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# Addendum Flora and Fauna Assessment

# 521 The Northern Road

# LONDONDERRY

**19th March 2019**

## SUMMARY

Fraser Ecological Consulting has been contracted by Mr. D Tolson (on behalf of Urban City Consulting) to prepare an additional assessment of a proposed mushroom farm on the terrestrial ecology located at 521 The Northern Road Londonderry in the Penrith City local government area. Previous Part 3A approval has been granted for a mushroom farm facility on the site. The proposed amendments include extension of the existing consent.

This addendum Flora and Fauna Assessment specifically addresses concerns raised by the NSW Office of Environment and Heritage (OEH) letter dated 16th May 2016. OEH's concerns related to the Flora and Fauna Assessment (dated June 2015) not adequately addressing the potential impacts of the 25m asset protection zone, acoustic wall and general construction impacts.

A majority of the subject site comprises cleared land with remnant Castlereagh Scribbly Gum Woodland and Castlereagh Swamp Woodland trees which are listed as an Endangered Ecological Community under the NSW *Biodiversity Conservation Act 2016*. The areas of native vegetation proposed for removal are considered to be in poor condition. Intact and better quality Castlereagh Woodland will be retained and conserved within the property but outside the development footprint.

Targeted flora and fauna surveys were undertaken to ensure a more informed assessment of the potential impacts of the 25m asset protection zone, acoustic wall and general construction impacts. Threatened plant species recorded in this area included *Dillwynia tenuifolia* and *Persoonia nutans* which are both listed under the NSW *Biodiversity Conservation 2016* (*refer to Section 4.4*).

Recommendations for APZ establishment have been made in this report that will ensure that the APZ could be established without requiring the removal of any of these plants and the retention of a hollow-bearing tree (*refer to Section 6*). The low-lying threatened plants occur within the drip zone of smooth-barked 'Hard-leaved Scribbly Gum' (*Eucalyptus scelorophylla*) trees that are considered ideal to retain within an APZ compared to rough-barked species when retained with a discontinuous canopy.

It was recommended that as part of the development consent, an 'Integrated Bushfire and Vegetation Management Plan' could be prepared to ensure that the threatened plants and their potential habitat are protected in perpetuity whilst ensuring the APZ complies with Inner Protection Area requirements of *Planning for Bushfire Protection 2006*. The plan would be prepared by an ecological restoration consultant in conjunction with a bushfire consultant to ensure compliance with the Rural Fire Service's GTAs.

Therefore, the major conclusion arising from this Flora and Fauna Impact Assessment is that the proposed works are unlikely to result in a significant impact on any listed species or communities. Therefore, in accordance with the assessment guidelines of the BC Act (2016), EPA Act (1979), TSC Act (1995) and FM Act (1994), a Species Impact Statement is not required.

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**Licensing**

When conducting flora and fauna surveys, consultants are required to possess licences to ensure that works are completed in an appropriate manner. Fraser Ecological Consulting is licensed under s.132c and s.91 of the NSW National Parks and Wildlife Act (1974) from the NSW NPWS. This allows Alex Fraser to undertake scientific investigations, collect specimens of protected flora and fauna across NSW in service and non-service areas and undertake bushland restoration works in EECs. This licence requires that all survey results are reported to the NSW NPWS for inclusion into the Atlas of NSW Wildlife.

Alex Fraser also holds an Animal Research Authority under the Animal Research Act (1995), as administered by NSW Agriculture. Surveys are approved and supervised by an Animal Care and Ethics Committee, applying the standards as detailed in the Australian Code of Practice for the Care and Use of Animals for Scientific Purposes (NHMRC 1997).

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# 1. Introduction

This flora and fauna assessment was commissioned by Mr. David Tolson (on behalf of Urban City Consulting) to accompany the development application lodged with Penrith City Council for 521 The Northern Road Londonderry. The data contained within this report was collected on the 2nd March 2018 and 12th March 2018.

This flora and fauna assessment:

- Identifies key flora and fauna habitats within the subject site;
- Reviews literature and databases relevant to the subject site;
- Describes the methodology and results of the survey;
- Addresses potential impacts on flora and fauna and their habitats resulting from the proposed development;
- Proposes appropriate mitigation measures; and
- Provides an assessment of the likelihood of significant impacts on threatened species and populations, and endangered ecological communities, according to Section 5A of the NSW EPA Act, TSC ACT, Commonwealth EPBC Act. This was done to determine the need for an SIS or an application under the EPBC Act.

Activities specifically related to the preparation of this report included:

- Identification of weed and indigenous native species recorded from the subject site
- Assessment of impacts of the proposed development
- Outlining the applicant's responsibilities including weed control and environmental safeguards before, during and post construction.

The information within this report relies upon the survey and design plans to determine the full impacts of the proposal. The proposed development plans are shown in Appendix A.

## 1.1 Site characteristics

The study site is located approximately 50km north-west of the Sydney CBD within the Sydney Basin Bioregion (Figure 1).

The site is a rural allotment of approximately 22 hectares in size located on the western side of The Northern Road. The property is opposite Castlereagh Nature Reserve managed by NSW National Parks and Wildlife (NSW OEH) which located on the eastern side of The Northern Road, Londonderry (Figure 2).

The site is currently occupied by a single storey dwelling and the surrounding area is characterised by rural living and agricultural activities.

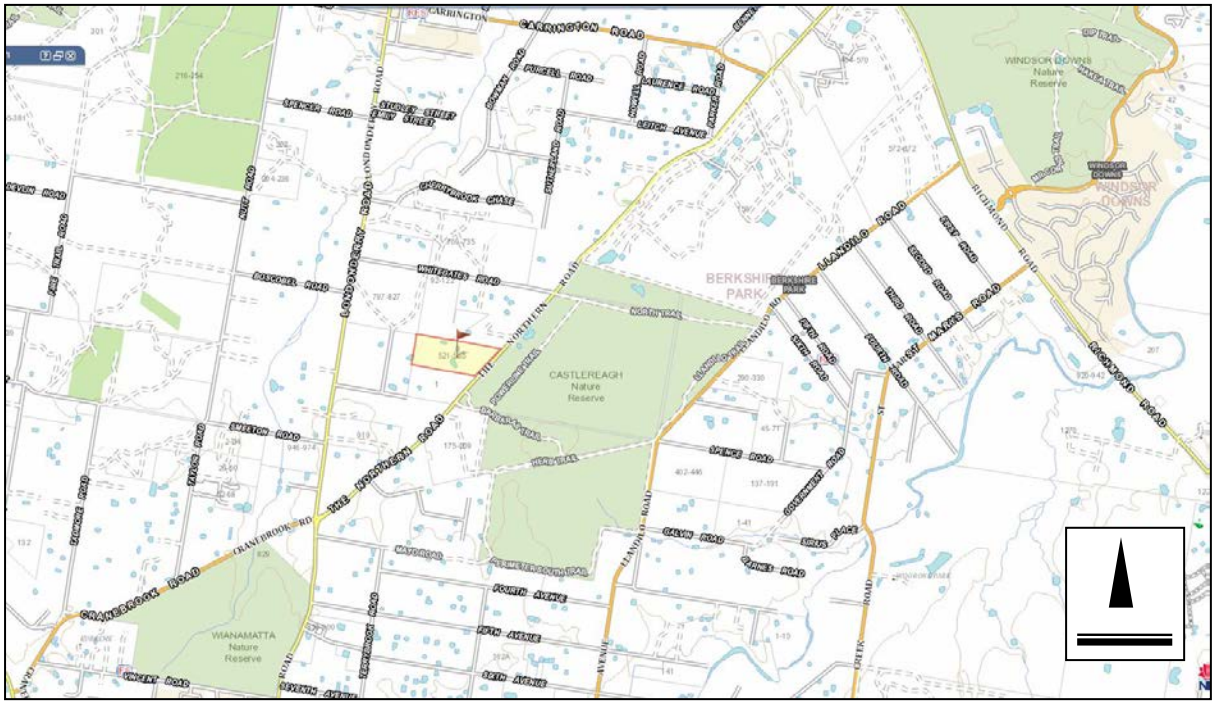


**Figure 1: Aerial map of the locality site showing the site in yellow (Source: SIX Maps)**

**Figure 2: Aerial map of the subject site showing bduilding envelope (Source: SIX Maps)**

## 1.2 Climate

The climate of the area is temperate with mild to hot summers and cool to cold winters. The Bureau of Meterology summary statistics for rainfall for all years at the nearest weather station (Castlereagh Station No. 60072) is provided in Figure 3 (below). The local rainfall patterns influence the vegetation types and microhabitat present on site.

| Statistic | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mean | 105.7 | 115.4 | 85.0 | 65.9 | 56.6 | 64.2 | 34.1 | 43.1 | 39.9 | 60.4 | 79.5 | 68.4 |
| Median | 79.0 | 86.8 | 75.6 | 34.1 | 30.5 | 32.2 | 16.8 | 22.0 | 30.0 | 40.8 | 72.5 | 50.4 |
| Highest Daily | 167.6 | 200.0 | 167.6 | 95.6 | 191.8 | 100.0 | 138.4 | 171.0 | 172.0 | 66.0 | 113.0 | 94.0 |

**Figure 3: Bureau of Meterology summary statistics for rainfall for Castlereagh Weather Station No. 60072**

## 1.3 Geology

The Penrith 1:100 000 Soil landscape of the Penrith 1:100 000 map sheet (Hazelton et al 1989) producedby the NSW Office of Environment and Heritage identifies the site as being part of the Berkshire Park soil landscape. The Berkshire Park soil landscape is found on the low rises of the Tertiary geology of the Hawkesbury/Nepean River system. Soils are weakly pedal of heavy orange clays and clayey sands. These soils are often mottled. Large silcrete boulders can occur as can unstructured plastic clays. Berkshire Park soils are prone to wind erosion when cleared of vegetation.

The limitation of this soil landscape is that it has very high wind erosion if cleared and gully, sheet and rill erosion on dissected area. It is also susceptible to water logging, impermeable subsoils and low fertility (Hazelton et al 1989).

# 2. Statutory Framework

The criteria used to assess likely impacts upon threatened species, populations or endangered ecological communities vary between Commonwealth and State jurisdictions. The following describes the legislative requirements for each level.

### 2.1. Commonwealth

The *Environment Protection and Biodiversity Conservation Act (1999)* (EPBC Act) is a nationally applicable Act that is administered by the Department of the Environment, Water, Heritage and the Arts. This Act requires approval for actions that are likely to have a significant impact on matters of National Environmental Significance (NES).

There are seven matters of NES that are triggers for Commonwealth assessment and approval. These are:

1. World Heritage properties;
2. National Heritage places;
3. Ramsar wetlands of international importance;
4. Nationally threatened species and communities;
5. Migratory species;
6. Nuclear actions; and
7. Commonwealth marine environment.

Threatened species and ecological communities are listed under Part 13, Division 1, Subdivision A of the EPBC Act 1999. Migratory species are listed under part 13, Division2, Subdivision A of the Act.

The Department of the Environment and Water Resources identifies the following:

"*Under the EPBC Act a person must not take an action that has, will have or is likely to have significant impact on any of these matter of NES without approval from the Commonwealth Environment Minister. There are penalties for taking such an action without approval.*

*In general, an action that may need approval under the Act will involve some physical interaction with the environment, such as clearing native vegetation, building a new road, discharging pollutants into the environment, or offshore seismic survey.*

*If, following a referral, it is determined that that an action is likely to have a significant impact, and approval is therefore required, the action is called a 'controlled action'. The proposal will then undergo a formal assessment and approval process, and cannot proceed unless approval is granted.*

*If it is determined that an action is not likely to have a significant impact, then the action is not a controlled action. Approval under the EPBC Act is not required and the action may proceed, subject to obtaining any other necessary permits or approvals*."

## 2.2 State

***Threatened Species Conservation Act 1995***

Section 5A of the (Environmental Planning and Assessment) EPA Act (1979) sets out seven factors that require consideration in terms of the likely significance of the impact of an action.

For the purposes of this Act and, in particular, in the administration of sections 78A, 79C (1) and 112, these seven factors must be taken into account in deciding whether there is likely to be a significant effect on threatened species, populations or ecological communities, or their habitats listed under the *Threatened Species Conservation (TSC) Act (1995)*.

If the proposed works are on land that is, or is a part of, critical habitat, or is likely to significantly affect threatened species, populations or ecological communities, or their habitats, a Species Impact Statement (SIS) must be prepared.

An SIS provides an more detailed assessment of threatened biota issues and proposes measures to manage and mitigate adverse impacts on threatened species, populations or ecological communities, or their habitats, resulting from the proposal.

This assessment considers these factors in accordance with the aforementioned legislative requirements. It also provides conclusions in regard to the necessity for a Species Impact Statement.

This application was lodged before the commencement of the Biodiversity Conservation 2016 that repealed the *TSC Act 1995*.

***Water Management Act 2000***

The WM Act provides a number of mechanisms for protection of water sources via the water management planning process. If a 'controlled activity' is proposed on 'waterfront land', an approval is required under Section 91 (2) of the WM Act. 'Controlled activities' include; the construction of buildings or carrying out of works; the removal of material or vegetation from land by excavation or any other means; the deposition of material on land by landfill or otherwise. 'Waterfront land' is defined as '*the bed of any river or lake, and any land lying between the river or lake and a line drawn parallel to and 40m inland from either the highest bank or shore*'.

**State Regional Environmental Plan No. 20 – Hawkesbury-Nepean River (No 2 – 1997)**

The State Regional Environmental Plan No 20 – Hawkesbury-Nepean River (No 2 – 1997) applies to certain lands in the Greater Metropolitan Region that are within a number of Local Government Areas, including the Hawkesbury LGA. The aim of this plan is to protect the environment of the Hawkesbury Nepean River system by ensuring that the impacts of future land uses are considered in a regional context.

Specific planning policies and recommended strategies for the plan have been set out under the broad areas of total catchment management, environmentally sensitive areas, water quality, water quantity, cultural heritage, flora and fauna, riverine scenic quality, agriculture/aquaculture and

fishing, rural residential development, urban development, recreation and tourism, and metropolitan strategy.

**Local Government Act 1993**

The Act sets out the responsibilities of Councils including public land management, activity approvals, corporate and operation planning, orders and enforcement powers, setting rates and charges (LGSA 2009). Section 7(e) of the Act requires Councils, Councillors and Council employees to have regard to the principles of ecologically sustainable development in carrying out their responsibilities. The Charter (Section 8) also requires Councils to properly manage, develop, protect, restore, enhance and conserve the environment of the area for which it is responsible, in a manner that is consistent with and promotes the principles of ecologically sustainable development. Under this Act, Councils are required to have Plans of Management for all Council owned land.

**Hawkesbury Nepean Catchment Action Plan**

The Hawkesbury Nepean Catchment Action Plan (Hawkesbury Nepean CAP) sets the direction for the activities and investment of the Hawkesbury Nepean Catchment Management Authority Hawkesbury Nepean CMA) over the next ten years. It was approved by the Minister for Environment and Climate Change in March 2008.

The Hawkesbury Nepean CAP is the first stage of managing the catchment in a way that will improve river health, protect biodiversity, and encourage best practice soil and land management. The goals of the CAP are underpinned by community and partnership programs which build community awareness and capacity, and support Indigenous community involvement.

The Hawkesbury Nepean CAP sets clear targets and a timetable for the Hawkesbury Nepean CMA's action and investment and is designed to be responsive to the changing needs of the catchment and the community. The Hawkesbury Nepean CAP operates across the same area as the Hawkesbury Nepean CMA's boundary.

**Biosecurity Act 2015**

From 1 July 2017, the Noxious Weeds Act 1993 will be repealed and replaced with the Biosecurity Act 2015. As such the declaration status and control measure of any weeds listed on this page will be no longer relevant. HRCC is developing a Local Weeds Plan which will guide the implementation of the new Act in relation to weeds.

The name "noxious weed" is a strictly legal term. It relates to plants which are "scheduled" by the Department of Primary Industries under the Noxious Weeds Act 1993. HRCC is the Local Control Authority for all land (terrestrial and aquatic) within the cities of Blacktown, Penrith, Hawkesbury and Hills Shire. The plants listed in the following link are the current noxious weeds for this area: http://hrcc.nsw.gov.au/weed-information/noxious-weed-list/

## Biodiversity Conservation Act 2016

A development application or modification of a development consent under Part 4 of the Environmental Planning and Assessment Act 1979 (excluding major projects) may utilise the former TSC Act scheme for biodiversity offsets if the application is lodged within three months of 25 August 2017.

