Flora and Fauna Assessment

Proposed Assembly Building – 1 Water Street, Werrington

Prepared for
Hills Christian Life Centre Ltd

May 2017

DOCUMENT TRACKING

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Contents

List of figures

1 Introduction

1.1 Description of proposal

Hills Christian Life Centre Ltd engaged Eco Logical Australia Pty Ltd (ELA) to prepare a flora and fauna assessment for a proposed church auditorium at 1 Water Street, Werrington (hereafter referred to as the subject land) located on Lot 1 DP 1176624.

The proposal involves the construction of a new auditorium (assembly building) on a large vacant block of land. It is understood that all vegetation on site would be removed to allow for the development.

1.2 Development pathway

Legislation	Relevance to the project
Commonwealth	
Environmental Protection and Biodiversity Conservation Act 1999 (EPBC Act)	The EPBC Act requires approval from the Minister for the Environment where a project is likely to have a significant impact on a Matter of National Environmental Significance. An assessment of impacts to Matters of National Environmental Significance (MNES) has been undertaken. Further assessment of MNES or referral to the Commonwealth Department of Environment is not required.
State	
Environmental Planning and Assessment Act 1979 (EP&A Act)	The proposed development requires consent under the Penrith LEP 2010 and is to be assessed under Part 4 of the EP&A Act. Assessments of significance for impacts to threatened ecological communities, species, or endangered populations, have been prepared in accordance with s5A of the Act.
Threatened Species Conservation Act 1995 (TSC Act)	The land on which the development is proposed is not biodiversity certified under s126 of the TSC Act and therefore impacts to threatened species and endangered ecological communities listed under the TSC Act are required in accordance with s5A of the EP&A Act.
Fisheries Management Act 1994 (FM Act)	The development does not involve harm to mangroves or other protected marine vegetation, dredging, reclamation or blocking of fish passage and therefore a permit under the FM Act is not required.
Water Management Act 2000 (WM Act)	The project may involve works on waterfront land (ie land within 40m of the top of bank of a river) and may require a Controlled Activity Approval under s91 of the WM Act.
Planning Instruments	
SEPP 14 Coastal Wetlands	The proposed development is not located on land subject to SEPP 14.
SEPP 44 Koala Habitat	SEPP 44 does not apply to the local government area in which the development is proposed.
Penrith Local Environment Plan 2010	The subject site is zoned IN2 under the Penrith LEP 2010. Clause 7.3 of the LEP contains provisions relating to natural resources sensitive land, however this clause does not apply to the subject land.
Penrith DCP 2014	Part C2 of the Penrith DCP 2014 contains controls for vegetation management. Figure E12.10 provides a Structure Plan for South Werrington Urban Village.

Figure 1: Location

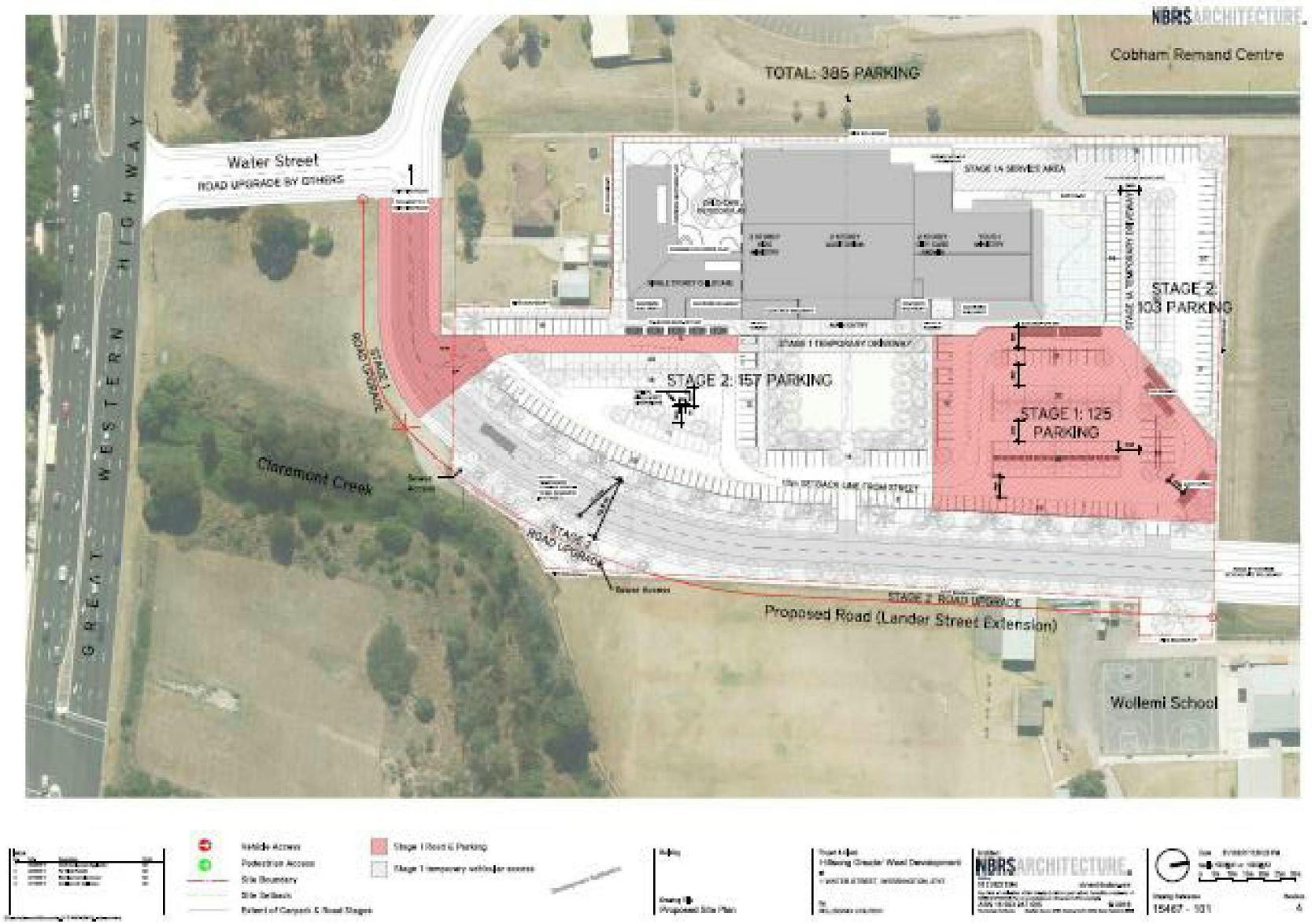

Figure 2: Plan of development

Figure 3 Extract from South Werrington Urban Village Structure Plan (Penrith DCP 2014)

2 Methodology

The site (**Figure 1**) is defined as the area likely to be directly impacted by the proposal, whereas the study area is defined as the area and any surrounding lands which maybe be directly and indirectly impacted. For the purposes of this report, the site and study area represent the same boundaries. The locality is defined as the land within a 5 km radius of the study area.

2.1 Literature review and database search

A database search of the *BioNet Atlas of NSW Wildlife* and *EPBC Protected Matters Search Tool* was conducted to provide state and federally listed threatened and migratory species previously recorded, or considered to potentially occur within a 5 km radius of the study area. An initial assessment of likelihood of occurrence (**Appendix A**) was made for these threatened and migratory species identified from the database searches and considered likely to occur within the study area. This likelihood of occurrence was used to guide the site inspection.

Aerial photography of the study area was used to identify landscape features, the extent of vegetation cover, and to guide the site inspection.

2.2 Site inspection

A site inspection was undertaken by ELA Ecologist, Stacey Wilson, on 8 December 2016 to assess the ecological values present, and potential impact of the proposed works on flora and fauna, within the study area (**Figure 1**). The site inspection involved a random meander of the study area to validate previous vegetation mapping and record any important flora or fauna habitat features (such as hollow-bearing trees).

