- Bushfire APZ 85m
- Development Site 11,700sqm

Figure 1.4
Study Site, Development Footprint and Proposal

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by Nicholas Skelton

Date: 31/01/2019
1:830 at A3
0 5 10 20 Meters

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1.4 Literature and Database Search

Relevant information was obtained from literature, local knowledge and established sources such as scientific journals, electronic databases and reports. The data in databases that were consulted included BioNet (5km search area) (including NPWS Atlas of NSW Wildlife records, Australian Museum specimen records and the Royal Botanic Gardens records), TBDC (BioNet), BAM Calculator, ROTAP records and Birds Australia Atlas. Searches were also undertaken on the DOEE – 'protected matters search tool' website to generate a report that will help determine whether matters of national environmental significance or other matters protected by the EPBC Act are likely to occur in the area of interest.

This information was used to ascertain which threatened species are known to occur in or near the study area. The data from within a 5km search area and the Species Credit Species produced by the BAM calculator were then combined with local knowledge and the habitat conditions within the study area to compile a list of Threatened plant and animal candidate species for specific targeting during the fieldwork.

1.5 Field Survey Method

An ecological field survey was carried out for the following purposes:

- general ecological site survey including observations across the whole of the site,
- mapping the extent of native vegetation
- to determine the Vegetation Types (PCT), their extent on the site and adjacent land and condition (disturbance) to determine the Vegetation Zones
- tree survey including; numbering, species, trunk girth, height, canopy diameter and health
- a formal plot based survey using the BAM method including ID of all plant species, percentage cover in each growth form, tree stem diversity and leaf litter cover.
- targeted Threatened species surveys.
- random meander to search for, identify and record other flora and fauna species.

See sections 3 and 4 for field survey effort, season, weather etc. for each survey technique and targeted survey method.

1.5.1 General Field survey

The general field survey involved the following procedures that were carried out throughout the Development Site:

- Initial familiarisation with the Development Site and its extent and surrounding land;
- Assessment of the physical characteristics of the Development Site and location of the proposal;
- Mapping the extent of the existing native vegetation;
- Identification and recording of all flora species and their percentage cover within each 400m^2 plot within the Subject Site and a random meander across the rest of the Development Site;
- Identification of fauna through sightings, calls and potential habitat, scats, remains, nests, dreys, bones, feathers, fur, diggings, scratches, tracks, owl white-wash and food sources. Examination of trees for scratchings, sap-feeding notches and hollows;
- Classification of any vegetation into communities according to their structural and floristic attributes;
- Assessment of the suitability of the habitats within the Development Site;
- Detailed search for targeted Threatened flora and fauna species;
- Assessment of the extent of disturbance and weed invasion;
- Photography of the Development Site

1.5.2 Extent of Native Vegetation

The extent of native vegetation was determined using aerial photography and on ground field verification.

The definition of native vegetation the is required by the BC Act to be used is the same as in the LLS Act. The location and extent of native vegetation on the Development Area is shown in Figure 3.1.

1.5.3 Field Survey

The field surveys were carried out on the 20th December 2018, 26th December 2018, 28th December 2018 and the 17th January 2019. The recent fieldwork was undertaken by a highly experienced Principal Ecologist Nicholas Skelton (approximately 60%) and the Ecologists; and Joshua Drane 40%.

1.5.4 Determining the Plant Community Type (PCT)

The vegetation within the study area was classified using structural and floristic indicators and was compared with threatened ecological communities listed in Schedule 2 of the BC Act 2016 and with the vegetation classification titled The Native Vegetation of the Sydney Metropolitan Area V3 Volume 2 (OEH 2016) and the PCT VIS vegetation type database (OEH online). Figure 2.1 shows the mapped vegetation in the locality.

The vegetation on the site was also classified according to Threatened Ecological Communities as listed in the schedules of the BC Act. A detailed description of how the importance of the habitat on the site for Threatened Ecological Communities (EEC) was determined, is given in Section 4.4.

1.5.5 BAM Plot Survey

A BAM plot survey was used to determine the integrity (condition) of the vegetation in each vegetation zone. The location of the sample locations are shown in Figure 3.1. The landscape features, vegetation type (PCT) and condition were surveyed using the Biodiversity Assessment Method (BAM) (OEH 2016).

1.5.5.1 Vegetation Integrity (condition) Assessment

A BAM survey was conducted to quantify vegetation integrity for the vegetation zone, including the following plot types:

- 400 m^2 plot (20 m x 20 m), used to assess the composition and structure;
- 1000 m^2 (20 m x 50 m) plot was used to assess functional attributes of the site; and
- 1 m^2 subplots (x5) nested within the 1000m^2 plot used to assess the average percentage leaf litter cover.

1.5.5.2 Composition and Structure

The floristic composition and relative cover were surveyed in the 20m x 20m plot. Information for each plant species within the plots was recorded including species name and the percent projected foliage cover across the plot for each species rooted in or overhanging the plot.

This information was then used to assist in determining the most likely Plant Community Types (PCTs) present and the presence of any endangered ecological communities (EECs) listed in schedule 2 of the BC Act 2016 and the condition of the vegetation at the site.

1.5.5.3 Function

The number of large trees, the presence of tree stem size class, tree regeneration and total fallen log length were recorded in the 20m x 50m plot. The DBH of live trees was measured and trees were assigned to a tree stem size classes from <5, 5-9, 10-19, 20-29, 30-49, 50-79, and 80+cm until all stem size classes were present or all tree measured. Where a tree had multiple stems, the largest stem was measured.

The number of large trees was recorded within the 20m x 50m plot. The definition of a “large tree” varies depending on the PCT that occurs within the plot.

The length of all fallen logs greater than 10 cm in diameter was measured. Only logs that were dead, on the ground, either in part or entirely were measured, and only the part of the log that was inside the plot was measured if the log extended out of the plot.

The percentage litter cover was measured within five 1m x 1m plots. The percentage litter cover includes dead leaves, seeds, twigs, branchlets and branches (<10 cm diameter).

1.5.5.4 Vegetation Integrity Score

The plot and transect survey data were then used to determine the composition score, the structure score and function score, which are used to determine the overall vegetation integrity score.

See section 4 for targeted field survey method and field survey effort for Threatened Flora and Fauna species and Section 3 for field survey effort for the vegetation survey.

1.5.6 Targeted Threatened Species Surveys

During the field surveys, all sections of the study area and some of the surrounding land were traversed on foot. The study area was searched for the presence of the Candidate Threatened flora and fauna species and their habitats using the published OEH guidelines.

- Bat Survey Guidelines, 'Species credit' Threatened bats and their habitats NSW survey guide for the Biodiversity Assessment Method OEH 2018
- Plant Survey Guidelines, NSW Guide to Surveying Threatened Plants OEH 2016
- Amphibian and Reptile Survey Guidelines, Threatened species survey and assessment guidelines: field survey methods for fauna, Amphibians DECC 2009
- Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities Working Draft DEC 2004

2 Landscape Features

2.1 IBRA Bioregion/Subregion and Landscape Region

Bioregion: Sydney Basin
Sub-region: Yengo
Mitchel Landscape Region: Blaxland Ridge

2.2 Locality and Adjacent Ecological Values

To the north, east, south and west are large lots with single residential dwellings. The bushland on the site is connected to Holland Reserve that is large patch of bushland north of the site.

The proximity of the site to National Parks, development and nearby bushland is shown in Figures 1.1, 1.2 and 1.3.

2.3 Native Vegetation Extent in Locality

In accordance with 4.3.2. of the BAM (OEH, Aug 17) the percentage cover of native woody and non-woody vegetation within the 1.5km buffer area (approx. 780ha) around the site was determined. The percent native vegetation cover is estimated by using the most up to date native vegetation mapping in combination with recent aerial photograph imagery.

The Hills Shire Council Vegetation mapping 2008 is currently the best vegetation mapping for this area. It is a compilation of the best available vegetation maps by various authors. The boundaries of many of the vegetation patches were mostly determined between 2 and 15 years ago. Figure 2.1 shows the vegetation types (ecological communities) in the locality that have been mapped at the regional scale. The Figure legend lists the vegetation types and the map shows their distribution in the locality and in relation to the site. Table 1 summarises the proportion of each vegetation type.

The total amount of mapped native woody and non-woody vegetation within the buffer area is approximately **55%** of the 776ha buffer area.

2.3.1 Differences Between Mapped Vegetation Extent and Aerial Imagery

There was good correlation between the mapped vegetation and the recent aerial photography. No changes were necessary.

2.4 Cleared Areas

The site has a long history of disturbance including clearing of trees and understorey vegetation, hazard reduction burn, construction of dwellings, establishment of weeds and planting exotic garden species. Approximately 50% (6000m^2) of the site is mostly cleared and contains, a house, driveway, mulched areas or exotic lawns and only scattered native trees and shrubs. The cleared parts of the site are in the southern section of the site. The cleared parts of the site do not contain any native vegetation.

2.5 Rivers and Streams

North-east of the site (on the property) there is a small old quarry that is filled with water forming a pond. The pond drains into Dooral Dooral Creek north of the site. Dooral Dooral Creek runs into Cattai Creek which eventually joins with the Hawkesbury River. There are no river or creeks on the site.

Waterbodies and hydrological processes are a type of Prescribed Impact and need to be specifically addressed in accordance with the BAM.

The impact of the proposal on waterbodies and hydrological process is described in the Prescribed Impact section in Table 16.

2.6 Wetlands

There is no wetland on or immediately adjacent to the property.

Waterbodies and hydrological processes are a type of Prescribed Impact and need to be specifically addressed in accordance with the BAM.

The impact of the proposal on waterbodies and hydrological process is described in the Prescribed Impact section in Table 16.

The impact of the proposal on connectivity is described in the Prescribed Impact section in Table 16.

2.7 Connectivity Features

The northern part of the site has medium wildlife corridor value. The bushland in the northern part of the site is connected to Holland Park, a large patch of bushland to the north, via remnant bushland on adjacent properties to the north and east. This corridor provides access for most native fauna species. Larapinta Place to the west of the site inhabits access for less mobile species to the bushland to the west. Scattered remanent trees in the southern part of the site provides some connectivity for high mobile species to the large patch of bushland to the south. There is better access to this southern patch of bushland, west of the site.

The proximity to National Parks, Reserves and remnant vegetation in the locality is shown on Figure 1.2.

2.8 Areas of Geological Significance

There are no karsts, caves, crevice's, cliffs or any other item of geological significance at the site. There are some natural sandstone rock on the site.

No soil hazard features were identified at the site. There is a geotechnical report as part of the DA/s.

The impact of the proposal on karsts, caves, cliffs and rocks is described in the Prescribed Impact section in Table 16.

Legend

- 1 Larapinta Pl, Glenhaven
- 1500m Buffer
- Vegetation 2008
  - Cattai Alluvial Tall Forest
  - Cattai Shale Cap Forest
  - Coastal Shale-Sandstone Forest
  - Gardens/Modified Vegetation Communities
  - Maroota Sands Swamp Forest*
  - Narrabeen Slopes Forest
  - Sandstone Gully Forest
  - Sandstone Gully Forest (rainforest understorey)
  - Sandstone Heath
  - Sandstone Ridgetop Woodland
  - Shale/Sandstone Transition Forest (Sandstone)*
  - Shale/Sandstone Transition Forest (Shale)*
  - The Vale - Ironbark Forest
  - Weeds

Figure 2.1
Locality, Mapped Vegetation Types

1 Larapinta Pl, Glenhaven

Date: 30/01/2019

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0 112.5 225 450 Meters

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3 Native Vegetation

3.1 Vegetation Class

The vegetation on the site is in the class – Sydney Coastal Dry Sclerophyll Forests

3.2 Native Vegetation Type Classification

The vegetation that occurs on the site was classified using three separate methods;

1. using the indicator species in the classification system in Native Vegetation of the Sydney Metropolitan Area (OEH 2016) which determines the PCT
2. VIS vegetation classification database and
3. The definitions of Threatened Ecological Communities in the Scientific Committee's determinations from the schedules of the Biodiversity Conservation Act.

Field survey results including the floristics (species mixture and relative abundance) and structure of the vegetation on the site was collected and these 3 methods were applied and the results are described in the following sections.

3.3 Plant Species List

The plant species that occur on the site are listed in the following table.

Table 1. Native Plant Species on the Site

1 Larapinta Rd, Glenhaven

by Nichlas Skelton, GIS Environmental Consultants

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Summary of Growth Form and Status

Row Labels	Local Native	Rare	Threatened	Vulnerable	Total
Additional	**11**	**1**		**1**	**13**
Grass	1				1
Grass Tree	1				1
Herb	1				1
Sedge	1				1
Shrub	3	1		1	5
Tree	4				4
Plot 1	**45**	**1**	**1**		**47**
Fern	2				2
Grass	1				1
Herb	11				11
Rush	1				1
Sedge	3				3
Shrub	18	1			19
Tree	6		1		7
Vine	3				3
Total	**56**	**2**	**1**	**1**	**60**

Plot	% Cover	Genus and Species	Family	Habit	Order	Common Name	Status
Additional		Angophora bakeri	MYRTACEAE	Tree	DICOTYLEDON		Local Native
Additional		Anisopogon avenaceus	POACEAE	Grass	MONOCOTYLEDON	Oat Speargrass	Local Native
Additional		Banksia serrata	PROTEACEAE	Tree	DICOTYLEDON	Old Man Banksia	Local Native
Additional		Callistemon rigidus	MYRTACEAE	Shrub	DICOTYLEDON	Stiff Bottlebrush	Local Native
Additional		Corymbia eximia	MYRTACEAE	Tree	DICOTYLEDON	Yellow Bloodwood	Local Native
Additional		Cyathochaeta diandra	CYPERACEAE	Sedge	MONOCOTYLEDON	Cyathochaeta	Local Native
Additional		Darwinia biflora (not onsite)	MYRTACEAE	Shrub	DICOTYLEDON	Darwinia	Vulnerable
Additional		Eucalyptus paniculata	MYRTACEAE	Tree	DICOTYLEDON	Grey Ironbark	Local Native
Additional		Leptospermum arachnoides	MYRTACEAE	Shrub	DICOTYLEDON	Spidery Tea Tree	Local Native
Additional		Melaleuca thymifolia	MYRTACEAE	Shrub	DICOTYLEDON		Local Native
Additional		Wahlenbergia gracilis	CAMPANULACEAE	Herb	DICOTYLEDON		Local Native
Additional		Xanthorrhoea media/resinifera	XANTHORRHOEACEAE	Grass Tree	MONOCOTYLEDON	Forest Grass Tree	Local Native
Plot 1	20	Allocasuarina littoralis	CASUARINACEAE	Tree	DICOTYLEDON	Black She-oak	Local Native
Plot 1	0.1	Angophora hispida	MYRTACEAE	Tree	DICOTYLEDON	Dwarf Apple	Local Native
Plot 1	1	Banksia ericifolia	PROTEACEAE	Shrub	DICOTYLEDON	Heath Leaved Banksia	Local Native
Plot 1	0.2	Baumea acuta	CYPERACEAE	Sedge	MONOCOTYLEDON	Pale Twig-rush	Local Native
Plot 1	0.1	Baumea juncea	CYPERACEAE	Sedge	MONOCOTYLEDON	Twig-rush	Local Native
Plot 1	0.1	Billardiera scandens	PITTOSPORACEAE	Vine	DICOTYLEDON	Apple Berry, Dumplings	Local Native
Plot 1	0.1	Boronia ledifolia	RUTACEAE	Shrub	DICOTYLEDON	Sydney Boronia	Local Native
Plot 1	0.1	Caesia parviflora var. parviflora	ANTHERICACEAE	Herb	MONOCOTYLEDON		Local Native
Plot 1	0.1	Cassytha glabella	LAURACEAE	Vine	DICOTYLEDON	Smooth Devil's Twine	Local Native
Plot 1	0.1	Cassytha pubescens	LAURACEAE	Vine	DICOTYLEDON	Hairy Devil's Twine	Local Native
Plot 1	0.1	Caustis flexuosa	CYPERACEAE	Sedge	MONOCOTYLEDON	Old Man's Beard	Local Native
Plot 1	0.5	Dianella caerulea var. producta	PHORMIACEAE	Herb	MONOCOTYLEDON	Blue Flax Lily	Local Native
Plot 1	0.1	Dianella prunina	PHORMIACEAE	Herb	MONOCOTYLEDON	Purple Flax Lily	Local Native
Plot 1	0.1	Dillwynia retorta	FABACEAE	Shrub	DICOTYLEDON	Eggs and Bacon	Local Native
Plot 1	0.1	Dodonaea camfieldii	SAPINDACEAE	Shrub	DICOTYLEDON	Hop Bush	Rare
Plot 1	0.1	Dodonaea triquetra	SAPINDACEAE	Shrub	DICOTYLEDON	Hop Bush	Local Native
Plot 1	0.5	Elaeocarpus reticulatus	ELAEOCARPACEAE	Tree	DICOTYLEDON	Blueberry Ash	Local Native
Plot 1	0.1	Entolasia stricta	POACEAE	Grass	MONOCOTYLEDON	Wiry Panic	Local Native
Plot 1	0.1	Epacris microphylla var. microphylla	EPACRIDACEAE	Shrub	DICOTYLEDON	Coral Heath	Local Native
Plot 1	0.1	Epacris pulchella	EPACRIDACEAE	Shrub	DICOTYLEDON		Local Native
Plot 1	5	Eucalyptus haemastoma	MYRTACEAE	Tree	DICOTYLEDON	Scribbly Gum	Local Native
Plot 1	70	Eucalyptus sp. Cattai	MYRTACEAE	Tree	DICOTYLEDON	Brown Stringy Bark	Threatened
Plot 1	0.1	Glochidion ferdinandi var. ferdinandi	EUPHORBIACEAE	Tree	DICOTYLEDON	Cheese Tree	Local Native
Plot 1	0.1	Grevillea buxifolia	PROTEACEAE	Shrub	DICOTYLEDON	Grey Spider Flower	Local Native
Plot 1	0.2	Hibbertia aspera	DILLENIACEAE	Shrub	DICOTYLEDON	Guinea Flower	Local Native
Plot 1	7	Kunzea ambigua	MYRTACEAE	Shrub	DICOTYLEDON	Tick Bush	Local Native
Plot 1	0.5	Lambertia formosa	PROTEACEAE	Shrub	DICOTYLEDON	Mountain Devil	Local Native
Plot 1	0.1	Lasiopetalum ferrugineum var. ferrugineum	STERCULIACEAE	Shrub	DICOTYLEDON	Rusty Petals	Local Native
Plot 1	0.1	Laxmannia gracilis	ANTHERICACEAE	Herb	MONOCOTYLEDON		Local Native
Plot 1	0.5	Leptospermum trinervium	MYRTACEAE	Shrub	DICOTYLEDON	Paperbark Tea Tree	Local Native
Plot 1	0.5	Lepyrodia scariosa	RESTIONACEAE	Rush	MONOCOTYLEDON	Scale-rush	Local Native
Plot 1	0.2	Leucopogon ericoides	EPACRIDACEAE	Shrub	DICOTYLEDON	Bearded Heath	Local Native
Plot 1	0.1	Leucopogon muticus	EPACRIDACEAE	Shrub	DICOTYLEDON	Blunt Beard-heath	Local Native
Plot 1	0.1	Lindsaea linearis	LINDSAEACEAE	Fern	FERN	Necklace Fern	Local Native
Plot 1	0.1	Lindsaea microphylla	LINDSAEACEAE	Fern	FERN	Lacy Wedge Fern	Local Native

Plot 1	0.1	Lomandra brevis	LOMANDRACEAE	Herb	MONOCOTYLEDON	Tuft Mat-rush	Local Native
Plot 1	0.1	Lomandra filiformis ssp. filiformis	LOMANDRACEAE	Herb	MONOCOTYLEDON	Wattle Mat-rush	Local Native
Plot 1	0.1	Lomandra gracilis	LOMANDRACEAE	Herb	MONOCOTYLEDON	Mat-rush	Local Native
Plot 1	0.1	Micrantheum hexandrum	EUPHORBIACEAE	Herb	DICOTYLEDON	Micrantheum	Local Native
Plot 1	0.1	Patersonia sericea	IRIDACEAE	Herb	MONOCOTYLEDON	Silky Purple Flag	Local Native
Plot 1	0.1	Persoonia lanceolata	PROTEACEAE	Shrub	DICOTYLEDON	Lance-leaved Geebung	Local Native
Plot 1	0.1	Persoonia pinifolia	PROTEACEAE	Shrub	DICOTYLEDON	Pine-leaved Geebung	Local Native
Plot 1	1	Pittosporum undulatum	PITTOSPORACEAE	Tree	DICOTYLEDON	Sweet Pittosporum	Local Native
Plot 1	0.1	Platysace linearifolia	APIACEAE	Herb	DICOTYLEDON	Carrot Tops	Local Native
Plot 1	0.1	Polyscias sambucifolia	ARALIACEAE	Shrub	DICOTYLEDON	Elderberry Panax	Local Native
Plot 1	0.5	Woollsia pungens	EPACRIDACEAE	Shrub	DICOTYLEDON	Snow Wreath	Local Native
Plot 1	0.1	Xanthosia tridentata	APIACEAE	Herb	DICOTYLEDON	Rock Xanthosia	Local Native

3.4 Justification for PCT (Vegetation Classification)

3.4.1 Candidate Vegetation Communities

The most likely vegetation community (PCT) and the one that have been mapped as occurring on or near the site is:

Note: Each PCT has been referred to within each reference with a different name. Therefore each PCT has two different names. This report assesses each PCT using two different references (OEH NVSMA, and VIS). The name that each reference uses, is used when assessing under that reference.

- **PCT 1782.**
    - Hornsby Enriched Sandstone Exposed Woodland (NVSMA OEH V3 2016, mapping name and name used in this report, See Figure 2.1)
    - Red Bloodwood-Scribbly Gum/ Old-man Banksia open forest on sandstone ridges of northern Sydney and the Central Coast (VIS Classification, PCT name and name in BAM Calculator).

Figure 2.1 shows the location and abundance of vegetation communities (using NVSMA OEH 2016 mapping).

3.4.2 Assessment using the VIS and the NVSMA 2016

Hornsby Enriched Sandstone Exposed Woodland

The site is mapped as containing Sandstone Heath in the northern part and Sandstone Gully in the south by the Hills Shire Council vegetation mapping (2008). These are broad vegetation types and do not have detailed description to compare to the site. A site inspection by Dr Rohan Mellick of Cumberland Ecology on the 12th February 2018 identified Hornsby Enriched Sandstone Exposed Woodland in moderate condition in the northern part of the site. Hornsby Enriched Sandstone Exposed Woodland is one of the communities defined in OEH's native Vegetation of the Sydney Metropolitan Area (2016).

Hornsby Enriched Exposed Sandstone Woodland is described as a low open eucalypt woodland with an open to dense shrub layer. The canopy is dominated by *Eucalyptus haemastoma* or *Eucalyptus piperita.* Sometimes the canopy is sparse and the shrub or mid layer is dominated by *Allocasuarina littoralis* and *Kunzea ambigua.* The vegetation in the northern part of the site fits this description, however it has had some past disturbances.

The species and relative abundance information from one 400m^2 plot within the area on the Development Site mapped as Hornsby Enriched Sandstone Exposed Woodland. The area of bushland has a patchy disturbance and the plot was placed in the least disturbed part of the bushland.

The positive diagnostic test for Hornsby Enriched Sandstone Exposed Woodland in the Native Vegetation of the Sydney Metropolitan Area (OEH 2016) requires 21 or more positive diagnostic in a 400m^2 plot for a positive diagnosis, provided that there are 38 or more native species within the plot.

Plot 1, on the site, had 47 native species, of these 26 are positive diagnostic for Hornsby Enriched Exposed Sandstone Woodland. An additional 4 positive diagnostic species were found outside of the plot. Therefore, it is considered that the northern part of the site does contain Hornsby Enriched Exposed Sandstone Woodland.

3.4.3 Other Native Vegetation at the Development Site

No other native vegetation occurs at the site. The southern part of the site contains mostly exotic garden species with mown lawn understorey that is not considered to represent native vegetation.

Photo Page 1- Plot Photos

North-east corner of Plot 1

South-east corner of Plot 1

South-west corner of Plot 1

North-west corner of Plot 1

Looking down centre line of the Plot

Looking up from the centre of the Plot

3.5 Presence of Threatened Ecological Communities

3.5.1 Threatened Ecological Communities in the Locality

The NSW Biodiversity Conservation Act, 2016 lists Threatened Ecological Communities (TECs) and Threatened Species that are likely to become extinct in nature unless the circumstances and factors threatening their survival cease to operate. The Threatened communities that are known to occur in the locality are shown with a red diagonal hash pattern on Figure 2.1. Drainage and soil types in the locality are shown in Figure 2.1 and 1.3. Abiotic factors and the site survey were used to determine targeted Threatened Ecological Communities.