Proponents should be aware that transitional arrangements under the new Scheme have not been fully developed and, in some cases, NSW Office of Environment and Heritage (**OEH**) should be approached directly for further information. The BC Act sets out the biodiversity assessment requirement for any development or activity that requires assessment or approval under the EP&A Act. The main elements of the Act:

- New Biodiversity Offsets Scheme (BOS)
- New assessment methodology - Biodiversity Assessment Method (BAM)
- Establishment of a Biodiversity Conservation Fund (collects and directs spending of offset monies throughout the state)
- Expansion of Biodiversity Certification for large rezoning proposal and masterplan 'green field' type developments (streamlined assessment at strategic planning stage)

It also consolidates:

- existing wildlife licensing requirements
- nominations of areas of outstanding biodiversity values
- updated criteria for listing threatened species and communities
- biodiversity offsets scheme
- Biocertification (large scale master planning development)
- Biodiversity stewardship agreements (where offset credits are created)

*Note: The BOS area clearing threshold in this Act is also applied within the new SEPP and LLS Act. If the amount of native vegetation clearing application is below the threshold it is optional if the applicant wants to submit a Biodiversity Assessment Report (BAR).* In relation to Council DAs assessments, Part 4 local development requires application of the BAM to determine whether an offset obligation if it either:

1) Exceeds the BOS threshold (also referred to as 'area trigger')
2) Located in an area of '*Sensitive Biodiversity Values*'

The Act sets outs the Biodiversity Assessment Methodology (BAM) which directs the methodology to be undertaken by accredited assessors (consultants) to produce a Biodiversity Assessment Report (BAR) submitted with a development application. The BAM sets out a detailed, complex and quantitative assessment methodology for producing the assessment report (BAR).

The methodology sets a framework for decision makers (Council assessment officers) to determine whether or not the proposal will have **'Serious and Irreversible Impact (SAII)**' for certain threatened species and communities (referred to as 'candidate entities').

For local developments, the new regulations make the new Offset Scheme **mandatory** for applications assessed under part of the Act that exceed the BOS thresholds. Under the Act, and offsets calculator will be used by accredited and appropriately trained assessors.

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**Penrith City Council Biodiversity Strategy 2004**

The strategy provides policy objectives to conserve biodiversity in the LGA.

The document also provides some useful statistics on the extant of vegetation community types in the LGA as shown below.

| Vegetation Communities | | Modelled Pre-1750 Vegetation | Proportion Remaining | |
|---|---|---|---|---|
| | All Codes | | All Codes | A+B+C+ SA |
| | Total (ha) | Total (ha) | (%) | (%) |
| Shale/Sandstone Transition Forest (Low Sandstone Influence) | 161.6 | 438.9 | 36.8% | 19.2% |
| Shale/Sandstone Transition Forest (High Sandstone Influence) | 468.9 | 596.8 | 78.6% | 31.4% |
| **Sub total - 1&2 Shale/Sandstone Transition Forest** | **630.4** | **1,035.7** | **60.9%** | **26.2%** |
| Cooks River Castlereagh Ironbark Forest (Low Sandstone Influence) | 777.3 | 1,413.4 | 55.0% | 34.4% |
| Castlereagh Swamp Woodland | 479.4 | 557.6 | 86.0% | 81.8% |
| Castlereagh Scribbly Gum Woodland* | 3,680.1 | 4,873.8 | 75.5% | 54.5% |
| Agnes Banks Woodland | 175.6 | 470.5 | 37.3% | 19.1% |
| Shale Hills Woodland | 778.2 | 2,854.1 | 27.3% | 13.4% |
| Shale Plains Woodland | 3,683.6 | 17,949.1 | 20.5% | 8.5% |
| **Sub total - 9 & 10 Cumberland Plain Woodland** | **4,461.7** | **20,803.2** | **21.4%** | **9.2%** |
| Alluvial Woodland | 1,813.9 | 7,255.0 | 25.0% | 15.1% |
| Riparian Forest | 85.2 | 215.6 | 39.5% | 22.8% |
| **Sub total - 11 & 12 Sydney Coastal River-flat Forest** | **1,899.1** | **7,470.8** | **25.4%** | **15.3%** |
| Western Sydney Dry Rainforest | | | na | na |
| Moist Shale Woodland | 14.1 | 20.0 | 70.3% | 61.2% |
| Turpentine-Ironbark Forest | 15.9 | 58.2 | 27.4% | 6.6% |
| Turpentine-Ironbark Margin Forest | 29.8 | 74.3 | 40.1% | 16.9% |
| **Sub-total 15-43 Sydney Turpentine-Ironbark Margin Forest** | **45.7** | **132.5** | **34.5%** | **12.4%** |
| Freshwater Wetlands* | 15.7 | 15.7 | 100.0% | 100.0% |
| Elderslie Banksia Scrub Forest | | | na | na |
| Shale/Gravel Transition Forest | 898.8 | 1,577.6 | 57.0% | 19.2% |
| Blue Gum High Forest | | 1.9 | 0.0% | 0.0% |
| **TOTAL** | **13,077.8** | **38,372.6** | **34.1%** | **19.2** |

** Indicates not listed on Schedule 1 of The TSC Act.*

**Rural Fires Amendment (Vegetation Clearing) Bill 2014**

The recent Rural Fires Amendment (Vegetation Clearing) Bill 2014 gives the relevant authorities a mechanism to clear certain vegetation for the purposes of preventing a bushfire. The bill seeks to authorise vegetation clearing work to be carried out in certain areas near residential accommodation or high-risk facilities to reduce bushfire risk. This bill will give residents living in bushfire-prone areas additional powers to protect their homes and to clear trees and vegetation from around their property. The new laws will provide for people with homes in bushfire zones to clear within 10 metres of their home and to clear shrubs and other vegetation, except for trees, within 50 metres of their home. The vegetation clearing entitlement area may carry out certain vegetation clearing work on that land, despite any requirement for an approval, consent or other authorisation for the work made by other legislation.

The bill provides that the Commissioner of the NSW Rural Fire Service is to determine what land is a 10/50 vegetation clearing entitlement area and to identify this land on a map published on the NSW Rural Fire Service website. The map has yet been published. However, it is understood that by accessing a portal on the Rural Fire Service website, home owners will be able to identify easily whether their home stands within an entitlement area. It is unknown when this map will be produced, however, given the location of the dwelling it is likely that site would be contained within the mapped area.

The bill states that vegetation clearing work must be carried out in accordance with the 10/50 clearing code of practice, which is to be prepared by the commissioner and is to deal with certain matters. Those matters are listed in the bill as follows:

(a) the type of vegetation that can and cannot be cleared, including the types of trees,
(b) the circumstances in which vegetation should be pruned and not entirely removed,
(c) the use of herbicides,
(d) managing soil erosion and landslip risks,
(e) protection of riparian buffer zones,
(f) protection of Aboriginal and other cultural heritage,
(g) protection of vegetation that the owner of the land on which vegetation clearing work may be carried out is under a legal obligation to preserve by agreement or otherwise

The code of practice has not yet been prepared. The bill further states the vegetation clearing work that can be carried out is the removal, destruction (by means other than by fire) or pruning of:

- any vegetation (including trees or parts of trees) within 10 metres of an external wall of a building containing habitable rooms that comprises or is part of residential accommodation or a high-risk facility, and
- any vegetation, except for trees or parts of trees, within 50 metres of an external wall of a building containing habitable rooms that comprises or is part of residential accommodation or a high-risk facility.

Of most relevance to the development application, the bill also makes consequential amendments to the *National Parks and Wildlife Act 1974* to expand the exemptions contained in sections 118A and 118D of that Act, provided there is compliance with the 10/50 Vegetation Clearing Code of Practice.

# 3. Methodology

This chapter presents the methods used in conducting the ecological survey and assessment of the conservation importance of the study area.

### 3.1 Existing records

Records of threatened flora and fauna species and populations, listed in the schedule of the TSC and EPBC Acts, were obtained and reviewed to document known locations threatened and regionally significant fauna within the locality. The source of these records was the NSW Office of Environment and Heritage Bionet and the Department of Environment, Water, Heritage and the Arts online Protected Matters Search Tool database for an area covering approximately 10km radius of the subject site (Section 4.4).

A total of 9 threatened flora species and 28 threatened or migratory fauna (1 invertebrate, 2 frogs, 15 birds, and 11 mammals, 6 of which are bats), listed under the TSC or EPBC Acts, have been previously recorded within 10km the site (OEH 2018; DEWHA 2018).

Threatened species that have been considered in particular detail as part of this development application and those species that have been previously recorded near the site may be potentially affected by the proposal are described in Section 4.5, Appendix C and Appendix D.

The native vegetation mapping by NSW Office of Environment and Heritage (2013) shows Castlereagh Scribbly Gum Woodland vegetation occurs on-site (refer to Section 4.1).

### 3.2 Desktop survey

A desktop survey was performed to ensure all relevant documentation is considered when preparing the plan. Documents and other information resources utilised include:

- Aerial photographs (Google Maps, NearMaps & DPI Land Information)
- Vegetation maps (NSW OEH and Department of Lands, Tozer 2003 & NPWS 2003)
- Soil Landscapes of the Penrith 1:100,000 Sheet (Hazerton 1989)
- Bushfire Assessment Report by Craig Burley Control Line (8th Sept 2015)
- Plans prepared by GTL Europe

### 3.3 Field Surveys

The data contained within this report was collected on the 2nd March 2018 and 12th March 2018 5 to identify and evaluate the current vegetation community occurring on the subject site, identify any threatened flora and fauna species and assess the current nature and extent of fauna habitats.

Targeted fauna surveys were undertaken for Cumberland Plain Land Snail were undertaken (2 people for 7 hours each – total of 14 hours).

Targeted flora surveys were undertaken for the entire area for the immediate building footprint, the APZ and additional areas 20m on the periphery of the APZ. The Royal Botanic Gardens Herbarium was sent a sample of the *Dillwynia tenuifolia* to confirm its identification (Section 4.4.1).

Features of the vegetation including floristics, structure, extent, type and projective foliage cover, presence of weed species and other significant features were noted and recorded). All flora recorded were predominantly identified to family, genus and species level with confirmation according to *Field Guide to the Native Plants of Sydney* (Robinson, 2003), *Weeds of the south-east: an identification guide for Australia* (Richardson, 2006*), Tree & Shrubs in Rainforest of New South Wales and Southern QLD* (Williams et al 1984), *Native Plants of the Sydney District* (Fairly and Moore 2000) and the Botanic Gardens Trust (2009) *PlantNET* flora database.

It was not possible to determine with certainty all the fauna that utilise habitats in the subject site. This is because of the likely seasonal occurrences of some fauna species, the occasional occurrence of vagrant species, and because some species are difficult to detect because of their timid or cryptic behaviour. Therefore, fauna investigations comprised an assessment of fauna habitats present on site and an indication of their potential to support native wildlife populations and, in particular, threatened species.

The fauna habitat assessment criteria included:

**Mammals:** extent of ground cover, shrub layer and tree canopy, hollow-bearing trees, substrate type (for burrowing etc), evidence such as droppings, diggings, footprints, scratches on trees, nests, burrow paths and runways.

**Birds:** structural; features such as the extent and nature of the canopy, understorey and ground strata and flowering character

**Reptiles and amphibians:** cover shelter, suitable substrate, basking and breeding site availability, reptiles and frogs sough in likely sheltering places

**Invertebrates:** logs and other debris, leaf and bark accumulations around base of trees, grass clumps, loose soil for burrowing

**Wildlife corridor values:** Importance of the creek systems and riparian vegetation as movement corridors for fauna, especially birds, aquatic fauna, mammals (e.g. microchiropteran bats) & amphibians

Wildlife habitat, in its broadest definition, includes any vegetation or other physical structure that meets an animal's needs for food, shelter, and/or reproduction. Habitat provided by indigenous vegetation usually provide the best habitat, as they are richest in diversity and, resources for indigenous fauna species. However, disturbed and degraded areas can provide habitat for native flora and fauna species.

Wildlife habitat can be comprised of a number of elements. These include intact canopy, mid-storey and understorey layers in a vegetation community, particular plant species which may provide food or shelter resources for fauna species, hollows and cracks in living or dead trees, fallen logs and

woody debris, deep leaf litter, exposed sandstone rocks supporting water seeps, and caves. Different resources for food, shelter, and reproduction occur in these habitat elements that may satisfy the varied needs of a particular species, or, more often, the needs of a number of different species.

## 3.4 Assessment of conservation value

**Conservation value parameters**

The conservation value of flora and fauna habitats on the subject site was determined by reference to the following criteria:

- Representativeness - whether the vegetation communities of the site are unique, typical or common in the bioregion. In addition the criteria takes into account whether or not such vegetation units are presently held in conservation reserves;
- the presence of threatened or regionally significant species on the site;
- the extent of human influence on the natural environment of the site and the condition of habitats (e.g. the presence of weeds, fire frequency, etc.);
- the uniqueness of the natural values of the site;
- the amount of native vegetation to be cleared or modified by the proposed development in relation to what remnant vegetation will remain in the locality; and
- the relative importance of the site as a corridor for the movement of wildlife.

# 4. Site ecological values

## 4.1 Vegetation associations/ communities

The vegetation within the site comprises of a mixture of predominantly previously cleared land (grazing pastures) and patches of remnant bushland that is consistent with the NSW Office of Environment and Heritage mapping and Final Determination for **Castlereagh Scribbly Gum Woodland (CSGW)** mainly within the western portion of the site as depicted in Figure 4.

The previous assessment prepared by Kevin Mills and Associates (2009) refers to some of the remnant vegetation as **Castlereagh Swamp Woodland (CSW) Endangered Ecological Community** in the poorly drained depressions of the site mainly in the middle and eastern portion of the site.

The remnant CSGW and CSW vegetation proposed for removal includes isolated paddock trees with a highly disturbed understorey and is considered to be in poor condition. The trees include a mixture of a few older mature trees with young to sub-mature growth vegetation regenerating where grazing practices have ceased. The native under-storey species have been outcompeted by predominantly introduced pasture species.

Better quality patches of woodland occur at the rear (western portion) of the property where grazing has been activities have been prevented as result of existing fencing. These areas will be excluded from the proposed clearing activities.

The native canopy tree species recorded on site include:

- *Eucalyptus sclerophylla* (Hard-leaved Scribbly Gum) - dominant on western edges of site
- *Angophora bakeri* (Narrow-leaved Apple) – dominant on western edges of site
- *Eucalyptus eugenioides* (Thin-leaved Stringybark)
- *Corymbia gummifera* (Red Bloodwood)
- *Eucalyptus parramatensis* (Parramatta Red Gum) – lower lying water-logged soils in the north-eastern corner

The main shrub species with a sparse and patchy distribution are:

- Saplings of *Angophora bakeri*
- *Melaleuca nodosa*
- *Ozothamnus diosmifolius*
- *Kunzea ambigua*

The groundcover layer is predominantly a mixture of introduced and native species including:

- *Commelina cyanea* (Wandering Sailor)
- *Microlaena stipoides* (Weeping Grass)
- *Pratia purpurascens* (White Root)

Native groundcovers (grasses and herbs) only dominate in few locations along the southern edge of the site.
The long history of grazing has resulted in depletion of the native soil seed bank, and therefore, is considered to have low native resilience (ability of the soil seed bank to regenerate).

The paddocks and other cleared areas are dominated by introduced species including:

- *Setaria gracilis* (Slender Pigeon Grass)
- *Sporobolus indicus* (Parramatta Grass)
- *Pennisetum clandestinum* (Kikuyu)
- *Paspalum dilatum* (Paspalum)
- *Sida rhombifolia* (Paddy's Lucerne)
- *Verbena bonariensis* (Purpletop)
- *Senecio madagascarensis* (Fireweed)

The dams contains contain a few aquatic species including:

- *Centipdea minima* (Spreading Sneezeweed)
- *Paspalum distichum* (Water Couch)
- *Potamogeton tricarinatus* (Floating Pondweed)
- *Juncus usitaus* (Common Rush)
- *Ludwigia pepolides* (Water Primrose) – listed under the *Noxious Weeds Act 1993*
- Occasional trees and shrubs

The assessment of impacts on the native vegetation community (Castlereagh Scribbly Gum Woodland and Castlereagh Swamp Woodland) is addressed in more detail in Section 5.

**Photograph 1: View east from the smallest dam on the property showing the vast cleared areas of grazing paddocks surrounded by remnant trees**

**Photograph 2: View south towards an old shed near the largest dam on the property located near remnant trees**

**Photograph 3: View towards the south-west corner of the property that contains contiguous and larger expanses of intact woodland at the perimeter of the proposed development**

**Photograph 4: Intact woodland occurring outside the proposed development area and still within the south-west corner of the property**

**Photograph 5: View from the north-west corner of the property towards the south boundary**

**Photograph 6: Pink flagging installed by surveyor indicating start of 25m APZ from western edge of the proposed building. Note: Dense Kunzea and Hakea shrub that would require clearing to establish APZ. No threatened plants present in this location.**

Photograph 7: Pink flagging installed by surveyor indicating western most extent of 25APZ along the northern property boundary



Photograph 8: Pink flagging installed by surveyor indicating western most extent of 25APZ along the northern property boundary (view east towards the proposed building. Note sporadic occurrences of *Melaleuca decora* trees which could be retained after dense Hakea and Kunzea thicket removed in this location for APZ establishment

Photograph 9: Close up of *Dilliwynia tenuifolia* recorded on-site

Photograph 10: *Persoonia nutans* recorded on-site outside of the proposed APZ, and therefore, will remain unaffected (Waypoint 103) as per Figure 5)



Photograph 11: Another view of same *Persoonia nutans* plant recorded on -site outside of the proposed APZ, and therefore, will remain unaffected (Waypoint 103) as per Figure 5)



Photograph 12: View towards south within APZ showing introduced weed African Lovegrass (*Eragrostis curvula* ssp. *curvula*) in the foreground which would be managed as part of the APZ management to enhance potential habitat for threatened plants. Sporadic small trees shown in the photo can be retained as part of the APZ.