On the 15 December, Ecologists Danielle-Adams Bennett and Stacey Wilson searched the area of potential Cumberland Plain Land Snail for approximately fifteen minutes following 6.2 mm of rain.

3 Results

3.1 Vegetation

One threatened ecological community, Cumberland Plain Woodland, listed as critically endangered under the TSC was recorded in the study area. The woodland covered approximately 0.27 ha and was in relatively poor condition with weeds present and the patch being isolated from other patches of CPW.

Cumberland Plain Woodland is also listed under the EPBC Act however following the site inspection it was confirmed that the assemblage of species in the native vegetation that exists on the study area does not meet condition thresholds criteria necessary for the vegetation to meet the definition of Cumberland Plain Woodland under the EPBC Act. The vegetation that occurs on site does not meet the criteria under the EPBC Act as:

- The perennial understorey vegetation cover is not made up of ≥30% of native species.
- Trees did not contain hollows.
- The patch is not contiguous with a native vegetation remnant.

3.2 Threatened Species

A list of threatened species originally listed as having a known occurrence or potential to utilise the study area either regularly or on occasion is provided in **Appendix A**. A list of flora species identified from the site inspection is provided in **Appendix B.**

The accumulation of leaf litter under the native canopy and the rubbish and large concrete pipes that exist were considered to provide potential habitat for *Meridolum corneovirens* (Cumberland Plain Land Snail) (CPLS). This species is listed as an endangered species under the TSC Act, as the snail is known to persist in degraded environments provided that ground cover of logs or rubbish is available. However no CPLS or shells were found amongst the leaf litter.

No threatened flora or fauna species were identified during the site inspection.

No hollow-bearing trees or any other landscape features were considered to provide habitat for threatened fauna.

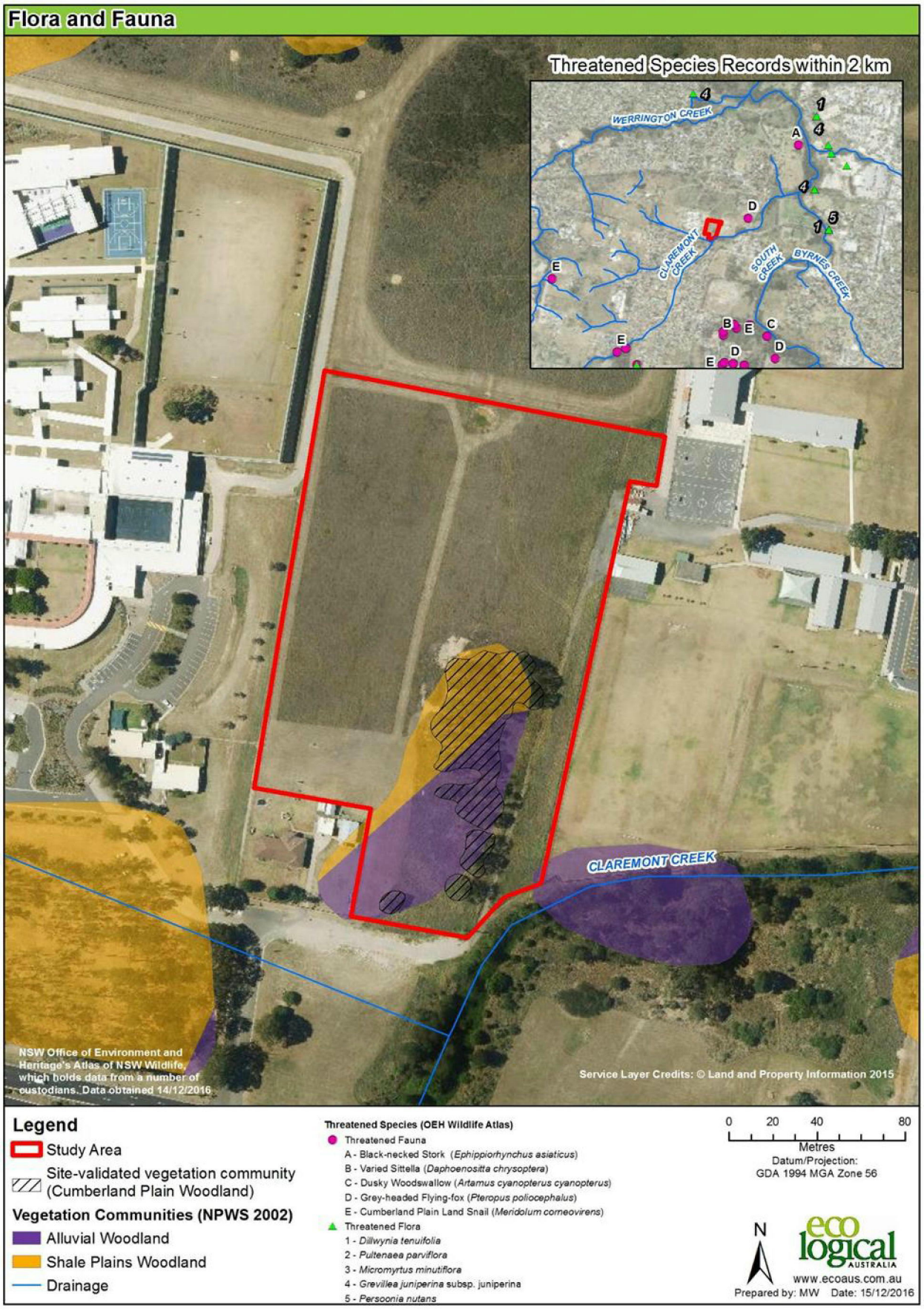

Figure 4: Ecological values of the site.

4 Impact Assessment

4.1 Direct Flora and Fauna impacts

The development will result in the removal of 0.27 ha of the Critically Endangered Ecological Community; Cumberland Plain Woodland from the site. An Assessment of Significance was undertaken (see **Appendix C**) and concluded that the impact would not be significant.

Following the site inspection it was determined that any impacts to highly mobile species or species that use the habitat intermittently would be considered negligible. Therefore an Assessment of Significance for these species were considered unnecessary. This is primarily due to the highly modified nature of the area and small size of the impact. Furthermore, only marginal foraging habitat was present and any impacts were considered negligible in comparison to available habitat in the locality.

Although no Cumberland Plain Land Snail were detected during field survey an Assessment of Significance was undertaken for potential impacts to Cumberland Plain Land Snail as a precautionary approach. The assessment is provided in **Appendix C** and concludes that the impact would not be significant.

As the impacts are unlikely to be significant a Species Impact Statement is not required.

No entities under the EPBC Act were observed or considered likely to occur. Therefore impacts to EPBC Act Matters of National Environmental Significance (MNES) are unlikely to result from the proposed works and a referral to the Commonwealth is considered unnecessary.

4.2 Riparian impacts

The proposed road in the development is within 40 of the Claremont Creek (a 3rd order stream in this location) and is therefore located on 'Waterfront land' under the Water Management Act. The development will be integrated development and will require a Controlled Activity Approval from DPI-Water.

The South Werrington Urban Village Structure Plan in Penrith DCP 2014 provides for a riparian corridor along Claremont Creek. The Structure Plan riparian corridor is approximately 10m either side of the watercourse and does not extend into the subject site. The proposed development is therefore consistent with the riparian corridor in the South Werrington Urban Village Structure Plan.

4.3 Recommended Mitigation Measures

The following safeguards are designed to minimise or mitigate the potential impacts of the proposed works on native vegetation, listed ecological communities or any potential threatened species in areas adjacent to works and include:

- installation of appropriate measures (i.e. silt fences) around the proposal site to limit the spread of sediment into adjacent waterways and vegetation
- minimise impacts during development design and construction phase, including establishing a buffer area adjacent to any native vegetation
- follow best practices for tree removal and pruning if required
- ensure protection of native vegetation outside of the construction footprint.