3.5.2 Method of Establishing if EEC's Occur on this Study area

To establish if any endangered ecological community occurs within the study area and a combination of three separate methods were used:

Mapping Method: The most accurate and up-to-date vegetation maps that are available were used to determine what is already known about the distribution of vegetation types in the locality. Where more accurate local maps are not available, the 'Vegetation of the Sydney Metropolitan Area' Figure and classification (OEH, 2016) are used. Vegetation mapping has inherent errors such as the spatial accuracy of the mapping, how old the mapping is and classification accuracy, which is limited, due to the amount of field verification that was carried out when they were made. Vegetation maps do not provide a sufficient level of spatial accuracy for the assessment of the impact at the scale of this proposal but are useful in determining the ecological communities that are likely to occur in the vicinity. Fieldwork is necessary to determine the site-specific accurate vegetation mapping.

Correlation Method: Correlations between the species that occur in the study area and the listed characteristic species for the Endangered Ecological Community in; the Final Determination in Part 3 of Schedule 1 of the Threatened Species Conservation Act (1995). The floristics were also compared to the document 'Vegetation of the Sydney Metropolitan Area V3' by OEH 2016.

Comparison Method: Comparison of the ecological features on the site to the environmental description in the legal definition of the Threatened Ecological Community in the Final Determination in Biodiversity Conservation Act (2016). This comparison is essential when determining if the type of ecological community that occurs within a study area is an endangered community. Not all the sections of the determinations need to apply to the study area and the earlier sections are more important and should be given more weight (Preston and Adams).

3.5.3 Occurrence of TECs in this Study Area

Mapping Result

The Hills Shire Council vegetation mapping (2008), has not mapped any Threatened Ecological Community on or adjacent to the site.

The nearest mapped Threatened Ecological Communities are Shale Sandstone Transition Forest south-east and south-west of the site. The spatial and classification accuracy of this mapping is limited due to the amount of field verification that was carried out and the time since the mapping in this locality was carried out. These maps have been made for broad scale planning and are useful in determining the ecological communities that are likely to occur in the vicinity. Field verification is needed to verify the boundaries of the community onsite and current conditions and for plant species identification for floristic analysis.

Correlation Result – Listed Characteristic Species within the TSC Final Determination

The floristics at the site most closely fits Hornsby Enriched Exposed Sandstone Woodland which is not listed as a Threatened Ecological Community under the Biodiversity Consideration Act 216 or the Environment Protection and Biodiversity Conservation Act 1999.

Comparison Result – Ecological Features within the TSC Final Determination

The structure of the vegetation the site most closely fits Hornsby Enriched Exposed Sandstone Woodland which is not listed as a Threatened Ecological Community under the Biodiversity Consideration Act 216 or the Environment Protection and Biodiversity Conservation Act 1999.

Conclusion Regarding the Occurrence of TECs on the Site

The site is not likely to contain any Threatened Ecological Community.

3.6 Conclusion Regarding the Vegetation Community Types Present

When the methods were applied it was determined that the site contains 1 PCTs, Red Bloodwood-Scribbly Gum/ Old-man Banksia open forest on sandstone ridges of northern Sydney and the Central Coast (PCT 1782), also known as Hornsby Enriched Sandstone Exposed Woodland. The other parts of the site that do not contain these PCTs contain some remanent native tree canopy, exotic lawn or exotic gardens.

3.7 Area of Each Vegetation Type

Table 2. The Area of Each Native Vegetation Type

Vegetation Community	PCT Number	Area (On Site)m^2	Percent Cleared
Hornsby Enriched Sandstone Exposed Woodland	1782	3721	17%

Legend

1 Larapinta Pl, Property

Creek

Old Quarry Pond

Plot

1000sqm

400sqm

Vegetation Zone 1, 3721sqm

Hornsby Enriched Sandstone Exposed Woodland PCT 1782

Development Site 11,700sqm

Aerial Photograph
Dated: 2018

Figure 3.1
Vegetation Type, Zones and Plot Survey

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by Nicholas Skelton

Date: 31/01/2019

1:830 at A3

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3.8 Vegetation Integrity Assessment

The condition of the one native vegetation community is patchy, with most of it being disturbed at different times. The area of each disturbance type is too small to be considered one Vegetation Zone, therefore the entire vegetation community is considered to be one Vegetation Zone. The Plot to measure vegetation integrity was placed in the least disturbed part of the zone.

Table 3. Vegetation Zones and Patch Size

Vegetation Zone	PCT	Area of Zone (m^2)	Patch Size (ha)
Zone 1- HESEW	1782	3271	<5ha

Table 4. Vegetation Survey Effort

Date	Person Hours	Weather	Type	Location
20/12/2018	2	fine 28 - 30ºC	Random Meander (Cropper (1993) across each vegetation type	Across the whole of the Development Footprint.
20/12/2018	3	fine 28 - 30ºC	Plot 1 (Zone 1)	See Figure 5
17/01/19	2	Fine 30-32°C	Additional vegetation survey	Across the whole development footprint

3.8.1 Composition and Structure

A total of 47 local native plant species were recorded in Plot 1 including one Threatened tree *Eucalyptus sp. Cattai* which made up the majority of the tree canopy within the plot . The plot had a high number of shrub species and a high percentage cover of shrubs, which reflects the heathy, woodland community that occurs on the site. The majority of the groundcovers in the plot were herbs. The native vegetation in the northern part of the site contains some weeds which are due to the past disturbance and introduction of fill in the parts of the site. An additional 12 native species were found outside of the plot including the Threatened plant *Darwina biflora* (found outside of the site).

The summary of the floristics and structure of the 20x20m plots are given in Table 3.

3.8.2 Function-Habitat Value

The results for tree width diversity, log length and ground cover for the 20m x 50m plot are recorded in the table below.

Table 5. Fauna Habitat Function Summary for Plots

Plot 1 (Zone 1) Function Results		
Tree Stem Size Class		**Log Length Total (m)**
Width Class (cm)		67.10
<5	present	
5 to 9	present	**Number of large trees (50cm+)**
10 to 19	present	1
20 to 29	present	

30 to 49	present	**Av Leaf Litter % Cover (1m² plots)**
50 to 79	present	99
80+	absent	

Table 6. Vegetation Integrity Score

Vegetation Zone	Composition Score	Structure Score	Function Score	Integrity Score
Zone 1	86.3	31.3	74.7	58.7

4 Threatened Species

4.1 Requirement for Ecosystem and Species Credit Species

Extract from Section 6.4.1.3 of the BAM (Aug 17)

The assessor must first use the following criteria to predict the threatened species that require assessment at the site:

(a) the distribution of the species includes the IBRA subregion which the subject land is, in the opinion of the assessor, mostly located within, and

(b) the subject land is within any geographic constraints of the distribution of the species within the IBRA subregion, and

(c) the species is associated with any of the PCTs identified by the assessor under Chapter 5 as occurring within the subject land, and

(d) the native vegetation cover within an assessment area 1500m wide surrounding the boundary of the subject site as determined by the assessor in accordance with Subsection 4.3.2 is equal to or greater than the minimum class that is required for the species (unless the development is, or is part of, a linear shaped development), and

(e) the patch size which the vegetation zone is part of, as identified in Subsection 5.3.2 is equal to or greater than the minimum specified for that species, and

(f) the species is identified as an ecosystem or species credit species in the Threatened Biodiversity Data Collection.

A threatened species is predicted as requiring assessment if that species meets all of the criteria a) – f) that are relevant to the species. A criterion is not relevant to a species if the species' profile in the Threatened Biodiversity Data Collection does not contain information for that criterion

If any past surveys undertaken on the subject land, regardless of whether or not the data is within BioNet, have recorded the presence of a threatened species, this species must be identified as being a species that requires assessment at the subject land.

4.2 Ecosystem Candidate Species Assessment & Justification

The list of ecosystem credit species derived (predicted) from the BAM calculator for this proposal are listed below in Table 9. Additional Threatened ecosystem credit species are to be added where they occur on the site, or have been recorded previously at the site or when listed criteria are met.

Ecosystem credit species are those where their likely occurrence can be predicted by habitat surrogates (such as PCT) and landscape features, or for which a targeted survey has a low probability of detection. A targeted survey is not required for ecosystem species.

The listed Threatened species are assessed in accordance with section 6.4 (Steps 1 and 2) of the BAM, to identify any species that should be excluded from the BAM calculation and subsequent ecosystem (PCT, vegetation type) credit generation. The reasons for any exclusions or additions are given in the final column of Table 9.

4.3 Species Candidate Assessment & Justification

The predicted (potential) candidate Threatened flora and fauna credit species derived from the BAM calculator for this proposal, are listed below in Tables 10 and 11 respectively. Additional Threatened species are to be added where they are likely to occur on the site or when the site contains suitable habitat.

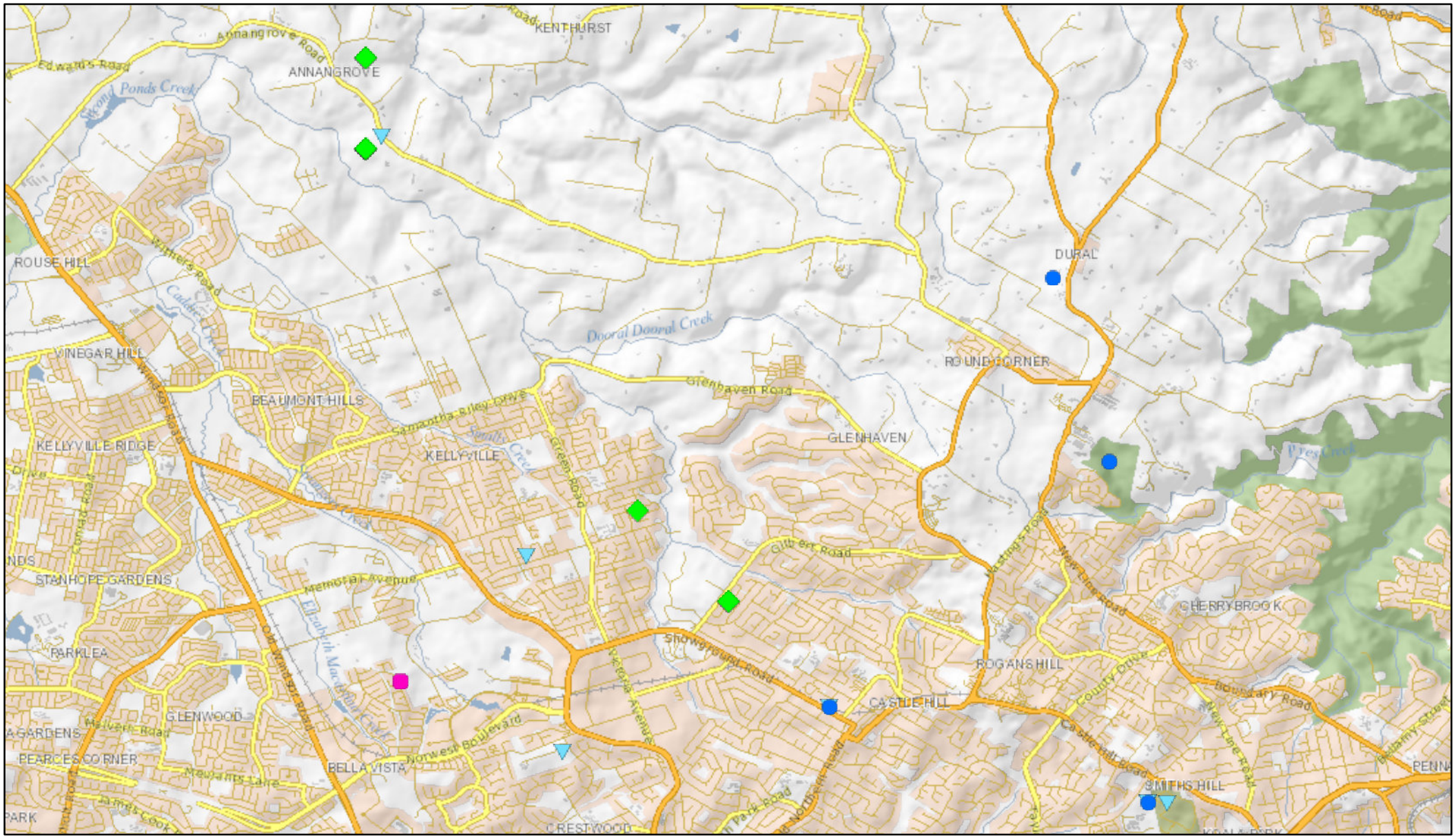
The habitat suitability and geographic constraints for potential candidate flora and fauna species credit species are assessed in the Tables 10 and 11 below. The criteria for identifying the Threatened species that should be added or excluded from further assessment are described in Sections 6.4 of the BAM. The reasons for any exclusions or additions are given in the final column.

The BAM calculator takes into consideration the location of the site and the vegetation community, to create the predicted candidate Threatened Species Credit Species list which is the basis of the table below.

Section 6.4 of the BAM method (OEH 2017) requires 4 steps to be taken to confirm which of these species are Candidate species credit species to target for further assessment. The table below summarises the habitat preferences and requirements for each species, based on information from the Threatened Species Database Collection and other scientific references. The table applies the 4 steps by assessing the suitability of the habitat on the Site based on the findings of the field survey, then provides a justification for including or excluding each species as a Candidate species credit species.

Figure 4.1 shows the location, distribution and abundance of historical records for each predicted Threatened candidate species.

Figure 4.1 (Fauna.a)- Threatened Species Records



January 30, 2019

drawGraphics_poly

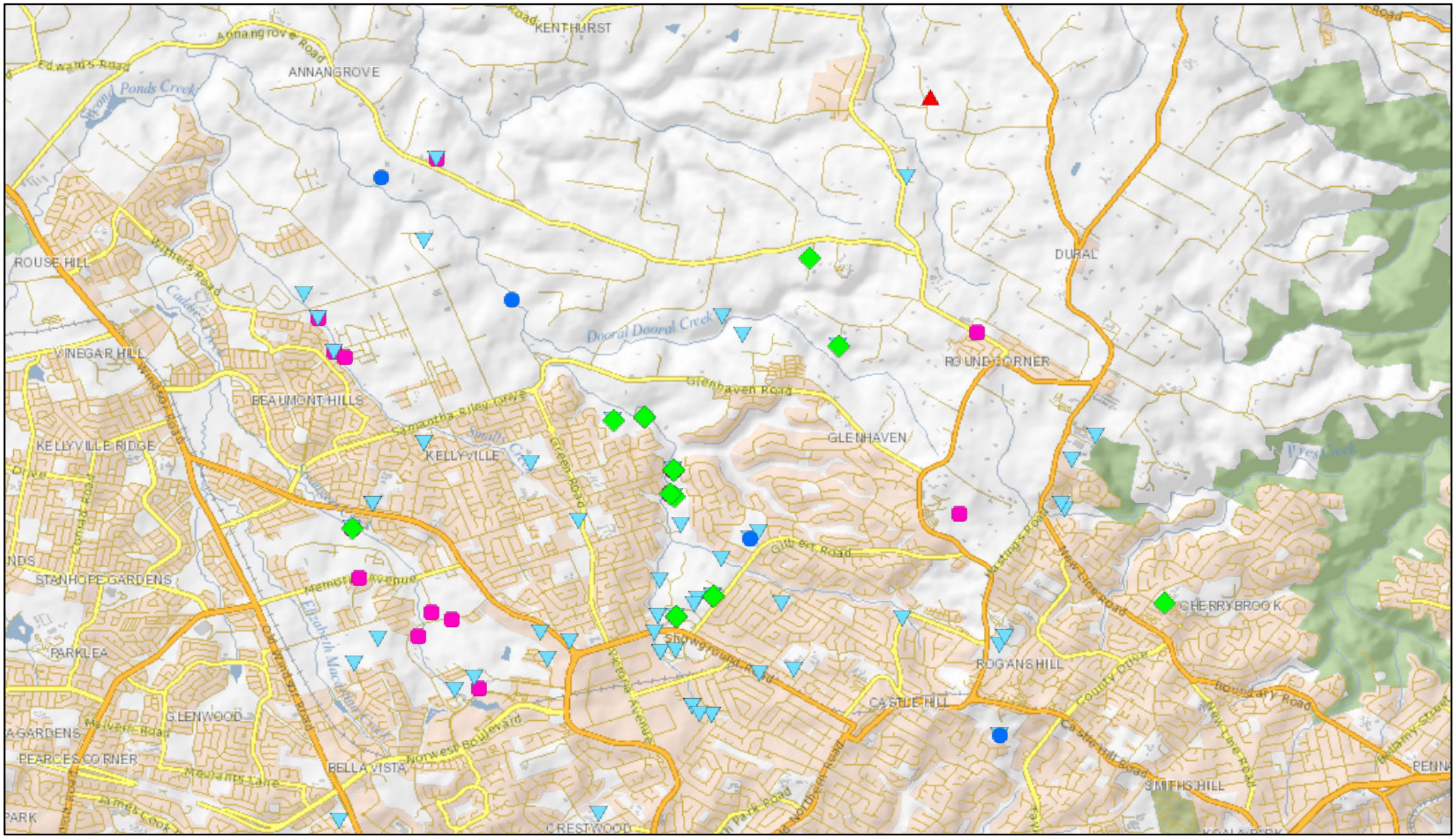
- Override 1
- Gang-gang Cockatoo (Callocephalon fimbriatum)
- ^^Glossy Black-Cockatoo (Calyptorhynchus lathami)
- Swift Parrot (Lathamus discolor)
- Regent Honeyeater (Anthochaera phrygia)

1:64,000

0 0.5 1 2 mi

0 0.75 1.5 3 km

Figure 4.1 (Fauna.b)- Threatened Species Records



January 30, 2019

1:64,000

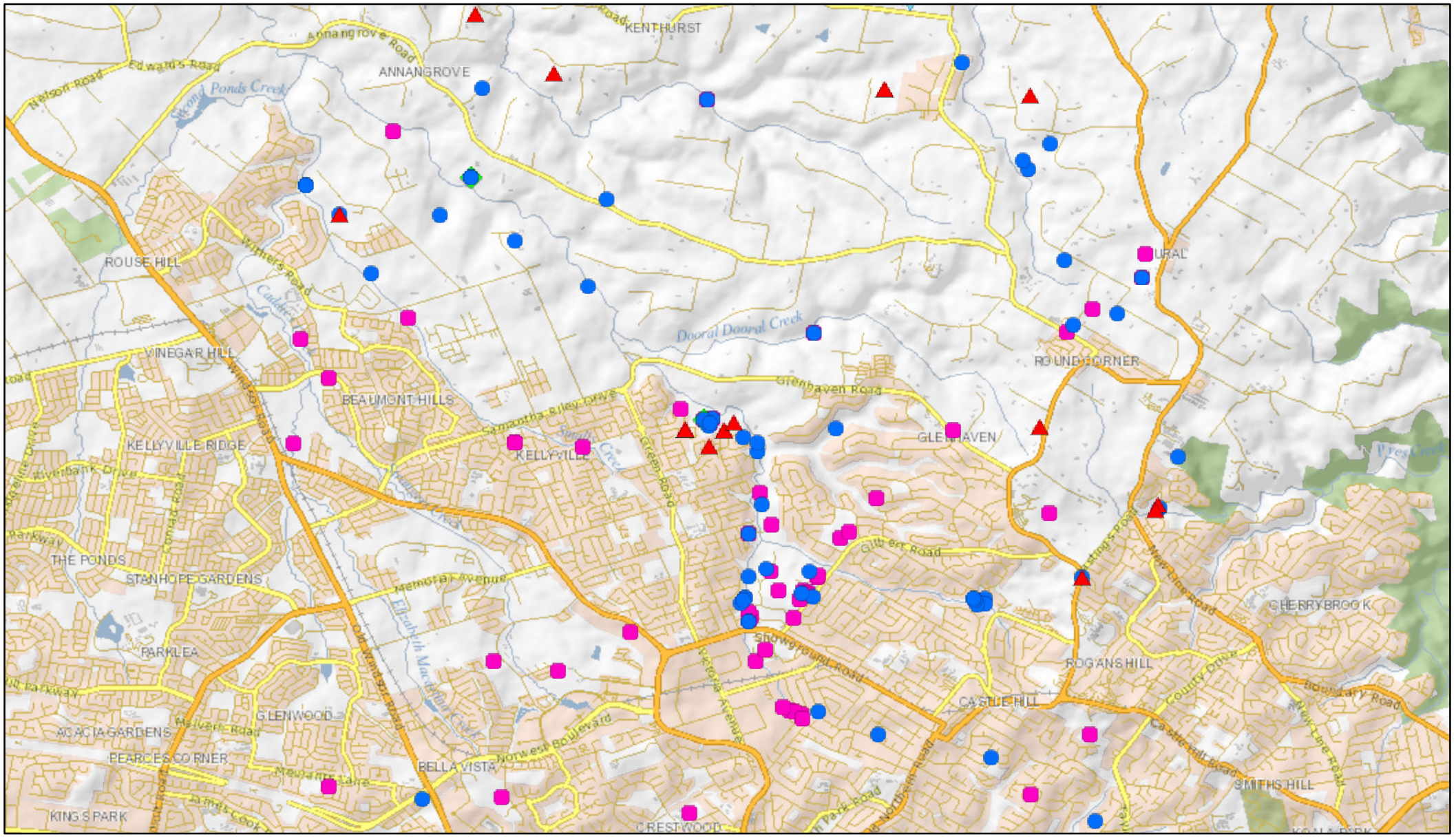
0 0.5 1 2 mi

0 0.75 1.5 3 km

drawGraphics_poly

- Override 1
- Green and Golden Bell Frog (Litoria aurea)
- Square-tailed Kite (Lophoictinia isura)
- Little Bentwing-bat (Miniopterus australis)
- Eastern Bentwing-bat (Miniopterus schreibersii oceanensis)
- Southern Myotis (Myotis macropus)

Figure 4.1 (Fauna.c)- Threatened Species Records



January 30, 2019

1:64,000

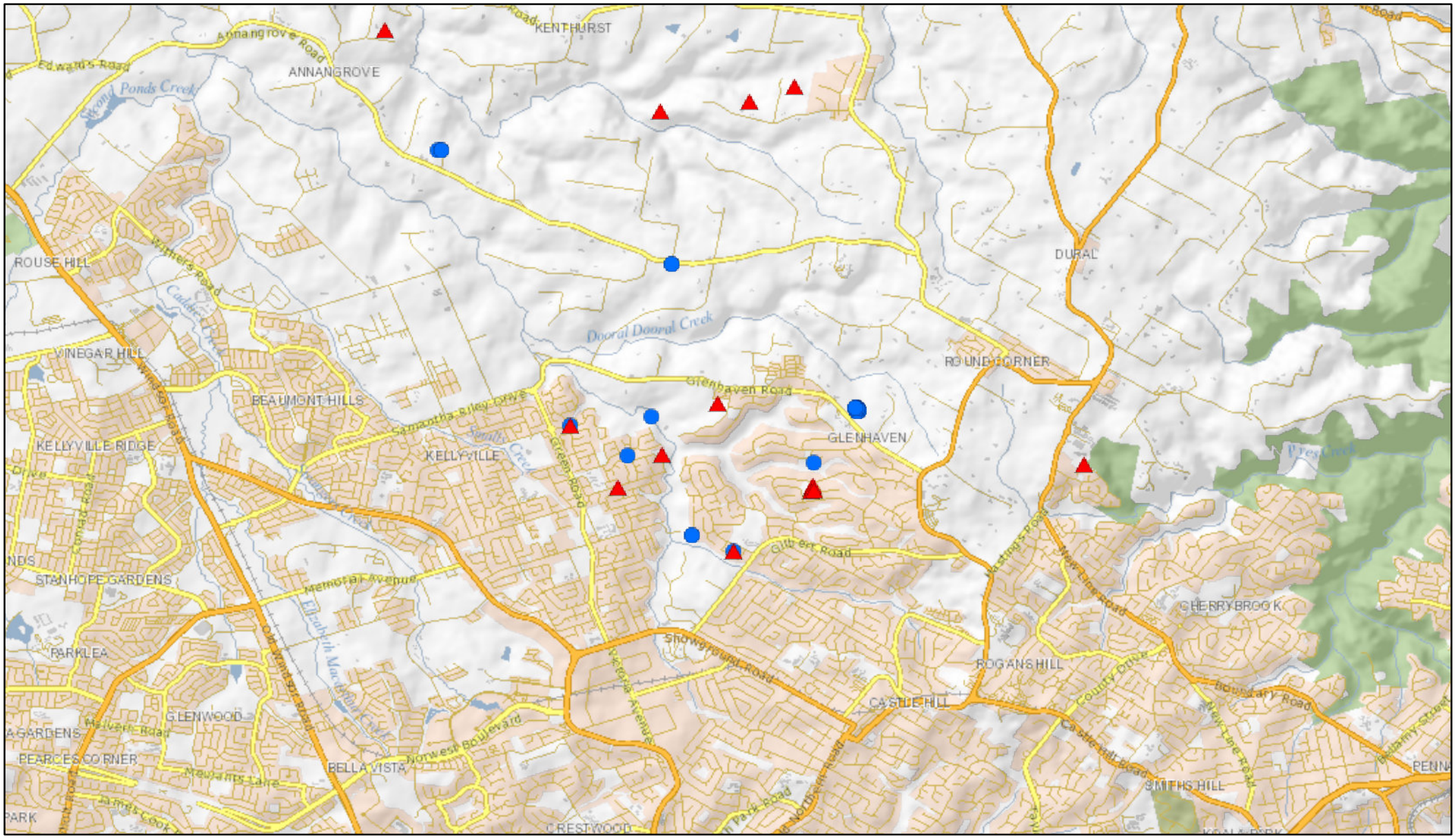
0 0.5 1 2 mi

0 0.75 1.5 3 km

drawGraphics_poly

- Override 1
- Red-crowned Toadlet (Pseudophryne australis)
- Powerful Owl (Ninox strenua)
- Masked Owl (Tyto novaehollandiae)
- Koala (Phascolarctos cinereus)
- Grey-headed Flying-fox (Pteropus poliocephalus)