Photograph 13: View towards south-east within APZ showing introduced weed African Lovegrass (*Eragrostis curvula* ssp. *curvula*) in the foreground which would be managed as part of the APZ management to enhance potential habitat for threatened plants. The small *Angophora bakeri* trees shown in the mid-ground of the photo would have to be thinned out and removed to establish the APZ. Larger *Angophora bakeri* trees would be retained as clumps/ islands to provide canopy separation to other larger trees (identified in the following photographs).



Photograph 14: View towards north within APZ showing introduced weed African Lovegrass (*Eragrostis curvula* ssp. *curvula*) in the foreground which would be managed as part of the APZ management to enhance potential habitat for threatened plants. The small *Angophora bakeri* trees shown in the mid-ground of the photo would have to be thinned out and removed to establish the APZ. Larger *Angophora bakeri* trees would be retained as clumps/ islands to provide canopy separation to other larger trees (identified in the following photographs).



Photograph 15: View towards south within APZ showing introduced weed African Lovegrass (*Eragrostis curvula* ssp. *curvula*) in the foreground which would be managed as part of the APZ management to enhance potential habitat for threatened plants. The small *Angophora bakeri* trees shown in the mid-ground of the photo would have to be thinned out and removed to establish the APZ. Larger *Angophora bakeri and Eucalyptus sclerophylla* trees would be retained as clumps/ islands to provide canopy separation to other larger trees (identified in the following photographs).



Photograph 16: View towards south within APZ showing introduced weed African Lovegrass (*Eragrostis curvula* ssp. *curvula*) in the foreground which would be managed as part of the APZ management to enhance potential habitat for threatened plants. The small *Angophora bakeri* trees shown in the mid-ground of the photo would have to be thinned out and removed to establish the APZ. Larger *Angophora bakeri and Eucalyptus sclerophylla* trees would be retained as clumps/ islands to provide canopy separation to other larger trees (identified in the following photographs).


Photograph 17: View towards north outside the APZ showing threatened *Dillwynia tenuifolia* (pink flagging tape) in the foreground at Waypoint 105 (refer to Figure 5)occurring at the base of Eucalyptus sclerophylla tree to be retained. Introduced weed African Lovegrass (*Eragrostis curvula* ssp. *curvula*) occurs in the mid-ground of photo.

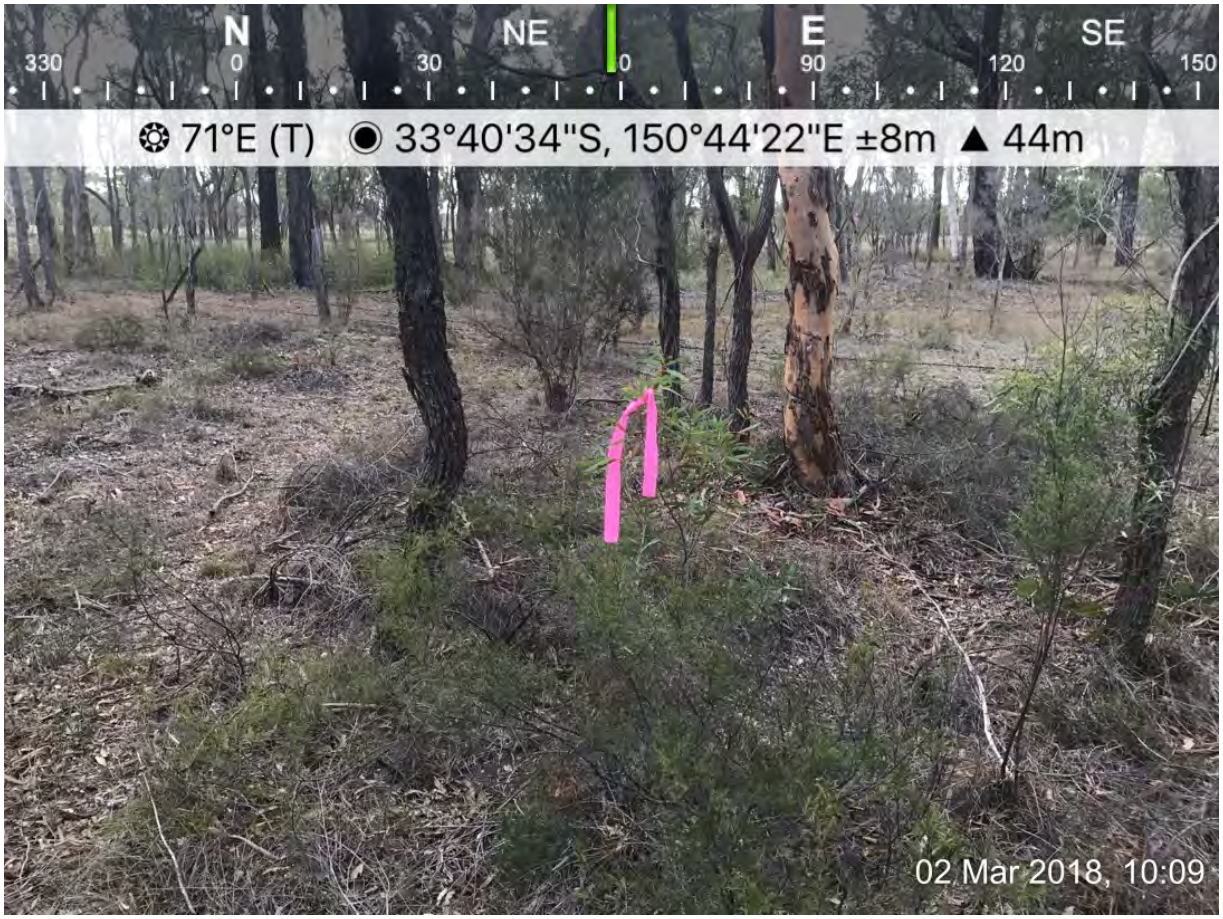


Photograph 18: View towards north on the western boundary of the APZ showing hollow -bearing *Eucalyotus sclerophylla* in the foreground at Waypoint 106 (refer to Figure 5). This tree would be recommended for retention as part of the Integrated Bushfire and Vegetation Management Plan.



Photograph 19: View towards south on the western boundary of the APZ showing Broad-leaved Ironbark (*Eucalyptus fibrosa*) hollow-bearing *Eucalyotus sclerophylla* in the foreground at Waypoint 107 (refer to Figure 5). This tree would be recommended for retention as part of the Integrated Bushfire and Vegetation Management Plan.


Photograph 20: View towards north on the western boundary showing the delineation in vegetation change (pink flagging tape indicates the western extent of the APZ), therefore, vegetation to the west of the flagging tape is proposed for retention.




Photograph 21: View towards east just within the APZ showing threatened *Dillwynia tenuifolia* (below pink flagging tape) in the foreground at Waypoint 108 (refer to Figure 5) occurring at the base of a *Eucalyptus sclerophylla* tree to be retained as part of the Integrated Bushfire Vegetation Management Plan.


**Figure 4: Broad-scale vegetation map of the property (NSW OEH 2008 - VISmap_ 3785). The green polygon shows the extent of Castlereagh Scribbly Gum Woodland (Source: SIX Maps.com)**

**Table 1: Plant species recorded on-site**

| Species name | Common name |
|---|---|
| **Native** | |
| *Eucalyptus sclerophylla* | Hard-leaved Scribbly Gum |
| *Angophora bakeri* | Narrow-leaved Apple |
| *Eucalyptus eugenioides* | Thin-leaved Stringybark |
| *Eucalyptus fibrosa* | Broad-leaved Ironbark |
| *Corymbia gummifera* | Red Bloodwood |
| *Eucalyptus parramatensis* | Parramatta Redgum |
| *Alternathera denticulata* | Lesser Joyweed |
| *Aristida vagans* | Threeawn Speargrass |
| *Bursaria spinosa* | Sweet Bursaria |
| *Callistemon pinifolius* | Pine-leaved Bottlebrush |

| Species name | Common name |
|---|---|
| *Cardamine paucijuga* | |
| *Centipeda minima subsp. minima* | spreading sneezeweed |
| *Cheilanthes sieberi* | Rock Fern |
| *Chloris truncata* | Windmill Grass |
| *Commelina cyanea* | Wandering sailor |
| *Corymbia gummifera* | Red Bloodwood |
| *Cynodon dactylon* | Common Couch |
| *Dianella spp.* | |
| *Daviesia ulicifolia* | |
| *Dillwynia tenuifolia* | |
| *Echinopogon ovatus* | Forest Hedgehog Grass |
| *Einadia hastata* | Berry Saltbush |
| *Eleocharis sphacelata* | Tall Spike Rush |
| *Epaltes australis* | Spreading Nut-heads |
| *Eragrostis leptostachya* | Paddock Lovegrass |
| *Fimbristylis dichotoma* | Common Fringe-sedge |
| *Glycine microphylla* | Small-leaf Glycine |
| *Hardenbergia violacea* | False Sarsaparilla |
| *Hakea sericea* | |
| *Hypericum gramineum* | Small St John's Wort |
| *Hypoxis hygrometrica* | Golden Weather-grass |
| *Juncus usitatus* | |
| *Kunzea ambigua* | Tick Bush |
| *Laginifera stipitata* | Blue Bottle Daisy |
| *Melaleuca decora* | |

| Species name | Common name |
|---|---|
| *Melaleuca linariifolia* | Flax-leaved Paperbark |
| *Melaleuca nodosa* | |
| *Melaleuca thymifolia* | Thyme Honey-myrtle |
| *Microlaena stipoides var. stipoides* | Weeping Grass |
| *Oxalis exilis* | |
| *Ozothamnus diosmifolius* | White Dogwood |
| *Paspalidium distans* | |
| *Persoonia nutans* | Nodding Geebung |
| *Pimelea linifolia* | Slender Rice Flower |
| *Pomax umbellata* | Pomax |
| *Potamogeton tricarinatus* | Floating Pondweed |
| *Pratia purpurascens* | Whiteroot |
| *Pteridium esculentum* | Bracken |
| *Rumex spp.* | Dock |
| *Solanum pungetium* | Eastern Nightshade |
| *Sporobolus creber* | Slender Rat's Tail Grass |
| *Urtica incise* | Stinging Nettle |
| *Wahlenbergia gracilis* | Sprawling Bluebell |
| **Introduced species** | |
| *Alternanthera pungens* | Khaki Weed |
| *Araujia sericifera* | Moth Vine |
| *Axonopus fissifolius* | Narrow-leafed Carpet Grass |
| *Chloris gayana* | Rhodes Grass |
| *Cirsium vulgare* | Spear Thistle |
| *Conyza spp.* | A Fleabane |

| Species name | Common name |
|---|---|
| *Cyperus brevifolius* | |
| *Datura stromonium* | Common Thornapple |
| *Eragrostis curvula* | African Lovegrass |
| *Gamochaeta calviceps* | Cudweed |
| *Gomphrena celosioides* | Gomphrena Weed |
| *Grevillea robusta* | Silky Oak |
| *Heliotropium amplexicaule* | Blue Heliotrope |
| *Ludwigia peploides subsp. montevidensis* | Water Primrose |
| *Modiola caroliniana* | Red-flowered Mallow |
| *Opuntia stricta* | Common Prickly Pear, Smooth Pest Pear |
| *Paspalum dilatatum* | Paspalum |
| *Pennisetum clandestinum* | Kikuyu Grass |
| *Phytolacca octandra* | Inkweed |
| *Rubus fruticosus sp. agg.* | Blackberry complex |
| *Senecio madagascariensis* | Fireweed |
| *Setaria spp.* | |
| *Sida rhombifolia* | Paddy's Lucerne |
| *Solanum nigrum* | Black-berry Nightshade |
| *Sporobolus africanus* | Parramatta Grass |
| *Verbena bonariensis* | Purpletop |
| *Yucca aloifolia* | Yucca |

## 4.2 Fauna habitat features

The main development impact area provides fauna habitat in the following forms:

- Seasonal foraging resources when eucalypts and other plants flower provide nectar and insect resources for mobile fauna including Grey-headed Flying Fox, possums, gliders, microchiropteran bats and a variety of woodland bird species
- marginal foraging area for owl species that may periodically roost or glean prey items such as possums from the area
- refuge and transient area for reptiles including snakes, lizards and amphibians including the intermittent drainage line occurring at the rear of the site
- potential grazing grounds for macropods

The site for the proposed development does not contain a significant amount of unique habitat features in the form of habitat hollows (in trees), hollow logs and other dead wood on the forest floor, rocky outcrops, creek lines and a diverse vegetation habitat structure as the site vegetation strata is limited to predominantly cleared open paddocks and isolated paddock trees. The three dams occurring on-site provide habitat for common waterbirds, however, these habitats are not considered to provide critical breeding resources for common protected or threatened fauna.

Intact woodland occurring outside the proposed development area includes better quality fauna habitat in the form of structurally diverse vegetation strata (tree canopy, shrubs and groundcovers) with some hollow-bearing trees and fallen dead timber.

It is likely that a variety of woodland birds frequent the locality. Seasonal blossoms from flowering canopy of Myrtaceae would attract a variety of nectivores including possums, birds and threatened Grey-headed Flying Fox.

Nocturnal arboreal marsupials including Common Brushtail Possum and Sugar Gliders are likely to occasionally use the site for foraging. Reptiles likely to occur include a variety of snakes (Red-bellied Black Snake, Brown Snake and Tiger Snake).

A detailed targeted fauna survey program was not considered necessary for this assessment due to the perceived minimal impacts likely to occur to fauna groups as a result of the development proposal. However, a habitat assessment and desktop threatened fauna assessment was undertaken.

**Photograph 22: Hollow-bearing tree stag located at front entrance to the property near the existing residence**

**Photograph 23: Hollow-bearing tree stag located at the south-west corner of the proposed development**

**Photograph 24: Largest dam occurring at the southern portion of the site considered to be in very poor condition**

**Photograph 25: Dam occurring in the central part of the site absent of riparian vegetation and associated habitat features**

**Photograph 26: Grazing paddocks (current and past usage) with introduced grasses predominantly occur throughout the development site**

## 4.3 Corridors and connectivity

The biodiversity value of corridor networks is well known. Landscapes that retain more connections between patches of otherwise isolated areas of vegetation are more likely to maintain more numerous and more diverse populations of various plant and animal species (Lindenmayer and Fischer, 2006). Conversely, a lack of landscape connectivity can have a range of negative impacts on species populations (Lindenmayer and Fischer, 2006). It is thought that if existing remnants are left to persist without sufficient immigration to maintain genetic diversity, continued losses of biodiversity are certain (Parker *et al.* 2008).

The site forms part of a local habitat corridor being continuous with mosaic patches of surrounding bushland interspersed with agricultural and rural residential development. Isolated paddock trees provide limited 'stepping stone' type connectivity for mobile groups of fauna that are likely to be seasonally transient through the area. However, the proposed loss of this habitat will **not** significantly impact upon the local population of a threatened species.

The rear (western portion) of the site contains remnant CSGW that will be retained as part of the development proposal. This vegetation is considered ecologically significant from a connectivity perspective because it comprises of CSGW Vulnerable Ecological Community type, contains recent records of threatened plant and it forms part of a broader corridor network that connects with Castlereagh Nature Reserve on the opposite side of The Northern Road (refer to Figure 1).

The proposed development will **not** fragment bushland or significantly impact upon the corridor function of bushland in the locality. Intact native woodland will be retained around the western side of the development (still within the property) for a significant area that will allow the movement of fauna groups and dispersal/exchange of genetic material for plants.

## 4.4 Threatened species

### 4.4.1 Threatened flora

Despite targeted surveys undertaken in June 2015 recording five (5) individuals of threatened plants – *Persoonia nutans* (Nodding Geebung), only one individual of this species was recorded during March 2018 surveys and this was outside the proposed APZ (Figure 5). *Persoonia nutans* is listed as Endangered under the NSW *Biodiversity Conservation Act 2016* and Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*.

64 individuals of another threatened plant – *Dillwynia tenuifolia* was recorded during the recent surveys. 15 of these plants occur within the proposed Asset Protection Zones (Figure 5). *Dillwynia tenuifolia* is listed as Vulnerable under the NSW *Biodiversity Conservation Act 2016* and Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*.