5 Conclusion

ELA undertook a flora and fauna assessment at 1 Water Street, Werrington in relation to ecological values listed under State (TSC Act) and Federal (EPBC Act) legislation.

A literature review and site inspection was undertaken to assess the ecological values present within the subject site, and potential impact of the proposed works on threatened flora and fauna.

The vegetation on site was confirmed to represent Cumberland Plain Woodland, a critically endangered ecological community listed under the NSW TSC Act.

No threatened flora or fauna species were observed during the site inspection. The site was not considered to provide potential habitat for threatened flora listed under the TSC Act and/or EPBC Act. However, the site was considered potential habitat for the Cumberland Plain Land Snail, despite not observing an individuals as part of a targeted survey within the site.

An Assessment of Significance under the TSC Act was undertaken for Cumberland Plain Woodland and the Cumberland Plain Land Snail and concluded that a significant impact is not likely and therefore a Species Impact Statement is not required.

A number of mitigation measures have been outlined above to ameliorate potential impacts to adjacent native vegetation during construction works

References

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Appendix A Likelihood of occurrence

Scientific Name	Common Name	TSC Act	EPBC Act	Habitat Associations	Number of records with 5 km of study area	Likelihood of Occurrence	Assessment of Significance required
Acacia bynoeana	Bynoe's Wattle	E	V	*Acacia bynoeana* is found in central eastern NSW, from the Hunter District (Morisset) south to the Southern Highlands and west to the Blue Mountains, and has recently been found in the Colymea and Parma Creek areas west of Nowra. It is found in heath and dry sclerophyll forest, typically on a sand or sandy clay substrate, often with ironstone gravels.	0	No. Not recorded during site inspection	No
Acacia pubescens	Downy Wattle	V	V	*Acacia pubescens* occurs on the NSW Central Coast in Western Sydney, mainly in the Bankstown-Fairfield-Rookwood area and the Pitt Town area, with outliers occurring at Barden Ridge, Oakdale and Mountain Lagoon. It is associated with Cumberland Plains Woodlands, Shale / Gravel Forest and Shale / Sandstone Transition Forest growing on clay soils, often with ironstone gravel.	7	No. Not recorded during site inspection	No.
Allocasuarina glareicola	*Allocasuarina glareicola*	E	E	*Allocasuarina glareicola* is primarily restricted to the Richmond district on the north-west Cumberland Plain, with an outlier population found at Voyager Point. It grows in Castlereagh woodland on lateritic soil..	0	No. Not recorded during site inspection	No.

Scientific Name	Common Name	TSC Act	EPBC Act	Habitat Associations	Number of records with 5 km of study area	Likelihood of Occurrence	Assessment of Significance required
Cynanchum elegans	White-flowered Wax Plant	—	E	*Cynanchum elegans* is a climber or twiner with a variable form, and flowers between August and May, peaking in November. It occurs in dry rainforest gullies, scrub and scree slopes, and prefers the ecotone between dry subtropical rainforest and sclerophyll woodland/forest. The species has also been found in littoral rainforest; *Leptospermum laevigatum – Banksia integrifolia* subsp. *integrifolia* coastal scrub; *Eucalyptus tereticornis* open forest/ woodland; *Corymbia maculata* open forest/woodland; and *Melaleuca armillaris* scrub to open scrub.	0	No. Not recorded during site inspection	No.
Dillwynia tenuifolia	*Dillwynia tenuifolia*	V	—	Occurs in the area bounded by Western Road, Elizabeth Drive, Devonshire Road and Cross Street, Kemps Creek in the Liverpool Local Government Area. Transition from Castlereagh Ironbark Forest to Castlereagh Scribbly Gum Woodland.	146	No. Not recorded during site inspection	No.
Genoplesium baueri	Yellow Gnat-orchid	E	E	Known from coastal areas from northern Sydney south to the Nowra district. Previous records from the Hunter Valley and Nelson Bay are now thought to be erroneous. Grows in shrubby woodland in open forest on shallow sandy soils.	0	Unlikely. Suitable habitat not recorded during site surveys	No

Scientific Name	Common Name	TSC Act	EPBC Act	Habitat Associations	Number of records with 5 km of study area	Likelihood of Occurrence	Assessment of Significance required
Grevillea juniperina subsp. *juniperina*	Juniper-leaved Grevillea	V	—	Endemic to Western Sydney, centred on an area bounded by Blacktown, Erskine Park, Londonderry and Windsor with outlier populations at Kemps Creek and Pitt Town. Cumberland Plain Woodland, Castlereagh Ironbark Woodland, Castlereagh Scribbly Gum Woodland and Shale/Gravel Transition Forest, on reddish clay to sandy soils derived from Wianamatta Shale and Tertiary alluvium.	634	No. Not recorded during site inspection	No.
Grevillea parviflora subsp. *parviflora*	Small-flower Grevillea	V	V	*Grevillea parviflora* subsp. *parviflora* is sporadically distributed throughout the Sydney Basin mainly around Picton, Appin and Bargo. Separate populations are also known further north from Putty to Wyong and Lake Macquarie and Cessnock and Kurri Kurri. It grows in sandy or light clay soils over thin shales, often with lateritic ironstone gravels. It often occurs in open, slightly disturbed sites such as tracks	2	No. Not recorded during site inspection	No.
Haloragis exalata subsp. *exalata*	Wingless Raspwort	V	V	Disjunct distribution in the Central Coast, South Coast and North Western Slopes botanical subdivisions of NSW. Protected and shaded damp situations in riparian habitats.	0	No. Not recorded during site inspection	No.

Scientific Name	Common Name	TSC Act	EPBC Act	Habitat Associations	Number of records with 5 km of study area	Likelihood of Occurrence	Assessment of Significance required
Marsdenia viridiflora subsp. *viridiflora*	Marsdenia viridiflora R. Br. subsp. viridiflora population in the Bankstown, Blacktown, Camden, Campbelltown, Fairfield, Holroyd, Liverpool and Penrith local government areas	E2	–	This Endangered Population of *Marsdenia viridiflora* subsp. *viridiflora* occurs in the Prospect, Bankstown, Smithfield, Cabramatta Creek and St Marys areas of western Sydney. It grows in vine thickets and open shale woodland.	84	No. Not recorded during site inspection	No.
Micromyrtus minutifolia	*Micromyrtus minutifolia*	E	V	Restricted to the general area between Richmond and Penrith, western Sydney. Castlereagh Scribbly Gum Woodland, Ironbark Forest, Shale/Gravel Transition Forest, open forest on tertiary alluvium and consolidated river sediments.	7	No. Not recorded during site inspection	No.
Persoonia nutans	Nodding Geebung	E	E	Associated with dry woodland, Castlereagh Scribbly Gum Woodland, Agnes Banks Woodland and sandy soils associated with tertiary alluvium, occasionally poorly drained. Endemic to the Western Sydney.	21	No. Not recorded during site inspection	No.

Scientific Name	Common Name	TSC Act	EPBC Act	Habitat Associations	Number of records with 5 km of study area	Likelihood of Occurrence	Assessment of Significance required
Pimelea curviflora var. *curviflora*	*Pimelea curviflora* var. *curviflora*	V	V	*Pimelea curviflora* var. *curviflora* is confined to the coastal area of Sydney between northern Sydney in the south and Maroota in the north-west. It grows on shaley/lateritic soils over sandstone and shale/sandstone transition soils on ridgetops and upper slopes amongst woodlands. Associated with the Duffys Forest Community, shale lenses on ridges in Hawkesbury sandstone geology.	0	No. Not recorded during site inspection	No.
Pimelea spicata	Spiked Rice-flower	E	E	In western Sydney, *Pimelea spicata* occurs on an undulating topography of well-structured clay soils, derived from Wianamatta shale. It is associated with Cumberland Plains Woodland (CPW), in open woodland and grassland often in moist depressions or near creek lines (*Ibid.*). Has been located in disturbed areas that would have previously supported CPW (*Ibid.*).	6	No. Not recorded during site inspection	No.
Pomaderris brunnea	Rufous Pomaderris	E	V	*Pomaderris brunnea* occurs in a limited area around the Colo, Nepean and Hawkesbury Rivers as well as near Walcha on the Northern Tablelands. It grows in moist woodland or forest on clay or alluvial soils of floodplains and creek lines.	0	No. Not recorded during site inspection	No.