Figure 4.1 (Flora.c)- Threatened Species Records



January 30, 2019

drawGraphics_poly

Override 1

Tetratheca glandulosa

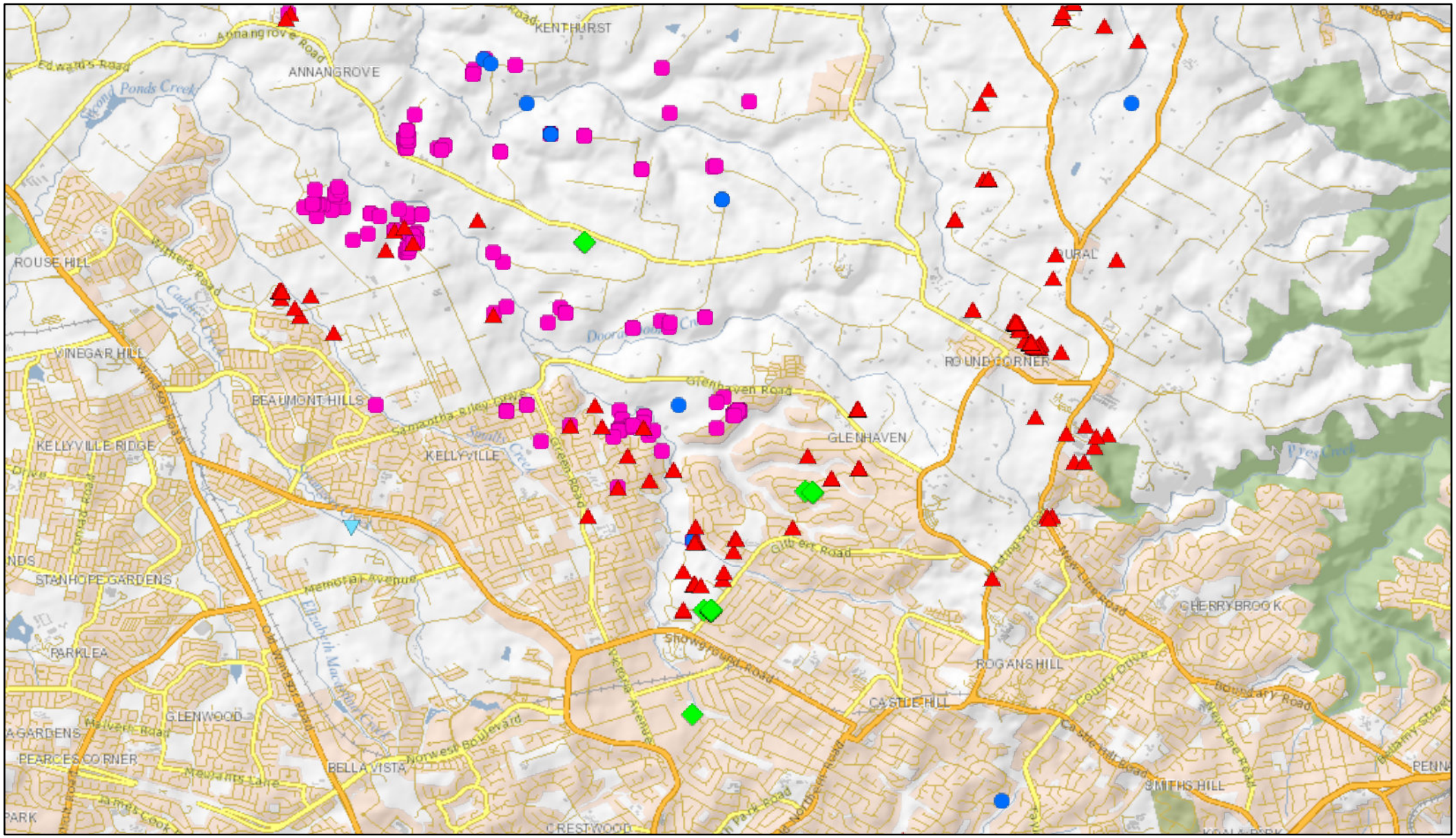
Pimelea curviflora var. curviflora

1:64,000

0 0.5 1 2 mi

0 0.75 1.5 3 km

Figure 4.1 (Flora.a)- Threatened Species Records



January 30, 2019

1:64,000

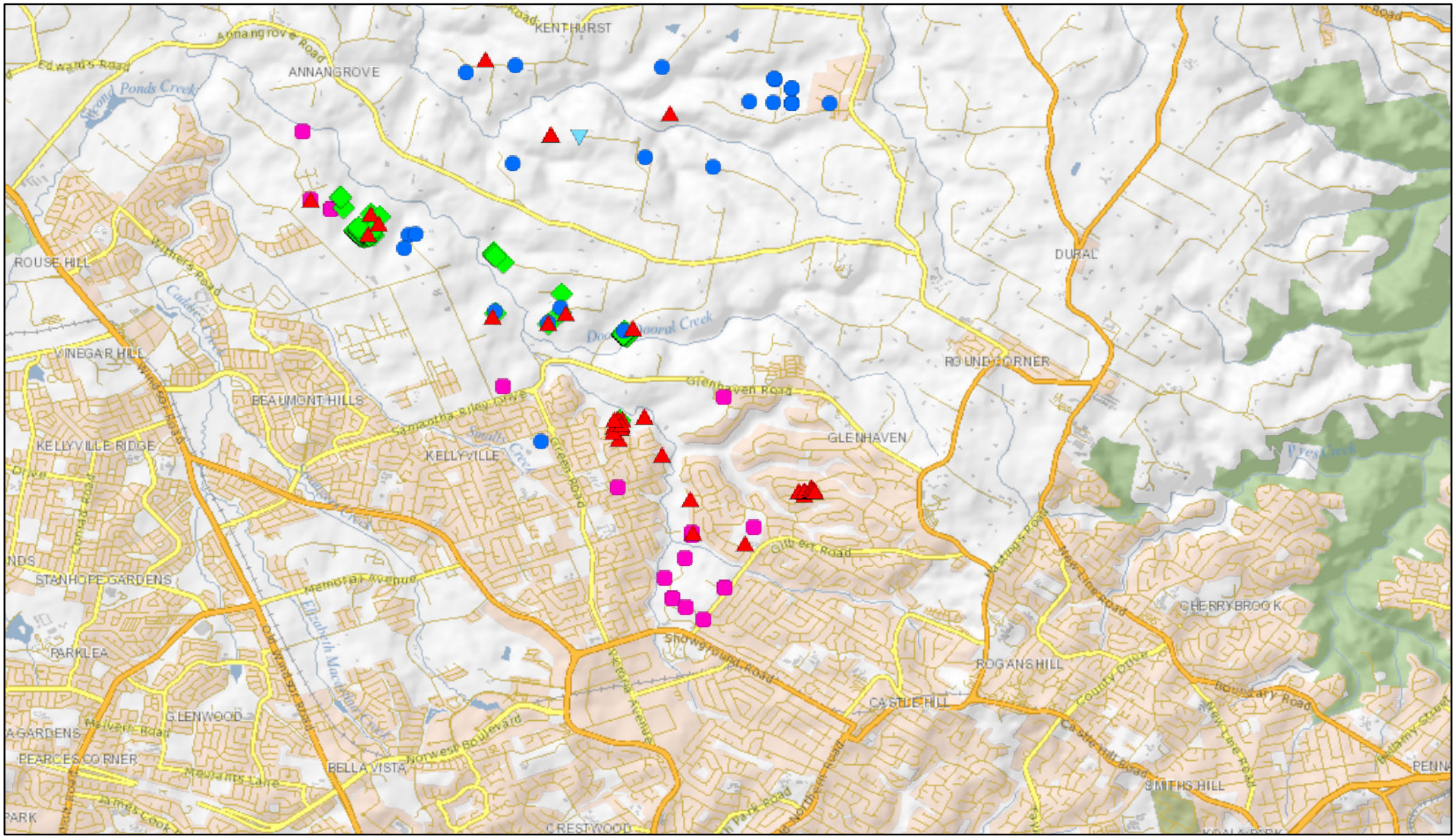
0 0.5 1 2 mi

0 0.75 1.5 3 km

drawGraphics_poly

- Override 1
- Epacris purpurascens var. purpurascens
- Bynoe's Wattle (Acacia bynoeana)
- Downy Wattle (Acacia pubescens)
- Netted Bottle Brush (Callistemon linearifolius)
- Darwinia biflora

Figure 4.1 (Flora.b)- Threatened Species Records



January 30, 2019

drawGraphics_poly

- Override 1
- Hibbertia superans
- Leucopogon fletcheri subsp. fletcheri
- Eucalyptus sp. Cattai
- Deane's Paperbark (Melaleuca deanei)
- Hairy Geebung (Persoonia hirsuta)

1:64,000

0 0.5 1 2 mi

0 0.75 1.5 3 km

Photo Page 1- Plot Photos

Threatened tree species *Eucalyptus cattai* in Plot 1

Threatened tree species *Eucalyptus cattai* in Plot 1

Table 7. Ecosystem Species Assessment

1 Larapinta Place, Glenhaven

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

Common Name	Scientific Name	Vegetation Zone	Exclude as Ecosystem Credit Species	Justification for Exclusion
Brown Treecreeper	*Climacteris picumnus victoriae*	Zone 1	No change	
Eastern Bentwing-bat	*Miniopterus schreibersii oceanensis*	Zone 1	No change	
Eastern Freetail-bat	*Mormopterus norfolkensis*	Zone 1	No change	
Eastern Osprey	*Pandion cristatus*	Zone 1	Excluded	The site is not within 5km of the sea or close to large water bodies.
Gang-gang Cockatoo	*Callocephalon fimbriatum*	Zone 1	No change	
Glossy Black-Cockatoo	*Calyptorhynchus lathami*	Zone 1	No change	
Golden-tipped Bat	*Kerivoula papuensis*	Zone 1	No change	
Grey-crowned Babbler	*Pomatostomus temporalis temporalis*	Zone 1	No change	
Grey-headed Flying-fox	*Pteropus poliocephalus*	Zone 1	No change	
Hooded Robin	*Melanodryas cucullata cucullata*	Zone 1	No change	
Koala	*Phascolarctos cinereus*	Zone 1	No change	
Little Bentwing-bat	*Miniopterus australis*	Zone 1	No change	
Little Eagle	*Hieraaetus morphnoides*	Zone 1	No change	
Little Lorikeet	*Glossopsitta pusilla*	Zone 1	No change	
Masked Owl	*Tyto novaehollandiae*	Zone 1	No change	
Painted Honey Eater	*Grantiella picta*	Zone 1	No change	
Powerful Owl	*Ninox strenua*	Zone 1	No change	
Regent Honeyeater	*Anthochaera phrygia*	Zone 1	No change	
Rosenberg's Goanna	*Varanus rosenbergi*	Zone 1	No change	
Scarlet Robin	*Petroica boodang*	Zone 1	No change	
Spotted-tailed Quoll	*Dasyurus maculatus*	Zone 1	No change	
Sqaure-tailed Kite	*Lophoictinia isura*	Zone 1	No change	
Swift Parrot	*Lathamus discolor*	Zone 1	No change	
Turquiose Parrot	*Neophema pulchella*	Zone 1	No change	
White-bellied Sea-eagle	*Haliaeetus leucogaster*	Zone 1	Excluded	The site is not with 1km of the sea.
Varied Sittella	*Daphoenositta chrysoptera*	Zone 1	No change	
Yellow-bellied Sheathtail-bat	*Saccolaimus flaviventris*	Zone 1	No change	

Table 8. Candidate Credit Species Assessment, Flora

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Step 4 6.4.1.20-25

		Yengo Sub Region	Habitat Suitability from TBDC, literature or calculator tick boxes			Proximity of Historic Records			
		Determining Factor -ve	May be a Determining Factor		May be a -ve Determining Factor			Determining Factor +ve	
Derived (Predicted) Potential Candidate Species	**Habitat Requirements and Preferences (constraints) from species profile and literature**	**Geographic Restrictions (from TBDC)**	**Habitat Reqirements (constraints) within Development Site**	**Habitat Preferences within Development Site**	**Disturbance, Habitat Degredation existing within Development Site**	**Historic Occurance within 5km**	**Historic Occurance in locality (date, location and vegetation type)**	**Historic Occurance on or imediately adjacent to Development Site**	**Candidate Species Conclusion & Justification**
Acacia bynoeana Byones Wattle *Endangered*	**Habitat Requirements:** Occurs on heath or dry sclerophyll forest on sandy soils. **Habitat Preferences:** Associated overstorey species include Red Bloodwood, Scribbly Gum, Parramatta Red Gum, Saw Banksia and Narrow Leaved Apple. Found in small population in the Marramarra National Park Castlereagh Nature Reserve, Lake Macquarie and Blue Mountains National Park. **Disturbance Factors:** It prefers open sometimes slightly disturbed sites along trails or edges of roadside and recently burnt patches.	None	The Site contains suitable habitat	The Site contains suitable habitat	The Site is not to disturbed for this species to occur	11 records	1 record from 1997 within 1km to the south east of the Site	None on or directly adjacent to the site	**Yes a Candidate species credit species:** This species is known to occur in general location, and suitable habitat occurs on the site, and the site is not too disturbed. A targeted field survey is required or this species can be
Acacia gordonii Acacia gordonii *Endangered*	**Habitat Requirements:** Grows in dry sclerophyll forest and heathlands amongst or within rock platforms on sandstone outcrops. **Habitat Preferences:** Seems to prefer open, sometimes slightly disturbed sites such as trail margins, edges of roadside spoil mounds and in recently burnt patches. Associated overstorey species include Red Bloodwood, Scribbly Gum, Parramatta Red Gum, Saw Banksia and Narrow-leafed Apple. **Disturbance Factors:** Germination will not occur in the absence of fire as the hard-coated seed requires heat to break seed dormancy.	None	The Site contains suitable habitat	The Site contains suitable habitat	The Site has not been burnt in 16 years and seeds may be dormant in the soil	No records	No nearby records	None on or directly adjacent to the site	**Yes a Candidate species credit species:** This species is known to occur in general location, and suitable habitat occurs on the site, and the site is not too disturbed. A targeted field survey is required or this species can be assumed to occur
Acacia pubescens Downy Wattle *Vulnerable*	**Habitat Requirements:** Occurs in open woodland and forest, in a variety of plant communities, including Cooks River/Castlereagh Ironbark Forest, Shale/Gravel Transition Forest and Cumberland Plain Woodland. **Habitat Preferences:** Concentrated around the Bankstown-Fairfield-Rookwood area and the Pitt Town area, with outliers occurring at Barden Ridge, Oakdale and Mountain Lagoon. Flowers from August to October. **Disturbance Factors:** Acacia species generally have high seed dormancy and long-lived persistent soil seedbanks. Species needs a minimum fire free period of 5-7 years to allow an adequate seedbank to	None	The Site contains suitable habitat	The Site does not occur in known habitat range	The Site has had suitable fire management for this species to occur	14 records	1 record from 1995 within 2km north west of the Site	None on or directly adjacent to the site	**Yes a Candidate species credit species:** This species is known to occur in general location, and suitable habitat occurs on the site, and the site is not too disturbed. A targeted field survey is required or this species can be assumed to occur
Ancistrachne maidenii Ancistrachne maidenii *Vulnerable*	**Habitat Requirements:** Populations occurring in distinct bands in areas associated with a transitional geology between Hawkesbury and Watagan soil landscapes. **Habitat Preferences:** Grows in dry sclerophyll forest on sandstone-derived soils. **Disturbance Factors:** None documented.	None	The Site does not conrain suitable geology for this species to occur	Suitable vegetation for this species to occur	None documented	No records	No nearby records	None on or directly adjacent to the site	**Not a Candidate Species:** No species requirements (constraints) occur on this site and the species is unlikely to occur. No further assessment is required for this species.

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Step 4 6.4.1.20-25

		Yengo Sub Region	Habitat Suitability from TBDC, literature or calculator tick boxes			Proximity of Historic Records			
		Determining Factor -ve	May be a Determining Factor		May be a -ve Determining Factor			Determining Factor +ve	
Derived (Predicted) Potential Candidate Species	**Habitat Requirements and Preferences (constraints) from species profile and literature**	**Geographic Restrictions (from TBDC)**	**Habitat Reqirements (constraints) within Development Site**	**Habitat Preferences within Development Site**	**Disturbance, Habitat Degredation existing within Development Site**	**Historic Occurance within 5km**	**Historic Occurance in locality (date, location and vegetation type)**	**Historic Occurance on or imediately adjacent to Development Site**	**Candidate Species Conclusion & Justification**
Asterolasia elegans Asterolasia elegans *Endangered*	**Habitat Requirements:** Occurs on Hawkesbury sandstone. Found in sheltered forests on mid- to lower slopes and valleys, e.g. in or adjacent to gullies which support sheltered forest. **Habitat Preferences:** The canopy at known sites includes Turpentine (Syncarpia glomulifera subsp. glomulifera), Smooth-barked Apple (Angophora costata), Sydney Peppermint (Eucalyptus piperita), Forest Oak (Allocasuarina torulosa) and Christmas Bush (Ceratopetalum gummiferum). **Disturbance Factors:** Fire sensitive and reliant on seed germination after disturbance to maintain populations.	None	Hawkesbury sandstone geology occurs. Suitable habitat is not present as the Site is upper slope	None of the known canopy species were recorded as occuring on the Site	The Site is not to disturbed for this species to occur	No records	No nearby records	None on or directly adjacent to the site	**Not a Candidate Species:** No species requirements (constraints) occur on this site and the species is unlikely to occur. No further assessment is required for this species.
Callistemon linearifolius Netted Bottlebrush *Vulnerable*	**Habitat Requirements:** This species is mainly confined to Hawkesbury Sandstone, however isolated specimens have been observed between Sydney and Nelson Bay, Georges River to Hawkesbury River. **Habitat Preferences:** Found in damp places in woodland and sclerophyll forest usually in gullies (Benson & McDougall, 1993). **Disturbance Factors:** None documented.	None	Site occurs within predicted distrubution area.	Suitable habitat occurs on Site	None documented	1 record	1 record from 2016 occurs 3km to the south-west of the Site	None on or directly adjacent to the site	**Yes a Candidate species credit species:** This species is known to occur in general location, and suitable habitat occurs on the site, and the site is not too disturbed. A targeted field survey is required or this species can be assumed to occur
Darwinia biflora Darwinia biflora *Vulnerable*	**Habitat Requirements:** Occurs on the edges of weathered shale-capped ridges, where these intergrade with Hawkesbury Sandstone. **Habitat Preferences:** Associated overstorey species include Eucalyptus haemastoma, Corymbia gummifera and/or E. squamosa. The vegetation structure is usually woodland, open forest or scrub-heath. **Disturbance Factors**: Fire kills all plants, but also produces a flush of germination from seed stored in the soil. The number of individuals at a site then declines with time since fire, as the surrounding vegetation develops.	None	Suitable habitat occurs on the Site	Suitable habitat and canopy species occur on Site	The Site has not been burnt in 16 years	348 records	several records within 1km from 1995 to 2017 surround the Site	Occurs on the Site	**Yes a Candidate species credit species:** This species is known to occur in general location, and suitable habitat occurs on the site, and the site is not too disturbed. A targeted field survey is required or this species can be assumed to occur
Darwinia fascicularis subsp. oligantha *Endangered population*	**Habitat Requirements:** Occurs around rock platforms and in rocky heath associated with friable sandstone shallow soils. **Habitat Preferences:** Associated species include Allocasuarina nana, A. distyla, Banksia ericifolia and Caustis flexuosa. **Disturbance Factors:** Stems are killed by fire and is likely to resprouts from the base. Will also germinate from soil stored seed after fire.	The Site occurs close to the Maroota area of Baulkham Hills and Hornsby LGAs	The Site contains rock outcrops and a heathy vegetation	*Banksia ericifolia* and *Caustis flexuosa* occur on the Site	Site is not to disturbed for this species to occur	No records	No nearby records	None on or directly adjacent to the site	**Yes a Candidate species credit species:** This species is known to occur in general location, and suitable habitat occurs on the site, and the site is not too disturbed. A targeted field survey is required or this species can be assumed to occur

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Step 4 6.4.1.20-25

		Yengo Sub Region	Habitat Suitability from TBDC, literature or calculator tick boxes			Proximity of Historic Records			
		Determining Factor -ve	May be a Determining Factor		May be a -ve Determining Factor			Determining Factor +ve	
Derived (Predicted) Potential Candidate Species	**Habitat Requirements and Preferences (constraints) from species profile and literature**	**Geographic Restrictions (from TBDC)**	**Habitat Reqirements (constraints) within Development Site**	**Habitat Preferences within Development Site**	**Disturbance, Habitat Degredation existing within Development Site**	**Historic Occurance within 5km**	**Historic Occurance in locality (date, location and vegetation type)**	**Historic Occurance on or imediately adjacent to Development Site**	**Candidate Species Conclusion & Justification**
Darwinia peduncularis *Vulnerable*	**Habitat Requirements:** Occurs in coastal NSW with a couple of isolated populations in the Blue Mountains. It has been recorded from Brooklyn, Berowra, Galston Gorge, Hornsby, Bargo River, Glen Davis, Mount Boonbourwa and Kings Tableland. **Habitat Preferences:** Usually grows on or near rocky outcrops on sandy, well drained, low nutrient soil over sandstone. **Disturbance Factors:** Disadvantaged by frequent fire.	None	Site occurs close to known distribution.	Suitable habitat occurs on site.	None documented	No records	None nearby	None on or directly adjacent to the site	**Not a Candidate Species:** The site is not within the geographic restriction and the species is unlikely to occur. No further assessment is required for this species.
Dillwynia tenuifolia *Vulnerable*	**Habitat Requirements:** In western Sydney, may be locally abundant particularly within scrubby/dry heath areas within Castlereagh Ironbark Forest and Shale Gravel Transition Forest on tertiary alluvium or laterised clays. May also be common in transitional areas where these communities adjoin Castlereagh Scribbly Gum Woodland. **Habitat Preferences:** Eucalyptus fibrosa is usually the dominant canopy species. **Disturbance Factors**: Killed by fire and re-establishes from soil-stored seed.	None	The species is not likely to occur in the vegetation and geology on the Site	The Site was not recorded as containing any *Eucalyptus fibrosa*	The Site has not been burnt in 16 years	No records	None nearby	None on or directly adjacent to the site	**Not a Candidate Species:** No species requirements (constraints) occur on this site and the species is unlikely to occur. No further assessment is required for this species.
Epacris purpurascens var. purpurascens *Vulnerable*	**Habitat Requirements:** Associated with Sydney Sandstone Gully Forest and wet heath in damp places on sandstone with a strong clay influence. **Habitat Preferences:** Recorded from Gosford in the north, to Narrabeen in the east, Silverdale in the west and Avon Dam vicinity in the South. **Disturbance Factors:** Killed by fire and re-establishes from soil-stored seed.	None	The Site occurs close to gully forest and the Site may be suitable for this species	The Site occurs within known distribution area	Site is not to disturbed for this species to occur	188 records	Several records within 1km south from 1996 to 2016	None on or directly adjacent to the site	**Yes a Candidate species credit species:** This species is known to occur in general location, and suitable habitat occurs on the site, and the site is not too disturbed. A targeted field survey is required or this species can be assumed to occur
Eucalyptus fracta Broken Back Ironbark	**Habitat Requirements:** Shallow soils on the upper and northern escarpment of the Broken Back Range, near Cessnock. **Habitat Preferences:** Occurs in dry eucalypt woodland in shallow soils. The dominant tree in a narrow band along the upper edge of a sandstone escarpment. Associated species in slightly deeper soils include Eucalyptus sparsifolia, E. punctata, Corymbia maculata and Angophora euryphylla. **Disturbance Factors:** None documented	None	The Site does not occur in the known distribution of this species	None of the associated species occur on the Site	None documented	No records	No nearby records	None on or directly adjacent to the site	**Not a Candidate Species:** No species requirements (constraints) occur on this site and the species is unlikely to occur. No further assessment is required for this species.