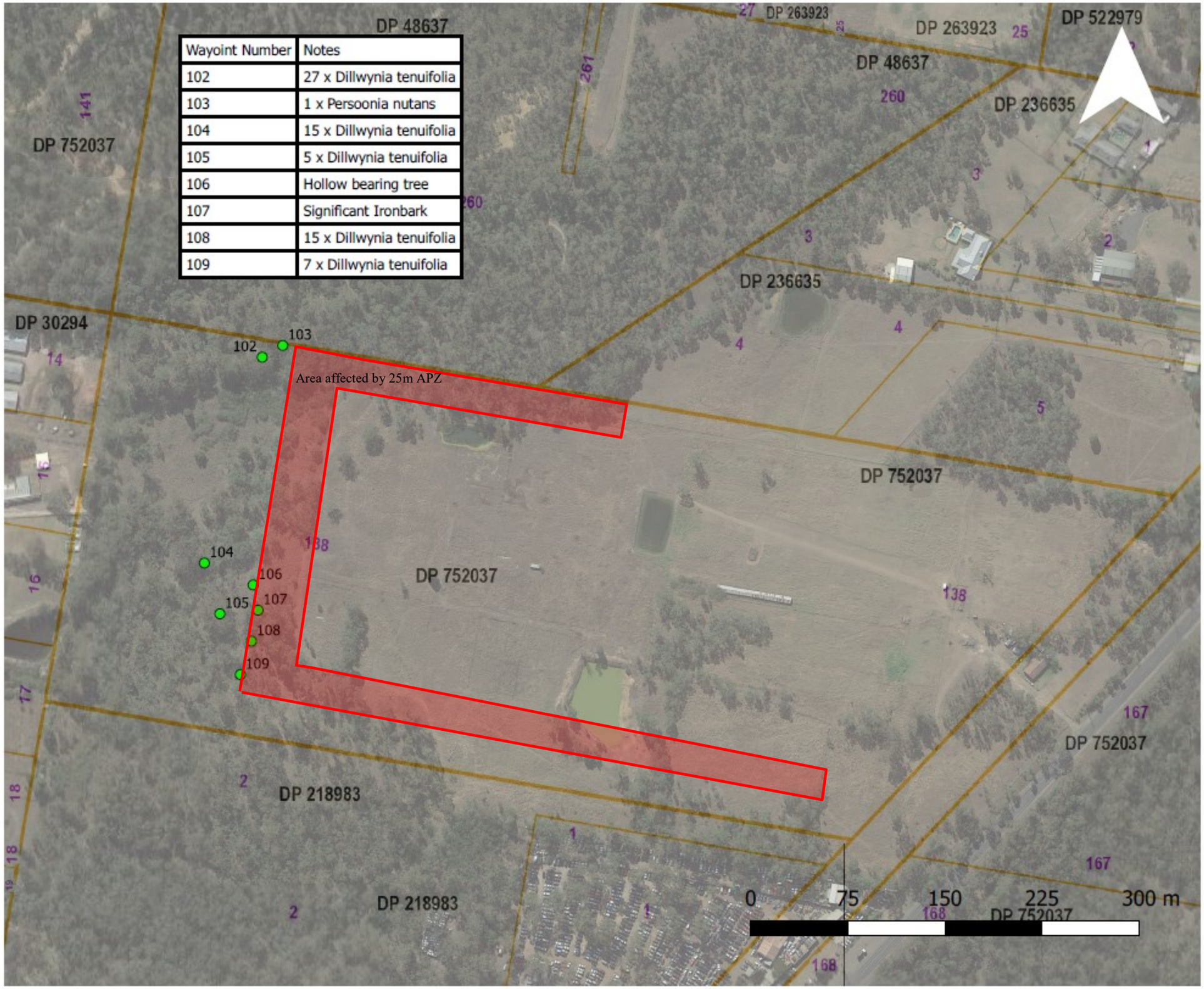
Other threatened flora previously recorded within 10km of the site that have been considered in this assessment are shown in Appendix C.

An Assessment of Significance was undertaken for *Persoonia nutans* (Nodding Geebung) and *Dillwynia tenuifolia* within Section 5.2.2.

The proposal is unlikely to constitute a significant impact on threatened plant species given that:

- the proposed works would only remove poor quality habitat for these species
- known records of the plants will be unaffected by the proposal
- other areas of better quality habitat will be retained immediately adjacent to within the subject site and surrounding landscape
- the proposal is not likely to fragment habitat to an extent that would prevent dispersal and/or pollination of the local viable population that exists within the sub-catchment

It was concluded that the proposal is unlikely to significantly impact on threatened flora listed under the NSW *Biodiversity Conservation Act 2016* and Commonwealth *Environment Protection and Biodiversity Conservation Act 1999.*




| Wayoint Number | Notes |
|---|---|
| 102 | 27 x Dillwynia tenuifolia |
| 103 | 1 x Persoonia nutans |
| 104 | 15 x Dillwynia tenuifolia |
| 105 | 5 x Dillwynia tenuifolia |
| 106 | Hollow bearing tree |
| 107 | Significant Ironbark |
| 108 | 15 x Dillwynia tenuifolia |
| 109 | 7 x Dillwynia tenuifolia |

# FIGURE 5: Significant environmental features

521 THE OLD NORTHERN ROAD

LONDONDERRY

## Legend

- Significant environmental feature
- APZ 25m from building

Aerial imagery: Google Satellite

FRASER ECOLOGICAL

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### 4.4.2 Threatened Fauna

No indirect evidence of threatened fauna species or habitats critical to survival of a local population of threatened fauna were recorded on site. Threatened fauna recorded previously within 10km of the site that have been considered in this assessment are shown in Appendix D.

The previous Flora and Fauna Assessment prepared by Kevin Mills and Associates (2009) states that the site contains potential habitat for Endangered Cumberland Plain Land Snail. Targeted searches were specifically undertaken for this species, however, none were recorded on-site. An Assessment of Significance was undertaken as a precautionary measure (Section 5).

The proposal is unlikely to constitute a significant impact on threatened fauna species given that:

- the proposed works would only remove poor quality/marginal foraging habitat for these species
- other areas of better quality habitat will be retained immediately adjacent to within the subject site and surrounding landscape
- the proposal is not likely to fragment habitat to an extent that would prevent mobility of the local viable populations of any threatened fauna species that may potentially occur within the sub-catchment

The proposal is unlikely to significantly impact on threatened fauna listed under the NSW *Biodiversity Conservation Act 2016* and Commonwealth *Environment Protection and Biodiversity Conservation Act 1999.*

## 4.5 Consideration of threatening processes

The proposal does require the removal of native vegetation which is consistent with the listed Key Threatening Process "Clearing of Native Vegetation" which has been considered as part of this assessment. This listed Key Threatening Process was considered within Assessment of significance (seven part test) undertaken for the Castlereagh Scribbly Gum Woodland Vulnerable Ecological Community as a precautionary measure (Section 5.2.1).

NSW OEH has identified the following actions to help in the recovery of this ecological community in NSW:

1. Develop and implement Cumberland Plain Reservation Strategy and create a protected bushland network through targeted land acquisition as land becomes available (high priority).
2. Encourage and promote best-practice management of EECs on private land (medium priority).
3. Encourage planning authorities to address EECs in development of environmental planning instruments and, where possible, seek biodiversity certification (medium priority).
4. Ensure the consideration of impacts on EECs when enforcing noxious weed or pest species control in EECs (medium priority).

5. Finalise the multi-EEC recovery plan as a State priority in accordance with contractual obligations with DEH, by July 2007 (medium priority).
6. Incorporate consideration of EEC protection in regional open space planning (high priority).
7. Investigate the development of a regular monitoring program to assess the change in extent of vegetation across the Cumberland Plain (medium priority).
8. Investigate the preparation of a recommendation for the declaration of critical habitat (low priority).
9. Liaise with institutions to facilitate research relevant to the recovery of Cumberland Plain EECs (low priority).
10. Local Govt prepare plans of management in accordance with the Local Government Act for reserves containing EECs, which have conservation as a primary objective, or where conservation is compatible (high priority).
11. Manage, to best practice standards, areas of EECs which have conservation as a primary objective, or where conservation is compatible. Priorities are to be based on DEC conservation significance assessment (high priority).
12. Management of EECs is to be included in school environmental management plans where the school land contains EECs (medium priority).
13. Management of EECs to be included in the conditions for Crown land trusts, lease and licence holders (medium priority).
14. Prepare and implement community awareness, education and involvement strategy (medium priority).
15. Promote best practice management guidelines (medium priority).
16. Public authorities will promote management agreements to landholders through their ongoing land use planning activities (medium priority).

# 5. Impact assessments

## 5.1 COMMONWEALTH ENVIRONMENTAL PROTECTION & BIODIVERSITY CONSERVATION ACT (1999) ASSESSMENT

The *Environment Protection and Biodiversity Conservation Act, (1999)* requires that Commonwealth approval be obtained for certain actions. The Act provides an assessment and approvals systems for actions that have a significant impact on matters of National Environment Significance (NES). These may include:-

- Wetlands protected by international treaty (the Ramsar Convention);
- Nationally listed threatened species and ecological communities;
- Nationally listed migratory species.

Actions are projects, developments, undertakings, activities, series of activities or alteration of any of these. An action that needs Commonwealth approval is known as a controlled action. A controlled action needs approval where the Commonwealth decides the action would have a significant effect on a NES matter.

Where a proposed activity is located in an area identified to be of NES, or such that it is likely to significantly affect threatened species, ecological communities, migratory species or their habitats, the matter needs to be referred to the Australian Government Department of the Environment (AGDE).

The following assessment in accordance with the EP&BC Act Policy Statement 1.1 *Significant Impact Guideline (AGDE 2013)* is provided:

**i. Are there any Matters of National Environmental Significance located in the area of the proposed action?**

*Persoonia nutans* (Nodding Geebung) and *Dillwynia tenuifolia* is listed under the *EPBC Act 1999* was recorded on-site (Section 4.5.2).

Castlereagh Scribbly Gum Woodland (CSGW) is listed as an Endangered under the Commonwealth *EPBC Act 1999*.

A search of the Protected Matters Search Tool (AGDE 2015) was conducted for EPBC Listed threatened and migratory species recorded within 5 km of the subject site (Appendix C).

Suitable habitat is present for the following nationally listed threatened species recorded from the Protected Matters Search (AGDE 2015) which occur or which may occur within 10 km of the subject site:

**Threatened Fauna Species**

- Large-eared Pied Bat
- Grey-headed Flying Fox
- Large-footed Myotis

Suitable habitat is present for the following nationally listed migratory species recorded from the Protected Matters Search (AGDE 2015) which occur or which may occur within 5 km of the subject site:

**Migratory Species**

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

The site does not contain suitable habitat for nationally listed threatened ecological communities.

**ii. Considering the proposed action at its broadest scope, is there potential for impacts on Matters of National Environmental Significance?**

The proposal will require the removal of a relatively small area of suitable habitat for nationally listed locally occurring threatened and migratory species which are highly mobile species.

No *Persoonia nutans* plants are proposed for removal.

Castlereagh Scribbly Gum Woodland (CSGW) proposed for removal includes isolated paddock trees with a highly disturbed understorey and is considered to be in poor condition. The trees include a mixture of a few older mature trees with young to sub-mature growth vegetation regenerating where grazing practices have ceased. The native under-storey species have been outcompeted by predominantly introduced pasture species.

Better quality patches of woodland occur at the rear (western portion) of the property where grazing has been activities have been prevented as result of existing fencing. These areas will be excluded from the proposed clearing activities.

The extent and quality of habitat of proposed for removal is insignificant in comparison to good quality woodland that will be retained within the property in perpetuity.

As result, the proposal will not increase extinction of this community on site.

**iii. Are there any proposed measures to avoid or reduce impacts on Matters of National Environmental Significance?**

Yes – pre-construction fencing will be installed to ensure no *Persoonia nutans* plants and Castlereagh Scribbly Gum Woodland (CSGW) are damaged as part of the proposal.

**iv. Are any impacts of the proposed action on Matters of National Environmental Significance likely to be significant impacts?**

With regard to nationally listed threatened species it is considered that the proposal is not likely to:

• lead to a long-term decrease in the size of an important population of a species;

• reduce the area of occupancy of an important population;

• fragment an existing important population into two or more populations;

• adversely affect habitat critical to the survival of a species;

• disrupt the breeding cycle of an important population;

• modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline;

• result in invasive species that are harmful to a threatened species becoming established in the threatened species' habitat;

• introduce disease that may cause a species to decline; or

• interfere with the recovery of the species.

**The following reasons are provided:**

• There are larger areas of higher quality habitat for locally occurring nationally listed threatened and migratory species present within the locality, including lands reserved for conservation such as Castlereagh Nature Reserve; and

• No nationally listed threatened species were observed within the subject site during surveys.

**With regard to nationally listed migratory species it is considered that the proposal is not likely to:**

• substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species;

• result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species; or

• seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species.

**The following reasons are provided:**

• The subject site has not been identified as containing important habitat for a nationally listed migratory species; and

• No nationally listed migratory species have been recorded within the subject site during surveys.

**CONCLUSION**

**It is considered that the proposed action is not likely to have a significant impact on nationally listed threatened or migratory species or communities.**

## 5.2 NSW Assessment of Significance ('seven part test')

Section 78A of the *Environmental Planning and Assessment Act*, 1979 (EP&A Act) enables a person to apply to a consent authority to carry out development that is permissible under an environmental planning instrument. In assessing a development application a consent authority must, pursuant to 79C of the EP&A Act take into consideration, where relevant, the likely impacts of the development on the natural and built environments.

Section 5A subsection 1 of the *Environmental Planning and Assessment Act 1979* states that **each** of the factors in subsection 2 must be taken into account in deciding whether there is likely to be a significant effect on threatened species, populations or ecological communities, or their habitats, and any **assessment guidelines**.

Species Impact Statement (SIS) is required if an activity is on land that is, or is part of critical habitat; or there is likely to be a significant effect as determined under s.5A of the EP&A Act, the seven part assessment of significance.

**Definitions:**

- *Critical habitat: the whole or any part or parts of the area or areas of land comprising the habitat of an endangered species, population or ecological community that is critical to the survival of the species, population or ecological community.*
- *Significant impact: if the Assessment of Significance determines that a there will be a significant effect on threatened species, populations or ecological communities, or their habitats a SIS will be required.*
- *Assessment guidelines means assessment guidelines issued and in force under section 94A of the Biodiversity Conservation Act 2016 or, subject to section 5C, section 220ZZA of the Fisheries Management Act 1994.*

- *Key threatening process means a threatening process specified in Schedule 3 of the Biodiversity Conservation Act 2016 or, subject to section 5C, Part 7A of the Fisheries Management Act 1994*

### 5.2.1 Castlereagh Scribbly Gum Woodland Vulnerable Ecological Community and Castlereagh Swamp Woodland Endangered Ecological Community

Castlereagh Scribbly Gum Woodland (CSGW) is listed as a Vulnerable Ecological Community listed under the NSW *Biodiversity Conservation Act 2016*.

Castlereagh Swamp Woodland (CSW) is listed as an Endangered Ecological Community under the NSW *Biodiversity Conservation Act 2016*.

**QUESTION A**

***In the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction,***

**Response:**

The question is not relevant to a vulnerable ecological community

**QUESTION B**

***In the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction,***

**Response:**

The question is not relevant to a vulnerable or endangered ecological community

**QUESTION C**

**In the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:**

**i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or**

**Response:**

The remnant CSGW and CSW vegetation proposed for removal includes isolated paddock trees with a highly disturbed understorey and is considered to be in poor condition. The trees include a mixture of a few older mature trees with young to sub-mature growth vegetation regenerating where grazing practices have ceased. The native under-storey species have been outcompeted by predominantly introduced pasture species.

Better quality patches of woodland occur at the rear (western portion) of the property where grazing has been activities have been prevented as result of existing fencing. These areas will be excluded from the proposed clearing activities.

The extent and quality of habitat of proposed for removal is insignificant in comparison to good quality woodland that will be retained within the property in perpetuity.

As result, the proposal will not increase extinction of this community on site.

**ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction?**

The proposal will NOT adversely modify the areas of CSGW and CSW proposed for retention.

The extent of modification proposed would not place the local occurrence of the EEC (including areas forming the local population of this EEC that extends outside the property) at risk of extinction.

**QUESTION D**

**In relation to the habitat of a threatened species, population or ecological community:**

i) **the extent to which habitat is likely to be removed or modified as a result of the action proposed,**

**Response:**

The extent and quality of habitat of proposed for removal is insignificant in comparison to good quality woodland that will be retained within the property in perpetuity.

ii) **whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and**

**Response:**

The rear (western portion) of the site contains remnant CSGW that will be retained as part of the development proposal. This vegetation is considered ecologically significant from a connectivity perspective because it comprises of CSGW Vulnerable Ecological Community type, contains recent records of threatened plants and it forms part of a broader corridor network that connects with Castlereagh Nature Reserve on the opposite side of The Northern Road (refer to Figure 1).

The proposed development will **not** fragment bushland or significantly impact upon the corridor function of bushland in the locality. Intact native woodland will be retained around the western side of the development (still within the property) for a significant area that will allow the movement of fauna groups and dispersal/exchange of genetic material for plants.

iii) **the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality?**

**Response:**

The condition of the vegetation community proposed for removal was in poor ecological condition.