Scientific Name	Common Name	TSC Act	EPBC Act	Habitat Associations	Number of records with 5 km of study area	Likelihood of Occurrence	Assessment of Significance required
Pterostylis saxicola	Sydney Plains Greenhood	E	E	Most commonly found growing in small pockets of shallow soil in depressions on sandstone rock shelves above cliff lines. The vegetation communities above the shelves where *Pterostylis saxicola* occurs are sclerophyll forest or woodland on shale/sandstone transition soils or shale soils. Restricted to western Sydney between Freemans Reach in the north and Picton in the south. There are very few known populations and they are all very small and isolated.	0	Unlikely. Suitable habitat not recorded during site surveys	No
Pultenaea parviflora	*Pultenaea parviflora*	E	V	Endemic to the Cumberland Plain. Mainly from Windsor to Penrith and east to Dean Park, with outlier populations at Kemps Creek and Wilberforce. Dry sclerophyll forest, especially Castlereagh Ironbark Forest, Shale Gravel Transition Forest and transitional areas where these communities adjoin Castlereagh Scribbly Gum Woodland.	247	No. Not recorded during site inspection	No.
Thesium australe	*Austral Toadflax*	V	V	Austral Toadflax is semi-parasitic on roots of a range of grass species, notably Kangaroo Grass (*Themeda triandra*). It occurs in subtropical, temperate and subalpine climates over a wide range of altitudes. It occurs on soils derived from sedimentary, igneous and metamorphic geology on a range of soils including black clay loams to yellow podzolics and peaty loams.	0	No. Not recorded during site inspection	No.

CE = Critically Endangered; E = Endangered; E1 = Endangered; E2 = Endangered Population;

Scientific Name	Common Name	TSC Act	EPBC Act	Habitat Associations	Number of records within 5 km of study area	Likelihood of Occurrence	Assessment of Significance required
AMPHIBIA							
Heleioporus australiacus	Giant Burrowing Frog	V	V	Forages in woodlands, wet heath, dry and wet sclerophyll forest. Associated with semi-permanent to ephemeral sand or rock based streams, where the soil is soft and sandy so that burrows can be constructed.	0	Unlikely. Suitable habitat not recorded during site surveys	No. Suitable habitat not present.
Litoria aurea	Green and Golden Bell Frog	E1	V	This species has been observed utilising a variety of natural and man-made waterbodies such as coastal swamps, marshes, dune swales, lagoons, lakes, other estuary wetlands, riverine floodplain wetlands and billabongs, stormwater detention basins, farm dams, bunded areas, drains, ditches and any other structure capable of storing water. Preferable habitat for this species includes attributes such as shallow, still or slow flowing, permanent and/or widely fluctuating water bodies that are unpolluted and without heavy shading. Large permanent swamps and ponds exhibiting well-established fringing vegetation (adjacent to open grassland areas for foraging are preferable.	11	Unlikely. Suitable habitat not recorded during site surveys	No. Suitable habitat not present.
FISH							
Macquarie australasica	Macquarie Perch	E (under FM Act)	E	Habitat is bottom or mid-water in slow-flowing rivers with deep holes, typically in the upper reaches of forested catchments with intact riparian vegetation. They also do well in some upper catchment lakes. In some parts of its range, the species is reduced to taking refuge in small pools which persist in midland–upland areas through the drier summer periods.	0	No. Habitat not recorded during site surveys	No.

Scientific Name	Common Name	TSC Act	EPBC Act	Habitat Associations	Number of records within 5 km of study area	Likelihood of Occurrence	Assessment of Significance required
Prototroctes maraena	Australian Grayling	—	V	The historic distribution of the Australian Grayling included coastal streams from the Grose River southwards through NSW, Vic. and Tas. On mainland Australia, this species has been recorded from rivers flowing east and south of the main dividing ranges. This species spends only part of its lifecycle in freshwater, mainly inhabiting clear, gravel-bottomed streams with alternating pools and riffles, and granite outcrops but has also been found in muddy-bottomed, heavily silted habitat. Grayling migrate between freshwater streams and the ocean and as such it is generally accepted to be a diadromous (migratory between fresh and salt waters) species.	0	No. Habitat not recorded during site surveys	No.
REPTILIA							
Hoplocephalus bungaroides	Broad-headed Snake	E	V	Typical sites consist of exposed sandstone outcrops and benching where the vegetation is predominantly woodland, open woodland and/or heath on Triassic sandstone of the Sydney Basin. They utilise rock crevices and exfoliating sheets of weathered sandstone during the cooler months and tree hollows during summer.	0	Unlikely. Suitable habitat not recorded during site surveys	No.
INVERTEBRATES							
Meridolum corneovirens	Cumberland Plain Land Snail	E	—	Associated with open eucalypt forests, particularly Cumberland Plain Woodland described in Benson (1992). Found under fallen logs, debris and in bark and leaf litter around the trunk of gum trees or burrowing in loose soil around clumps of grass (NPWS 1997; Rudman 1998). Urban waste may also form suitable habitat (NSW NPWS 1997; Rudman 1998).	90	Potential. Habitat on site, although not recorded during site inspection.	Yes

Scientific Name	Common Name	TSC Act	EPBC Act	Habitat Associations	Number of records within 5 km of study area	Likelihood of Occurrence	Assessment of Significance required
AVES							
Anthochaera phrygia	Regent Honeyeater	CE	E, Mi	Regent Honeyeaters mostly occur in dry box-ironbark eucalypt woodland and dry sclerophyll forest associations, wherein they prefer the most fertile sites available, e.g. along creek flats, or in broad river valleys and foothills. In NSW, riparian forests containing *Casuarina cunninghamiana* (River Oak), and with *Amyema cambagei* (Needle-leaf Mistletoe), are also important for feeding and breeding. At times of food shortage (e.g. when flowering fails in preferred habitats), Honeyeaters also use other woodland types and wet lowland coastal forest dominated by *Eucalyptus robusta* (Swamp Mahogany) or *E. maculata* (Spotted Gum).	1	Unlikely. Suitable habitat not recorded during site surveys	No.
Artamus cyanopterus cyanopterus	Dusky Woodswallow	V	—	In New South Wales it is widespread from coast to inland, including the western slopes of the Great Dividing Range and farther west. It is sparsely scattered in, or largely absent from, much of the Upper Western region. The Dusky Woodswallow is often reported in woodlands and dry open sclerophyll forests, usually dominated by eucalypts, including mallee associations. It has also been recorded in shrublands and heathlands and various modified habitats, including regenerating forests; very occasionally in moist forests or rainforests	5	Unlikely. Suitable habitat not recorded during site surveys	No.
Botaurus poiciloptilus	Australasian Bittern	E	E	Terrestrial wetlands with tall dense vegetation, occasionally estuarine habitats. Found along the east coast and in the Murray-Darling Basin, notably in floodplain wetlands of the Murrumbidgee, Lachlan, Macquarie and Gwydir Rivers. Reedbeds, swamps, streams, estuaries. Favours permanent shallow waters, edges of	1	No. Study area does not support suitable habitat for this species.	No.