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Step 4 6.4.1.20-25

		Yengo Sub Region	Habitat Suitability from TBDC, literature or calculator tick boxes			Proximity of Historic Records			
		Determining Factor -ve	May be a Determining Factor		May be a -ve Determining Factor			Determining Factor +ve	
Derived (Predicted) Potential Candidate Species	**Habitat Requirements and Preferences (constraints) from species profile and literature**	**Geographic Restrictions (from TBDC)**	**Habitat Reqirements (constraints) within Development Site**	**Habitat Preferences within Development Site**	**Disturbance, Habitat Degredation existing within Development Site**	**Historic Occurance within 5km**	**Historic Occurance in locality (date, location and vegetation type)**	**Historic Occurance on or imediately adjacent to Development Site**	**Candidate Species Conclusion & Justification**
Eucalyptus sp. Cattai *Critically endangered*	**Habitat Requirements:** Associated soils are laterised clays overlying sandstone. The sites at which it occurs are generally flat and on ridge tops. **Habitat Preferences:** Occurs as a rare emergent tree in scrub, heath and low woodland on sandy soils, usually as isolated individuals or occasionally in small clustered groups. **Disturbance Factors:** None documented.	None	Suitable habitat occurs on the Site	Suitable habitat occurs on the Site	None documented	177 records	A large clump of records from 2018 occur within 600m north-west of the Site	Occurs on the Site	**Yes a Candidate species credit species:** This species is known to occur in general location, and suitable habitat occurs on the site, and the site is not too disturbed. A targeted field survey is required or this species can be assumed to occur
Grevillea parviflora subsp. parviflora Small-flower grevillea *Endangered*	**Habitat Requirements:** Sydney region occurrences are usually on Tertiary sands and alluvium, and soils derived from the Mittagong Formation. Occurs in a range of vegetation types from heath and shrubby woodland to open forest. **Habitat Preferences:** Often occurs in open, slightly disturbed sites such as along tracks. Found over a range of altitudes from flat, low-lying areas to upper slopes and ridge crests **Disturbance Factors:** Competition from tick bush (Kunzea ambigua) can affect recruitment and recovery, including spread, following disturbance.	None	Suitable vegetation occurs on the Site	Suitable habitat occurs on Site	Kunzea ambigua occurs on Site and may affect the suitabilty for this species	No records	No nearby records	None on or directly adjacent to the site	**Yes a Candidate species credit species:** This species is known to occur in general location, and suitable habitat occurs on the site, and the site is not too disturbed. A targeted field survey is required or this species can be assumed to occur
Grevillea parviflora subsp. supplicans	**Habitat Requirements:** Occurs in heathy woodland associations on skeletal sandy soils over massive sandstones. **Habitat Preferences:** May be associated with the margins of the Sydney Turpentine Ironbark Forest endangered ecological community and, to a greater extent, with Shale/Sandstone Transition Forest endangered ecological community. **Disturbance Factors:** This plant may have an affinity with disturbance margins such as trail and road verges where soils are suitable and the availability of light due to clearing has promoted its growth.	None	Suitable vegetation occurs on the Site	The Site does not contain associated vegetation communities	The Site is not to disturbed for this species to occur	No records	No nearby records	None on or directly adjacent to the site	**Yes a Candidate species credit species:** This species is known to occur in general location, and suitable habitat occurs on the site, and the site is not too disturbed. A targeted field survey is required or this species can be assumed to occur
Hibbertia procumbens Spreading Guinea Flower *Endangered*	**Habitat Requirements:** North of Hawkesbury River and east of Boree, South of Wollombi. **Habitat Preferences:** Majority of known populations occur within Banksia ericifolia–Angophora hispida–Allocasuarina distyla scrub/heath on skeletal sandy soils. May also be found associated with 'hanging swamp' vegetation communities on sandy deposits. **Disturbance Factors:** Is capable of resprouting following fire and has a persistent soil-stored seed bank.	None	The Site occurs within known distribution	*Banksia ericifolia* and *Angophora hispida* occur on the Site	The Site is not to disturbed for this species to occur	No records	No nearby records	None on or directly adjacent to the site	**Yes a Candidate species credit species:** This species is known to occur in general location, and suitable habitat occurs on the site, and the site is not too disturbed. A targeted field survey is required or this species can be assumed to occur

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		Yengo Sub Region	Habitat Suitability from TBDC, literature or calculator tick boxes			Proximity of Historic Records			
		Determining Factor -ve	May be a Determining Factor		May be a -ve Determining Factor			Determining Factor +ve	
Derived (Predicted) Potential Candidate Species	**Habitat Requirements and Preferences (constraints) from species profile and literature**	**Geographic Restrictions (from TBDC)**	**Habitat Reqirements (constraints) within Development Site**	**Habitat Preferences within Development Site**	**Disturbance, Habitat Degredation existing within Development Site**	**Historic Occurance within 5km**	**Historic Occurance in locality (date, location and vegetation type)**	**Historic Occurance on or imediately adjacent to Development Site**	**Candidate Species Conclusion & Justification**
Hibbertia puberula *Endangered*	**Habitat Requirements:** Early records of this species are from the Hawkesbury River area and Frenchs Forest (1946) in northern Sydney, South Coogee (1954) in eastern Sydney, the Hacking River area in southern Sydney, and the Blue Mountains. **Habitat Preferences:** Habitats are typically dry sclerophyll woodland communities, although heaths are also occupied. Occurs on sandy soil often associated with sandstone, or on clay. Cryptic and sporadic species (Benson & McDougall, 1993). **Disturbance Factors:** None documented.	None	Not in likely distribution.	Suitable habitat occurs on site.	None documented	No nearby records	None nearby	None on or directly adjacent to the site	**Not a Candidate Species:** No species requirements (constraints) occur on this site and the species is unlikely to occur. No further assessment is required for this species.
Hibbertia superans *Endangered*	**Habitat Requirements:** Ridgetops. **Habitat Preferences:** The species occurs on sandstone ridgetops often near the shale/sandstone boundary in both open woodland and heathland. Prefer open disturbed areas, such as tracksides. **Disturbance Factors:** Highly sensitive to both frequent and infrequent fire and other disturbance regimes.	None	The Site occurs very near a ridgetop	The site contains suitable habitat	The Site has not been burnt in 16 years	55 records	1 record to the north-west within 600m from 2007 and several records from 1999 to 2015 within 1km south of the Site	None on or directly adjacent to the site	**Yes a Candidate species credit species:** This species is known to occur in general location, and suitable habitat occurs on the site, and the site is not too disturbed. A targeted field survey is required or this species can be assumed to occur
Keraudrenia corollata var. denticulata *Endangered population*	**Habitat Requirements:** Colo River area between Lower Portland and Morans Rock and near Gees Lagoon. All locations for this species within the Hawkesbury local government area are associated with the endangered Sydney Coastal River-flat Forest. **Habitat Preferences:** Occurs on sandy soil on sandstone banks, edge of floodplains or on road verges. Soils are low in nutrients and well drained. **Disturbance Factors:** None documented.	The site does not occur near the Colo River area between Lower Portland Morans Rock and near Gees Lagoon	The site does not occur in known distribution	The Site does not contain suitable habitat	None documented	No nearby records	None nearby	None on or directly adjacent to the site	**Not a Candidate Species:** The site is not within the geographic restriction and the species is unlikely to occur. No further assessment is required for this species.

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		Yengo Sub Region	Habitat Suitability from TBDC, literature or calculator tick boxes			Proximity of Historic Records			
		Determining Factor -ve	May be a Determining Factor		May be a -ve Determining Factor			Determining Factor +ve	
Derived (Predicted) Potential Candidate Species	**Habitat Requirements and Preferences (constraints) from species profile and literature**	**Geographic Restrictions (from TBDC)**	**Habitat Reqirements (constraints) within Development Site**	**Habitat Preferences within Development Site**	**Disturbance, Habitat Degredation existing within Development Site**	**Historic Occurance within 5km**	**Historic Occurance in locality (date, location and vegetation type)**	**Historic Occurance on or imediately adjacent to Development Site**	**Candidate Species Conclusion & Justification**
Kunzea rupestris *Vulnerable*	**Habitat Requirements:** Rocky areas and sandstone rock outcrops. Grows in shallow depressions on large flat sandstone rock outcrops. **Habitat Preferences:** Characteristically found in short to tall shrubland or heathland. **Disturbance Factors:** None documented.	None	The Site contains suitable rocky areas and outcrops	Suitable habitat occurs on Site	None documented	No nearby records	None nearby	None on or directly adjacent to the site	**Yes a Candidate species credit species:** This species is known to occur in general location, and suitable habitat occurs on the site, and the site is not too disturbed. A targeted field survey is required or this species can be assumed to occur
Lasiopetalum joyceae *Vulnerable*	**Habitat Requirements:** Rocky areas and lateritic to shaley ridgetops. Has a restricted range occurring on lateritic to shale ridgetops on the Hornsby Plateau south of the Hawkesbury River. **Habitat Preferences:** Grows in heath on sandstone. **Disturbance Factors:** None documented.	None	The Site contains suitable rocky areas	Suitable habitat occurs on site.	None documented	No nearby records	None nearby	None on or directly adjacent to the site	**Yes a Candidate species credit species:** This species is known to occur in general location, and suitable habitat occurs on the site, and the site is not too disturbed. A targeted field survey is required or this species can be assumed to occur
Leionema lamprophyllum subsp. obovatum	**Habitat Requirements:** Cliffs and rocky cliff lines. **Habitat Preferences:** Occurs in dry eucalypt forest on exposed rocky terrain. The Hunter Catchment population is considered to be highly genetically isolated due to the distance to the nearest recorded occurrence of this taxon, and the lack of specialised mechanisms for long distance dispersal of seed or pollen. **Disturbance Factors:** None documented.	None	The Site does not contain any cliffs or rocky cliff lines	Suitable habitat occurs on Site	None documented	No nearby records	None nearby	None on or directly adjacent to the site	**Not a Candidate Species:** No species requirements (constraints) occur on this site and the species is unlikely to occur. No further assessment is required for this species.
Leucopogon fletcheri subsp. fletcheri *Endangered*	**Habitat Requirements:** Occurs in dry eucalypt woodland or in shrubland on clayey lateritic soils, generally on flat to gently sloping terrain along ridges and spurs. **Habitat Preferences:** Occurs within the local government areas of Hawkesbury, Baulkham Hills and Blue Mountains. **Disturbance Factors:** Evidence suggests the species responds slowly to fire.	None	Suitable habitat occurs on the Site	The Site occurs close to known distribution areas	The Site has not been burnt in 16 years	25 records	6 records within 1km to the north, east and south of the Site recorded from 1996 to 2008.	None on or directly adjacent to the site	**Yes a Candidate species credit species:** This species is known to occur in general location, and suitable habitat occurs on the site, and the site is not too disturbed. A targeted field survey is required or this species can be assumed to occur

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		Yengo Sub Region	Habitat Suitability from TBDC, literature or calculator tick boxes			Proximity of Historic Records			
		Determining Factor -ve	May be a Determining Factor		May be a -ve Determining Factor			Determining Factor +ve	
Derived (Predicted) Potential Candidate Species	**Habitat Requirements and Preferences (constraints) from species profile and literature**	**Geographic Restrictions (from TBDC)**	**Habitat Reqirements (constraints) within Development Site**	**Habitat Preferences within Development Site**	**Disturbance, Habitat Degredation existing within Development Site**	**Historic Occurance within 5km**	**Historic Occurance in locality (date, location and vegetation type)**	**Historic Occurance on or imediately adjacent to Development Site**	**Candidate Species Conclusion & Justification**
Melaleuca deanei Deane's Paperbark *Vulnerable*	**Habitat Requirements:** Occurs in two distinct areas, in the Ku-ring-gai/Berowra, St Ives and Holsworthy/Wedderburn areas respectively. **Habitat Preferences:** Usually found in heath or woodland on sandstone or clay (Benson & McDougall, 1993). Flowers between October and early December. **Disturbance Factors:** None documented.	None	Site occurs close to known population.	Suitable habitat occurs on site.	None documented	1 record	None nearby	None on or directly adjacent to the site	**Yes a Candidate species credit species:** This species is known to occur in general location, and suitable habitat occurs on the site, and the site is not too disturbed. A targeted field survey is required or this species can be assumed to occur
Melaleuca groveana Grove's Paperbark *Vulnerable*	**Habitat Requirements:** Widespread, scattered populations in coastal districts north of Yengo National Park to southeast Queensland. **Habitat Preferences:** Grove's Paperbark grows in heath and shrubland, often in exposed sites, in low coastal hills, escarpment ranges and tablelands on outcopping granite, rhyolite and sandstone on rocky outcrops and cliffs. It also occurs in dry srubby open forest and woodlands. **Disturbance Factors:** None documented.	None	Site not in known distribution.	Suitable habitat occurs on site.	None documented	No nearby records	None nearby	None on or directly adjacent to the site	**Not a Candidate Species:** The site is not within the geographic restriction and the species is unlikely to occur. No further assessment is required for this species.
Micromyrtus blakelyi *Vulnerable*	**Habitat Requirements:** Typically occurs within heathlands in shallow sandy soil in cracks and depressions of sandstone rock platforms. **Habitat Preferences:** Restricted to areas near the Hawkesbury River, north of Sydney. All known populations occur within the Baulkham Hills and Hornsby local government areas. **Disturbance Factors:** Fire sensitive, with adults killed by fire and recruitment occurring from a soil seed bank.	None	Suitable habitat occurs on the Site	The Site occurs close to known habitat range	None documented	No nearby records	None nearby	None on or directly adjacent to the site	**Yes a Candidate species credit species:** This species is known to occur in general location, and suitable habitat occurs on the site, and the site is not too disturbed. A targeted field survey is required or this species can be assumed to occur
Olearia cordata *Vulnerable*	**Habitat Requirements:** Grows in dry open sclerophyll forest and open shrubland, on sandstone ridges. **Habitat Preferences:** Most known populations occur within conservation reserves (Wollemi National Park, Yengo National Park and Wisemans Ferry Historic Site). **Disturbance Factors:** Adults are capable of resprouting following fire. Abundant seedlings have been observed following fire, but seeds are also capable of germinating in the absence of fire.	None	Suitable habitat occurs on the Site	The Site does not occur in known habitat range	Suitable fire regime on the Site for this species to occur	No nearby records	None nearby	None on or directly adjacent to the site	**Not a Candidate Species:** The site is not within the geographic restriction and the species is unlikely to occur. No further assessment is required for this species.

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		Yengo Sub Region	Habitat Suitability from TBDC, literature or calculator tick boxes			Proximity of Historic Records			
		Determining Factor -ve	May be a Determining Factor		May be a -ve Determining Factor			Determining Factor +ve	
Derived (Predicted) Potential Candidate Species	**Habitat Requirements and Preferences (constraints) from species profile and literature**	**Geographic Restrictions (from TBDC)**	**Habitat Reqirements (constraints) within Development Site**	**Habitat Preferences within Development Site**	**Disturbance, Habitat Degredation existing within Development Site**	**Historic Occurance within 5km**	**Historic Occurance in locality (date, location and vegetation type)**	**Historic Occurance on or imediately adjacent to Development Site**	**Candidate Species Conclusion & Justification**
Persoonia hirsuta Hairy Geebug *Endangered*	**Habitat Requirements:** Usually found in sandy soils in dry sclerophyll open forest, woodland and heath on sandstone. **Habitat Preferences:** Persoonia hirsuta has a large area of occurrence, but occurs in small populations, increasing the species' fragmentation in the landscape. **Disturbance Factors:** None documented	None	Suitable habitat occurs on the Site	Suitable habitat occurs on the Site	None documented	19 records	Several records from 1996-2008 within 2km south of the Site	None on or directly adjacent to the site	**Yes a Candidate species credit species:** This species is known to occur in general location, and suitable habitat occurs on the site, and the site is not too disturbed. A targeted field survey is required or this species can be assumed to occur
Pimelea curviflora var. curviflora Curved Rice Flower *Vulnerable*	**Habitat Requirements:** Confined to the coastal area of Sydney between northern Sydney in the south and Maroota in the north-west. **Habitat Preferences:** Usually found in shale/sandstone transition woodland on sandstone and laterite soils. It often grows among dense grasses and sedges. Cryptic and sporadic species. Flowers October to January. **Disturbance Factors:** Weed invasion.	None	Site occurs in known distribution.	Suitable habitat occurs on site.	The Site is not to disturbed for this species to occur	37 records	6 records from 1996 and 2008 south-east of the site within 2km	None on or directly adjacent to the site	**Yes a Candidate species credit species:** This species is known to occur in general location, and suitable habitat occurs on the site, and the site is not too disturbed. A targeted field survey is required or this species can be assumed to occur
Prostanthera cineolifera Singleton Mint Bush	**Habitat Requirements:** Grows in open woodlands on exposed sandstone ridges. Usually found in association with shallow or skeletal sands. **Habitat Preferences:** Restricted to only a few localities near Scone, Cessnock and St Albans. **Disturbance Factors:** None documented	None	Suitable habitat occurs on the Site	The Site does not occur in known habitat range	None documented	No nearby records	None nearby	None on or directly adjacent to the site	**Not a Candidate Species:** The site is not within the geographic restriction and the species is unlikely to occur. No further assessment is required for this species.
Pultenaea parviflora *Endangered*	**Habitat Requirements:** Endemic to the Cumberland Plain. **Habitat Preferences:** May be locally abundant, particularly within scrubby/dry heath areas within Castlereagh Ironbark Forest and Shale Gravel Transition Forest on tertiary alluvium or laterised clays. **Disturbance Factors:** None documented	None	The Site does not occur on Cumberland Plain.	The Site is not suitable habitat for this species	None documented	No nearby records	None nearby	None on or directly adjacent to the site	**Not a Candidate Species:** No species requirements (constraints) occur on this site and the species is unlikely to occur. No further assessment is required for this species.

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		Yengo Sub Region	Habitat Suitability from TBDC, literature or calculator tick boxes			Proximity of Historic Records			
		Determining Factor -ve	May be a Determining Factor		May be a -ve Determining Factor			Determining Factor +ve	
Derived (Predicted) Potential Candidate Species	**Habitat Requirements and Preferences (constraints) from species profile and literature**	**Geographic Restrictions (from TBDC)**	**Habitat Reqirements (constraints) within Development Site**	**Habitat Preferences within Development Site**	**Disturbance, Habitat Degredation existing within Development Site**	**Historic Occurance within 5km**	**Historic Occurance in locality (date, location and vegetation type)**	**Historic Occurance on or imediately adjacent to Development Site**	**Candidate Species Conclusion & Justification**
Tetratheca glandulosa Glandular Pink Bell *Vulnerable*	**Habitat Requirements:** Restricted to the following Local Government Areas: Baulkham Hills, Gosford, Hawkesbury, Hornsby, Ku-ring-gai, Pittwater, Ryde, Warringah, and Wyong. **Habitat Preferences:** Found in Sydney Sandstone Ridge top Woodland in sandy or rocky heath scrub. Associated with shale-sandstone transition habitat where shale-cappings occur over sandstone, with associated soil landscapes such as Lucas Heights, Gymea, Lambert and Faulconbridge.. Resprouts from a woody root following fire. Flowers July to November. Seasonal and cryptic. **Disturbance Factors:** None documented.	None	Developments Site occurs close to known distribution	Suitable habitat occurs on site	None documented	15 records	9 records from 1996-2003 south of the Site within 2km	None on or directly adjacent to the site	**Yes a Candidate species credit species:** This species is known to occur in general location, and suitable habitat occurs on the site, and the site is not too disturbed. A targeted field survey is required or this species can be assumed to occur
Velleia perfoliata *Vulnerable*	**Habitat Requirements:** Found in shallow depressions on sandstone shelves, rocky hillsides, under cliffs and along sandy tracks and trails. **Habitat Preferences:** Occurs from the Hawksbury to the upper Hunter Valley regions. Associated species include Angophora bakeri, Corymbia eximia, Backhousia myrtifolia, Eucalyptus sparsifolia, E. crebra, E. notabilis, Allocasuarina torulosa and Leptospermum attenuatum. **Disturbance Factors:** None documented.	None	Suitable habitat occurs on the Site	The Site does not occur in known distribution areas and associated species do not occur on the Site	None documented	No nearby records	None nearby	None on or directly adjacent to the site	**Not a Candidate Species:** The site is not within the geographic restriction and the species is unlikely to occur. No further assessment is required for this species.

4.4 Candidate Species Credit Species & Justification: Fauna

4.4.1 Existing Fauna Habitat at Development Site

The northern part of the site contains native bushland that provides good quality habitat for a range of native fauna species. There are many native trees that provides roosting and foraging habitat for native birds and arboreal mammals and reptiles. The *Allocasuarina* trees provide potential foraging habitat for the Threatened Glossy Black-cockatoo. Microbats may forage over the trees tops. There are some exposed sandstone rock throughout the bushland part of the site that provide basking and sheltering habitat for small reptiles.

The southern part of the site contains exotic mown lawn with some scattered remnant native canopy trees and shrubs that provides habitat for native birds and mammals. there are also several wood piles that provide sheltering habitat for snakes.

The Site and the locality are shown on the maps in Figures 1.2 and 1.3.

4.4.2 Habitat Trees

Of the remanent trees in the southern part of the site 12 where observed as containing small hollows these are tree numbers 26, 22, 18, 15, 16, 17, 21, 31, 37, 38, 60 and 59. Tree numbers are as per the Arborist Report by Bradley Magus (4th June 2018). Three were also two dead (unnumbered trees) that contained multiple hollows along the southern boundary of the site. There may be more tree that contain hollows that were missed during the survey.

The northern bushland part of the Development Site also contains many small to medium sized hollows that are potential nesting or roosting habitat for small birds, possums and some species of microbats. The hollows are not likely to be large enough for Threatened owls.

Table 9. Candidate Credit Species Assessment, Fauna

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		Yengo Sub Region	Habitat Suitability within Development Site, from TBDC, literature or calculator tick boxes			Proximity of Historic Records from past reports and databases			
		Determining Factor -ve	May be a Determining Factor		May be a -ve Determining Factor			Determining Factor +ve	
Derived (Predicted) Potential Candidate Species	**Habitat Requirements and Preferences (constraints) from species profile and literature**	**Geographic Restrictions (from TBDC)**	**Habitat Reqirements (constraints) within Development Site**	**Habitat Preferences within Development Site**	**Disturbance, Habitat Degredation existing within Development Site**	**Historic Occurance within 5km**	**Historic Occurance in locality (date, location and vegetation type)**	**Historic Occurance on or imediately adjacent to Development Site**	**Candidate Species Conclusion & Justification**
Anthochaera Phrygia Regent Honey Eater **(Breeding only)** *Critically Endangered*	**Habitat Requirements:** Main breeding sites in NSW are in Capertee Valley and Bundarra-Barraba Regions. **Habitat Preferences:** Inhabits dry open forest and woodland, particularly Box-Ironbark woodland, and riparian forests of River Sheoak. Mainly feeds on the nectar from a wide range of eucalypts and mistletoes. When nectar is scarce lerp, honeydew and insects comprise a large proportion of the diet. Every few years non-breeding flocks are seen foraging in flowering coastal Swamp Mahogany and Spotted Gum forests. **Disturbance Factors:** None documented. **Breeding:** Main breeding sites in NSW are in Capertee Valley and Bundarra-Barraba Regions. A shrubby understorey is an important source of insects and nesting material.	None	The site does not fall within the two known breeding areas.	N/A	None documented	2 records	No records in locality	None on or directly adjacent to the site	**Not a Candidate species credit species:** This species requirements (constraints) do not occur on this site and the species is unlikely to occur. No further assessment is required for this species.
Burhinus grallarius Bush Stone-curlew *Endangered*	**Habitat Requirements:** Fallen/standing dead timber including logs. **Habitat Preferences:** Occurs in open forests and woodlands with a sparse grassy groundlayer and fallen timber. Feed on insects and small vertebrates, such as frogs, lizards and snakes. **Disturbance Factors:** None documented **Breeding**: Nests on the ground in a scrape or small bare patch.	None	Sparse fallen/standing dead timber including logs.	Open forests and woodlands with a sparse grassy groundlayer and fallen timber occur on Site.	None documented	No records	No nearby records	None on or directly adjacent to the site	**Yes a Candidate species credit species:** This species has historically been found in or near this site, a targeted field survey is required or this species can be assumed to occur. Further assessment is required for this species.
Callocephalon fimbriatum-endangered population Gang-Gang Cockatoo **(Breeding only)** *Vulnerable*	**Habitat Requirements:** The only known breeding areas in the Sydney region are within the Hornsby and Kur-ring-gai LGAs which is also an endangered population. **Habitat Preferences:** Occurs in tall mountain forests and woodlands during spring and summer. In autumn and winter it moves to lower altitudes in drier more open eucalypt forests or in coastal areas. Often found in urban areas. **Disturbance Factors**: None documented. **Breeding:** Nests are located in hollows that are 10 cm in diameter or larger and at least 9 m above the ground in eucalypts.		The site does not fall within the two known breeding areas.	Suitable foraging habitat	N/A	2 records	No nearby records	None on or directly adjacent to the site	**Not a Candidate species credit species:** This species requirements (constraints) do not occur on this site and the species is unlikely to occur. No further assessment is required for this species.