The habitat proposed for removal to facilitate the proposed development is not considered to have a detrimental effect to the availability of food, roosting and other habitat resources for native fauna in the study area and locality. It does not provide habitat resources that are critical to the survival of threatened species or other local areas of this same EEC.

Local vegetation mapping studies and aerial photographs have been checked, and the action will not break the connectivity between, or otherwise fragment or isolate habitat.

The vegetation proposed for removal does not provide a vital ecological function or genetic bank to such an extent that its potential removal would place the local population at risk of extinction.

Therefore, the habitat potentially removed as result of the development would not further exacerbate the decline in ecological CSGW and CSW in the locality.

**QUESTION E**

**Whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly)?**

**Response:**

No critical habitat has been declared for this ecological community.

**QUESTION F**

**Whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan?**

**Response:**

The action is not inconsistent with a recovery or threat abatement plan or the actions in the Priorities Action Statement (PAS).

The mitigation measures are consistent with the PAS for Threatened Spp/Pop/Communities in the Penrith LGA.

**QUESTION G**

**Whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process?**

**Response:**

The proposal does require the removal of native vegetation which is consistent with the listed Key Threatening Process "Clearing of Native Vegetation" which has been considered as part of this assessment. This listed Key Threatening Process was considered within this Assessment of significance (seven part test) undertaken for the CSGW and CSW communities.

However, the development footprint is consistent with the permissible land use zoning of the site and surrounding existing rural residential properties and the former Part 3A approval.

The size of the development is not considered excessive from an ecological perspective as most of it will occur in previously cleared areas.

**CONCLUSION**

**The proposed development will not have a significant impact upon the local population of Castlereagh Scribbly Gum Woodland Vulnerable Ecological Community.**

### 5.2.2 *Persoonia nutans* (Nodding Geebung)

***(a) in the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction,***

Response:

Despite targeted surveys undertaken in June 2015 recording five (5) individuals of threatened plants – *Persoonia nutans* (Nodding Geebung), only one individual of this species was recorded during March 2018 surveys and this was outside the proposed APZ (Figure 5). *Persoonia nutans* is listed as Endangered under the NSW *Biodiversity Conservation Act 2016* and Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*.

The plant is outside the proposed development area and will not be impacted by the proposal.

Other threatened flora previously recorded within 10km of the site that have been considered in this assessment are shown in Appendix C.

The proposal is unlikely to constitute a significant impact on this threatened plant species given that:

- the proposed works would only remove poor quality habitat for these species
- known records of the plants will be unaffected by the proposal
- other areas of better quality habitat will be retained immediately adjacent to within the subject site and surrounding landscape
- the proposal is not likely to fragment habitat to an extent that would prevent dispersal and/or pollination of the local viable population that exists within the sub-catchment

As such, the viability of the local population would not be adversely affected thereby resulting in the local extinction of this species.

***(b) in the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction,***

Response:

This question is not relevant to a threatened species

***(c) in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:***

***(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or***

Response:

This question is not relevant to a threatened species

***(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,***

Response:

This question is not relevant to a threatened species.

**(d) "…in relation to the habitat of a threatened species, population or ecological community:**

**(i) the extent to which habitat is likely to be removed or modified as a result of the action proposed…", and**

The habitat proposed for removal includes isolated paddock trees with a highly disturbed understorey and is considered to be in poor condition. The trees include a mixture of a few older mature trees with young to sub-mature growth vegetation regenerating where grazing practices have ceased. The native under-storey species have been outcompeted by predominantly introduced pasture species.

Better quality patches of woodland occur at the rear (western portion) of the property where grazing has been activities have been prevented as result of existing fencing. These areas will be excluded from the proposed clearing activities and is the known location of this species.

The extent and quality of habitat of proposed for removal is insignificant in comparison to good quality woodland that will be retained within the property in perpetuity.

***(ii) "… whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action…", and***

The rear (western portion) of the site contains remnant CSGW that will be retained as part of the development proposal. This vegetation is considered ecologically significant from a connectivity perspective because it comprises of CSGW Vulnerable Ecological Community type, contains recent records of a threatened plants including *Persoonia nutans* and it forms part of a broader corridor network.

The proposed development will **not** fragment bushland or significantly impact upon the corridor function of bushland in the locality. Intact native woodland will be retained around the western side of the development (still within the property) for a significant area that will allow the movement of fauna groups and dispersal/exchange of genetic material for plants.

***(iii) "…the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality…"***

The importance of the habitat proposed for removal is not considered significant.

The areas of potential habitat for this species to be removed under the current proposal is not considered critical to the survival of the local population of these species, particularly in proportion to the area of similar and better quality habitats that will be retained on the property and locality and throughout the region.

***(e) whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly),***

Response:

No critical habitat has been declared for this species.

***(f) whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,***

Response:

A Draft Recovery Plan has been prepared for this species (DEC 2005).

The main threats to the survival of *P. nutans* are habitat loss and fragmentation (due to clearing for mining, and rural/residential development) and inappropriate fire regimes, particularly frequent fire. The species is also threatened by habitat degradation due to disturbance associated with unrestricted access to *P. nutans* habitat.

The overall objective of the recovery plan is to ensure the continued and long-term survival of *P. nutans* in the wild by promoting the in situ conservation of the species across its natural range. Specific recovery objectives include:

- minimise the loss and fragmentation of P. nutans habitat;
- identify and minimise the operation of threats at sites where P. nutans occurs;
- implement a survey and monitoring program that will provide information on the extent and viability of P.nutans;
- provide public authorities with information that assists in conserving the species;
- raise awareness of the species and involve the community in the recovery program; and
- promote research questions that will assist future management decisions.

Thus the proposal is largely consistent with these recovery strategies.

***(g) whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.***

Response:

The proposed works will contribute to the relevant Key Threatening Processes “Clearing of Native Vegetation”.

However, the quality of vegetation is considered to be in very poor condition with low resilience and of minimal potential habitat significance for this species.

**Conclusion**

The proposal is unlikely to constitute a significant impact on *Persoonia nutans* given that:

- the proposed works would only remove marginal foraging resources for these species
- other areas of potential foraging habitat are present within the subject site and surrounding landscape
- the proposal would not isolate or fragment any currently connecting areas of habitat in terms of use by these highly mobile species

### 5.2.3 *Dillwynia tenuifolia*

***(a) in the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction,***

Sixty-four (64) individuals of another threatened plant – *Dillwynia tenuifolia* were recorded during the recent surveys.

Fifteen (15) of these plants occur within the proposed Asset Protection Zones (Figure 5). *Dillwynia tenuifolia* is listed as Vulnerable under the NSW *Biodiversity Conservation Act 2016* and Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*.

The proposal is unlikely to constitute a significant impact on this threatened plant species given that:

- the proposed works would only remove poor quality habitat for these species
- known records of the plants will be unaffected by the proposal
- other areas of better quality habitat will be retained immediately adjacent to within the subject site and surrounding landscape
- the proposal is not likely to fragment habitat to an extent that would prevent dispersal and/or pollination of the local viable population that exists within the sub-catchment

As such, the viability of the local population would not be adversely affected thereby resulting in the local extinction of this species.

***(b) in the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction,***

Response:

This question is not relevant to a threatened species

***(c) in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:***

***(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or***

Response:

This question is not relevant to a threatened species

***(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,***

Response:

This question is not relevant to a threatened species.

**(d) "…in relation to the habitat of a threatened species, population or ecological community:**

**(i) the extent to which habitat is likely to be removed or modified as a result of the action proposed…", and**

The habitat proposed for removal includes isolated paddock trees with a highly disturbed understorey and is considered to be in poor condition. The trees include a mixture of a few older mature trees with young to sub-mature growth vegetation regenerating where grazing practices have ceased. The native under-storey species have been outcompeted by predominantly introduced pasture species.

Better quality patches of woodland occur at the rear (western portion) of the property where grazing has been activities have been prevented as result of existing fencing. These areas will be excluded from the proposed clearing activities and is the known location of this species.

The extent and quality of habitat of proposed for removal is insignificant in comparison to good quality woodland that will be retained within the property in perpetuity.

***(ii) "… whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action…", and***

The rear (western portion) of the site contains remnant CSGW that will be retained as part of the development proposal. This vegetation is considered ecologically significant from a connectivity perspective because it comprises of CSGW Vulnerable Ecological Community type, contains recent records of a threatened plants and it forms part of a broader corridor network.

The proposed development will **not** fragment bushland or significantly impact upon the corridor function of bushland in the locality. Intact native woodland will be retained around the western side of the development (still within the property) for a significant area that will allow the movement of fauna groups and dispersal/exchange of genetic material for plants.

***(iii) "…the importance of the habitat to be removed, modified, fragmented or isolated to the***

***long-term survival of the species, population or ecological community in the locality…"***

The importance of the habitat proposed for removal is not considered significant.

The areas of potential habitat for this species to be removed under the current proposal is not considered critical to the survival of the local population of these species, particularly in proportion to the area of similar and better quality habitats that will be retained on the property and locality and throughout the region.

***(e) whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly),***

Response:

No critical habitat has been declared for this species.

***(f) whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,***

Response:

No Recovery Plan has been prepared for this species.

***(g) whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.***

Response:

The proposed works will contribute to the relevant Key Threatening Processes "Clearing of Native Vegetation".

However, the quality of vegetation is considered to be in very poor condition with low resilience and of minimal potential habitat significance for this species.

**Conclusion**

The proposal is unlikely to constitute a significant impact on *Dillwynia tenuifolia* given that:

- the proposed works would only remove marginal foraging resources for these species
- other areas of potential foraging habitat are present within the subject site and surrounding landscape
- the proposal would not isolate or fragment any currently connecting areas of habitat in terms of use by these highly mobile species

### 5.2.3 *Meridolum corneovirens* (Cumberland Plain Land Snail)

***(a) in the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction,***

Response:

This species was not recorded during surveys undertaken in 2013, 2015 and recently in March 2018. However, some portions of the site proposed for development contain potential habitat for this species (remnant CSGW).

The proposal is unlikely to constitute a significant impact on this species given that:

- the proposed works would only remove poor quality habitat for these species
- other areas of better quality habitat will be retained immediately adjacent to within the subject site and surrounding landscape
- the proposal is not likely to fragment habitat to an extent that would prevent dispersal of a local viable population

As such, the viability of the local population would not be adversely affected thereby resulting in the local extinction of this species.

***(b) in the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction,***

Response:

This question is not relevant to a threatened species

***(c) in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:***

***(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or***

Response:

This question is not relevant to a threatened species

***(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,***

Response:

This question is not relevant to a threatened species.

**(d) "…in relation to the habitat of a threatened species, population or ecological community:**

**(i) the extent to which habitat is likely to be removed or modified as a result of the action proposed…", and**

The habitat proposed for removal includes isolated paddock trees with a highly disturbed understorey and is considered to be in poor condition. The trees include a mixture of a few older mature trees with young to sub-mature growth vegetation regenerating where grazing practices have ceased. The native under-storey species have been outcompeted by predominantly introduced pasture species.

Better quality patches of woodland occur at the rear (western portion) of the property where grazing has been activities have been prevented as result of existing fencing. These areas will be excluded from the proposed clearing activities and provides better quality habitat for this species.

The extent and quality of habitat of proposed for removal is insignificant in comparison to good quality woodland and Cumberland Plain Land Snail habitat that will be retained within the property in perpetuity.

***(ii) "… whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action…", and***

The rear (western portion) of the site contains remnant CSGW that will be retained as part of the development proposal.

The proposed development will **not** fragment bushland or significantly impact upon the corridor function of bushland in the locality. Intact native woodland will be retained around the western side of the development (still within the property) for a significant area that will allow the movement of this species should it be present within the property.

***(iii) "…the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality…"***

The importance of the habitat proposed for removal is not considered significant.

The areas of potential habitat for this species to be removed under the current proposal is not considered critical to the survival of the local population of these species, particularly in proportion to the area of similar and better quality habitats that will be retained on the property and locality and throughout the region.

***(e) whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly),***

Response:

No critical habitat has been declared for this species.

***(f) whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,***

Response:

No recovery plan has been prepared for this species.

***(g) whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.***

Response:

The proposed works will contribute to the relevant Key Threatening Processes "Clearing of Native Vegetation".

However, the quality of vegetation is considered to be in very poor condition with low resilience. It is of low potential habitat for this species. Better quality habitat will be retained on the property.

**Conclusion**

The proposal is unlikely to constitute a significant impact on Cumberland Plain Land Snail given that:

- the proposed works would only remove marginal foraging resources for these species
- other areas of potential foraging habitat are present within the subject site and surrounding landscape
- the proposal would not isolate or fragment any currently connecting areas of habitat in terms of use by these highly mobile species

### 5.2.4 Grey-headed Flying Fox (*Pteropus poliocephalus*)

**(a)** ***"…in the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction…"***

Numerous canopy trees occur throughout the locality; these trees are likely to be utilised by the Grey-headed Flying fox as food when these Myrtaceae species.

The Proposal would thus not significantly reduce the extent of any Grey-headed Flying-fox foraging or sheltering opportunities, nor would it result in the erection of any barriers to the dispersal, foraging or interbreeding needs of this species. As such, the viability of the local Grey-headed Flying-fox population would not be adversely affected thereby resulting in the local extinction of this species.

**(b)** ***"…in the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction…",***

An 'endangered population' is defined as a "population specified in Part 2 of Schedule 1" of the *TSC Act.* Therefore the Grey-headed Flying-fox is not an endangered population.

**(c)** ***"…in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:***

***(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or***

***(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction..."***

An Endangered Ecological Community means an ecological community specified in Part 3 of Schedule 1 of the *TSC Act*. The Grey-headed Flying-fox is not listed as an Endangered Ecological Community.

**(d)** ***"…in relation to the habitat of a threatened species, population or ecological community:***

***(i) the extent to which habitat is likely to be removed or modified as a result of the action proposed…", and***

The vegetation likely to be removed or impacted may offer some foraging opportunities for the Grey-headed Flying-fox when the Myrtaceae species flower. Whilst this is the case other areas of foraging habitat may also be found in local parks and reserves, in private gardens and streetscapes, and ofcourse vast areas of bushland within the property that will remain unaffected by the proposed development.

The removal of foraging habitat is not considered to be significant in the context of the Locality and Region.

***(ii) "… whether an area of habitat is likely to become fragmented or isolated from other areas ofhabitat as a result of the proposed action…", and***

The Grey-headed Flying-fox is known to easily negotiate urban infrastructure, roads, open fields, water bodies and paddocks. When eucalyptus trees are flowering, the Flying-fox is known to traverse long distances in search of food.

The rear (western portion) of the site contains remnant CSGW that will be retained as part of the development proposal.

The proposed development will **not** fragment bushland or significantly impact upon the corridor function of bushland in the locality. Intact native woodland will be retained around the western side of the development (still within the property) for a significant area that will allow the movement of this species should it be present within the property.

The subject species potentially utilising the subject site for foraging, is highly mobile. Thus, the loss of what is considered a relatively small amount of native vegetation in relation to their territorial range is unlikely to increase the fragmentation or isolation of habitat for these species.

***(iii) "…the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality…"***

The importance of the habitat proposed for removal is not considered significant.

The areas of potential habitat for this species to be removed under the current proposal is not considered critical to the survival of the local population of these species, particularly in proportion to the area of similar and better quality habitats that will be retained on the property and locality and throughout the region.

**(e)** ***"…whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly)…"***

No critical habitat would be adversely affected by the Proposal. The Study Area and Locality are not listed as critical habitat under Part 3, Division 1 of the *TSC Act*. Critical habitat for the Grey-headed Flying-fox is yet to be defined.

***(f) whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,***

A Draft National Recovery Plan has been prepared for the Grey-headed Flying-fox (DECCW 2009).

The following objective is relevant to this Proposal: to identify and protect foraging habitat critical to the survival of Grey-headed Flying-foxes throughout their range. However, given the very small amount of habitat likely to be disturbed by the proposal it is highly unlikely that this stand of vegetation would be identified as a priority foraging area.

***(g) ..whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.***

Currently 27 Key Threatening Processes for mainland NSW are listed under Schedule 3 of the *TSC Act*. Of these, "clearing of native vegetation" would be applicable to the Proposal. Whilst it is acknowledged that the proposal would impact native bushland, it is not considered that this impact, would result in a significant loss of habitat for this species from the Locality or Region.

The effects of other key threatening processes such as the introduction and spread of weeds such as Lantana, exotic vines, perennial grasses, vines and scramblers should be kept to a minimum.

**Conclusion**

The proposal is unlikely to constitute a significant impact on Grey-headed Flying Fox given that:

- the proposed works would only remove marginal foraging resources for these species
- other areas of potential foraging habitat are present within the subject site and surrounding landscape
- the proposal would not isolate or fragment any currently connecting areas of habitat in terms of use by these highly mobile species

### 5.2.5 Microchiropteran Bats

The Eastern Bentwing-bat (*Miniopterus schreibersii oceanensis*), Eastern False Pipistrelle (*Falsistrellus tasmaniensis*), Yellow-bellied Sheathtail-bat (*Saccolaimus flaviventris*), and Eastern Freetail-bat (*Mormopterus norfolkensis*), Greater-broad-nosed Bat (*Scoteanx ruepelli*) and Large-eared Pied Bat (*Chalinolobus dwyeri*) have been grouped on the basis of their similar habitat requirements.