Scientific Name	Common Name	TSC Act	EPBC Act	Habitat Associations	Number of records within 5 km of study area	Likelihood of Occurrence	Assessment of Significance required
				pools and waterways, with tall, dense vegetation such as sedges, rushes and reeds on muddy or peaty substrate. Also occurs in Lignum *Muehlenbeckia florulenta* and Canegrass *Eragrostis australasica* on inland wetlands.			
Burhinus grallarius	Bush Stone-curlew	E	—	Associated with dry open woodland with grassy areas, dune scrubs, in savanna areas, the fringes of mangroves, golf courses and open forest / farmland. Forages in areas with fallen timber, leaf litter, little undergrowth and where the grass is short and patchy. Is thought to require large tracts of habitat to support breeding, in which there is a preference for relatively undisturbed in lightly disturbed.	2	Unlikely. Suitable habitat not recorded during site surveys	No.
Calyptorhynchus lathami halmaturinus	Glossy Black-Cockatoo	E	E	It inhabits woodlands that are dominated by *Allocasuarina verticillata* and often interspersed with taller stands of *Eucalyptus cladocalyx*. These woodlands occur in small gullies adjacent to cleared land in coastal and sub-coastal areas, generally on shallow acidic soils on the steep and rocky slopes of gorges and valleys, along inland creek and river systems. Though most activity is confined to *Allocasuarina verticillata* and *Eucalyptus cladocalyx*, the Glossy Black-Cockatoo occasionally utilises other tree species, including *Eucalyptus leucoxylon*, *E. viminalis* for breeding and Allocasuarina muelleriana for foraging.	2	Unlikely. Suitable habitat not recorded during site surveys	No.
Chthonicola sagittata	Speckled Warbler	V	—	From south-eastern Qld, the eastern half of NSW and into Victoria, as far west as the Grampians, mostly on hills and tablelands of the Great Dividing Range and rarely on coast. *Eucalyptus*-dominated communities with a grassy understorey and sparse shrub layer, often on rocky ridges or in gullies.	14	Unlikely. Suitable habitat not recorded during site surveys	No.

Scientific Name	Common Name	TSC Act	EPBC Act	Habitat Associations	Number of records within 5 km of study area	Likelihood of Occurrence	Assessment of Significance required
Daphoenositta chrysoptera	Varied Sittella	V	—	Inhabits eucalypt forests and woodlands, especially those containing rough-barked species and mature smooth-barked gums with dead branches, mallee and *Acacia* woodland.	9	Unlikely. Suitable habitat not recorded during site surveys	No.
Ephippiorhynchus asiaticus	Black-necked Stork	E	—	Associated with tropical and warm temperate terrestrial wetlands, estuarine and littoral habitats, and occasionally woodlands and grasslands floodplains. Forages in fresh or saline waters up to 0.5m deep, mainly in open fresh waters, extensive sheets of shallow water over grasslands or sedgeland, mangroves, mudflats, shallow swamps with short emergent vegetation and permanent billabongs and pools on floodplains.	2	Unlikely. Suitable habitat not recorded during site surveys	No.
Grantiella picta	Painted Honeyeater	V	V	The Painted Honeyeater is found in dry open forests and woodlands, and is strongly associated with mistletoe. It may also be found along rivers, on plains with scattered trees and on farmland with remnant vegetation. It has been seen in urban parks and gardens where large eucalypts are available.	0	Unlikely. Suitable habitat not recorded during site surveys. Not recorded within 5 km from study area	No.
Hieraaetus morphnoides	Little Eagle	V	—	The Little Eagle is widespread in mainland Australia, central and eastern New Guinea. The Little Eagle is seen over woodland and forested lands and open country, extending into the arid zone. It tends to avoid rainforest and heavy forest. The population of Little Eagle in NSW is considered to be a single population. This species was recently listed as vulnerable due to a moderate	2	Unlikely. Suitable habitat not recorded during site surveys	No.

Scientific Name	Common Name	TSC Act	EPBC Act	Habitat Associations	Number of records within 5 km of study area	Likelihood of Occurrence	Assessment of Significance required
				reduction in population size based on geographic distribution and habitat quality.			
Ixobrychus flavicollis	Black Bittern	V	—	Occurs in both terrestrial and estuarine wetlands generally in areas of permanent water and dense vegetation. In areas with permanent water it may occur in flooded grassland, forest, woodland, rainforest and mangroves.	1	Unlikely. Suitable habitat not recorded during site surveys	No.
Lathamus discolour	Swift Parrot	E	E, Ma	Breeds in Tasmania between September and January. Feeds mostly on nectar, mainly from eucalypts, but also eats psyllid insects and lerps, seeds and fruit. Migrates to mainland in autumn, where it forages on profuse flowering Eucalypts. 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*), White Box (*E. albens*) and Forest Red Gum (*E. tereticornis*). Box-ironbark habitat in drainage lines, and coastal forest in NSW is thought to provide critical food resources during periods of drought or low food abundance elsewhere.	8	Unlikely. Suitable habitat not recorded during site surveys	No.
Lophoictinia isura	Square-tailed Kite	V	—	In NSW, it is a regular resident in the north, north-east and along the major west-flowing river systems. It is a summer breeding migrant to the south-east, including the NSW south coast. Timbered habitats including dry woodlands and open forests, particularly timbered watercourses.	2	Unlikely. Suitable habitat not recorded during site surveys	No.
Melithreptus gularis gularis	Black-chinned Honeyeater	V	—	Widespread in NSW from the tablelands and western slopes of the Great Dividing Range to the north-west and central-west plains and the Riverina. Also Richmond and Clarence River areas and a	1	Unlikely. Suitable habitat not recorded	No.

Scientific Name	Common Name	TSC Act	EPBC Act	Habitat Associations	Number of records within 5 km of study area	Likelihood of Occurrence	Assessment of Significance required
	(eastern subspecies)			few scattered sites in the Hunter, Central Coast and Illawarra regions. Open forests or woodlands dominated by box and ironbark eucalypts, or by smooth-barked gums, stringybarks, river sheoaks and tea-trees.		during site surveys	
Pandion haliaetus	Osprey	V	Ma; Mi	Associated with waterbodies including coastal waters, inlets, lakes, estuaries, beaches, offshore islands and sometimes along inland rivers. Osprey may nest on the ground, on sea cliffs or in trees. Osprey generally prefer emergent trees, often dead or partly dead with a broken off crown.	0	Unlikely. Suitable habitat not recorded during site surveys. Not recorded within 5 km from study area.	No.
Petroica boodang	Scarlet Robin	V	—	Occurs from the coast to the inland slopes in NSW. After breeding (July-Jan), some disperse to the lower valleys and plains of the tablelands and slopes. Primarily resides in dry eucalypt forests and woodlands, with usually open and grassy understorey, with scattered shrubs. Abundant logs and fallen timber are important habitat components. In autumn and winter many Scarlet Robins live in open grassy woodlands, and grasslands or grazed paddocks with scattered trees, and may join mixed flocks of other small insectivorous birds.	2	Unlikely. Suitable habitat not recorded during site surveys	No.
Stagonopleura guttata	Diamond Firetail	V	—	Typically found in grassy eucalypt woodlands, but also occurs in open forest, mallee, Natural Temperate Grassland, and in secondary grassland derived from other. It is often found in riparian areas and sometimes in lightly wooded farmland. Appears to be sedentary, though some populations move locally, especially those in the south.	1	Unlikely. Suitable habitat not recorded during site surveys	No.