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		Yengo Sub Region	Habitat Suitability within Development Site, from TBDC, literature or calculator tick boxes			Proximity of Historic Records from past reports and databases			
		Determining Factor -ve	May be a Determining Factor		May be a -ve Determining Factor			Determining Factor +ve	
Derived (Predicted) Potential Candidate Species	**Habitat Requirements and Preferences (constraints) from species profile and literature**	**Geographic Restrictions (from TBDC)**	**Habitat Reqirements (constraints) within Development Site**	**Habitat Preferences within Development Site**	**Disturbance, Habitat Degredation existing within Development Site**	**Historic Occurance within 5km**	**Historic Occurance in locality (date, location and vegetation type)**	**Historic Occurance on or imediately adjacent to Development Site**	**Candidate Species Conclusion & Justification**
Callocephalon fimbriatum Gang-Gang Cockatoo **(Breeding only)** *Vulnerable*	**Habitat Requirements:** The only known breeding areas in the Sydney region are within the Hornsby and Kur-ring-gai LGAs which is also an endangered population. **Habitat Preferences:** Occurs in tall mountain forests and woodlands during spring and summer. In autumn and winter it moves to lower altitudes in drier more open eucalypt forests or in coastal areas. Often found in urban areas. **Disturbance Factors**: None documented. **Breeding:** Nests are located in hollows that are 10 cm in diameter or larger and at least 9 m above the ground in eucalypts.	None	The site does not occur within known breeding areas in the Sydney region.	Suitable foraging habitat	N/A	2 records	No nearby records	None on or directly adjacent to the site	**Not a Candidate species credit species:** This species requirements (constraints) do not occur on this site and the species is unlikely to occur. No further assessment is required for this species.
Calyptorhynchus lathami Glossy Black-Cockatoo **(Breeding only)** *Vulnerable*	**Habitat Requirements:** Dependent on large hollow-bearing eucalypts for nest sites. **Habitat Preferences:** Feeds almost exclusively on the seeds of several species of she-oak (Casuarina and Allocasuarina species), shredding the cones with the massive bill. **Disturbance Factors:** None documented. **Breeding:** Nests in large hollow-bearing eucalypts close to food trees (Mooney & Pedler, 2005). A single egg is laid between March and May.	None	The Site does not contain any large hollows that are suitable for breeding	Only one species of allocasurina species occurs on Site	None documented	12 records	2 records within 1km south of the Site from 2000 and 2014	None on or directly adjacent to the site	**Not a Candidate species credit species:** This species requirements (constraints) do not occur on this site and the species is unlikely to occur. No further assessment is required for this species.
Cercartetus nanus Eastern Pygmy-possum *Vulnerable*	**Habitat Requirements:** Nesting sites. **Habitat Preferences:** Found in dense rainforests, wet and dry sclerophyll forests, woodlands, mallee scrub and coastal heathlands, but in most areas woodlands and heath appear to be preferred. Large foraging range and feeds largely on nectar and pollen collected from Banksias, Eucalypts and Bottlebrushes. Can be difficult to detect. **Disturbance Factors:** Disturbance to the midstorey. **Breeding:** Tree hollows are favoured for nesting but spherical nests have been found under the bark of eucalypts and in shredded bark in tree forks. Most births occur between late spring and early autumn.	None	Suitable nesting habitat occurs on the Site	Suitable food and breeding habitat present	The Site is not to disturbed for this species to occur	No records	No nearby records	None on or directly adjacent to the site	**Yes a Candidate species credit species:** This species is known to occur in general location, and suitable habitat occurs on the site, and the site is not too disturbed. A targeted field survey is required or this species can be assumed to occur.

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		Yengo Sub Region	Habitat Suitability within Development Site, from TBDC, literature or calculator tick boxes			Proximity of Historic Records from past reports and databases			
		Determining Factor -ve	May be a Determining Factor		May be a -ve Determining Factor			Determining Factor +ve	
Derived (Predicted) Potential Candidate Species	**Habitat Requirements and Preferences (constraints) from species profile and literature**	**Geographic Restrictions (from TBDC)**	**Habitat Reqirements (constraints) within Development Site**	**Habitat Preferences within Development Site**	**Disturbance, Habitat Degredation existing within Development Site**	**Historic Occurance within 5km**	**Historic Occurance in locality (date, location and vegetation type)**	**Historic Occurance on or imediately adjacent to Development Site**	**Candidate Species Conclusion & Justification**
Chalinolobus dwyeri Large-eared Pied Bat *Vulnerable*	**Habitat Requirements:** Cliffs, within 2km of rocky areas containing caves, overhangs, escarpments, outcrops, crevices and old mines or tunnels. **Habitat Preferences:** It is generally rare with a very patchy distribution in NSW. Found in well-timbered areas containing gullies. Probably forages for small, flying insects below the forest canopy. **Disturbance Factors:** None documented. **Breeding:** Roosts in caves, crevices in cliffs, old mine workings and in the disused, bottle-shaped mud nests of the Fairy Martin (Hirundo ariel).	None	Cliffs. Within 2km of rocky areas containing caves, overhangs, escarpments, outcrops, or crevices or within 2km of old mines or tunnels.	A large forest canopy occurs on Site which would be suitable for foraging.	None documented	No records	No nearby records	None on or directly adjacent to the site	**Yes a Candidate species credit species:** This species is known to occur in general location, and suitable habitat occurs on the site, and the site is not too disturbed. A targeted field survey is required or this species can be assumed to occur.
Haliaeetus leucogaster White-bellied Sea-Eagle (Breeding only) Vulnerable	**Habitat Requirements:** Large emergent eucalypts. Breeds in mature tall open forest, open forest, tall woodland, and swamp sclerophyll forest close to foraging habitat. **Habitat Preferences:** 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. **Disturbance Factors:** None documented. **Breeding:** Nest trees are typically large emergent eucalypts and often have emergent dead branches or large dead trees nearby which are used as 'guard roosts'.	None	The site is not within 1km of a bay, estuary, dam or the sea.	The Site is not close to suitable foraging habitat	None documented	No records	No nearby records	None on or directly adjacent to the site	**Not a Candidate species credit species:** This species requirements (constraints) do not occur on this site and the species is unlikely to occur. No further assessment is required for this species.
Hieraaetus morphnoides Little Eagle **(Breeding only)** *Vulnerable*	**Habitat Requirements:** Nests in Tall trees. **Habitat Preferences:** Nests in tall trees in open eucalypt forest, woodland or open woodland. Preys on birds, reptiles and mammals, occasionally adding large insects and carrion. **Disturbance Factors:** None documented. **Breeding:** 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.	None	No suitable tall nesting trees occur on the Site	No suitable tall nesting trees occur on the Site	None documented	2 records	No nearby records	None on or directly adjacent to the site	**Not a Candidate species credit species:** This species requirements (constraints) do not occur on this site and the species is unlikely to occur. No further assessment is required for this species.

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		Yengo Sub Region	Habitat Suitability within Development Site, from TBDC, literature or calculator tick boxes			Proximity of Historic Records from past reports and databases			
		Determining Factor -ve	May be a Determining Factor		May be a -ve Determining Factor			Determining Factor +ve	
Derived (Predicted) Potential Candidate Species	**Habitat Requirements and Preferences (constraints) from species profile and literature**	**Geographic Restrictions (from TBDC)**	**Habitat Reqirements (constraints) within Development Site**	**Habitat Preferences within Development Site**	**Disturbance, Habitat Degredation existing within Development Site**	**Historic Occurance within 5km**	**Historic Occurance in locality (date, location and vegetation type)**	**Historic Occurance on or imediately adjacent to Development Site**	**Candidate Species Conclusion & Justification**
Hoplocephalus bitorquatus Pale-headed Snake *Vulnerable*	**Habitat Requirements:** Highly cryptic species that can spend weeks at a time hidden in tree hollows. **Habitat Preferences:** Shelter during the day between loose bark and tree-trunks, or in hollow trunks and limbs of dead trees. In drier environments, it appears to favour habitats close to riparian areas. **Disturbance Factors:** None documented.	None	The Site contains suitable hollows	Suitable habitat occurs on the Site	None documented	No records	No nearby records	None on or directly adjacent to the site	**Yes a Candidate species credit species:** This species is known to occur in general location, and suitable habitat occurs on the site, and the site is not too disturbed. A targeted field survey is required or this species can be assumed to occur.
Lathamus discolor Swift Parrot **(Breeding only)** *Vulnerable*	**Habitat Requirements:** Breeds in Tasmania. **Habitat Preferences:** On the mainland they occur in areas where eucalypts are flowering profusely or where there are abundant lerp (from sap-sucking bugs) infestations. Favoured feed trees include winter flowering species such as Swamp Mahogany Eucalyptus robusta, Spotted Gum Corymbia maculata, Red Bloodwood C. gummifera, Mugga Ironbark E. sideroxylon, and White Box E. albens. **Disturbance Factors:** Feed trees. **Breeding:** Breeds in Tasmania during spring and summer.	None	The site does not fall within the two known breeding areas.	The Site may contain low quality foraging habitat	Some feed trees occur on the Site	5 records	No nearby records	None on or directly adjacent to the site	**Not a Candidate species credit species:** This species requirements (constraints) do not occur on this site and the species is unlikely to occur. No further assessment is required for this species.
Litoria aurea Green and Golden Bell Frog *Vulnerable*	**Habitat Requirements:** Optimum habitat includes water-bodies that are unshaded, free of predatory fish such as Plague Minnow (Gambusia holbrooki), have a grassy area nearby and diurnal sheltering sites available. **Habitat Preferences:** Inhabits marshes, dams and stream-sides, particularly those containing bullrushes (Typha spp.) or spikerushes (Eleocharis spp.). **Distubance Factors:** This species in known, especially in the Greater Sydney area, to occur in highly disturbed sites.	None	The Development Site does not contain suitable habitat but there is suitable habitat north of the Site	No marshes, dams and stream-sides occur on the Site	The Site is not to disturbed for this species to occur	2 records	No nearby records	None on or directly adjacent to the site	**Not a Candidate species credit species:** This species requirements (constraints) do not occur on this site and the species is unlikely to occur. No further assessment is required for this species.

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		Yengo Sub Region	Habitat Suitability within Development Site, from TBDC, literature or calculator tick boxes			Proximity of Historic Records from past reports and databases			
		Determining Factor -ve	May be a Determining Factor		May be a -ve Determining Factor			Determining Factor +ve	
Derived (Predicted) Potential Candidate Species	**Habitat Requirements and Preferences (constraints) from species profile and literature**	**Geographic Restrictions (from TBDC)**	**Habitat Reqirements (constraints) within Development Site**	**Habitat Preferences within Development Site**	**Disturbance, Habitat Degredation existing within Development Site**	**Historic Occurance within 5km**	**Historic Occurance in locality (date, location and vegetation type)**	**Historic Occurance on or imediately adjacent to Development Site**	**Candidate Species Conclusion & Justification**
Litoria booroolongensis Booroolong Frog *Vulnerable*	**Habitat Requirements:** Live along permanent streams with some fringing vegetation cover such as ferns, sedges or grasses. **Habitat Preferences:** Adults occur on or near cobble banks and other rock structures within stream margins. Shelter under rocks or amongst vegetation near the ground on the stream edge. **Disturbance Facors:** None documented	None	No permenant streams occur on the Site	No streams occur on the Site	None documented	No records	No nearby records	None on or directly adjacent to the site	**Not a Candidate species credit species:** This species requirements (constraints) do not occur on this site and the species is unlikely to occur. No further assessment is required for this species.
Lophoictinia isura Square-tailed Kite **(Breeding only)** *Vulnerable*	**Habitat Requirements:** Large trees for breeding. **Habitat Preferences:** Inhabits dry woodlands and open forest, in particular timbered watercourses. Feeds on passerines, insects in tree canopy. **Disturbance Factors:** None documented. **Breeding:** The Square-tailed Kite builds a large stick platform in a living tree, in open forest or woodland or near edges or openings in forest. Nests are predominatly sticks lined with green eucalyptus leaves. Usually nests nearby water. A clutch of one or two eggs is laid in winter, with a single attempt per season.	None	No suitable tall nesting trees occur on the Site	No suitable tall nesting trees occur on the Site	None documented	8 records	1 record within 1km to the west of the Site from 2013	None on or directly adjacent to the site	**Not a Candidate species credit species:** This species requirements (constraints) do not occur on this site and the species is unlikely to occur. No further assessment is required for this species.
Miniopterus australis Little Bentwing-bat **(Breeding only)** *Vulnerable*	**Habitat Requirements:** Caves. **Habitat Preferences:** Moist eucalypt forest, rainforest, vine thicket, wet and dry sclerophyll forest, Melaleuca swamps, dense coastal forests and banksia scrub. Generally found in well-timbered areas. **Disturbance Factors:** None documented. **Breeding:** Breeds in caves in large maternity colonies, often along side eastern bent wing bats.	None	No Caves occur or were likely to have occured on site.	The Site does not contain suitable foraging habitat	None documented	17 records	Several records within 1km south of the Site from 1999-2016	None on or directly adjacent to the site	**Not a Candidate species credit species:** This species requirements (constraints) do not occur on this site and the species is unlikely to occur. No further assessment is required for this species.
Miniopterus schreibersii oceanensis Eastern Bentwing-bat **(Breeding only)** *Vulnerable*	**Habitat Requirements:** Caves. **Habitat Preferences:** Hunt in forested areas, catching moths and other flying insects above the tree tops. **Disturbance Factors:** None documented. **Breeding:** Caves are the primary maternity roosts but derelict mines, storm-water tunnels, buildings and other man-made structures will be used.	None	No caves or other breeding habitat occurs or was likely to have occured on site.	The Site contains suitable foraging habitat	None documented	67 records	Several records within 1km surounding the Site from 2013-2018	None on or directly adjacent to the site	**Not a Candidate Species.** Species constraints do not occur on this site and the species is unlikely to occur. No further assessment is required for this species.

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		Yengo Sub Region	Habitat Suitability within Development Site, from TBDC, literature or calculator tick boxes			Proximity of Historic Records from past reports and databases			
		Determining Factor -ve	May be a Determining Factor		May be a -ve Determining Factor			Determining Factor +ve	
Derived (Predicted) Potential Candidate Species	**Habitat Requirements and Preferences (constraints) from species profile and literature**	**Geographic Restrictions (from TBDC)**	**Habitat Reqirements (constraints) within Development Site**	**Habitat Preferences within Development Site**	**Disturbance, Habitat Degredation existing within Development Site**	**Historic Occurance within 5km**	**Historic Occurance in locality (date, location and vegetation type)**	**Historic Occurance on or imediately adjacent to Development Site**	**Candidate Species Conclusion & Justification**
Myotis macropus Southern Myotis *Vulnerable*	**Habitat Requirements:** Within 200m of suitable waterbody that is atleast 3m wide and can be a river, creek, billabong, lagoon, dam, estuary or coastal lake. It does not include ocean, beach or marine harbour. Hollow bearing trees, caves, bridges or artificial structures within 200m of suitable water body. **Habitat Preferences:** Forage over streams and pools, catching insects and small fish on the water surface. **Disturbance Factors:** None documented. **Breeding:** Generally roost in groups of 10-15 close to water in caves, mine shafts, hollow-bearing trees, storm water channels, buildings, under bridges and in dense foliage.	None	The site is within 200m of suitable waterbody.	The Site contains suitable foraging habitat	None documented	17 records	2 records south of the Site within 2km from 2016	None on or directly adjacent to the site	**Yes a Candidate species credit species:** This species is known to occur in general location, and suitable habitat occurs on the site, and the site is not too disturbed. A targeted field survey is required or this species can be assumed to occur.
Ninox strenua Powerful Owl (Breeding only) Vulnerable	**Habitat Requirements:** Tree hollows within 100m of a creekline. **Habitat Preferences:** Inhabits large tracts (but can occur in fragmented landscapes) of forest in a range of vegetation types, from woodland and open sclerophyll forest to tall open wet forest and rainforest. **Disturbance Factors:** Most prey species require hollows and a shrub layer. **Breeding:** Nests in large tree hollows along creeks.	None	No large hollows within 100m of a creekline.	The Site may contain suitable foraging habitat	No large hollows on the Site	61 records	Several records within 2km south of the Site along the creekline from 2002-2016	None on or directly adjacent to the site	**Not a Candidate species credit species:** This species requirements (constraints) do not occur on this site and the species is unlikely to occur. No further assessment is required for this species.
Pandion cristatus Eastern Osprey **(Breeding only)** *Vulnerable*	**Habitat Requirements:** Tall dead or live trees near foraging habitat. **Habitat Preferences:** Favour coastal areas, especially the mouths of large rivers, lagoons and lakes. Feed on fish over clear, open water. **Disturbance Factors:** None documented. **Breeding:** Breed from July to September in NSW. Nests are made high up in dead trees or in dead crowns of live trees, usually within one kilometre of the sea.	None	The Site does not containd large trees and is not within 1km of a bay, estuary, dam or the sea.	The Site is not close to suitable foraging habitat	None documented	No records	No nearby records	None on or directly adjacent to the site	**Not a Candidate species credit species:** This species requirements (constraints) do not occur on this site and the species is unlikely to occur. No further assessment is required for this species.

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		Yengo Sub Region	Habitat Suitability within Development Site, from TBDC, literature or calculator tick boxes			Proximity of Historic Records from past reports and databases			
		Determining Factor -ve	May be a Determining Factor		May be a -ve Determining Factor			Determining Factor +ve	
Derived (Predicted) Potential Candidate Species	**Habitat Requirements and Preferences (constraints) from species profile and literature**	**Geographic Restrictions (from TBDC)**	**Habitat Reqirements (constraints) within Development Site**	**Habitat Preferences within Development Site**	**Disturbance, Habitat Degredation existing within Development Site**	**Historic Occurance within 5km**	**Historic Occurance in locality (date, location and vegetation type)**	**Historic Occurance on or imediately adjacent to Development Site**	**Candidate Species Conclusion & Justification**
Petaurus norfolcensis Squirrel Glider *Vulnerable*	**Habitat Requirements:** Tree hollows. **Habitat Preferences:** Inhabits mature or old growth Box, Box-Ironbark woodlands and River Red Gum forest west of the Great Dividing Range and Blackbutt-Bloodwood forest with heath understorey in coastal areas. Prefers mixed species stands with a shrub or Acacia midstorey. Diet varies seasonally and consists of Acacia gum, Eucalypt sap, nectar, honeydew and manna, with invertebrates and pollen providing protein. Can be difficult to detect. **Disturbance Factors:** None documented. **Breeding:** Require abundant tree hollows for refuge and nest sites.	None	Several hollows and suitable foraging habitat are present.	Acacia and Euclaypt species are a suitable food source on site.	None documented	No records	No nearby records	None on or directly adjacent to the site	**Yes a Candidate species credit species:** This species is known to occur in general location, and suitable habitat occurs on the site, and the site is not too disturbed. Further assessment is required for this species.
Phascogale tapoatafa Brush-tailed Phasogale *Vulnerable*	**Habitat Requirements:** Prefer dry sclerophyll open forest with sparse groundcover of herbs, grasses, shrubs or leaf litter also inhabit heath, swamps, rainforest and wet sclerophyll forest. **Habitat Preferences:** Females have exclusive territories of approximately 20 - 40 ha, while males have overlapping territories often greater than 100 ha. **Disturbance Factors:** None documented.	None	The Site does contain suitable habitat	The Site may be a small part of a larger home range	None documented	No records	No nearby records	None on or directly adjacent to the site	**Yes a Candidate species credit species:** This species is known to occur in general location, and suitable habitat occurs on the site, and the site is not too disturbed. Further assessment is required for this species.
Phascolarctos cinereus Koala **(Breeding only)** *Vulnerable*	**Habitat Requirements:** There needs to be a breeding colony. **Habitat Preferences:** Feed on the foliage of more than 70 eucalypt species and 30 non-eucalypt species, in larger areas it will select preferred browse species. Home range size varies with quality of habitat, ranging from less than 2ha to several hundred hectares in size. Females breed at two years of age and produce one young per year. **Disturbance Factors:** None documented. **Breeding:** Breeding relys on good quality suitable habitat.	None	No known breeding colony in locality within the last 20 years.	The Site does not contain suitable foraging habitat	N/A	1 record	No nearby records	None on or directly adjacent to the site	**Not a Candidate species credit species:** This species requirements (constraints) do not occur on this site and the species is unlikely to occur. No further assessment is required for this species.

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		Yengo Sub Region	Habitat Suitability within Development Site, from TBDC, literature or calculator tick boxes			Proximity of Historic Records from past reports and databases			
		Determining Factor -ve	May be a Determining Factor		May be a -ve Determining Factor			Determining Factor +ve	
Derived (Predicted) Potential Candidate Species	**Habitat Requirements and Preferences (constraints) from species profile and literature**	**Geographic Restrictions (from TBDC)**	**Habitat Reqirements (constraints) within Development Site**	**Habitat Preferences within Development Site**	**Disturbance, Habitat Degredation existing within Development Site**	**Historic Occurance within 5km**	**Historic Occurance in locality (date, location and vegetation type)**	**Historic Occurance on or imediately adjacent to Development Site**	**Candidate Species Conclusion & Justification**
Pseudophryne australis Red-crowned Toadlet *Vulnerable*	**Habitat Requirements:** Periodically wet drainage line. **Habitat Preferences:** Occurs in open forests. Inhabits periodically wet drainage lines below sandstone ridges that often have shale lenses or cappings. Shelters under rocks and amongst masses of dense vegetation or thick piles of leaf litter. **Disturbance Factors:** Water quality. **Breeding:** Breeding congregations occur in dense vegetation and debris beside ephemeral creeks and gutters. Eggs are laid in moist leaf litter, from where they are washed by heavy rain.	None	Periodically wet drainage lines occur on the Site	Suitable habitat occurs on Site	The water quality is not to low for the species to occur	17 records	4 records from 1995, 1999 and 2016 occur within 1km south of the Site	None on or directly adjacent to the site	**Yes a Candidate species credit species:** This species is known to occur in general location, and suitable habitat occurs on the site, and the site is not too disturbed. Further assessment is required for this species.
Pteropus poliocephalus Grey-headed Flying-fox **(Breeding only)** *Vulnerable*	**Habitat Requirements:** Breeds close to fresh water body. **Habitat Preferences:** Roosting camps are generally located within 20 km of a regular food source and are commonly found in gullies, close to water, in vegetation with a dense canopy. **Disturbance Factors:** None documented. **Breeding:** Site fidelity to camps is high. Individual camps may have tens of thousands of animals and are used for mating, and for giving birth and rearing young.	None	No breeding or roosting habitat close to or on a water body within site.	Suitable foraging habitat on the Site	None documented	56 records	4 records to the south from 1996 to 2006 and 1 record to the east from 2006 within 1km	None on or directly adjacent to the site	**Not a Candidate species credit species:** This species requirements (constraints) do not occur on this site and the species is unlikely to occur. No further assessment is required for this species.
Tyto novaehollandiae Masked Owl **(Breeding only)** *Vulnerable*	**Habitat Requirements:** Tree hollows greater than 40cm wide and 100cm deep and more than 3m above the ground, in Eucalypt trees atleast 90cm (DEC 2006) or caves. **Habitat Preference:** Lives in dry eucalypt forests and woodlands from sea level to 1100 m. Hunts tree-dwelling and ground mammals, especially rats along the edges of forests, including roadsides. **Disturbance Factors:** None documented. **Breeding:** Roosts and breeds in moist eucalypt forested gullies, using large tree hollows or sometimes caves for nesting.	None	No suitable large tree hollows occur on site.	Suitable foraging habitat occurs on the Site	None documented	2 records	No nearby records	None on or directly adjacent to the site	**Not a Candidate species credit species:** This species requirements (constraints) do not occur on this site and the species is unlikely to occur. No further assessment is required for this species.