***(a) "…in the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction…"***

Only two (2) hollow-bearing trees that are suitable for roosting are proposed for removal. Potential breeding and roosting habitat will retained within the property.

Microbats use 'flyways' created by openings or interface edges surrounding bushland. It is expected that post-construction, these species would to continue forage in and around the property, utilising much the same habitat types as previously. Given the area of vegetation to be impacted in proportion to the species' high mobility and foraging range, it is unlikely that the proposal would have a significant impact on a viable local population of these microchiropteran bats.

***(b) "…in the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction…",***

An endangered population is defined under the TSC Act as 'a population specified in Part 2 of Schedule 1'. At the present time, there are no endangered populations of microchiropteran bat species listed under the Act.

***(c) "…in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:***

***(i)... is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or***

***(ii)... is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction..."***

Not applicable to a threatened species.

***(d) "…in relation to the habitat of a threatened species, population or ecological community:***

***(i) ...the extent to which habitat is likely to be removed or modified as a result of the action proposed…", and***

Only two (2) hollow-bearing trees that are suitable for roosting are proposed for removal. Potential breeding and roosting habitat will retained within the property.

The vegetation likely to be removed or impacted may offer some foraging for insects. Whilst this is the case other areas of foraging habitat may also be found in local parks and reserves, in private gardens and streetscapes, and ofcourse vast areas of bushland within the property that will remain unaffected by the proposed development.

***(ii) "… whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action…", and***

Microchiropteran bats can easily negotiate open areas and given the limited size of the habitat to be cleared, this loss is not expected to result in the disturbance to the bats' foraging patterns. The possible roosting (i.e. hollows for the Eastern Freetail-bat) and foraging sites within the Study Area will still be connected to other foraging and roosting in the Locality and Region.

***(iii) "…the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality…"***

The habitat proposed for removal is not considered important breeding habitat for the local population of these species. Although potential foraging habitat would be removed similar foraging habitat will be available in the locality. Given the extent of the resources to be retained in the Study Area and beyond, it is not considered that the Proposal would affect these species such that there would be an impact on their long term survival.

***(e) "…whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly)…"***

No critical habitat would be adversely affected by the draft Proposal. The Study Area is not listed as critical habitat under Part 3 Division 1 of the TSC Act.

***(f) "…whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan…"***

No Recovery Plans or Threat Abatement Plans (either finalised or draft) have been prepared for these species.

The retention of good quality native vegetation is consistent with the objectives of the priority actions.

***(g) "…whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process..."***

Currently 27 Key threatening processes are defined under Schedule 3 of the TSC Act. The Proposal would include the clearing of an area of native vegetation; this being listed as a Key Threatening Process.

The effects of other key threatening processes such as the introduction and spread of weeds such as Lantana, exotic vines, perennial grasses, vines and scramblers should be kept to a minimum.

**Conclusion**

The proposal is unlikely to constitute a significant impact on threatened microchiropetran bats given that:

- the proposed works would only remove marginal foraging resources for these species
- other areas of potential foraging habitat are present within the subject site and surrounding landscape
- the proposal would not isolate or fragment any currently connecting areas of habitat in terms of use by these highly mobile species

# 6. Environmental Protection Measures

The current proposal is to be carried out in accordance with all policies, operational procedures and guidelines in place as part of consent conditions issued by Penrith City Council relating to environmental management or impact minimisation for construction projects.

The following environmental safeguard measures have been recommended for all phases of the proposed development.

**1) Bushland and threatened plant protection during construction**

The owner will ensure the long term protection of existing better quality remnant vegetation (Castlereagh Scribbly Gum Woodland and threatened *Dillwynia tenuifolia* and *Persoonia nutans* plants) by providing fencing between retained areas and the proposed development to prevent degradation from livestock and other potential impacts including building and road construction and asset protection zone establishment.

In the longer term, this will allow natural regeneration of this bushland and the native soil seed bank to occur in perpetuity in accordance with natural ecological process, whilst facilitating adjacent proposed rural land uses.

The following activities shall not be conducted within the remnant bushland on site:

- Ripping, cultivation, trenching or mechanical removal of vegetation or earth
- The placement of fill
- Movement, stockpiling or storage of plant, materials, waste, equipment or vehicles
- Any activity likely to damage the trunk, crown or root system of the protected vegetation

It is recommended that fencing system be installed prior to the commencement of any construction works to ensure the protetction of threatened *Dillwynia tenuifolia* and *Persoonia nutans* plants.

**2) Erosion and Sediment Control**

As a precautionary measure, a silt fence will be installed and maintained to EPA/OEH best practice standards during the entire construction of the proposal. The fence will remain in situ until the ground surface has stabilised.

All erosion and sediment controls (i.e. geotextile sediment fence and straw bales) shall be in place before any works begin so as to protect sedimentation of the riparian zone. Techniques used for erosion and sediment control on building sites are to be adequately maintained at all times and must be installed in accordance with EPA guidelines. All techniques shall remain in proper operation until all development activities have been completed and the site fully stabilised. This condition must be complied with during building work.

### 3) Weed management following construction works

Weeds are to be removed and kept to a minimum within the transition area between the proposed development and retained bushland where threatened plants occur on-site. The weed control methods shall be done in accordance with the following techniques recommended by the National Trust, NSW National Parks and Wildlife Service and Australian Association of Bush Regenerators.

Weed control from areas of high resilience to low resilience, upper slope to lower slope in accordance with the Bradley Method (Buchanan 1989) is to be undertaken in 3 stages described below:

1) Primary weed control: The first step. Targets primary weeds but does not remove all weeds as the soil will be eroded (DEC 2005). Areas identified with the greatest resilience (e.g. around the base of remnant trees) should be cleared first to encourage regeneration from the soil seed bank. Involves getting rid of larger debris and raking up areas of invasive creepers.

2) Secondary weed control: Intensive follow up weeding straight after primary weeding and treating weed seedlings as they germinate (Buchanan 1989). The weeds progress is monitored and some are allowed a month or two of annual weed growth before they are treated. Sites in good condition require little follow-up while others in worse condition require more effort.

3) Maintenance weeding: Maintain and controlling low weed levels ensuring new weeds that have moved into the area or have had the chance to germinate are eliminated.

### 4) General Environmental Management

The site must be managed in accordance with the *Protection of the Environment Operations Act 1997* by way of implementing appropriate measures to prevent sediment run-off, excessive dust, noise or odour emanating from the site during the construction of the development.

**5) Integrated Bushfire and Vegetation Management Plan**

It is recommended sensitive APZ establishment is undertaken without requiring the removal of any threatened plants and the retention of a hollow-bearing tree (refer to Section 6). The low-lying threatened *Dillwynia tenuifolia* plants (refer to waypoint 108 in Figure 5)occur within the drip zone of smooth-barked 'Hard-leaved Scribbly Gum' (*Eucalyptus scelorophylla*) that are considered ideal to retain within an APZ compared to rough-marked trees when retained as 'islands' of non-interlocking/ discontinuous canopy.

It is therefore recommended that as part of the development consent, an 'Integrated Bushfire and Vegetation Management Plan' could be prepared to ensure that the threatened plants and their potential habitat are protected in perpetuity whilst ensuring the APZ complies with Inner Protection Area requirements of Planning for Bushfire Protection 2006. The plan would be prepared by an ecological restoration consultant in conjunction with a bushfire consultant to ensure compliance with the Rural Fire Service's GTAs.

The following recommended program of work phases would be aimed at providing a management framework for enacting threatened plant protection, maintenance, monitoring and review works reasonably required for the conservation of threatened species:

**Pre-construction works phase**

Pre-construction works refers to all site preparation activities prior to the commencement of construction works on site. These works would include tagging of all threatened plants by an ecologist, on-site consultation with bushfire consultant about APZ establishment works to clearly identify what vegetation is required to be retained and removed. Includes installation of signage to notify contractors of the presence of threatened plant species and what actions are not permitted within the APZ.

**Construction works phase**

Construction works refers to the period during which earthworks and construction of buildings, roads and other facilities and services are being installed. It is during this period that the protection of remnant vegetation is critical to minimising accidental loss of trees or associated vegetation. It is also during this phase that the APZ is established. The APZ works would be undertaken by a qualified and experienced bush regeneration company under the supervision of the project ecologist.

**Primary restoration works phase**

Primary restoration works, as defined under this VMP, include the completion of primary and secondary weed control and protective fencing. Practical completion of the primary restoration phase is determined by the project ecologist at which point all primary restoration actions need to have been completed. Should there be a delay in the completion of works, for any reason, then the construction works phase may be extended.

**Post construction works phase**

Post construction works essentially consist of maintenance activities, unless further contingency works are identified by the project ecologist for auditing purposes. Maintenance will be undertaken by a fully qualified bush regeneration crew for a minimum of three (3) years post completion of primary restoration works. Includes provision of monitoring reports to the certifying authority.

All bush regeneration or landscape crews working within the site are required to have at a minimum TAFE Certificate Level II Bush Regeneration qualifications or equivalent to work within the bush regeneration zone. All staff are to be supervised by a qualified bush regeneration supervisor with a minimum five (5) years full time experience and a minimum TAFE Certificate Level II Bush Regeneration qualifications and / or a degree in Natural Areas Management or the equivalent.

# 7. Conclusion

Based on the field surveys and information provided in this report it is concluded that:

i. No threatened fauna species listed within the BC Act (2016) or the EP&BC Act (1999) were observed during surveys;

ii. The threatened plant species, *Persoonia nutans* (Nodding Geebung) and *Dillwynia tenuifolia* were observed during recent surveys on the site. However, impacts on threatened species will be avoided as none of these plants would require removal to conform with RFS Inner Protection Area requirements.

iii. It is recommended that as part of the development consent, an 'Integrated Bushfire and Vegetation Management Plan' could be prepared to ensure that the threatened plants and their potential habitat are protected in perpetuity whilst ensuring the APZ complies with Inner Protection Area requirements of Planning for Bushfire Protection 2006. The plan would be prepared by an ecological restoration consultant in conjunction with a bushfire consultant to ensure compliance with the Rural Fire Service's GTAs. The works would done by a qualified and experienced bush regeneration company under the supervision of the project ecologist. Signage would be installed to remind contractors what actions are not permitted in the APZ to ensure protection of *Persoonia nutans* (Nodding Geebung) and *Dillwynia tenuifolia.*

iv. Castlereagh Scribbly Gum Woodland (CSGW) is listed as an Vulnerable Ecological Community listed under the NSW *Biodiversity Conservation Act 2016* was recorded on-site. CSGW is listed as an Endangered under the Commonwealth *EPBC Act 1999*.

v. Castlereagh Swamp Woodland listed as an Endangered Ecological Community under the NSW *Biodiversity Conservation Act 2016* was recorded on-site.

vi. No migratory species listed within the EPBC Act (1999), were observed within the subject site.

vii. A referral to the Australian Government Department of the Environment is not likely to be required as it was determined that the proposal would not have a significant impact on nationally listed threatened or migratory species listed under the EPBC Act (1999).

viii. A Species Impact Statement is not required for the proposed development. The proposed development is not likely to have a significant effect on threatened species, populations or ecological communities or their habitats listed under the TSC Act (1995) with the implementation of weed control measures.

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## APPENDIX A: PROPOSED PLANS - PLEASE REFER TO DETAILED PLANS SUBMITTED AS PART OF THE APPLICATION

## APPENDIX B: NSW OEH information on Castlereagh Scribbly Gum Woodland Vulnerable Ecological Community

# Castlereagh Scribbly Gum Woodland in the Sydney Basin Bioregion - vulnerable ecological community listing

## NSW Scientific Committee - final determination

The Scientific Committee, established by the Threatened Species Conservation Act, has made a FinalDetermination to list the Castlereagh Scribbly Gum Woodland in the Sydney Basin Bioregion, as a VULNERABLE ECOLOGICAL COMMUNITY in Part 2 of Schedule 2 of the Act. Listing of Vulnerable Ecological Communities is provided for by Part 2 of the Act.

The Scientific Committee has found that:

1. Castlereagh Scribbly Gum Woodland in the Sydney Basin Bioregion is the name given to the ecological community characterised by the species assemblage listed in paragraph 2. In NSW all sites are within the Sydney Basin Bioregion (*sensu* Thackway & Cresswell 1995).

2. Castlereagh Scribbly Gum Woodland in the Sydney Basin Bioregion is characterised by the following assemblage of species:

*Acacia brownii*
*Acacia bynoeana*
*Acacia elongata*
*Amphipogon strictus* var. *strictus*
*Angophora bakeri*
*Aristida warburgii*
*Banksia spinulosa*
*Bursaria spinosa*
*Cassytha glabella* subsp. *glabella*
*Centrolepis strigosa*
*Cheilanthes sieberi* var. *sieberi*
*Cyathochaeta diandra*
*Cyperus haspan* subsp. *haspan*
*Daviesia ulicifolia*
*Dianella revoluta* subsp. *revoluta*
*Dichondra repens*
*Drosera spatulata*
*Eleocharis philippinensis*
*Entolasia stricta*
*Eragrostis brownii*
*Eucalyptus parramattensis* subsp. *parramattensis*
*Eucalyptus sclerophylla*
*Gonocarpus micranthus*
*Gonocarpus tetragynus*
*Hakea dactyloides*
*Hakea sericea*
*Hovea longifolia*
*Hypericum gramineum*
*Laxmannia gracilis*
*Leptospermum contintale*
*Leptospermum trinervium*
*Lepyrodia scariosa*
*Lomondra multiflora* subsp. *multiflora*
*Melaleuca decora*
*Melaleuca nodosa*
*Melichrus urceolatus*
*Microlaena stipoides* var. *stipoides*
*Micromyrtus ciliata*
*Micromyrtus minutiflora*
*Opercularia diphylla*
*Panicum simile*
*Pimelea linifolia* subsp. *collina*
*Pimelea linifolia* subsp. *linifolia*
*Platysace ericoides*
*Schoenus paludosus*
*Sphaerolobium vimineum*
*Stylidium graminifolium*
*Themeda australis*
*Xanthorrhoea minor* subsp. *minor*

3. The total species list of the community is considerably larger than that given above, with many species present in only one or two sites or in low abundance. The species composition of a site will be influenced by the size of the site, recent rainfall or drought condition and by its disturbance (including fire) history. The number of species, and the above ground relative abundance of species will change with time since fire, and may also change in response to changes in fire regime (including changes in fire frequency). At any one time, above ground individuals of some species may be absent, but the species may be represented below ground in the soil seed banks or as dormant structures such as bulbs, corms, rhizomes, rootstocks or lignotubers. The list of species given above is of vascular plant species; the community also includes micro-organisms, fungi, cryptogamic plants and a diverse fauna, both vertebrate and invertebrate. These components of the community are poorly documented.

4. Castlereagh Scribbly Gum Woodland in the Sydney Basin Bioregion is dominated by *Eucalyptus parramattensis* subsp. *parramattensis, Angophora bakeri* and *E. sclerophylla*. A small tree stratum of*Melaleuca*

*decora* is sometimes present, generally in areas with poorer drainage. It has a well-developed shrub stratum consisting of sclerophyllous species such as *Banksia spinulosa* var. *spinulosa, M. nodosa, Hakea sericea and H. dactyloides* (multi-stemmed form). The ground stratum consists of a diverse range of forbs including *Themeda australis, Entolasia stricta, Cyathochaeta diandra, Dianella revoluta* subsp. *revoluta, Stylidium graminifolium, Platysace ericoides, Laxmannia gracilis* and *Aristida warburgii* (Tozer 2003).

5. Castlereagh Scribbly Gum Woodland in the Sydney Basin Bioregion occurs almost exclusively on soils derived from Tertiary alluvium, or on sites located on adjoining shale or Holocene alluvium (Tozer 2003). It is most often found on sandy soils and tends to occur on slightly higher ground than Castlereagh Ironbark Forest or Shale Gravel Transition Forest in the Sydney Basin Bioregion (Tozer 2003). The boundary between Castlereagh Scribbly Gum Woodland and Castlereagh Ironbark Forest or Shale Gravel Transition Forest in the Sydney Basin Bioregion appears to be a function of the interaction of localised drainage conditions and the thickness of the Tertiary alluvium mantle (Tozer 2003).

6. Castlereagh Scribbly Gum Woodland in the Sydney Basin Bioregion corresponds to the community of the same name described by Benson (1992) (Map Unit 14a), NSW NPWS (1997, 2002) and Tozer (2003) (Map Unit 6). It is similar to the Scribbly Gum woodlands found on perched sands in the Mellong Swamp area in Yengo and Wollemi National Parks, however there are distinct geological and floristic differences (James 1997).