Scientific Name	Common Name	TSC Act	EPBC Act	Habitat Associations	Number of records within 5 km of study area	Likelihood of Occurrence	Assessment of Significance required
Stictonetta naevosa	Freckled Duck	V	—	Associated with a variety of plankton-rich wetlands, such as heavily vegetated, large open lakes and their shores, creeks, farm dams, sewerage ponds and floodwaters.	2	Unlikely. Suitable habitat not recorded during site surveys	No.
AVES (NOCTURNAL)							
Ninox strenua	Powerful Owl	V	—	Powerful Owls are associated with a wide range of wet and dry forest types with a high density of prey, such as arboreal mammals, large birds and flying foxes. Large trees with hollows at least 0.5m deep are required for shelter and breeding.	6	Unlikely. No limited foraging habitat on site. No suitable roosting habitat recorded on site.	No. Foraging habitat marginal and any impacts considered negligible
Tyto tenebricosa	Sooty Owl	V	—	Sooty Owls are associated with tall wet old growth forest on fertile soil with a dense understorey and emergent tall Eucalyptus species. Pairs roost in the daytime amongst dense vegetation, in tree hollows and sometimes in caves. The Sooty Owl is typically associated with an abundant and diverse supply of prey items and a selection of large tree hollows.	1	Unlikely. No limited foraging habitat on site. No suitable roosting habitat recorded on site.	No. Foraging habitat marginal and any impacts considered negligible
MAMMALIA							
Dasyurus maculatus	Spotted-tailed Quoll	V	—	The Spotted-tailed Quoll inhabits a range of forest communities including wet and dry sclerophyll forests, coastal heathlands and rainforests, more frequently recorded near the ecotones of closed and open forest and in NSW within 200km of the coast. Preferred habitat is mature wet forest, especially in areas with rainfall 600	4	Unlikely. Suitable habitat not recorded during site surveys	No.

Scientific Name	Common Name	TSC Act	EPBC Act	Habitat Associations	Number of records within 5 km of study area	Likelihood of Occurrence	Assessment of Significance required
				mm/year. Unlogged forest or forest that has been less disturbed by timber harvesting is also preferable. This species requires habitat features such as maternal den sites, an abundance of food (birds and small mammals) and large areas of relatively intact vegetation to forage in. Maternal den sites are logs with cryptic entrances; rock outcrops; windrows; burrows.			
Petauroides volans	Greater Glider	—	V	The greater glider is restricted to eastern Australia, occurring from the Windsor Tableland in north Queensland through to central Victoria (Wombat State Forest), with an elevational range from sea level to 1200 m above sea level. It is typically found in highest abundance in taller, montane, moist eucalypt forests with relatively old trees and abundant hollows	0	Unlikely. Suitable habitat not recorded during site surveys. Not recorded within 5km radius of study area.	No.
Phascolarctos cinereus	Koala	E2	V	Koala habitat can be broadly defined as any forest or woodland containing species that are known koala food trees, or shrubland with emergent food trees. The distribution of this habitat is largely influenced by land elevation, annual temperature and rainfall patterns, soil types and the resultant soil moisture availability and fertility. Preferred food and shelter trees are naturally abundant on fertile clay soils. Koalas are also known to occur in modified or regenerating native vegetation communities, as well as urban and rural landscapes where food trees or shelter trees may be highly scattered.	1	Unlikely. Suitable habitat not recorded within study area.	No.

Scientific Name	Common Name	TSC Act	EPBC Act	Habitat Associations	Number of records within 5 km of study area	Likelihood of Occurrence	Assessment of Significance required
Pseudomys novaehollandiae	New Holland Mouse	V	V	This species has been recorded from Queensland to Tasmania, though with a sporadic and patchy distribution. Most records are coastal. However, populations have been recently recorded up to 400km inland. The species includes heathlands, woodlands, open forest and paperbark swamps and on sandy, loamy or rocky soils. In coastal populations the species seems to have a preference for sandy substrates, a heathy understorey of legumes less than one metre high and sparse ground litter. This species is generally recorded in regenerating burnt areas occurs that are one or two years post fire and rehabilitated sand-mined areas that are four to five years post-mining.	0	Unlikely. Suitable habitat not recorded during site surveys. No known records within 5 km radius of study area	No.
MAMMALS (BATS)							
Chalinolobus dwyeri	Large-eared Pied Bat	V	V	The Large-eared Pied Bat has been recorded in a variety of habitats, including dry sclerophyll forests, woodland, sub-alpine woodland, edges of rainforests and wet sclerophyll forests. This species roosts in caves, rock overhangs and disused mine shafts and as such is usually associated with rock outcrops and cliff faces.	0	Unlikely. Suitable habitat not recorded during site surveys. No known records within 5 km radius of study area	No.
Falsistrellus tasmaniensis	Eastern False Pipistrelle	V	—	Prefers moist habitats with trees taller than 20m. Roosts in tree hollows but has also been found roosting in buildings or under loose bark.	3	Unlikely. Suitable habitat not recorded in study area.	No.

Scientific Name	Common Name	TSC Act	EPBC Act	Habitat Associations	Number of records within 5 km of study area	Likelihood of Occurrence	Assessment of Significance required
Miniopterus australis	Little Bentwing-bat	V	—	East coast and ranges south to Wollongong in NSW. Moist eucalypt forest, rainforest, vine thicket, wet and dry sclerophyll forest, Melaleuca swamps, dense coastal forests and banksia scrub.	2	Unlikely. Suitable habitat not recorded in study area.	No.
Miniopterus schreibersii oceanensis	Eastern Bentwing-bat	V	—	Associated with a range of habitats such as rainforest, wet and dry sclerophyll forest, monsoon forest, open woodland, paperbark forests and open grassland. It forages above and below the tree canopy on small insects. Will utilise caves, old mines, and stormwater channels, under bridges and occasionally buildings for shelter.	21	Potential Marginal foraging habitat present. No breeding habitat present. Known within locality.	No. Impact to foraging habitat considered minor in comparison to remaining habitat within the locality
Mormopterus norfolkensis	Eastern Freetail-bat	V	—	Most records of this species are from dry eucalypt forest and woodland east of the Great Dividing Range. Individuals have, however, been recorded flying low over a rocky river in rainforest and wet sclerophyll forest and foraging in clearings at forest edges. Primarily roosts in hollows or behind loose bark in mature eucalypts, but have been observed roosting in the roof of a hut.	13	Potential Marginal foraging habitat present. No breeding habitat present. Known within locality.	No. Impact to foraging habitat considered minor in comparison to remaining habitat within the locality
Myotis macropus	Southern Myotis	V	—	Will occupy most habitat types such as mangroves, paperbark swamps, riverine monsoon forest, rainforest, wet and dry sclerophyll forest, open woodland and River Red Gum woodland, as long as they are close to water. While roosting is most	10	Potential Marginal foraging habitat present. No	No. Impact to foraging habitat considered

Scientific Name	Common Name	TSC Act	EPBC Act	Habitat Associations	Number of records within 5 km of study area	Likelihood of Occurrence	Assessment of Significance required
				commonly associated with caves, this species has been observed to roost in tree hollows, amongst vegetation, in clumps of Pandanus, under bridges, in mines, tunnels and stormwater drains. However the species apparently has specific roost requirements, and only a small percentage of available caves, mines, tunnels and culverts are used.		breeding habitat present. Known within locality.	minor in comparison to remaining habitat within the locality
Pteropus poliocephalus	Grey-headed Flying-Fox	V	V	Inhabits a wide range of habitats including rainforest, mangroves, paperbark forests, wet and dry sclerophyll forests and cultivated areas. Camps are often located in gullies, typically close to water, in vegetation with a dense canopy.	13	Potential. Marginal foraging habitat present. No breeding camps present. Known within locality.	No. Impact to foraging habitat considered minor in comparison to remaining habitat within the locality
Saccolaimus flaviventris	Yellow-bellied Sheathtail-bat	V	—	Found in almost all habitats, from wet and dry sclerophyll forest, open woodland, open country, mallee, rainforests, heathland and waterbodies. Roosts in tree hollows; may also use caves; has also been recorded in a tree hollow in a paddock and in abandoned sugar glider nests. The Yellow-bellied Sheathtail-bat is dependent on suitable hollow-bearing trees to provide roost sites, which may be a limiting factor on populations in cleared or fragmented habitats.	1	Potential Marginal foraging habitat present. No breeding habitat present. Known within locality.	No. Impact to foraging habitat considered minor in comparison to remaining habitat within the locality