4.5 Field Survey Effort

4.5.1 Threatened Flora Field Survey Effort

Date	Person Hours	Weather	Type	Location	Targeted species
20th December 2018	3	Fine 28-30°C	Threatened flora and habitat searches	Across the whole development Site	All threatened flora that has suitable habitat.
17th January 2019	2	Fine 30-32°C	Threatened flora and habitat searches	Across the whole development Site	All threatened flora that has suitable habitat.

4.5.2 Threatened Fauna Field Survey Effort

Date	Time of day	Person Hours	Weather	Type	Location	Targeted Species
20th December 2018	Day	3	Fine 28-30°C	Threatened fauna habitat searches	Across the whole development Site	All threatened fauna that has suitable habitat.
20th December 2018- 26th December 2018	24 hours	6 trap nights	Fine 15-32°C	Motion Detecting Cameras 1, 2 and 8	See Figure 4.2	Nocturnal and Diurnal Threatened Fauna
20th December 2018- 28th December 2018	24 hours	8 trap nights	Fine 15-33°C	Motion Detecting Cameras 4, 5 and 7	See Figure 4.2	Nocturnal and Diurnal Threatened Fauna
17th January	3:30-5:30	2	Fine 30-32°C	Threatened fauna habitat searches	Across the whole development Site	All Threatened fauna that has suitable habitat.

4.6 Candidate Species Presence

Step 5 of Section 6.4 determines if each species is present (or assumed present) on the site. A map of the location or a count of the number of individuals is also given.

4.7 Eucalyptus sp. Cattai a Critically Endangered Species

Eight stems of Eucalyptus sp. Cattai occur in a group in the northern part of the site within the bushfire Asset protection Zone and outside of the building footprint. The location of these stems is shown on Map 4.2.

Eucalyptus sp. Cattai (Gregson s.n., 28 Aug 1954) is a Threatened species listed in Schedule 1 of the Biodiversity Conservation Act 2016.

The NSW Threatened Species Scientific Committee, established by the *Threatened Species Conservation Act 1995*, has made a Final Determination to list the tree, *Eucalyptus* sp. Cattai (Gregson s.n., 28 Aug 1954) as a CRITICALLY ENDANGERED SPECIES in Part 1 of Schedule 1A of the Act. When the TSC Act was removed and replaced by the Biodiversity Conservation Act 2016 this species was transferred to the new schedules.

The Final Determination (2015) provides information of the species, it's rarity and it's conservation.

Description of *Eucalyptus sp. Cattai*

> *The following description of Eucalyptus sp. Cattai (family Myrtaceae) is taken from PlantNet (The Royal Botanic Gardens and Domain Trust accessed January 2018): "Description: Small mallee-like tree to 4.5 m high, with more or less crooked trunks and bark thick, sub-fibrous, furrowed, but loose on lower trunk tending to scaly bloodwood type higher up. Adult leaves disjunct, lanceolate to broad lanceolate, 4.6–11.5 cm long, 1–4.2 cm wide, dark green, glossy, discolorous, penniveined. Umbellasters 6–8-flowered; peduncle flattened or angular, 5–13 mm long; pedicels terete, 0–6 mm long. Buds fusiform to ovoid or conical, 6–10 mm long, 3.5–5 mm diam., scar present; calyptra conical to hemispherical, sometimes slightly beaked, more or less ribbed, at least as wide as hypanthium, length longer or shorter than hypanthium. Fruit hemispherical or cup-shaped, 5–6 mm long, 5–7 mm long; disc flat to raised; valves exserted."*

The tree (trunks) on this site fit this description well.

The number of of *Eucalyptus sp. Cattai* plants on this site

This plant grows in a mallee form and it is often difficult to determine which stems are from the same plant. It is possible that these stems may be all from the one plant.

Conservation Status of *Eucalyptus sp. Cattai*

This species is known to occur in this locality to the north-west from 117 records (within 5km) most of which are within the last 10 years. See Figure 4.1.

The Determination provides the following information regarding the species conservation:

> *"The number of mature individuals of Eucalyptus sp. Cattai is unknown, however there are currently estimated to be fewer than 2500 individuals. There are up to seven populations of E. sp. Cattai located on land of various tenures. The three largest populations total approximately 280 – 570 trees, the range here indicating the difficulty in differentiating individuals of this mallee species (Scott, 2013). These three populations occur on former Crown Land granted to the Deerubbin Local Aboriginal Land Council. The remainder of the species is restricted to scattered individuals or groups of trees across the species' range. There are no populations known from a conservation reserve. "*

There is no recovery plan for this species however there is a NSW Saving Our Species program for this species.

Threats to of *Eucalyptus sp. Cattai*

The threats to **of *Eucalyptus sp. Cattai*** are described in the Determination as:

> *The area where Eucalyptus sp. Cattai occurs is highly urbanised and the remnant vegetation is fragmented due to expanding urban development. Known or likely threats to E. sp. Cattai are ongoing clearing and fragmentation, road works, disturbance to habitat from urban and rural-residential land use, clearing and understorey suppression for bushfire management and an altered fire regime and apparent lack of recruitment (S. Douglas in litt. December 2012, V. Klaphake in litt. September 2014). These threats are impacting on the species across its current geographic range. 'Clearing of native vegetation' is listed as a Key Threatening Process under the NSW Threatened Species Conservation Act 1995.*

The proposal clearing due to urban development and clearing for a bushfire APZ is a recognised threat.

Offsetting Cost

If the stems are separate plants and the proposal involved the removal of these stems the offset cost would be $250,000.

The cost of harming this species or its habitat without approval is likely to be up to $2,000,000.

Recommendation regarding the *Eucalyptus sp. Cattai* on this site

This clump of stems is of very high ecological importance and needs to be retained and conserved by fencing, sign posting and protection from changes to water flow, sediment, weeds and nutrients.

- There should be no clearing of habitat around this species.
- The area of habitat around this species on the site is to fenced and clearly signposted to inform users of the site regarding the importance of these plants and the finds for harming the habitat.
- Existing adjacent uphill fill is to be retained by a concrete block wall and any new fill is to be fully retained with water flow diverted to a water treatment pond.
- Measures should be put in place to ensure that no runoff from the uphill areas enters the habitat of this species.
- The habitat around this species is to be manged as weed free bushland.
- It is likely there is funding to assist with the conservation of these plants on this site.
- If the bushland and these trees are to be part of a Stewardship Site it is likely that more than $300,000 and annual payments can be obtained.

Table 10. Candidate Species Presence

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Step 5, 6.4.1.26-34 and Step 6. 6.4.1.35-37

					Development Site	Only in Impact Area	
Derived (Predicted) Potential Candidate Species	Biodiversity Risk Weighting	Suitability of the Time of Year Surveyed	Presence On Site or Assumed Presence or Expert Report	Vegetation Zone	Habitat Component that is Present	Area of Habitat or Count Impacted including parts of buffers of features outside impact area	Step 6: Habitat Condition in Species Polygon (Integrity Score for each Zone)
Acacia bynoeana Byones Wattle *Endangered*	2.00	Surveyed in suitable time of year.	Not found, no further assesment or offsetting required.	Zone 1	Suitable region and habitat.		
Acacia gordonii Acacia gordonii *Endangered*	2.00	Surveyed in suitable time of year.	Not found, no further assesment or offsetting required.	Zone 1	Suitable region and habitat.		
Acacia pubescens Downy Wattle *Vulnerable*	2.00	Surveyed in suitable time of year.	Not found, no further assesment or offsetting required.	Zone 1	Suitable region and habitat.		
Burhinus grallarius Bush Stone-curlew *Endangered*	2.00	Surveyed in suitable time of year.	Not found, no further assesment or offsetting required.	Zone 1	Suitable foraging and breeding habitat.		
Callistemon linearifolius Netted Bottlebrush *Vulnerable*	2.00	Surveyed in suitable time of year.	Not found, no further assesment or offsetting required.	Zone 1	Suitable habitat on Site.		
Cercartetus nanus Eastern Pygmy-possum *Vunerable*	2.00	Surveyed in suitable time of year.	Not found, no further assesment or offsetting required.	Zone 1	Suitable hollows and foraging habitat.		
Chalinolobus dwyeri Large-eared Pied Bat *Vunerable*	3.00	Assumed Present	Assumed present due to suitable habitat.	Zone 1	Large forest canopy, within 2km of potential roosting habitat.	0.3	Good
Darwinia biflora Darwinia biflora *Vulnerable*	2.00	Surveyed in suitable time of year.	Found in the property but not within the Site. No offsetting required. (See figure 4.2)	Zone 1	Suitable habitat on Site.		
Darwinia fascicularis subsp. oligantha *Endangered population*	2.00	Surveyed in suitable time of year.	Not found, no further assesment or offsetting required.	Zone 1	Suitable habitat on Site.		
Epacris purpurascens var. purpurascens *Vulnerable*	1.50	Surveyed in suitable time of year.	Not found, no further assesment or offsetting required.	Zone 1	Suitable habitat on Site.		
Eucalyptus sp. Cattai *Critically endangered*	3.00	Surveyed in suitable time of year.	Found during survey, not disturbed by the development, no offsetting required.	Zone 1	Suitable habitat on Site.	0	Good
Grevillea parviflora subsp. parviflora Small-flower grevillea	2.00	Surveyed in suitable time of year.	Not found, no further assesment or offsetting required.	Zone 1	Suitable habitat on Site.		
Grevillea parviflora subsp. supplicans *Endangered*	2.00	Surveyed in suitable time of year.	Not found, no further assesment or offsetting required.	Zone 1	Suitable habitat on Site.		
Hibbertia procumbens Spreading Guinea Flower *Endangered*	2.00	Surveyed in suitable time of year.	Not found, no further assesment or offsetting required.	Zone 1	Suitable habitat on Site.		

1 Larapinta Place, Glenhaven

Step 5, 6.4.1.26-34 and Step 6. 6.4.1.35-37

					Development Site	Only in Impact Area	
Derived (Predicted) Potential Candidate Species	Biodiversity Risk Weighting	Suitability of the Time of Year Surveyed	Presence On Site or Assumed Presence or Expert Report	Vegetation Zone	Habitat Component that is Present	Area of Habitat or Count Impacted including parts of buffers of features outside impact area	Step 6: Habitat Condition in Species Polygon (Integrity Score for each Zone)
Hibbertia superans *Endangered*	2.00	Surveyed in suitable time of year.	Not found, no further assesment or offsetting required.	Zone 1	Suitable habitat on Site.		
Hoplocephalus bitorquatus Pale-headed Snake *Vulnerable*	2.00	Surveyed in suitable time of year.	Not found, no further assesment or offsetting required.	Zone 1	Suitable habitat on Site.		
Kunzea rupestris *Vulnerable*	2.00	Surveyed in suitable time of year.	Not found, no further assesment or offsetting required.	Zone 1	Suitable habitat on Site.		
Lasiopetalum joyceae *Vulnerable*	2.00	Surveyed in suitable time of year.	Not found, no further assesment or offsetting required.	Zone 1	Suitable habitat on Site.		
Leucopogon fletcheri subsp. fletcheri *Endangered*	2.00	Surveyed in suitable time of year.	Not found, no further assesment or offsetting required.	Zone 1	Suitable habitat on Site.		
Melaleuca deanei Deane's Paperbark *Vulnerable*	2.00	Surveyed in suitable time of year.	Not found, no further assesment or offsetting required.	Zone 1	Suitable habitat on Site.		
Micromyrtus blakelyi *Vulnerable*	2.00	Surveyed in suitable time of year.	Not found, no further assesment or offsetting required.	Zone 1	Suitable habitat on Site.		
Myotis macropus Southern Myotis *Vulnerable*	2.00	Assumed Present	Assumed present due to suitable habitat.	Zone 1	Suitable habitat on Site.	0.3	Good
Persoonia hirsuta Hairy Geebug *Endangered*	2.00	Surveyed in suitable time of year.	Not found, no further assesment or offsetting required.	Zone 1	Suitable habitat on Site.		
Petaurus norfolcensis Squirrel Glider Vunerable	2.00	Surveyed in suitable time of year.	Not found, no further assesment or offsetting required.	Zone 1	Suitable habitat on Site.		
Phascogale tapoatafa Brush-tailed Phasogale *Vulnerable*	2.00	Surveyed in suitable time of year.	Not found, no further assesment or offsetting required.	Zone 1	Suitable habitat on Site.		
Pimelea curviflora var. curviflora Curved Rice Flower *Vulnerable*	2.00	Surveyed in suitable time of year.	Not found, no further assesment or offsetting required.	Zone 1	Suitable habitat on Site.		
Pseudophryne australis Red-crowned Toadlet *Vulnerable*	1.50	Surveyed in suitable time of year.	Not found, no further assesment or offsetting required.	Zone 1	Drainage lines on Site		
Tetratheca glandulosa Glandular Pink Bell *Vulnerable*	2.00	Not surveyed in suitable time of year, assumed present.	Assumed present due to suitable habitat.	Zone 1	Suitable habitat on Site.	0.3	Good

Table 13. Candidate Species Presence

1 Larapinta Place, Glenhaven

Step 5, 6.4.1.26-34 and Step 6. 6.4.1.35-37

					Development Site	Only in Impact Area	
Derived (Predicted) Potential Candidate Species	Biodiversity Risk Weighting	Suitability of the Time of Year Surveyed	Presence On Site or Assumed Presence or Expert Report	Vegetation Zone	Habitat Component that is Present	Area of Habitat or Count Impacted including parts of buffers of features outside impact area	Step 6: Habitat Condition in Species Polygon (Integrity Score for each Zone)
Acacia bynoeana Byones Wattle *Endangered*	2.00	Surveyed in suitable time of year.	Not found, no further assesment or offsetting required.	Zone 1	Suitable region and habitat.		
Acacia gordonii Acacia gordonii *Endangered*	2.00	Surveyed in suitable time of year.	Not found, no further assesment or offsetting required.	Zone 1	Suitable region and habitat.		
Acacia pubescens Downy Wattle *Vulnerable*	2.00	Surveyed in suitable time of year.	Not found, no further assesment or offsetting required.	Zone 1	Suitable region and habitat.		
Burhinus grallarius Bush Stone-curlew *Endangered*	2.00	Surveyed in suitable time of year.	Not found, no further assesment or offsetting required.	Zone 1	Suitable foraging and breeding habitat.		
Callistemon linearifolius Netted Bottlebrush *Vulnerable*	2.00	Surveyed in suitable time of year.	Not found, no further assesment or offsetting required.	Zone 1	Suitable habitat on Site.		
Cercartetus nanus Eastern Pygmy-possum *Vunerable*	2.00	Surveyed in suitable time of year.	Not found, no further assesment or offsetting required.	Zone 1	Suitable hollows and foraging habitat.		
Chalinolobus dwyeri Large-eared Pied Bat *Vunerable*	3.00	Assumed Present	Assumed present due to suitable habitat.	Zone 1	Large forest canopy, within 2km of potential roosting habitat.	0.36	Good
Darwinia biflora Darwinia biflora *Vulnerable*	2.00	Surveyed in suitable time of year.	Found during survey not in disturbance are, no offsetting required.	Zone 1	Suitable habitat on Site.	0	Good
Darwinia fascicularis subsp. oligantha *Endangered population*	2.00	Surveyed in suitable time of year.	Not found, no further assesment or offsetting required.	Zone 1	Suitable habitat on Site.		
Epacris purpurascens var. purpurascens *Vulnerable*	1.50	Surveyed in suitable time of year.	Not found, no further assesment or offsetting required.	Zone 1	Suitable habitat on Site.		
Eucalyptus sp. Cattai *Critically endangered*	3.00	Surveyed in suitable time of year.	Found during survey, not disturbed by the development, no offsetting required.	Zone 1	Suitable habitat on Site.	0	Good
Grevillea parviflora subsp. parviflora Small-flower grevillea	2.00	Surveyed in suitable time of year.	Not found, no further assesment or offsetting required.	Zone 1	Suitable habitat on Site.		
Grevillea parviflora subsp. supplicans *Endangered*	2.00	Surveyed in suitable time of year.	Not found, no further assesment or offsetting required.	Zone 1	Suitable habitat on Site.		
Hibbertia procumbens Spreading Guinea Flower *Endangered*	2.00	Surveyed in suitable time of year.	Not found, no further assesment or offsetting required.	Zone 1	Suitable habitat on Site.		

1 Larapinta Place, Glenhaven

Step 5, 6.4.1.26-34 and Step 6. 6.4.1.35-37

					Development Site	Only in Impact Area	
Derived (Predicted) Potential Candidate Species	Biodiversity Risk Weighting	Suitability of the Time of Year Surveyed	Presence On Site or Assumed Presence or Expert Report	Vegetation Zone	Habitat Component that is Present	Area of Habitat or Count Impacted including parts of buffers of features outside impact area	Step 6: Habitat Condition in Species Polygon (Integrity Score for each Zone)
Hibbertia superans *Endangered*	2.00	Surveyed in suitable time of year.	Not found, no further assesment or offsetting required.	Zone 1	Suitable habitat on Site.		
Hoplocephalus bitorquatus Pale-headed Snake *Vulnerable*	2.00	Surveyed in suitable time of year.	Not found, no further assesment or offsetting required.	Zone 1	Suitable habitat on Site.		
Kunzea rupestris *Vulnerable*	2.00	Surveyed in suitable time of year.	Not found, no further assesment or offsetting required.	Zone 1	Suitable habitat on Site.		
Lasiopetalum joyceae *Vulnerable*	2.00	Surveyed in suitable time of year.	Not found, no further assesment or offsetting required.	Zone 1	Suitable habitat on Site.		
Leucopogon fletcheri subsp. fletcheri *Endangered*	2.00	Surveyed in suitable time of year.	Not found, no further assesment or offsetting required.	Zone 1	Suitable habitat on Site.		
Melaleuca deanei Deane's Paperbark *Vulnerable*	2.00	Surveyed in suitable time of year.	Not found, no further assesment or offsetting required.	Zone 1	Suitable habitat on Site.		
Micromyrtus blakelyi *Vulnerable*	2.00	Surveyed in suitable time of year.	Not found, no further assesment or offsetting required.	Zone 1	Suitable habitat on Site.		
Myotis macropus Southern Myotis *Vulnerable*	2.00	Assumed Present	Assumed present due to suitable habitat.	Zone 1	Suitable habitat on Site.	0.36	Good
Persoonia hirsuta Hairy Geebug *Endangered*	2.00	Surveyed in suitable time of year.	Not found, no further assesment or offsetting required.	Zone 1	Suitable habitat on Site.		
Petaurus norfolcensis Squirrel Glider Vunerable	2.00	Surveyed in suitable time of year.	Not found, no further assesment or offsetting required.	Zone 1	Suitable habitat on Site.		
Phascogale tapoatafa Brush-tailed Phasogale *Vulnerable*	2.00	Surveyed in suitable time of year.	Not found, no further assesment or offsetting required.	Zone 1	Suitable habitat on Site.		
Pimelea curviflora var. curviflora Curved Rice Flower *Vulnerable*	2.00	Surveyed in suitable time of year.	Not found, no further assesment or offsetting required.	Zone 1	Suitable habitat on Site.		
Pseudophryne australis Red-crowned Toadlet *Vulnerable*	1.50	Surveyed in suitable time of year.	Assumed present due to suitable habitat.	Zone 1	Drainage lines on Site		
Tetratheca glandulosa Glandular Pink Bell *Vulnerable*	2.00	Not surveyed in suitable time of year, assumed present.	Assumed present due to suitable habitat.	Zone 1	Suitable habitat on Site.	0.3	Good

Table 11. Non-threatened Fauna Found

Common Name	Scientific Name	Evidence	Date
Birds			
Australian Owlet Nightjar	*Aegotheles cristatus*	Camera 4	27/12/18
Common Bronzewing	*Phaps chalcoptera*	Observed	20/12/18
Crested Pigeon	*Ocyphaps lophotes*	Observed	20/12/18
Eastern Koel	*Eudynamys orientalis*	Observed	20/12/18
Little Wattlebird	*Anthochaera chrysoptera*	Observed, Camera 4	20-27/12/18
Magpie-lark	*Grallina cyanoleuca*	Observed	20/12/18
Rainbow Lorikeet	*Trichoglossus haematodus*	Observed, Camera 2	25/12/18
Red Wattlebird	*Anthochaera carunculata*	Observed, Camera 7	24/12/18
Mammals			
Common Ringtail Possum	*Pseudocheirus peregrinus*	Nest, Observed Camera 1	20/12/18
Rabbit*	*Oryctolagus cuniculus*	Observed	20/12/18
Short-beaked Echidna	*Tachyglossus aculeatus*	Diggings	20/12/18
Swamp Wallaby	*Wallabia bicolor*	Observed	20/12/18
Reptiles			
Eastern Water Dragon	*Physignathus lesueurii*	Observed	27/12/2018

*Introduced species

Legend

- 1 Larapinta Pl, Property
- Threatened Plant, Darwinia biflora
- Critically Endangered Plant, Eucalyptus sp. Cattai
- Creek
- Old Quarry Pond
- Camera Traps

Action

- Tree to Keep
- Tree to be Removed
- Vegetation Zone 1, 3721sqm
- Hornsby Enriched Sandstone Exposed Woodland PCT 1782
- Habitat: Lrg Ear Pied Bat, Sth Myotis and Tetratheca glandulosa
- Development Site 11,700sqm

Prescribed Impacts
Red-crowned Toadlet on sandstome rock benches
Throughout northern partr of property

Aerial Photograph
Dated: 2018

Figure 4.2
Threatened Species Survey, Habitat and Perscribed Impact Features

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by Nicholas Skelton

Date: 31/01/2019

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Stage 2: Impact Assessment

5 Avoid and Minimisation of Impacts

5.1 Steps Taken to Avoid and Minimise Ecological Impact

The need to Avoid and Minimise is a consideration the consent authority needs to take into consideration when assessing Site Suitability in s79C (now s 4.15).

The Biodiversity Conservation Act 2016 and Biodiversity Conservation Regulation (2017) require that all developments "Avoid" then "Minimise" ecological impacts.

Chapter 8 of the BAM requires that the measures that were taken to Avoid and Minimise are documented.

The *Biodiversity Conservation Act 2016* (s 7.13(6)) allows the consent authority discretion over what measures are required in relation to avoiding and minimising impacts.

Once all possible impact minimisation and avoidance has been undertaken, then offsetting can be used to mitigate the residual impacts of the proposal on the environment. This report describes ecological constraints on this site that were provided to the planning team for the use in planning and to avoid and minimise the impacts.

The main ecological constraints that have been identified at the site are the

- The Critically Endangered *Eucalyptus sp. Cattai*
- The native vegetation in the northern part of the site that is habitat to a range on Threatened and non-threatened fauna.
- Hollow bearing habitat trees.
- Downslope and adjacent (outside of site) ecological value such and bushland habitat, waterbodies (quarry) and creeks and Threatened species (*Darwinia biflora*)

Table 12. Steps Taken to Avoid and Minimise Impact

Avoid and Minimise	Outcome	Timing	Participants
Locate the building in the most disturbed part of the site that contains a existing building	Avoid impact from building to the native vegetation and Threatened species in the northern part of the site. Area still impacted by APZ	DA Design	Architect/Planner
Fencing and protecting the area around the Threatened species Eucalyptus sp. Cattai	Avoid impact to Threatened sp. Eucalyptus sp. Cattai and minimise impact to bushland from APZ	DA Design, to be protected in the long-term	Ecologist
Retain some natives and remove weeds from within northern part of APZ	Minimise impact to native vegetation within APZ.	DA Design, to be managed as bushland habitat in the long-term	Ecologist and Bushfire Consultant
Leaky wall nutrient retention wetland for nutrient trapping along eastern boundary, shown on Landscape Plan (21/01/19)	Trap nutrient runoff from the developed areas to prevent them entering the bushland and Threatened species habitat in northern part of site	DA Design, to be established during construction and managed in the long-term	Ecologist and Landscaper
500mm edge to define edge of cultivated area shown on Landscape Plan (21/01/19)	Prevent sediment and nutrients from entering bushland habitat in northern part of site.	DA Design , to be established during construction and managed in the long-term	Ecologist, Landscaper and builder
Locate onsite sewerage disposal area outside of important habitat	Minimise impact to bushland and Threatened species habitat	DA Design	Hydrologic Engineer

Recommendations have been made in Part 3 of this report to further minimise the ecological impact from the proposal.