7. Castlereagh Scribbly Gum Woodland in the Sydney Basin Bioregion occurs within the local government areas of Bankstown, Blacktown, Campbelltown, Hawkesbury, Liverpool and Penrith (James 1997), but may occur elsewhere within the Sydney Basin Bioregion.

8. The main occurrence of Castlereagh Scribbly Gum Woodland in the Sydney Basin Bioregion is in the Castlereagh area of the Cumberland Plain, with small patches occurring at Kemps Creek and Longneck Lagoon. It is also present around Holsworthy, however the floristic composition in this area shows stronger similarities to Castlereagh Ironbark Forest than at other localities (Tozer 2003).

9. The estimated area of extent of Castlereagh Scribbly Gum Woodland in the Sydney Basin Bioregion in 1997 (Tozer 2003) is mapped as 3083 ± 171 ha (upper and lower plausible bounds, *sensu* Keith *et al*. 2009). This represents 52.7 ± 2.9% of its pre-1750 extent. Much of the community, with the exception of the Holsworthy remnant, is represented in small, isolated fragments. The area reserved within the National Parks estate in 2002 was 386 ha (NSW NPWS 2002). Castlereagh Scribbly Gum Woodland is found within the Castlereagh Nature Reserve, Scheyville National Park and Windsor Downs Nature Reserve.

10. Castlereagh Scribbly Gum Woodland in the Sydney Basin Bioregion is known to contain an Endangered population (*Dillwynia tenuifolia*, Kemps Creek) and threatened plant species including *Acacia bynoeana, Allocasuarina glareicola, Dillwynia tenuifolia, Grevillea juniperina* subsp. *juniperina, Micromyrtus minutiflora, Persoonia nutans* and *Pultenaea parviflora* (James 1997) and *Grevillea parviflora* subsp. *parviflora* (voucher at NSW Herbarium).

11. Threats to Castlereagh Scribbly Gum Woodland in the Sydney Basin Bioregion include clearing for urban development, frequent fire due to arson and hazard reduction burning intended to reduce fire risk to surrounding development, invasion by exotic plants, climate change, impacts from recreational vehicle use on soil, vegetation and water courses, removal of timber from the ground for firewood, rubbish dumping, and infestation by the soil pathogen *Phytophthora cinnamomi*. Clearing of understorey vegetation and addition of fertilisers in areas zoned for rural use has degraded some remnant Castlereagh Scribbly Gum Woodland (J. Sanders *in litt*. 2010). Exotic plants that threaten Castlereagh Scribbly Gum Woodland include *Acacia baileyana* (Cootamundra wattle), *Andropogon virginicus*(Whiskey grass), *Asparagus asparagoides* (Bridal Creeper), *Araujia sericifera* (Moth Vine), *Ehrharta erecta* (Panic Veldgrass), *Eragrostis curvula* (African Love Grass), *Hypochaeris radicata* (Flat Weed),*Olea europaea* subsp. *cuspidata* (African Olive) and *Pennisetum clandestinum* (Kikuyu). Low seedling recruitment in Castlereagh Scribbly Gum Woodland is thought to be related to high frequency fires and extended dry periods, with extended dry periods being predicted to increase for the region with climate change (B. Summerell *in litt*. 2010). The alluvial soil that Castlereagh Scribbly Gum Woodland occurs on is particularly susceptible to erosion in areas subject to vehicle use after rain, and also to stormwater erosion. There is an infestation of *Phytophthora cinnamomi* in Kemps Creek Nature Reserve and it is likely that the moist soils and vegetation of Castlereagh Scribbly Gum Woodland makes this community susceptible to *Phytophthora cinnamomi* (J. Sanders *in litt*. 2010). 'Clearing of native vegetation', 'High frequency fire resulting in the disruption of life cycle processes in plants and animals and loss of vegetation structure and composition', 'Invasion and establishment of exotic vines and scramblers', 'Invasion of native plant communities by exotic perennial grasses', 'Invasion by African Olive *Olea europaea* subsp. *cuspidata'*, 'Anthropogenic climate change', 'Removal of dead wood and dead trees' and 'Infection of native plants by *Phytophthora cinnamomi* are listed as Key Threatening Processes under the*Threatened Species Conservation Act* 1995.

12. Castlereagh Scribbly Gum Woodland in the Sydney Basin Bioregion is not eligible to be listed as an Endangered or Critically Endangered Ecological Community.

13. Castlereagh Scribbly Gum Woodland in the Sydney Basin Bioregion is eligible to be listed as a Vulnerable Ecological Community as, in the opinion of the Scientific Committee, it is facing a high risk of extinction in New South Wales in the medium-term future, as determined in accordance with the following criteria as prescribed by the *Threatened Species Conservation Regulation* 2010:

**Clause 17 Reduction in geographic distribution of ecological community**
The ecological community has undergone, is observed, estimated, inferred or reasonably suspected to have undergone or is likely to undergo within a time span appropriate to the life cycle and habitat characteristics of its component species:
(c) a moderate reduction in geographic distribution.

**Clause 18 Restricted geographic distribution of ecological community**
The ecological community's geographic distribution is estimated or inferred to be:
(c) moderately restricted,
and the nature of its distribution makes it likely that the action of a threatening process could cause it to decline or degrade in extent or ecological function over a time span appropriate to the life cycle and habitat characteristics of the ecological community's component species.

**Clause 19 Reduction in ecological function of ecological community**
The ecological community has undergone, is observed, estimated, inferred or reasonably suspected to have undergone or is likely to undergo within a time span appropriate to the life cycle and habitat characteristics of its component species:
(c) a moderate reduction in ecological function
as indicated by any of the following:
(d) change in community structure
(e) change in species composition
(f) disruption of ecological processes
(g) invasion and establishment of exotic species
(h) degradation of habitat
(i) fragmentation of habitat.

Dr Richard Major
Chairperson
Scientific Committee

Proposed Gazettal date: 05/12/10
Exhibition period: 05/12/10 – 28/01/11

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## APPENDIX C: Threatened flora previously recorded within 10km of the site (Source: NSW Bionet accessed June 2015)

| Scientific Name | Common Name | TSC Act | EPBC Act | ROTAP | Records | Habitat |
|---|---|---|---|---|---|---|
| *Allocasuarina glareicola* | | E | E | | 5 | Grows in Castlereagh woodland on lateritic soil. Found in open woodland with Eucalyptus parramattensis, Eucalyptus fibrosa, Angophora bakeri, Eucalyptus sclerophylla and Melaleuca decora. Common associated understorey species include Melaleuca nodosa, Hakea dactyloides, Hakea sericea, Dillwynia tenuifolia, Micromyrtus minutiflora, Acacia elongata, Acacia brownei, Themeda australis and Xanthorrhoea minor.Not killed outright by fire but resprouts from the rootstock. Spreads by vegetative means, such that clumps of up to 100s of stems may be a single individual. The time taken for the plants to flower and set seed is not known, but only those plants growing in areas unburnt for some time produced substantial numbers of fruit. |
| *Pultenaea villifera* | Pultenaea villifera Sieber ex DC. population in the Blue Mountains local government area | Endangered Population | | | | Grows in dry sclerophyll forest and woodlands on sandy soil and appears to favour sheltered spots. Flowers all year, with peak flowering July to December. Fire sensitive (although can resprout following low intensity fire), with recruitment occurring from a persistent soil stored seed bank following fire. |
| *Grevillea juniperina subsp. juniperina* | Juniper-leaved Grevillea | V | | | | Grows on reddish clay to sandy soils derived from Wianamatta Shale and Tertiary alluvium (often with shale influence), typically containing lateritic gravels. Recorded from Cumberland Plain Woodland, Castlereagh Ironbark Woodland, Castlereagh Scribbly Gum Woodland and Shale/Gravel Transition Forest. Associated canopy species within Cumberland Plain Woodland and Shale/Gravel Transition Forest include Eucalyptus tereticornis, E. moluccana, E. crebra, E. fibrosa and E. eugenioides. Understorey species include Bursaria spinosa, Dillwynia sieberi, Ozothamnus diosmifolius, Daviesia ulicifolia, Acacia falcata, Acacia parramattensis, Themeda australis, Aristida ramosa, Cymbopogon refractus, Eragrostis brownii, Cheilanthes sieberi, Dianella revoluta and Goodenia hederacea. In Castlereagh Woodland on more sandy soils the dominant canopy species are Eucalyptus fibrosa, E. sclerophylla, Angophora bakeri and Melaleuca decora. Understorey species include Melaleuca nodosa, Hakea sericea, Cryptandra spinescens, Acacia elongata, Gonocarpus teucrioides, Lomandra longifolia and the threatened species Dillwynia tenuifolia, Pultenaea parviflora, Micromyrtus minutiflora and Allocasuarina glareicola. Dense growth of blackthorn (Bursaria) can limit the ability of the species to spread. Most prolific seeding occurs on plants more than 1m high. |
| *Dillwynia tenuifolia* | | V | V | 2Vi | 67 | Occurs on the Cumberland Plain from the Blue Mountains to Howes Valley area where it grows in dry sclerophyll woodland on sandstone, shale or laterite {Harden, 2002 #5}. Specifically, occurs within Castlereagh woodlands, particularly in shale gravel transition forest. Associated species include Eucalyptus fibrosa, E. sclerophylla, Melaleuca decora, Daviesia ulicifolia, Dillwynia juniperina and Allocasuarina littoralis {James, 1997 #69}. |

| Scientific Name | Common Name | TSC Act | EPBC Act | ROTAP | Records | Habitat |
|---|---|---|---|---|---|---|
| *Pultenaea parviflora* | | E1 | V | 2E | 17 | Restricted to the Cumberland Plain where it grows in dry sclerophyll forest on Wianamatta shale, laterite or alluvium {Harden, 2002 #5}. Locally abundant within Castlereagh Ironbark Forest and Shale Gravel Transition Forest on tertiary alluvium or laterised clays. Also occurs in transitional areas where these communities adjoin Castlereagh<br><br>Scribbly Gum Woodland {NSW National Parks and Wildlife Service, 2002 #82; James, 1997 #69}. |
| *Acacia bynoeana* | Bynoe's Wattle | E1 | V | 3V | 23 | Occurs south of Dora Creek-Morisset area to Berrima and the Illawarra region and west to the Blue Mountains. It grows mainly in heath and dry sclerophyll forest on sandy soils {Harden, 2002 #5}. Seems to prefer open, sometimes disturbed sites such as trail margins and recently burnt areas. Typically occurs in association with Corymbia gummifera, Eucalyptus haemastoma, E. gummifera, E. parramattensis, E. sclerophylla, Banksia serrata and Angophora bakeri {NSW National Parks and Wildlife Service, 1999 #61}. |
| *Persoonia hirsuta* | Hairy Geebung | E | E | | 1 | The Hairy Geebung is found in sandy soils in dry sclerophyll open forest, woodland and heath on sandstone. It is usually present as isolated individuals or very small populations. It is probably killed by fire (as other Persoonia species are) but will regenerate from seed. |
| *Persoonia nutans* | *Nodding Geebung* | E | E | | 89 | Northern populations are confined to aeolian and alluvial sediments and occur in a range of sclerophyll forest and woodland vegetation communities, with the majority of individuals occurring within Agnes Banks Woodland or Castlereagh Scribbly Gum Woodland and some in Cooks River / Castlereagh Ironbark Forests. Southern populations also occupy tertiary alluvium, but extend onto shale sandstone transition communities and into Cooks River / Castlereagh Ironbark Forest. Peak flowering is from November to March with sporadic flowering all year round. An obligate seed regenerator. Seed germination is promoted by fire and also by physical disturbance. Although listed as a short-lived species much of the ecology is poorly known. Maturity is expected in about 10 years. Plants appear to set abundant fruit. Seed is likely to be dispersed, after consumption of the fruit, by large birds such as currawongs and large mammals such as wallabies, kangaroos and possums. Abundance at a site appears to be related to disturbance history. Sites with higher abundance also appear to be more disturbed. |
| *Micromyrtus minutiflora* | | E1 | V | 2V | 27 | Occurs in the western part of the Cumberland Plain between Richmond and Penrith where it grows on Tertiary sediments in dry sclerophyll forest {NSW Scientific Committee, 2002 #98; Harden, 2002 #5}. |

**TSC Act (*Biodiversity Conservation Act 2016*):** E1 =Critically Endangered E= Endangered V= Vulnerable **EPBC Act (*Environment Protection Biodiversity Conservation Act 1999*):** E1 =Critically Endangered E= Endangered V= Vulnerable **ROTAP CODES *Source: Briggs, J.D. & Leigh J.H. (1988) Rare or threatened Australian plants.*** Plant Codes: **Distribution** 1: Known from type collection only. 2: Geographic range < 100km. 3: Geographic range > 100km. **Conservation** E: Endangered (at risk of disappearing in 1 or 2 decades) V: Vulnerable (at risk of disappearing in 20 - 50 years). R: Rare (rare in Australia but currently not endangered or vulnerable). K: Poorly known Reservation. C: Population reserved adequately reserved (>1000 plants). I: Inadequately reserved (<1000 plants) - Adequacy of reservation unknown.

## APPENDIX D: Threatened fauna previously recorded within 10km of the site (Source: NSW Bionet accessed June 2015)

| Scientific Name | Common Name | TSC Act | EPBC Act | Records | Habitat | Potential habitat |
|---|---|---|---|---|---|---|
| *Litoria aurea* | Green and Golden Bell Frog | E | V | 3 | Inhabits marshes, dams and stream-sides, particularly those containing bullrushes (Typha spp.) or spikerushes (Eleocharis spp.).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. Some sites, particularly in the Greater Sydney region occur in highly disturbed areas. The species is active by day and usually breeds in summer when conditions are warm and wet. Males call while floating in water and females produce a raft of eggs that initially float before settling to the bottom, often amongst vegetation. Tadpoles feed on algae and other plant-matter; adults eat mainly insects, but also other frogs. Preyed upon by various wading birds and snakes. | No |
| *Pseudophryne australis* | Red-crowned Toadlet | V | | 3 | Occurs within 160 km of Sydney where it is restricted to Hawkesbury Sandstone. It breeds in deep grass and debris adjacent to ephemeral drainage lines. When not breeding individuals are found scattered on sandstone ridges under rocks and logs {Cogger, 2000 #20}. | No |
| *Callocephalon fimbriatum* | Gang-gang Cockatoo | V | | 9 | Occurs in wetter forests and woodland from sea level to an altitude over 2000 metres, timbered foothills and valleys, coastal scrubs, farmlands and suburban gardens {Pizzey, 1997 #24}. | No |
| *Calyptorhynchus lathami* | Glossy Black-Cockatoo | V | | 1 | Occurs in eucalypt woodland and forest with Casuarina/Allocasuarina spp. Characteristically inhabits forests on sites with low soil nutrient status, reflecting the distribution of key Allocasuarina species. The drier forest types with intact and less rugged landscapes are preferred by the species. Nests in tree hollows {Garnett, 2000 #21; NSW National Parks and Wildlife Service, 1999 #55}. | No |
| *Glossopsitta pusilla* | Little Lorikeet | V | | 4 | Forages primarily in the canopy of open Eucalyptus forest and woodland, yet also finds food in Angophora, Melaleuca and other tree species. Riparian habitats are particularly used, due to higher soil fertility and hence greater productivity. Isolated flowering trees in open country, e.g. paddocks, roadside remnants and urban trees also help sustain viable populations of the species. Feeds mostly on nectar and pollen, occasionally on native fruits such as mistletoe, and only rarely in orchards Gregarious, travelling and feeding in small flocks (<10), though often with other lorikeets. Flocks numbering hundreds are still occasionally observed and may have been the norm in past centuries. Roosts in treetops, often distant from feeding areas. Nests in proximity to feeding areas if possible, most typically selecting hollows in the limb or trunk of smooth-barked Eucalypts. Entrance is small (3 cm) and usually high above the ground (2–15 m). These nest sites are often used repeatedly for decades, suggesting that preferred sites are limited. Riparian trees often chosen, including species like Allocasuarina. Nesting season extends from May to September. In years when flowering is prolific, Little Lorikeet pairs can breed twice, producing 3-4 young per attempt. However, the survival rate of fledglings is unknown. | Marginal foraging habitat; however, seven part test not required |