Scientific Name	Common Name	TSC Act	EPBC Act	Habitat Associations	Number of records within 5 km of study area	Likelihood of Occurrence	Assessment of Significance required
Scoteanax rueppellii	Greater Broad-nosed Bat	V	—	Associated with moist gullies in mature coastal forest, or rainforest, east of the Great Dividing Range tending to be more frequently located in more productive forests. Within denser vegetation types use is made of natural and man-made openings such as roads, creeks and small rivers, where it hawks backwards and forwards for prey.	4	Potential Marginal foraging habitat present. No breeding habitat present. Known within locality.	No. Impact to foraging habitat considered minor in comparison to remaining habitat within the locality
MIGRATORY TERRESTRIAL SPECIES							
Actitis hypoleucos	Common Sandpiper	—	Ma, Mi	In Australia, the Common Sandpiper is found in coastal or inland wetlands, both saline and fresh. It is found mainly on muddy edges or rocky shores. During the breeding season in the northern hemisphere, it prefers freshwater lakes and shallow rivers.	1	Unlikely	No.
Apus pacificus	Fork-tailed Swift	—	Ma, Mi	Sometimes travels with Needletails. Varied habitat with a possible tendency to more arid areas but also over coasts and urban areas.	1	Unlikely	No.
Cuculus optatus	Oriental Cuckoo	—	Ma, Mi	Mainly inhabiting forests, the Oriental cuckoo occurs in mixed, deciduous and coniferous forest. It is present at all levels of the forest canopy, and can be found at a range of elevations, occasionally being recorded in mountains as high up as 1,100 metres	0	Unlikely	No.
Hirundapus caudacutus	White-throated Needletail	—	Ma, Mi	Forages aerially over a variety of habitats usually over coastal and mountain areas, most likely with a preference for wooded areas. Has been observed roosting in dense foliage of canopy trees, and may seek refuge in tree hollows in inclement weather.	0	Unlikely	No.

Scientific Name	Common Name	TSC Act	EPBC Act	Habitat Associations	Number of records within 5 km of study area	Likelihood of Occurrence	Assessment of Significance required
Monarcha melanopsis	Black-faced Monarch	—	Ma, Mi	Rainforest and eucalypt forests, feeding in tangled understorey.	0	Unlikely	No.
Motacilla flava	Yellow wagtail	—	Ma, Mi	The yellow wagtail occurs in a variety of damp or wet habitats with low vegetation, from rush pastures, meadows, hay fields and marshes to damp steepe and grassy tundra. Outside of the breeding season it is also found in cultivated areas. The yellow wagtail typically forages in damp grassland and on relatively bare open ground at edges of rivers, lakes and wetlands, but also feeds in dry grassland and in fields of cereal crops	0	Unlikely	No.
Myiagra cyanoleuca	Satin Flycatcher	—	Ma, Mi	Associated with drier eucalypt forests, absent from rainforests, open forests, often at height.	0	Unlikely	No.
Plegadris falcinellus	Glossy Ibis	—	Mi	Recorded over much of NSW. Spring/summer breeding migrant to southern Murray-Darling region and Macquarie Marshes. Edges of lakes and rivers, lagoons, flood-plains, wet meadows, swamps, reservoirs, sewage ponds, rice-fields and cultivated areas under irrigation. Occasionally estuaries, deltas, saltmarshes and coastal lagoons.	1	Unlikely	No.
Rhipidura rufifrons	Rufous Fantail	—	Ma, Mi	The Rufous Fantail is a summer breeding migrant to south-eastern Australia. The Rufous Fantail is found in rainforest, dense wet eucalypt and monsoon forests, paperbark and mangrove swamps and riverside vegetation. Open country may be used by the Rufous Fantail during migration.	0	Unlikely	No.
MIGRATORY SPECIES							

Scientific Name	Common Name	TSC Act	EPBC Act	Habitat Associations	Number of records within 5 km of study area	Likelihood of Occurrence	Assessment of Significance required
Ardea ibis	Cattle Egret	—	Ma, Mi	Cattle Egrets forage on pasture, marsh, grassy road verges, rain puddles and croplands, but not usually in the open water of streams or lakes and they avoid marine environments. Cattle Egrets are likely to spend the winter dispersed along the coastal plain and only a small number have been recovered west of the Great Dividing Range.	12	Unlikely	No.
Calidris ferruginea	Curlew Sandpiper	—	CE; Mi	Intertidal mudflats of estuaries, lagoons, mangrove channels; around lakes, dams, floodwaters, flooded saltbush surrounds of inland lakes.	4	Unlikely	No.
Gallinago hardwickii	Latham's Snipe	—	Ma, Mi	A variety of permanent and ephemeral wetlands, preferring open fresh water wetlands with nearby cover. Occupies a variety of vegetation around wetlands including wetland grasses and open wooded swamps.	1	Unlikely	No.
Numenius madagascariensis	Eastern Curlew	—	CE; Ma, Mi	Estuaries, bays, harbours, inlets and coastal lagoons, intertidal mudflats or sandflats, ocean beaches, coral reefs, rock platforms, saltmarsh, mangroves, freshwater/brackish lakes, saltworks and sewage farms.	0	Unlikely	No.
Rostratula australis	Australian Painted Snipe	E	E; Ma, Mi	Prefers fringes of swamps, dams and nearby marshy areas where there is a cover of grasses, lignum, low scrub or open timber. Nests on the ground amongst tall vegetation, such as grasses, tussocks or reeds (*ibid.*). Breeding is often in response to local conditions; generally occurs from September to December. Roosts during the day in dense vegetation. Forages nocturnally on mud-flats and in shallow water. Feeds on worms, molluscs, insects and some plant-matter (*ibid.*).	9	Unlikely	No.

Scientific Name	Common Name	TSC Act	EPBC Act	Habitat Associations	Number of records within 5 km of study area	Likelihood of Occurrence	Assessment of Significance required
Tringa glareola	Wood Sandpiper	—	Ma, Mi	Summer migrant to Australia. In NSW, recorded east of the Great Divide, from Stratheden and Casino, south to Nowra and elsewhere, mostly from the Riverina, but also from the Upper and Lower Western Regions. Well-vegetated, shallow, freshwater wetlands, such as swamps, billabongs, lakes, pools and waterholes; inundated grasslands; floodplains; irrigated crops; sewage ponds; reservoirs; large farm dams; bore drains; rarely brackish wetlands and saltmarsh.	2	Unlikely	No.
Tringa nebularia	Common Greenshank	—	Ma, Mi	Summer migrant to Australia. Recorded in most coastal regions of NSW; also widespread west of the Great Dividing Range, especially between the Lachlan and Murray Rivers and the Darling River drainage basin, including the Macquarie Marshes, and north-west regions. Terrestrial wetlands (swamps, lakes, dams, rivers, creeks, billabongs, waterholes and inundated floodplains, claypans, saltflats, sewage farms and saltworks dams, inundated rice crops and bores) and sheltered coastal habitats (mudflats, saltmarsh, mangroves, embayments, harbours, river estuaries, deltas, lagoons, tidal pools, rock-flats and rock platforms).	3	Unlikely	No.