The northern part of the property that is outside of the site, will not be directly or indirectly impacted by the proposal. There is potential to make this part of the property a Stewardship Site.

Avoiding Impact to the Vegetated Riparian Zone

5.2 Residual Direct and Indirect Impacts

Table 13. Summary of Residual Direct and Indirect Impacts

Type	Frequency	Intensity	Duration	Consequence
Construction on a new Mosque building with an underground carpark	Once, during construction	Med	Impact permanent	Will remove 39 native trees include 10 trees with hollows see section 5.2.1
Asset Protection Zone Across the whole of Development Site	During Construction	Med	To be established during construction and managed as fuel reduced in the long-term.	Likely removal of additional native trees and shrubs from northern part of the site. see section 5.2.1
Landscaping See section 5.2.2	During construction	Low	Impact permanent	Landscaping will occur outside of native vegetation and Threatened species in the northern part of the site.
Onsite Sewage Disposal Area See section 5.2.3	During construction	Low	Impact permanent	Sewage disposal area located outside of bushland, impact from excess nutrients low due to Leaky Wall Nutrient Restation Wetland in north-eastern part of the site.

5.2.1 Vegetation Loss

There is approximately 3721m^2 of Hornsby Enriched Sandstone Exposed Woodland (PCT 1782) on the site. This native vegetation has a patchy condition but the majority has had some level of disturbance in the past.

The proposed new building, carpark, sewerage disposal area and landscaping will not remove any of this native vegetation as they occur in the southern part of the site.

3010m^2 of the HESEW will be impacted by the proposed Asset Protection Zone (APZ) that encompasses the entire site. The APZ will be established by removing weeds and exotic first and then native only if required. The establishment of the APZ will require the removal of native shrubs and likely native trees. The soil, logs and natural sandstone rock features in the APZ can be retained and leaf litter and dead material removed by hand. A 711m^2 area around the Threatened *Eucalyptus sp. Cattai,* will be fenced and protected and will not form part of the APZ.

The southern part of the site contains scattered remnant native trees and some shrubs that do no represent an native vegetation community. These scattered remnant native species will be impacted by the proposed building, carpark and landscaping. See section 5.2.2 below for tree loss.

5.2.2 Tree Loss

The Arborist Report (Bradley Magus, 04/06/18) identified 65 trees in the southern part of the site. The northern bushland part of the site contains many more trees that are not listed in the Arborist Report. The trees listed in the Arborist Report contain a mixture of native remnant (such as *Eucalyptus haemastoma, Glochidion ferdinandi* and *Angophora floribunda*) and exotics (such as *Jacaranda mimosifolia*). The Arborist Report

The trees to be removed by the proposed building, carpark, sewerage disposal and landscaping is shown on the Landscape Plan (21/01/19). The Landscape Plan shows 39 trees (both native and exotic) to be

removed in the southern part of the site. Trees 8, 31, 32, 34, 35, 36, 38 and 41 are shown to be retained on the Landscape Plan (shown with tree numbers).

5.2.3 Hollows

Tree hollows were found in the trees numbered 26, 22, 18, 15, 16, 17, 21, 31, 37, 38, 60 and 59. There may be many more hollows not visible from the ground. There were also many hollows recorded in trees in the northern part of the site that was no surveyed by the arborist and do not have tree numbers.

The hollows in trees 31 and 38 are shown as being retained on the Landscape Plan. All other hollows in the numbered trees in the southern part of the site will be removed.

It is recommended that hollow bearing trees in the northern part of the site be marked onsite by the Site Ecologist prior to the establishment of the APZ, and be given preference for retention in the APZ.

It is recommended that dead hollow bearing trees be retained where possible as they have a high habitat value.

5.2.4 Impact to Threatened Species and their Habitat

The vegetation to be removed is suitable foraging or breeding habitat for several Threatened fauna species (ecosystem credit species). The Ecosystem Credits species and Species Credit Species (flora and fauna) are listed in Table 10, 11 and 12.

Candidate Species

Eucalyptus sp. Cattai

The northern part of the site **contains 8 stems** that are the Critically Endangered Eucalyptus sp. Cattai. These stems will be permanently fenced and protected and will not be part of the APZ. They will not be directly or indirectly impacted by the development and will not require offsetting.

Large Eared Pied Bat

The HESEW to be impacted by the APZ is potentially foraging habitat to the Large Eared Pied Bat. The proposal will partially remove 0.3ha of this foraging habitat for this species. The retention of some trees within the APZ will retain some foraging habitat value for the Large Eared Pied Bat. There are large areas of similarly suitable habit north of the site. The site does not contain any potential roosting or breeding habitat for the Large Eared Pied Bat.

Southern Myotis

The site does not contain any suitable foraging habitat for the southern Myotis. It does contain hollow bearing trees that are within 200m of a creekline (Dooral Dooral Creek north of the site) that are potential roosting habitat. The number of hollows to be impacted within Vegetation Zone 1 is unknown and therefore the entire zone will be offset.

Tetratheca glandulosa

The northern part of the site contains suitable habitat for the Threatened plant *Tetreatheca glandulosa.* No *Tetratheca glandulosa* plants were observed during the surveys, however the site was not surveyed during the flowering season, and as they are hard to identified when not in flower it is possible that they occur at the site. It is recommended that prior to the establishment of the APZ the site is resurveyed for the presence of *Tetratheca glandulosa* during the suitable time of year (Jul-Nov).

Darwina biflora

A population of the Threatened plant *Darwina biflora* **was observed** in the bushland north of the site (northern part of property. This area will not be impacted by this proposal and therefore this species does not require any offsetting. This part of the property has the potential to become a Stewardship Site in the future.

5.2.5 Potential Indirect Impacts

The Leaky Wall Nutrient Retention Wetland will reduce the amount of nutrients and sediment entering the bushland and Threatened species habitat in the northern part of the site.

5.2.6 Prescribed Biodiversity Impacts

Prescribed Biodiversity Impacts are impacts in addition to native vegetation clearing and can be sued by the determining authority to make Condition of Consent, add credits or refuse an application.

Prescribed Biodiversity Impact are described in section 6.7 of the BAM and include impact to cliffs, Karsts, caves, rocks, manmade structures, non-native vegetation, waterbodies & hydrological processes, connectivity features, wind turbine strikes and vehicle strikes. Prescribed Impacts are assessed in Table 17 below.

Table 14. Identificaton and Assessment of Prescribed Impacts

1 Larapinta Place, Glenhaven

This table addresses section 9.2 of the BAM.

OEH species profile and TBDC were used to assess the impact on the species.

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Feature	Present	Prescribed Impact on Site	Species Likley to use Habitat	Importance of Habitat	Nature, Extent and Duration of Impacts	Prediction of Consequences of Impact	Justification of Prediction
Karst, caves, crevices, cliffs or other geologically significant feature	No	No karsts, caves, crevices, cliffs or other geologically significant features are present on the site. A cliff is present, adjacent to the Site, within the property but will not be affected as part of the development and is not assessed in this report.	See section 9.2.1.1 of the BAM.	See section 9.2.1.1 of the BAM.	See section 9.2.1.1 of the BAM.	See section 9.2.1.1 of the BAM.	See section 9.2.1.1 of the BAM.
Rocks	Yes	Rock boulders and exposed bedrock shelving occur throughout the site. See Figure 4.2.	Red-crowned Toadlet.	The rock outcrops provide important sheltering habitat for the Red-crowned toadlet that is known to shelter under rocks and amongst dense vegetation or thick piles of leaf litter.	The exposed bedrock that occur on the Site are scattered throughout the APZ. No rocks occur in the building footprint or landscape areas.	The exposed bed rock on the Site only occurs in the APZ. Areas of exposed bedrock on the Site will not be impacted by this proposal and will remain as areas of intact habitat for the Red-crowned toadlet.	No justification required.
Human-made structure	No	There is no man-made structures present on the site.	See section 9.2.1.3 of the BAM.	See section 9.2.1.3 of the BAM.	See section 9.2.1.3 of the BAM.	See section 9.2.1.3 of the BAM.	No justification required.
Non-native vegetation	No	There is no non-native vegetation on the site.	See section 9.2.1.4 of the BAM.	See section 9.2.1.4 of the BAM.	See section 9.2.1.4 of the BAM.	See section 9.2.1.4 of the BAM.	No justification required.
Hydrological process sustaining/interacting with rivers, streams or wetlands and water bodies and water quality	No	Waterbodies and seepage lines occur on the property but not within the Development Site. They will not be impacted by the development.	See section 9.2.1.5 of the BAM.	See section 9.2.1.5 of the BAM.	See section 9.2.1.5 of the BAM.	See section 9.2.1.5 of the BAM.	No justification required.
Wind farm development	No	There is no windfarm present on the site.	See BAM section 9.2.1.8 of the Bam	See BAM section 9.2.1.8 of the Bam	See BAM section 9.2.1.8 of the Bam	See BAM section 9.2.1.8 of the Bam	No justification required.
Connectivity	Yes	See section 2.7 of this document for a description of the connectivity features on the site.	All candidate species (see table table 12).	The Site has medium wildlife corridor value and good east-west corridor value. See Figures 1.1 and 1.2. The bushland in the northern part of the Site is connected to Holland Park, a large patch of bushland to the north, via remnant bushland on adjacent properties to the north and east. The site is	As part of the proposal there will be xx trees removed within the development footpint and xx are of vegetation thinned for the APZ. A Threatened Tree Protection Are will be included in the proposal and will likely increase the connectivity and habitat value of the area.	The Development Footprint will occur within the already disturbed area of the property. The removal of the small number of trees and thinning of the vegetation for the APZ is not likely to impact the value of the corridor on the Site. The building footprint occurs within the already disturbed area on the propoerty so the large area of natuve vegetation will remain intact. A Threatened Tree Protection Are will be included in the proposal and will likely increase the connectivity and habitat value of the area.	No Justification required.
Migration	No	The site is not a known habitat for migrating species.	See section 9.2.1.6 of the BAM.	See section 9.2.1.6 of the BAM.	See section 9.2.1.6 of the BAM.	See section 9.2.1.6 of the BAM.	No Justification required.
Vehichle stikes (Road Proposals)	No	The DA is not for a road proposal and vehicle strikes are not an impact. See BAM section 9.2.1.9 of the Bam	See BAM section 9.2.1.9 of the Bam	See BAM section 9.2.1.9 of the Bam	See BAM section 9.2.1.9 of the Bam	See BAM section 9.2.1.9 of the Bam	No Justification required.
Other	No	No other habitat features occur on the site	No additonal prescribed impacts identified	No additonal prescribed impacts identified	No additonal prescribed impacts identified	No additonal prescribed impacts identified	No Justification required.

6 Impact Summary

6.1 Potential SAII Serious And Irreversible Impacts

A guide to assist a decision-maker to determine a serious and irreversible impact (OEH Aug 2017) lists 5 steps to determine whether an impact is classified as a potential Serious and Irreversible Impact (SAII).

Step 1. Identify Relevant Potential Entities

Potential SAII entities are species or ecological communities that meet the criteria in Appendix 1 of the Guide. Appendix 2 of the guide lists some potential entities that are considered to meet the criteria

The potential listed SAII entities that are relevant to this development include:

- Eucalyptus sp. Cattai
- Large Eared Pied Bat (breeding habitat)
- No additional SAII entities are likely to be affected by the proposal

Step 2. Evaluate the nature of Impact on a Potential Entity

These are potential residual impacts on Potential Entities after steps have been taken to avoid and mitigate impact.

- There will be no impact to the Eucalyptus sp. Cattai on the site.
- Impact to 3010m^2 of potential Large Eared Pied Bat foraging habitat but no impact to roosting or breeding habitat.

Step 3. Determine if Impacts Exceed Threshold

Impact assessment information from steps 1 and 2 can be compared to the impact threshold for the SAII entity. Impact thresholds are for potential SAII entities are in the Threatened Biodiversity Data Collection (not yet available).

- The proposal will not impact Large Eared Pied Bat breeding habitat and is therefore not considered to be an SAII for this entity.
- The proposal will not impact the Eucalyptus sp. Cattai on the site and is therefore not considered to be and SAII for this entity

Steps 4 and 5 *are for the decision-maker to decide whether they consider the potential SAII to be a SAII and the steps required to be undertaken once that decision has been reached.*

6.2 Impacts Requiring Offset

Table 15. Impacts to Vegetation and Ecosystem Credit

PCT	Vegetation Zone	Existing Integrity Score	Management Zone	Area of Impact	Future Integrity Score
1782	1-HESEW	58.7	MZ1 (APZ_	0.3ha	33.1 (Partial Impact)
1782	1-HESEW	58.7	MZ2 (TTPA)	0.07	58.7 (No Impact)

6.2.1 Justification for future integrity scores

Management Zone 1- Asset Protection Zone

The future integrity score for, Management Zone 1 is based on partial removal of the native vegetation for the establishment and ongoing maintenance of the bushfire APZ. No parts of Management Zone 1 will be completely removed. The future integrity score was calculated using the specifications in the RFS Planning for Bushfire Protection (Standards for Asset Protection Zones) by reducing the shrub cover to 0 and the tree canopy cover to 20%. The leaflitter cover was reduced to 10%. The groundcover and logs was not reduced. There is to be concrete block wall edging and temporary environment protection fencing along the southern extent of Management Zone 1 to protect the bushland during construction and from any sediment and nutrients from the developed site.

Management Zone 2- Threatened Tree Protection Area

The integrity score in Management Zone 2 will not change as it is not proposed to be impacted by the proposal. This area will be permanently fenced prior to the establishment of the APZ and all native species, including the Threatened Eucalyptus sp. Cattai will be retained and protected. The soil or leaflitter in this area will not be disturbed. There will be ongoing monitoring of this area during construction to ensure that there is no damage to the Threatened species or native species. A proposed Leaky Wall Nutrient Retention Wetland upslope from the Threatened Tree Protection Area, will reduce the risk of potential indirect impacts from nutrients and sediment.

The adjustment of integrity scores was done by an ecologist with 25 years of experience with experience in this vegetation type and this type of development.

There is a Biodiversity Management Plan (GIS Environmental Consultants Dec 18) that describes in detail the required during construction amelioration measures.

Species Credit Species	Associated Vegetation Zone	Total Area of Impact or Count
Large-eared Pied Bat	Zone 1	0.3ha
Southern Myotis	Zone 1	0.3ha
Tetratheca glandulosa	Zone 1	0.3ha

Legend

- Creek
- Old Quarry Pond

Action

- Tree to Keep
- Tree to be Removed

Habitat: Lrg Ear Pied Bat, Sth Myotis and Tetratheca glandulosa

- **Habitat Impacted, Requires Offsetting**
- **No loss of Habitat, No Offset**
- Management Zone 1, Fuel Reduced, To Be Offset 3010sqm
- Management Zone 2, T Tree Protection Area No Impact 711sqm
- Development Site 11,700sqm

Prescribed Impacts
Red-crowned Toadlet on sandstome rock benches
Throughout northern partr of property

Aerial Photograph
Dated: 2018

Figure 6.1
Impact to be Offset

GIS Environmental Consultants
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ecology@ecology.net.au, ecology.net.au

by Nicholas Skelton

Date: 31/01/2019

1:830 at A3

0 5 10 20 Meters

N

6.3 Impacts Not Requiring Offsetting

Impacts that do not require offsetting include parts of the site that have native vegetation but the integrity score is less than the following minimum requirements;

- An integrity score of 15 where the PCT is representative of an Endangered or Critically Endangered Ecological Community
- An integrity score of 17 if the PCT is associated with Threatened species habitat (for ecosystem credit species) or is representative of a Vulnerable Ecological Community.
- An integrity score of 20 if the PCT is not representative of a TEC or Threatened species habitat.

The vegetation zone in the Development Footprint is within Hornsby Enriched Exposed Sandstone Woodland that has an integrity score above the minimum integrity score of 17 for a non-Threatened PCT that is Threated species habitat and therefore both require offsetting.

6.4 Areas Not Requiring Assessment

The Development Site does not include any Bio certified Land.

The southern part of the Development Site is disturbed and does not contain native vegetation and does not require assessment.

6.5 Mitigating prescribed biodiversity impacts

6.6 Additional Impacts and Indirect Impacts that are not Offset

The southern part of the site is not classified as a native vegetation community and any impacts to this area are not offset in the BAM calculator. Impacts to this area includes removal of 39 trees (both native and exotic), including the removal of 10 hollow bearing trees. It is recommended that the removal of hollows be offset with suitable nesting boxes at a ratio of 2:1 to be installed throughout the property.

There are not likely to be any potential indirect impacts from excess nutrient or sediment due to the proposed Leaky Wall Nutrient Retention Wetland and concrete edging.

The assessment of **Prescribed Impacts** is in Table 17 of this report.

6.7 Environment Protection and Biodiversity Conservation Act 1999

The Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) would only be relevant if the proposal was to be or impact a Matter of National Environmental Significance (MNES), thus triggering referral to the Federal Department of the Environment and Water Resources.

A Protected Matters search was conducted within a 10km radius of the site. A Protected Matters search is a broad scale assessment that includes World Heritage Properties, National Heritage Places, Wetlands of International Importance, Great Barrier Reef Marine Park, Commonwealth Marine Areas, Listed Threatened Ecological communities, Listed Threatened Species and Listed Migratory Species. The only relevant categories to this report are Threatened species, Threatened Ecological Communities and Migratory species.

The report lists the following ecologically relevant items:

- 8 Threatened Ecological Communities
- 45 Threatened species
- 16 Migratory Species

Most of the migratory and aquatic bird species, as well as the fish, sharks and marine mammals are not assessed in this report. This report addresses terrestrial species, which are likely to have potential habitat on the site.

The EPBC Act Threatened species that have potential habitat onsite have been assessed under BC Act criteria in this Flora and Fauna Impact Assessment report. The assessments concluded that no significant impacts are likely to occur to those species as a result of the proposal and a similar conclusion was also reached after consideration of the Commonwealth criteria. The vegetation on the site does not meet the definition of any EEC under the EPBC Act.

It is recommended that this proposal (see Figure 6) does not need to be referred to Environment Australia.

7 Offsets

7.1 BOS Offset Credits Required

Biota	Required Total Credits	Offset Cost inc GST
Ecosystem Credits		
PCT 1083, Red Bloodwood – Scribbly Gum Heathy Woodland on Sandstone Plateaux	3	$23,690
Species Credits		
Large Eared Pied Bat	5	$5196
Tetratheca glandulosa	3	$212
Southern Myotis	3	$3,118
	Total	**$34,214**

Stage 3. Ameliorative Conditions & Recommendations

7.3 Specifications for Conservation Management Areas

7.3.1 Threatened Tree Protection Area (TTPA)

The clump of stems of the Threatened species Eucalyptus sp. Cattai is of very high ecological importance and is to be retained and conserved by fencing, sign posting and protection from changes to water flow, sediment, weeds and nutrients. This area will not be managed as part of the Asset Protection Zone.

- There should be no clearing or disturbance of native vegetation, soil, leaf litter or rocks within this area.
- The area of habitat around this species on the site is to permanently fenced prior to the establishment of the Asset Protection and clearly signposted with permeant metal A4 sized signs to inform users of the site regarding the importance of these plants and the finds for harming the habitat. The Site Ecologist is to supervised the installed of the protection fencing.
- There is to be no dumping of fill or materials in this area.
- There is to be access to this area during construction.
- Existing adjacent uphill fill is to be retained by a concrete block wall and any new fill is to be fully retained with water flow diverted to the Leaky Wall Nutrient Retention Wetland.
- Measures should be put in place to ensure that no runoff from the uphill areas enters the habitat of this species.
- The habitat around this species is to be manged as weed free bushland. Weed control is to occur in this area every 6 months and is to be conducted by qualified Bush Regenerators. Weed control is achieve a percentage foliage cover of <5% weed cover.
- The Threatened Tree Protection Area is to be monitored every 3 months by the Site Ecologist during construction.
- It is likely there is funding to assist with the conservation of these plants on this site.
- If the bushland and these trees are to be part of a Stewardship Site it is likely that more than $300,000 and annual payments can be obtained.

7.3.2 Asset Protection Zone

- The Asset Protection Zone on the site will be separated into the northern part of the site that will also be bushland habitat and the southern part that will be landscaped gardens.
- The northern bushland part of the APZ and the southern landscaped part of the APZ will be separated by concrete block wall edging that will be 500mm above the finished soil level on the southern side.
- The APZ may be able to be achieved by the following actions adapted from Standards for Asset Protection Zones (NSW Rural Fire Service) for establishing and maintaining an APZ:

1. Raking or manual reduction of fine fuels in the APZ part of the site only

Ground fuels such as fallen leaves, twigs (less than 6 mm in diameter) and bark should be reduced on a regular basis. This flash fuel burns quickly and increases the intensity of a fire. Fine fuels should be removed by hand. Fine fuel does not include logs or hollows. The leaf litter reduction is not to expose bare earth that may lead to erosion and weed invasion. This does not apply to the southern part of the site that is to be retained as bushland; or,

2. mowing or grazing of grass in the southern APZ

Where there is lawn, the grass needs to be kept short and, where possible, green. This only applied to previously cleared areas (southern part of the site) and not to intact bushland. This does not apply to the northern part of the site that is to be maintained as bushland habitat; or,

3. removal or pruning of trees, shrubs and understorey in APZ part of the site only

.The control of existing vegetation involves both selective fuel reduction (removal, thinning and pruning) and the retention of vegetation. Prune or remove trees so that you do not have a continuous tree canopy leading from the hazard to the asset. This can be achieved by separating tree crowns by two to five metres, tree canopy should not overhang within two to five metres of a dwelling. Native trees and shrubs can be retained as clumps or islands and can maintain a covering of up to 20% of the area. All weeds are to be removed then there is to be removal of dead material then thinning of native vegetation if necessary to meet the fuel load requirements.

- There is to be construction access (including by vehicles, machinery or builders) to the northern bushland part of the Asset Protection Zone.
- There is to be no dumping of fill in the northern part of the Asset Protection Zone or north of the proposed carpark.
- The establishment and management of the northern part of the Asset Protection Zone by qualified Bush Regenerators.
- Hollow bearing tree within the APZ should be marked prior to the establishment of the APZ and be given preference for retention.
- No Threatened species are to be removed when establishing and maintaining the APZ
- All weeds are to be removed every three months during then every 6 months following construction by qualified bush regenerators. Weed control is to achieve foliage cover of <5% weed cover.
- The northern extent of the Asset Protection Zone is to be delineated by permeant marker poles. The marker poles are to be 1.8m star pickets and are to be placed every 5m along the northern boundary of the APZ. There is to be a permanent metal sign on every second pole. The signs are to face towards the new building (south) and are to inform people that the Asset Protection Zone does not extend any further north.
- There is to be temporary environment protection fencing during construction between the northern and southern parts of the APZ (see Figure 1.4), to prevent construction access to the northern part of the site. The fencing is to be in place for the entire length of construction.

7.4 Other Environment Protection and Management Measures

- There is to be and edging masonry wall to delineate the southern boundary of the bushland part of the site (see Figure 1.4) and to prevent weeds, sediment and nutrients from entering the environmentally sensitive bushland area that is downslope. The edging wall is to be a concrete block wall with a minimum height of 500mm above the finished soil level on the southern side of the wall.

- Trees containing hollows should be retained where possible. Should hollows require removal, they should be replaced with suitable nesting boxes at a ratio of 1:2. The nesting boxes should be installed on the property prior to tree removal. It is recommended that the installation of the nesting boxes should be supervised by an ecologist

7.4.1 Leaky Wall Nutrient Retention Wetland

- There is to be a leaky wall dam with aquatic macrophyte reed vegetation to improve the water quality leaving the developed area.
- The Leaky Wall Nutrient Retention Wetland is not for storing water, it will only contain water for a day or two after rain. The water will leak or filter out of the structure.
- The Leaky Wall Nutrient Retention Wetland is to be constructed in the location shown on the map in Figure 1.4.
- The Leaky Wall Nutrient Retention Wetland **is for treatment of water from the; first flush roof water, above ground and underground carparks and landscaped area**.
- The Leaky Wall Nutrient Retention Wetland is **not** for the high volume of roof water from the which is clean and is to be piped to below the leaky wall wetland to be discharged directly into the bushland. If it is piped into the wetland it will destroy the wetland.
- The wetland is to constructed with agricultural pipe at the base with 300mm of course gravel(not blue metal gravel) then a Geotech fabric then 150mm of sand. The outside of the wetland and the lowest line is to be lined with300-500mm sandstone boulders. The lower end of the wetland is to have a wall to detin water until the wetland is full but allow excess overflow to not scour.