| Scientific Name | Common Name | TSC Act | EPBC Act | Records | Habitat | Potential habitat |
|---|---|---|---|---|---|---|
| *Lophoictinia isura* | Square-tailed Kite | V | M | 2 | This species hunts primarily over open forest, woodland and mallee communities as well as over adjacent heaths and other low scrubby habitats in wooded towns. It feeds on small birds, their eggs and nestlings as well as insects. Seems to prefer structurally diverse landscapes {Garnett, 2000 #21}. | Marginal foraging habitat; however, seven part test not required |
| *Circus assimilis* | Spotted Harrier | V | | 1 | Occurs in grassy open woodland including Acacia and mallee remnants, inland riparian woodland, grassland and shrub steppe. It is found most commonly in native grassland, but also occurs in agricultural land, foraging over open habitats including edges of inland wetlands. Builds a stick nest in a tree and lays eggs in spring (or sometimes autumn), with young remaining in the nest for several months. Preys on terrestrial mammals (eg bandicoots, bettongs, and rodents), birds and reptile, occasionally insects and rarely carrion. | Marginal foraging habitat; however, seven part test not required |
| *Falco subniger* | Black Falcon | V | | 1 | The Black Falcon inhabits woodland, shrubland and grassland in the arid and semi-arid zones, especially wooded watercourses and agricultural land with scattered remnant trees. The Black Falcon is usually associated with streams or wetlands, visiting them in search of prey and often using standing dead trees as lookout posts. Habitat selection is generally influenced more by prey densities than by specific aspects of habitat floristics or condition, although in agricultural landscapes the Black Falcon tends to nest in healthy, riparian woodland remnants with a diverse avifauna (Debus et al. 2005). Much of the best habitat of the Black Falcon in New South Wales is likely to occur on private land (i.e. agricultural or pastoral land), rather than in reserves (e.g. Debus et al. 2005; Debus & Olsen 2011; Debus & Tsang 2011). | Marginal foraging habitat; however, seven part test not required |
| *Ninox connivens* | Barking Owl | V | | 1 | Occurs in dry sclerophyll woodland. In the south west it is often associated with riparian vegetation while in the south east it generally occurs on forest edges. It nests in large hollows in live eucalypts, often near open country. It feeds on insects in the non-breeding season and on birds and mammals in the breeding season {Garnett, 2000 #21}. | Marginal foraging habitat; however, seven part test not required. No habitat hollows recorded on site. |
| *Tyto novaehollandiae* | Masked Owl | V | | 1 | Lives in dry eucalypt forests and woodlands from sea level to 1100 m. A forest owl, but often hunts along the edges of forests, including roadsides. The typical diet consists of tree-dwelling and ground mammals, especially rats. Pairs have a large home-range of 500 to 1000 hectares. Roosts and breeds in moist eucalypt forested gullies, using large tree hollows or sometimes caves for nesting. | Marginal foraging habitat; however, seven part test not required. No habitat hollows recorded on site. |
| *Chthonicola sagittata* | Speckled Warbler | | | 3 | The Speckled Warbler lives in a wide range of Eucalyptus dominated communities that have a grassy understorey, often on rocky ridges or in gullies. Typical habitat would include scattered native tussock grasses, a sparse shrub layer, some eucalypt regrowth and an open canopy. Large, relatively undisturbed remnants are required for the species to persist in an area. The diet consists of | Marginal foraging habitat; however, seven part test |

| Scientific Name | Common Name | TSC Act | EPBC Act | Records | Habitat | Potential habitat |
|---|---|---|---|---|---|---|
| | | | | | seeds and insects, with most foraging taking place on the ground around tussocks and under bushes and trees. Pairs are sedentary and occupy a breeding territory of about ten hectares, with a slightly larger home-range when not breeding. The rounded, domed, roughly built nest of dry grass and strips of bark is located in a slight hollow in the ground or the base of a low dense plant, often among fallen branches and other litter. A side entrance allows the bird to walk directly inside. A clutch of 3-4 eggs is laid, between August and January, and both parents feed the nestlings. The eggs are a glossy red-brown, giving rise to the unusual folk names 'Blood Tit' and 'Chocolatebird'. Some cooperative breeding occurs. The species may act as host to the Black-eared Cuckoo. Speckled Warblers often join mixed species feeding flocks in winter, with other species such as Yellow-rumped, Buff-rumped, Brown and Striated Thornbills. | not required. |
| *Petroica boodang* | Scarlet Robin | V | | 5 | The Scarlet Robin lives in dry eucalypt forests and woodlands. The understorey is usually open and grassy with few scattered shrubs. This species lives in both mature and regrowth vegetation. It occasionally occurs in mallee or wet forest communities, or in wetlands and tea-tree swamps. Scarlet Robin habitat usually contains abundant logs and fallen timber: these are important components of its habitat. The Scarlet Robin breeds on ridges, hills and foothills of the western slopes, the Great Dividing Range and eastern coastal regions; this species is occasionally found up to 1000 metres in altitude. The Scarlet Robin is primarily a resident in forests and woodlands, but some adults and young birds disperse to more open habitats after breeding. In autumn and winter many Scarlet Robins live in open grassy woodlands, and grasslands or grazed paddocks with scattered trees. The Scarlet Robin is a quiet and unobtrusive species which is often quite tame and easily approached. Birds forage from low perches, fence-posts or on the ground, from where they pounce on small insects and other invertebrates which are taken from the ground, or off tree trunks and logs; they sometimes forage in the shrub or canopy layer. Scarlet Robin pairs defend a breeding territory and mainly breed between the months of July and January; they may raise two or three broods in each season. This species' nest is an open cup made of plant fibres and cobwebs and is built in the fork of tree usually more than 2 metres above the ground; nests are often found in a dead branch in a live tree, or in a dead tree or shrub. Eggs are pale greenish-, bluish- or brownish-white, spotted with brown; clutch size ranges from one to four. Birds usually occur singly or in pairs, occasionally in small family parties; pairs stay together year-round. In autumn and winter, the Scarlet Robin joins mixed flocks of other small insectivorous birds which forage through dry forests and woodlands. | Marginal foraging habitat; however, seven part test not required |
| *Petroica rodinogaster* | Pink Robin | V | | 1 | Inhabits rainforest and tall, open eucalypt forest, particularly in densely vegetated gullies. Catches prey by the perch-and-pounce method, foraging more on the ground than the more flycatcher-like Rose Robin. Insects and spiders are the main dietary items. Breeds between October and January and can produce two clutches in a season. The nest is a deep, spherical cup made of green moss bound with cobweb and adorned with camouflaging lichen, and is lined with fur and plant down. It is situated in an upright or oblique fork, from 30cm to 6m above the ground, in deep undergrowth. Females do most or all of the nest building and incubate unaided, but both adults feed the nestlings. The most common call most closely resembles a snapping twig | No |
| *Dasyurus maculatus* | Spotted-tailed Quoll | V | E | 2 | Occurs from the Bundaberg area in south-east Queensland, south through NSW to western Victoria and Tasmania. In NSW, it occurs on both sides of the Great Dividing Range and north-east NSW represents a national stronghold {NSW National Parks and | No |

| Scientific Name | Common Name | TSC Act | EPBC Act | Records | Habitat | Potential habitat |
|---|---|---|---|---|---|---|
| | | | | | Wildlife Service, 1999 #502}. Occurs in wide range of forest types, although appears to prefer moist sclerophyll and rainforest forest types, and riparian habitat. Most common in large unfragmented patches of forest. It has also been recorded from dry sclerophyll forest, open woodland and coastal heathland, and despite its occurrence in riparian areas, it also ranges over dry ridges. Nests in rock caves and hollow logs or trees. Feeds on a variety of prey including birds, terrestrial and arboreal mammals, small macropods, reptiles and arthropods {NSW National Parks and Wildlife Service, 1999 #27; NSW National Parks and Wildlife Service, 1999 #502}. | |
| *Falsistrellus tasmaniensis* | Eastern False Pipistrelle | V | | 3 | Usually roosts in tree hollows in higher rainfall forests. Sometimes found in caves (Jenolan area) and abandoned buildings. Forages within the canopy of dry sclerophyll forest. It prefers wet habitats where trees are more than 20 metres high {Churchill, 1998 #26}. | No |
| *Miniopterus schreibersii* | Eastern Bent-wing Bat | V | C | 15 | Usually found in well timbered valleys where it forages on small insects above the canopy. Roosts in caves, old mines, stormwater channels and sometimes buildings and often return to a particular nursery cave each year {Churchill, 1998 #26}. | No |
| *Mormopterus norfolkensis* | Eastern Freetail-bat | V | | 6 | Thought to live in sclerophyll forest and woodland. Small colonies have been found in tree hollows or under loose bark. It feeds on insects above the forest canopy or in clearings at the forest edge {Churchill, 1998 #26}. | No |
| *Myotis adversus* | Large-footed Myotis | V | | 9 | Colonies occur in caves, mines, tunnels, under bridges and buildings. Colonies always occur close to bodies of water where this species feeds on aquatic insects {Churchill, 1998 #26}. | No |
| *Petaurus australis* | Yellow-bellied Glider | V | | 1 | Restricted to tall, mature eucalypt forest in high rainfall areas of temperate to sub-tropical eastern Australia. Feeds on nectar, pollen, the sap of eucalypts and sometimes insects. Preferred habitats are productive, tall open sclerophyll forests where mature trees provide helter and nesting hollows and year round food resources are available from a mixture of eucalypt species {NSW National Parks and Wildlife Service, 1999 #44; NSW National Parks and Wildlife Service, 2003 #45}. | No.<br><br>No habitat hollows recorded on site. |
| *Petaurus norfolcensis* | Squirrel Glider | V | | 2 | 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. Live in family groups of a single adult male one or more adult females and offspring. Require abundant tree hollows for refuge and nest sites. Diet varies seasonally and consists of Acacia gum, eucalypt sap, nectar, honeydew and manna, with invertebrates and pollen providing protein. | Marginal foraging habitat; however, seven part test not required. No habitat hollows recorded on site. |
| *Phascolarctos cinereus* | Koala | V | | 4 | Found in sclerophyll forest. Throughout New South Wales, Koalas have been observed to feed on the leaves of approximately 70 species of eucalypt and 30 non-eucalypt species. However, in any one area, Koalas will feed almost exclusively on a small number of preferred species. The preferred tree species vary widely on a regional and local basis. Some preferred species in NSW include | No |

| Scientific Name | Common Name | TSC Act | EPBC Act | Records | Habitat | Potential habitat |
|---|---|---|---|---|---|---|
| | | | | | Forest Red Gum Eucalyptus tereticornis, Grey Gum E. punctata, Monkey Gum E. cypellocarpa and Ribbon Gum E. viminalis. In coastal areas, Tallowwood E. microcorys and Swamp Mahogany E. robusta are important food species, while in inland areas White Box E. albens, Bimble Box E. populnea and River Red Gum E. camaldulensis are favoured {NSW National Parks and Wildlife Service, 1999 #43; NSW National Parks and Wildlife Service, 2003 #31}. | |
| *Pteropus poliocephalus* | Grey-headed Flying-fox | V | V | 24 | Occurs in subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps. Urban gardens and cultivated fruit crops also provide habitat for this species. Feeds on the flowers and nectar of eucalypts and native fruits including lilly pillies. It roosts in the branches of large trees in forests or mangroves {NSW National Parks and Wildlife Service, 2001 #56; Churchill, 1998 #26}. | Marginal foraging habitat; however, seven part test not required |
| *Scoteanax rueppellii* | Greater Broad-nosed Bat | V | | 7 | The preferred hunting areas of this species include tree-lined creeks and the ecotone of woodlands and cleared paddocks but it may also forage in rainforest. Typically it forages at a height of 3-6 metres but may fly as low as one metre above the surface of a creek. It feeds on beetles, other large, slow-flying insects and small vertebrates. It generally roosts in tree hollows but has also been found in the roof spaces of old buildings {Churchill, 1998 #26}. | No |
| *Daphoenositta chrysoptera* | Varied Sitella | V | | 21 | Inhabits eucalypt forests and woodlands, especially those containing rough-barked species and mature smooth-barked gums with dead branches, mallee and Acacia woodland. Feeds on arthropods gleaned from crevices in rough or decorticating bark, dead branches, standing dead trees and small branches and twigs in the tree canopy. Builds a cup-shaped nest of plant fibres and cobwebs in an upright tree fork high in the living tree canopy, and often re-uses the same fork or tree in successive years. Generation length is estimated to be 5 years. | Marginal foraging habitat; however, seven part test not required |
| *Xanthomyza phrygia* | Regent Honeyeater | E1 | | 14 | The Regent Honeyeater builds a cup-shaped nest of fibres located in forks in live eucalypt (including Angophora) or she-oak canopy. The Regent Honeyeater mostly feeds on nectar from flowering eucalypts, especially boxes and ironbarks, and from Amyema cambagei. They also feed on the sugary exudates of insects (e.g. lerps) which become an important part of their diet when breeding. Within NSW, breeding sub-populations are fragmented and now occur mainly around the Capertee Valley in central-eastern NSW and the Bundarra-Barraba region in northern inland NSW. Minor and sporadic breeding occurs in other areas such as Warrumbungle National Park, Pilliga forests, Mudgee-Wollar region, and the Hunter and Clarence Valleys. | Marginal foraging habitat; however, seven part test not required |
| Neophema pulchella | Turquoise Parrot | V | | 3 | Lives on the edges of eucalypt woodland adjoining clearings, timbered ridges and creeks in farmland. Usually seen in pairs or small, possibly family, groups and have also been reported in flocks of up to thirty individuals. Prefers to feed in the shade of a tree and spends most of the day on the ground searching for the seeds or grasses and herbaceous plants, or browsing on vegetable matter. Forages quietly and may be quite tolerant of disturbance. However, if flushed it will fly to a nearby tree and then return to the ground to browse as soon as the danger has passed. Nests in tree hollows, logs or posts, from August to December. It lays four or five white, rounded eggs on a nest of decayed wood dust. | No |

| Scientific Name | Common Name | TSC Act | EPBC Act | Records | Habitat | Potential habitat |
|---|---|---|---|---|---|---|
| | | | | | | |
| *Lathamus discolor* | Swift Parrot | E | E | 5 | Migrates to the Australian south-east mainland between March and October. 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. Commonly used lerp infested trees include Inland Grey Box E. microcarpa, Grey Box E. moluccana and Blackbutt E. pilularis. Return to some foraging sites on a cyclic basis depending on food availability. Following winter they return to Tasmania where they breed from September to January, nesting in old trees with hollows and feeding in forests dominated by Tasmanian Blue Gum Eucalyptus globulus. | No |
| *Meridolum corneovirens* | Cumberland Plain Snail | E | | 13 | Primarily inhabits Cumberland Plain Woodland (a critically endangered ecological community). This community is a grassy, open woodland with occasional dense patches of shrubs. It is also known from Shale Gravel Transition Forests, Castlereagh Swamp Woodlands and the margins of River-flat Eucalypt Forest, which are also listed communities. Lives under litter of bark, leaves and logs, or shelters in loose soil around grass clumps. Occasionally shelters under rubbish. Can dig several centimetres into soil to escape drought. Is a fungus specialist. Unlike the Garden Snail, does not eat green plants. It is generally active at night. Little is known of its biology, including breeding biology. It is known to be hermaphroditic, laying clutches of 20-25 small, round, white eggs in moist, dark areas (such as under logs), with the eggs taking 2-3 weeks to hatch. There is a suggestion that the species breeds throughout the year when conditions are suitable. | No |

**TSC Act (*Biodiversity Conservation Act 2016*):** E1 =Critically Endangered E= Endangered V= Vulnerable

**EPBC Act (*Environment Protection Biodiversity Conservation Act 1999*):** E1 =Critically Endangered E= Endangered V= Vulnerable

# APPENDIX E: Results from EPBC Protected Matters Search Tool database

# APPENDIX F: QUALIFICATIONS & EXPERIENCE OF THE AUTHOR

Alex Fraser (Fraser Ecological Consulting) has over 10 years experience in ecological assessment and on-ground bushland restoration management. Previous work roles include ecological consulting with Parsons Brinckerhoff (large infrastructure), NPWS (regional biodiversity surveys), NSW Department of Environment and Climate Change (SIS DGRs/ breach investigations) and Hornsby Shire Council (residential, rural and industrial DA assessment and bushland project management) have focussed primarily on ecological survey, project work and policy development for consent authorities. Alex also possesses practical experience in bushland restoration and landscape construction.

A full list of flora and fauna assessments previously undertaken can be provided upon request.

Professional Affiliations include the Australian Association of Bush Regenerators, Ecological Society of Australia, Royal Zoological Society of NSW, Birds Australia, Australasian Bat Society, Urban Feral Animal Action Control Group (Sydney North Councils), Surfrider Foundation & Fred Hollows Foundation.

**Relevant qualifications and training:**

- Bachelor of Applied Science – Coastal Resource Management (Honours)
- Certificate 3 - Bushland Restoration (Ryde Horticultural College)
- Land for Wildlife Assessor (NPWS and Central Coast Environment Network)
- Chemcert (Department of Natural Resources – Cert 3)
- Chainsaw Cross Cutting Techniques (Ryde Horticultural College)
- Certificate 3 Vertebrate Animal Pest Control (NSW DPI, Orange)
- OH&S General Induction for Construction Work (Work Cover NSW)
- Senior First Aid ( St. Johns Ambulance Australia)
- Project Management 'the hard and soft skills' (NPWS- 2004)
- Frog, Bat and Reptile: species identification and survey skills (Forests NSW)
- Planning for Bushfire Protection (2006) UTS Sydney
- State Rail Contractor Safety Awareness (State Rail Authority)
- NPWS Scientific Licence - S10445 (Department of Environment Climate Change and Water)
- Animal Ethics Research Authority (NSW DPI&I)
- Recreational Boat Drivers Licence (NSW Maritime)