- Jute matting must be laid out over the entirety of the wetland and pinned down with 300mm pins every 400mm. The jute matting must not contain plastic/nylon scrim.
- The Leaky Wall Nutrient Retention Wetland is to be planted out, at a density of 5 plants per square metre, with the species shown in the table below.
- Each species must be distributed across the wetland.
- Watering will be required regularly for 3 months until the plants are established and during droughts
- If plants die, they must be replanted to the density of 5 plants per square metre.

Planting list for Leaky Wall Nutrient Retention Wetland

Genus and Species	Family	Habit	Common Name
Baumea rubiginosa	CYPERACEAE	Rush	Soft Twig-rush
Bolboschoenus fluviatilis	CYPERACEAE	Rush	Club-rush
Carex appressa	CYPERACEAE	Sedge	Sedge
Caustis flexuosa	CYPERACEAE	Sedge	Curly Wig
Caustis recurvata	CYPERACEAE	Sedge	
Dianella caerulea	PHORMIACEAE	Herb	Blue Flax-lily
Gahnia clarkei	CYPERACEAE	Sedge	Saw Sedge
Ficinia nodosa	CYPERACEAE	Rush	Knobby Club-rush
Juncus kraussi	JUNCACEAE	Rush	Sea Rush
Juncus usitatus	JUNCACEAE	Rush	Common Rush

7.5 Ongoing Management

- Weed control is to be carried out across the property to improve habitat and wildlife corridor value, reduce the medical conditions caused by weeds and to improve aesthetics. The presence of weeds in an area decreases the aesthetic and habitat value of the study area as weeds compete with the native plants and cause medical problems such as asthma, hay fever, allergies, ticks and the dense vegetation creates a fire hazard. The sight of weeds also decreases the perception of an areas value. Landowners are required by the Biosecurity Act to control weeds on their land. Weed level control is achieve a percentage foliage cover of less than 5%.
- No environmental weeds are to be planted in any part of the property.
- There should be no lighting directed into the bushland habitat, any path lighting should be low intensity and only directed down.
- No pesticides or insecticides are to be used on the property as they are harmful to native flora and fauna species. There is to no rat baiting outside of buildings.

8 References

Australian Standard 4970 – 2009 Protection of Trees on Development Sites

Benson, D. & McDougall, L. (1993) Ecology of Sydney Plant Species Part 1: Ferns, fern-allies, cycads, conifers and dicotyledon families Acanthaceae to Asclepiadaceae. *Cunninghamia* 3(2): 257-422.

Cropper, S.C. (1993) Management of Endangered Plants CSIRO Publications, East Melbourne.

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DEC 2006, Recovery Plan for Large Forest Owls.

Gibbons, P. and Lindenmayer, D. (2002), *Tree Hollows and Wildlife Conservation in Australia*. CSIRO Publishing

Morrison D. A. and Davies S. J. 1991. Acacia, in G. J. Harden (Ed.) Flora of New South Wales, Volume 2: 327-392. New South Wales University Press, Kensington.

The Native Vegetation of the Sydney Metropolitan Area Version 3 2016, Volume 2, Office of Environment and Heritage (OEH)

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NSW Rural Fire Service, 2006, Planning for Bushfire Protection, A Guide for Councils, Planners, Fire Authorities and Developers

9 Appendices

Appendix A: BAM Calculator Reports

Biodiversity payment summary report

Assessment Id	Payment data version	Revision number	Report created
00013533/BAAS17083/19/00013534	41	0	31/01/2019

PCT list

Include	PCT common name	Credits
Yes	**1083 -** Red Bloodwood - scribbly gum heathy woodland on sandstone plateaux of the Sydney Basin Bioregion	3

Species list

Include	Species	Credits
Yes	***Chalinolobus dwyeri*** (Large-eared Pied Bat)	5
No	***Eucalyptus sp. Cattai*** (Eucalyptus sp. Cattai)	0
Yes	***Myotis macropus*** (Southern Myotis)	3
Yes	***Tetratheca glandulosa*** (Tetratheca glandulosa)	3

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

Biodiversity payment summary report

IBRA sub region	PCT common name	Baseline price	Dynamic coefficient	Market coefficient	Risk premium	Administrative cost	Methodology adjustment factor	Price per credit	No. of ecosystem credits	Final credits price
Yengo	**1083 -** Red Bloodwood - scribbly gum heathy woodland on sandstone plateaux of the Sydney Basin Bioregion **Note: This PCT has trades recorded**	$5,533.98	0.84551880	1.36679147	24.87%	$20.00	1.0000	$7,179.07	3	$21,537.22

Subtotal (excl. GST)	**$21,537.22**
GST	**$2,153.72**
Total ecosystem credits (incl. GST)	**$23,690.94**

Species credits for threatened species

Species profile ID	Species	Threat status	Price per credit	Risk premium	Administrative cost	No. of species credits	Final credits price
10157	***Chalinolobus dwyeri*** (Large-eared Pied Bat)	Vulnerable	$816.33	24.8700%	$20.00	5	$5,196.76
10549	***Myotis macropus*** (Southern Myotis)	Vulnerable	$816.33	24.8700%	$20.00	3	$3,118.05
10798	***Tetratheca glandulosa*** (Tetratheca glandulosa)	Vulnerable	$40.82	24.8700%	$20.00	3	$212.92

Subtotal (excl. GST)	**$8,527.73**

Biodiversity payment summary report

	GST	**$852.77**
Total species credits (incl. GST)		**$9,380.50**
	Grand total	**$33,071.44**

BAM Biodiversity Credit Report (Variations)

Proposal Details

Assessment Id
00013533/BAAS17083/19/00013534

Proposal Name
Larapinta Place Glenhaven

BAM data last updated *
04/01/2019

Assessor Name
Nick Skelton

Assessor Number
BAAS17083

BAM Data version *
6

Proponent Name(s)

Report Created
31/01/2019

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

Candidate Serious and Irreversible Impacts

Nil

Nil

Additional Information for Approval

PCTs With Customized Benchmarks

No Changes

Predicted Threatened Species Not On Site

BAM Biodiversity Credit Report (Variations)

Name
Haliaeetus leucogaster / White-bellied Sea-Eagle
Pandion cristatus / Eastern Osprey

Ecosystem Credit Summary

PCT	TEC	Area	Credits
1083-Red Bloodwood - scribbly gum heathy woodland on sandstone plateaux of the Sydney Basin Bioregion	Not a TEC	0.4	3.00

Credit classes for 1083	**Like-for-like options**			
	Any PCT in the below Class	And in any of below trading groups	Containing HBT	In the below IBRA subregions
	Sydney Coastal Dry Sclerophyll Forests (including PCT's 1083, 1138, 1156, 1181, 1183, 1250, 1253, 1619, 1620, 1621, 1623, 1624, 1625, 1627, 1632, 1636, 1638, 1642, 1643, 1681, 1776, 1777, 1778, 1780, 1782, 1783, 1785, 1786, 1787)	Sydney Coastal Dry Sclerophyll Forests - < 50% cleared group (including Tier 7 or higher).	Yes	Yengo,Cumberland, Hunter, Kerrabee, Pittwater, Wollemi and Wyong. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	Variation options			
	Any PCT in the below Formation	And in any of below trading groups	Containing HBT	In the below IBRA regions/subregions

	Dry Sclerophyll Forests (Shrubby sub-formation)	Tier 7 or higher	Yes (including artificial)	IBRA Region: Sydney Basin, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Species Credit Summary

Species	Area	Credits
Chalinolobus dwyeri / Large-eared Pied Bat	0.3	5.00
Eucalyptus sp. Cattai / Eucalyptus sp. Cattai	0.0	0.00
Myotis macropus / Southern Myotis	0.3	3.00
Tetratheca glandulosa / Tetratheca glandulosa	0.3	3.00

Chalinolobus dwyeri/ Large-eared Pied Bat	1083_Good	**Like-for-like options**		
		Only the below Spp	In the below IBRA subregions	
		Chalinolobus dwyeri/Large-eared Pied Bat	Any in NSW	
		Variation options		
		Any Spp in the below Kingdom	Any species with same or higher category of listing under Part 4 of teh BC Act showb below	In the below IBRA subregions

		Fauna	Vulnerable	Yengo,Cumberland, Hunter, Kerrabee, Pittwater, Wollemi and Wyong. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Eucalyptus sp. Cattai/ Eucalyptus sp. Cattai	1083_Good	**Like-for-like options**		
		Only the below Spp	In the below IBRA subregions	
		Eucalyptus sp. Cattai/Eucalyptus sp. Cattai	Any in NSW	
Myotis macropus/ Southern Myotis	1083_Good	**Like-for-like options**		
		Only the below Spp	In the below IBRA subregions	
		Myotis macropus/Southern Myotis	Any in NSW	
		Variation options		
		Any Spp in the below Kingdom	Any species with same or higher category of listing under Part 4 of teh BC Act showb below	In the below IBRA subregions
		Fauna	Vulnerable	Yengo,Cumberland, Hunter, Kerrabee, Pittwater, Wollemi and Wyong. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

<table>
<tr><td rowspan="6">Tetratheca glandulosa/ Tetratheca glandulosa</td><td rowspan="6">1083_Good</td><td colspan="3">Like-for-like options</td></tr>
<tr><td colspan="2">Only the below Spp</td><td>In the below IBRA subregions</td></tr>
<tr><td colspan="2">Tetratheca glandulosa/Tetratheca glandulosa</td><td>Any in NSW</td></tr>
<tr><td colspan="3">Variation options</td></tr>
<tr><td>Any Spp in the below Kingdom</td><td>Any species with same or higher category of listing under Part 4 of teh BC Act showb below</td><td>In the below IBRA subregions</td></tr>
<tr><td>Flora</td><td>Vulnerable</td><td>Yengo,Cumberland, Hunter, Kerrabee, Pittwater, Wollemi and Wyong.
or
Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.</td></tr>
</table>

BAM Biodiversity Credit Report (Like for like)

Proposal Details

Assessment Id
00013533/BAAS17083/19/00013534

Proposal Name
Larapinta Place Glenhaven

BAM data last updated *
04/01/2019

Assessor Name
Nick Skelton

Assessor Number
BAAS17083

BAM Data version *
6

Proponent Names

Report Created
31/01/2019

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

Candidate Serious and Irreversible Impacts

Nil

Nil

Additional Information for Approval

PCTs With Customized Benchmarks

No Changes

Predicted Threatened Species Not On Site

BAM Biodiversity Credit Report (Like for like)

Name
Haliaeetus leucogaster / White-bellied Sea-Eagle
Pandion cristatus / Eastern Osprey

Ecosystem Credit Summary

PCT	TEC	Area	Credits
1083-Red Bloodwood - scribbly gum heathy woodland on sandstone plateaux of the Sydney Basin Bioregion	Not a TEC	0.4	3.00

Credit classes for 1083

Like-for-like options

Any PCT in the below Class	And in any of below trading groups	Containing HBT	In the below IBRA subregions
Sydney Coastal Dry Sclerophyll Forests (including PCT's 1083, 1138, 1156, 1181, 1183, 1250, 1253, 1619, 1620, 1621, 1623, 1624, 1625, 1627, 1632, 1636, 1638, 1642, 1643, 1681, 1776, 1777, 1778, 1780, 1782, 1783, 1785, 1786, 1787)	Sydney Coastal Dry Sclerophyll Forests - < 50% cleared group (including Tier 7 or higher).	Yes	Yengo,Cumberland, Hunter, Kerrabee, Pittwater, Wollemi and Wyong. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Species Credit Summary

BAM Biodiversity Credit Report (Like for like)

Species	Area	Credits
Chalinolobus dwyeri / Large-eared Pied Bat	0.3	5.00
Eucalyptus sp. Cattai / Eucalyptus sp. Cattai	0.0	0.00
Myotis macropus / Southern Myotis	0.3	3.00
Tetratheca glandulosa / Tetratheca glandulosa	0.3	3.00

Chalinolobus dwyeri/ Large-eared Pied Bat	1083_Good	**Like-for-like options**	
		Only the below Spp	In the below IBRA subregions
		Chalinolobus dwyeri/Large-eared Pied Bat	Any in NSW
Eucalyptus sp. Cattai/ Eucalyptus sp. Cattai	1083_Good	**Like-for-like options**	
		Only the below Spp	In the below IBRA subregions
		Eucalyptus sp. Cattai/Eucalyptus sp. Cattai	Any in NSW
Myotis macropus/ Southern Myotis	1083_Good	**Like-for-like options**	
		Only the below Spp	In the below IBRA subregions
		Myotis macropus/Southern Myotis	Any in NSW

Myotis macropus/ Southern Myotis	1083_Good	
Tetratheca glandulosa/ Tetratheca glandulosa	1083_Good	**Like-for-like options** Only the below Spp / In the below IBRA subregions **Tetratheca glandulosa**/Tetratheca glandulosa / Any in NSW

BAM Vegetation Zones Report

Proposal Details

Assessment Id
00013533/BAAS17083/19/00013534

Assessment name
Larapinta Place Glenhaven

BAM data last updated *
04/01/2019

Assessor Name
Nick Skelton

Report Created
31/01/2019

BAM Data version *
6

Assessor Number
BAAS17083

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

Vegetation Zones

#	Name	PCT	Condition	Area	Minimum number of plots	Management zones
1	1083_Good	1083-Red Bloodwood - scribbly gum heathy woodland on sandstone plateaux of the Sydney Basin Bioregion	Good	0.37	1	APZ (0.3 ha) TTPA (0.07 ha)

BAM Predicted Species Report

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00013533/BAAS17083/19/00013534	Larapinta Place Glenhaven	04/01/2019
Assessor Name	**Report Created**	**BAM Data version ***
Nick Skelton	31/01/2019	6
Assessor Number	* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.	
BAAS17083		

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

Common Name	Scientific Name	Vegetation Types(s)
Brown Treecreeper (eastern subspecies)	Climacteris picumnus victoriae	1083-Red Bloodwood - scribbly gum heathy woodland on sandstone plateaux of the Sydney Basin Bioregion
Eastern Bentwing-bat	Miniopterus schreibersii oceanensis	1083-Red Bloodwood - scribbly gum heathy woodland on sandstone plateaux of the Sydney Basin Bioregion
Eastern Freetail-bat	Mormopterus norfolkensis	1083-Red Bloodwood - scribbly gum heathy woodland on sandstone plateaux of the Sydney Basin Bioregion
Gang-gang Cockatoo	Callocephalon fimbriatum	1083-Red Bloodwood - scribbly gum heathy woodland on sandstone plateaux of the Sydney Basin Bioregion
Glossy Black-Cockatoo	Calyptorhynchus lathami	1083-Red Bloodwood - scribbly gum heathy woodland on sandstone plateaux of the Sydney Basin Bioregion
Golden-tipped Bat	Kerivoula papuensis	1083-Red Bloodwood - scribbly gum heathy woodland on sandstone plateaux of the Sydney Basin Bioregion
Grey-crowned Babbler (eastern subspecies)	Pomatostomus temporalis temporalis	1083-Red Bloodwood - scribbly gum heathy woodland on sandstone plateaux of the Sydney Basin Bioregion
Grey-headed Flying-fox	Pteropus poliocephalus	1083-Red Bloodwood - scribbly gum heathy woodland on sandstone plateaux of the Sydney Basin Bioregion
Hooded Robin (south-eastern form)	Melanodryas cucullata cucullata	1083-Red Bloodwood - scribbly gum heathy woodland on sandstone plateaux of the Sydney Basin Bioregion
Koala	Phascolarctos cinereus	1083-Red Bloodwood - scribbly gum heathy woodland on sandstone plateaux of the Sydney Basin Bioregion
Little Bentwing-bat	Miniopterus australis	1083-Red Bloodwood - scribbly gum heathy woodland on sandstone plateaux of the Sydney Basin Bioregion

Little Eagle	Hieraaetus morphnoides	1083-Red Bloodwood - scribbly gum heathy woodland on sandstone plateaux of the Sydney Basin Bioregion
Little Lorikeet	Glossopsitta pusilla	1083-Red Bloodwood - scribbly gum heathy woodland on sandstone plateaux of the Sydney Basin Bioregion
Masked Owl	Tyto novaehollandiae	1083-Red Bloodwood - scribbly gum heathy woodland on sandstone plateaux of the Sydney Basin Bioregion
Painted Honeyeater	Grantiella picta	1083-Red Bloodwood - scribbly gum heathy woodland on sandstone plateaux of the Sydney Basin Bioregion
Powerful Owl	Ninox strenua	1083-Red Bloodwood - scribbly gum heathy woodland on sandstone plateaux of the Sydney Basin Bioregion
Regent Honeyeater	Anthochaera phrygia	1083-Red Bloodwood - scribbly gum heathy woodland on sandstone plateaux of the Sydney Basin Bioregion
Scarlet Robin	Petroica boodang	1083-Red Bloodwood - scribbly gum heathy woodland on sandstone plateaux of the Sydney Basin Bioregion
Spotted-tailed Quoll	Dasyurus maculatus	1083-Red Bloodwood - scribbly gum heathy woodland on sandstone plateaux of the Sydney Basin Bioregion
Square-tailed Kite	Lophoictinia isura	1083-Red Bloodwood - scribbly gum heathy woodland on sandstone plateaux of the Sydney Basin Bioregion
Swift Parrot	Lathamus discolor	1083-Red Bloodwood - scribbly gum heathy woodland on sandstone plateaux of the Sydney Basin Bioregion
Turquoise Parrot	Neophema pulchella	1083-Red Bloodwood - scribbly gum heathy woodland on sandstone plateaux of the Sydney Basin Bioregion
Varied Sittella	Daphoenositta chrysoptera	1083-Red Bloodwood - scribbly gum heathy woodland on sandstone plateaux of the Sydney Basin Bioregion
Yellow-bellied Sheathtail-bat	Saccolaimus flaviventris	1083-Red Bloodwood - scribbly gum heathy woodland on sandstone plateaux of the Sydney Basin Bioregion

Threatened species not within the area of these PCT's

Common Name	Scientific Name	Vegetation Types(s)
Eastern Osprey	Pandion cristatus	1083-Red Bloodwood - scribbly gum heathy woodland on sandstone plateaux of the Sydney Basin Bioregion
White-bellied Sea-Eagle	Haliaeetus leucogaster	1083-Red Bloodwood - scribbly gum heathy woodland on sandstone plateaux of the Sydney Basin Bioregion

BAM Candidate Species Report

Proposal Details

Assessment Id
00013533/BAAS17083/19/00013534

Proposal Name
Larapinta Place Glenhaven

BAM data last updated *
04/01/2019

Assessor Name
Nick Skelton

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31/01/2019

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Assessor Number
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List of Species Requiring Survey

Name	Presence	Survey Months
Acacia bynoeana Bynoe's Wattle	No (expert report)	Jan Feb Mar Sep Oct Nov Dec
Acacia gordonii Acacia gordonii	No (surveyed)	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Acacia pubescens Downy Wattle	No (surveyed)	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Burhinus grallarius Bush Stone-curlew	No (surveyed)	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Callistemon linearifolius Netted Bottle Brush	No (surveyed)	Jan Feb Mar Sep Oct Nov Dec
Darwinia biflora Darwinia biflora	No (surveyed)	Jan Feb Sep Oct Nov Dec
Cercartetus nanus Eastern Pygmy-possum	No (surveyed)	Jan Feb Mar Oct Nov Dec

Eucalyptus sp. Cattai Eucalyptus sp. Cattai	Yes (surveyed)	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Chalinolobus dwyeri Large-eared Pied Bat	Yes (assumed present)	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Epacris purpurascens var. purpurascens Epacris purpurascens var. purpurascens	No (surveyed)	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Grevillea parviflora subsp. parviflora Small-flower Grevillea	No (surveyed)	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Grevillea parviflora subsp. supplicans Grevillea parviflora subsp. supplicans	No (surveyed)	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Hibbertia superans Hibbertia superans	No (surveyed)	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Lasiopetalum joyceae Lasiopetalum joyceae	No (surveyed)	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Leucopogon fletcheri subsp. fletcheri Leucopogon fletcheri subsp. fletcheri	No (surveyed)	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Melaleuca deanei Deane's Paperbark	No (surveyed)	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Myotis macropus Southern Myotis	Yes (assumed present)	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

Persoonia hirsuta Hairy Geebung	No (surveyed)	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Petaurus norfolcensis Squirrel Glider	No (surveyed)	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Pimelea curviflora var. curviflora Pimelea curviflora var. curviflora	No (surveyed)	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Tetratheca glandulosa Tetratheca glandulosa	Yes (assumed present)	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Hibbertia procumbens Spreading Guinea Flower	No (surveyed)	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Hoplocephalus bitorquatus Pale-headed Snake	No (surveyed)	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Kunzea rupestris Kunzea rupestris	No (surveyed)	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Micromyrtus blakelyi Micromyrtus blakelyi	No (surveyed)	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Phascogale tapoatafa Brush-tailed Phascogale	No (surveyed)	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

List of Species Not On Site

Name
Calyptorhynchus lathami Glossy Black-Cockatoo
Darwinia peduncularis Darwinia peduncularis
Dillwynia tenuifolia Dillwynia tenuifolia

Hibbertia puberula Hibbertia puberula
Callocephalon fimbriatum Gang-gang Cockatoo
Hieraaetus morphnoides Little Eagle
Haliaeetus leucogaster White-bellied Sea-Eagle
Callocephalon fimbriatum - endangered population Gang-gang Cockatoo population in the Hornsby and Ku-ring-gai Local Government Areas
Lathamus discolor Swift Parrot
Litoria aurea Green and Golden Bell Frog
Lophoictinia isura Square-tailed Kite
Miniopterus australis Little Bentwing-bat
Miniopterus schreibersii oceanensis Eastern Bentwing-bat
Ninox strenua Powerful Owl
Pandion cristatus Eastern Osprey
Phascolarctos cinereus Koala
Pseudophryne australis Red-crowned Toadlet
Pteropus poliocephalus Grey-headed Flying-fox
Pultenaea parviflora Pultenaea parviflora
Tyto novaehollandiae Masked Owl
Anthochaera phrygia Regent Honeyeater
Ancistrachne maidenii Ancistrachne maidenii
Asterolasia elegans Asterolasia elegans
Eucalyptus fracta Broken Back Ironbark
Litoria booroolongensis Booroolong Frog
Melaleuca groveana Grove's Paperbark
Velleia perfoliata Velleia perfoliata
Olearia cordata Olearia cordata
Leionema lamprophyllum subsp. obovatum - endangered population Leionema lamprophyllum subsp. obovatum population in the Hunter Catchment
Darwinia fascicularis subsp. oligantha - endangered population Darwinia fascicularis subsp. oligantha population in the Baulkham Hills and Hornsby Local Government Areas

Keraudrenia corollata var. denticulata - endangered population Keraudrenia corollata var. denticulata in the Hawkesbury local government area
Prostanthera cineolifera Singleton Mint Bush

BAM Credit Summary Report

Proposal Details

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

Zone	Vegetation zone name	Vegetation integrity loss / gain	Area (ha)	Constant	Species sensitivity to gain class (for BRW)	Biodiversity risk weighting	Candidate SAII	Ecosystem credits
Red Bloodwood - scribbly gum heathy woodland on sandstone plateaux of the Sydney Basin Bioregion								
1	1083_Good	20.7	0.4	0.25	High Sensitivity to Potential Gain	1.50		3
							Subtotal	**3**
							Total	**3**

BAM Credit Summary Report

Species credits for threatened species

Vegetation zone name	Habitat condition (HC)	Area (ha) / individual (HL)	Constant	Biodiversity risk weighting	Candidate SAII	Species credits
Chalinolobus dwyeri / Large-eared Pied Bat (Fauna)						
1083_Good	20.7	0.3	0.25	3	True	5
					Subtotal	**5**
Eucalyptus sp. Cattai / Eucalyptus sp. Cattai (Flora)						
1083_Good	N/A	0	0.25	3	True	0
					Subtotal	**0**
Myotis macropus / Southern Myotis (Fauna)						
1083_Good	20.7	0.3	0.25	2	False	3
					Subtotal	**3**
Tetratheca glandulosa / Tetratheca glandulosa (Flora)						
1083_Good	20.7	0.3	0.25	2	False	3
					Subtotal	**3**