CE = Critically Endangered; E = Endangered; E2 = Endangered Population; V = Vulnerable; Mi = Migratory; Ma = Marine

Appendix B Flora species

Scientific name	Common name
Acacia longifolia	Sydney Golden Wattle
*Araujia sericifera**	Moth Vine
*Bidens pilosa**	Cobbler's Peg
*Chloris gayana**	Rhodes Grass
Cirsium sp.*	Thistle
*Cynodon dactylon**	Couch Grass
Daviesia genistifolia	Broom Bitter Pea
Desmodium varians	Slender Tick-trefoil
Dichondra repens	Kidney Weed
*Eragrostis curvula**	African Love Grass
Eucalypts moluccana	Grey Box
Hydrocotyle sp.	
*Ligustrum sinense**	Small-leaved Privet
*Ludwigia peploides**	Floating Primrose-willow
*Olea europaea**	African Olive
*Opuntia stricta**	Common Prickly Pear
*Paspalum dilatatum**	Dallis Grass
*Pennisetum clandestinum**	Kikuyu
Persicaria sp.*	
*Senecio madagascariensis**	Fireweed
*Sida rhombifolia**	Arrow Leaf Sida
Solanum sp.*	
Themeda triandra	Kangaroo Grass

* Denotes an exotic species (or non-indigenous cultivated species)

Appendix C Assessment of Significance (7 Part Test)

Cumberland Plain Woodland

Cumberland Plain Woodland (CPW) is listed as a Critically Endangered Ecological Community under the TSC Act. In the NPWS vegetation mapping of the Cumberland Plain, two forms of Cumberland Plain Woodland have been identified: Shale Hills Woodland and Shale Plains Woodland. Shale Hills Woodland occurs mainly on the elevated and sloping southern half of the Cumberland Plain and is the most widely distributed form of CPW (NPWS 2002). The dominant canopy trees in CPW include *Eucalyptus moluccana* (Grey Box), *E. tereticornis* (Forest Red Gum) and *E. crebra* (Narrow-leaved Ironbark), although *Corymbia maculata* (Spotted Gum) and *E. eugenioides* (Thin-leaved Stringybark) may also occur. The community typically has a shrub layer dominated by *Bursaria spinosa* (Blackthorn), with other shrubs, such as *Acacia implexa, Indigofera australis* and *Dodonaea viscosa* subsp. *cuneata*, also present. The diverse understorey layer is similar for both forms of Cumberland Plain Woodland. It is common to find grasses, such as *Themeda australis* (Kangaroo Grass), *Microlaena stipoides* var. *stipoides* (Weeping Meadow Grass) in the community, as well as herbs, such as *Dichondra repens* (Kidney Weed), *Brunoniella australis* (Blue Trumpet) and *Desmodium varians* (NPWS 2002).

Before European settlement, CPW was extensive across western Sydney, covering 125,000 hectares. In 2002 there was only 9% of the original extent, with a further 14 % remaining as scattered trees across the landscape (NPWS 2002). CPW occurs in the Auburn, Bankstown, Baulkham Hills, Blacktown, Camden, Campbelltown, Fairfield, Hawkesbury, Holroyd, Liverpool, Parramatta, Penrith and Wollondilly Local Government Areas (DECC, 2010).

Cumberland Plain Woodland is habitat for many flora and fauna species. Some threatened species supported by CPW include *Pimelea spicata* and *Meridolum corneovirens* (Cumberland Plain Land Snail).

Clearing for agriculture and urban development is the greatest threat to CPW. Given it exists now only in fragments, CPW is vulnerable to disturbances, such as weed invasion, increased soil nutrients, rubbish dumping and frequent fire. Weeds, such as *Eragrostis curvula* (African Lovegrass), *Olea europaea* subsp. *cuspidata* (African Olive) and *Chloris gayana* (Rhodes Grass), are major threats to the community (DECC, 2010).

The local occurrence of Cumberland Plain Woodland is approximately 10.5 ha, based off mapping from NPWS 2002.

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.

CPW is a critically endangered ecological community and therefore this question is not applicable.

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

CPW is a critically endangered ecological community and therefore this question is not applicable.

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

Approximately 0.27 hectares (ha) of CPW in low condition would be removed for the proposal. However, approximately 10.5 ha of CPW would remain throughout the locality (NPWS 2002). Therefore, it is unlikely that the proposed small amount of vegetation removal would place the local occurrence of CPW at risk of extinction.

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 proposed vegetation clearance consists of a small stand of CPW canopy with a highly disturbed and exotic understorey in the south east of the study area. Given the highly degraded nature of the vegetation (consisting only as a native canopy of *Eucalyptus moluccana*) to be removed and the fact that areas of CPW are present throughout the locality, it is considered unlikely that the proposal would modify the composition of the community such that it would place the local occurrence of CPW at risk of extinction.

d. in relation to the habitat of a threatened species, population or ecological community:

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

The proposal will remove a small stand of highly disturbed CPW stand in the south east of the site (approximately 0.27 ha).

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 stand of CPW at the site is part of a largely fragmented local occurrence. A stand of CPW occurs to the south west of the site (within 100m). The whole patch of CPW on site is proposed to be removed. However, since the local occurrence is already fragmented the proposal would not further isolate or fragment any areas of CPW.

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 CPW at the site has undergone significant past disturbance with evidence of selective clearing and it remains as scattered trees with an exotic grassy understorey. Given the vegetation proposed for removal is comprised of scattered trees with an exotic understorey, it is unlikely that the small area, 0.27 ha of CPW proposed for removal would represent and area of habitat that is important to the long-term survival of this community within the locality.

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

No critical habitat has been declared for Cumberland Plain Woodland. No other critical habitat has been declared on this patch.

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

CPW is included in the Cumberland Plain Recovery Plan (DECCW 2010). The Recovery Plan has the overall objective of providing for the long-term survival and protection of the threatened biodiversity of the Cumberland Plain. The specific recovery objectives (DECCW 2010) are:

1. to build a protected area network, comprising public and private lands, focused on the priority conservation lands;
2. to deliver best practice management for threatened biodiversity across the Cumberland Plain, with a specific focus on the priority conservation lands and public lands where the primary management objectives are compatible with biodiversity conservation;
3. to develop an understanding and enhanced awareness in the community of the Cumberland Plain's threatened biodiversity, the best practice standards for its management, and the recovery program Cumberland Plain Recovery Plan; and
4. to increase knowledge of the threats to the survival of the Cumberland Plain's threatened biodiversity, and thereby improve capacity to manage these in a strategic and effective manner.

In its present form, this proposal is not consistent with the Cumberland Plain Recovery Plan (DECCW 2010). Whilst a small patch of CPW will be removed, the patch is not part of a Priority Conservation Land.

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.

Vegetation clearance is listed as a key threatening process. The area of potential habitat to be cleared is small (0.27 ha) and exists as a few scattered trees with an exotic understorey. Additional areas of the community would remain adjacent to the study area. Therefore, it is unlikely that the proposal would exacerbate any key threatening processes to such an extent that they would place any local occurrences of CPW at risk of extinction.

Conclusion

The proposal would result in the removal of approximately 0.27 ha of CPW. However, the proposed vegetation removal is unlikely to be considered significant for the following reasons:

- Clearance area is very small (0.27 ha) in relation to CPW in the locality.
- Clearing is primarily only of canopy species.
- The site is highly modified and invaded by exotic species
- Additional CPW is present directly adjacent to the site and within the locality (~10.5 ha).

On the basis of the above considerations, it is unlikely that the proposed development will result in a significant impact on CPW.

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

Meridolum corneovirens (Cumberland Plain Land Snail; CPLS) is a native snail species with a typical adult shell diameter ranging between 15-30mm. The colour is generally tan to dark brown with a green or yellow tinge (NPWS, 2000). The snail primarily inhabits Cumberland Plain Woodland (CPW) in Western Sydney, where it is currently known from over 100 locations. However, most of these populations are scattered throughout the region and are often small and isolated (DECCW 2010b).

Current knowledge suggests that the CPLS is restricted to the Cumberland Plain and Castlereagh Woodlands of Western Sydney and also along the fringes of River-Flat Eucalypt Forest (RFEF), especially where it meets CPW. CPLS typically occurs under logs and other debris, amongst leaf and bark accumulations and sometimes under grass clumps. Where possible it will burrow into loose soil (DECCW 2010).

Potential habitat for the CPLS within the study area exists under the leaf letter of at the base of the CPW canopy trees (*Eucalyptus moluccana*). Small areas of potential habitat were searched but no individuals were recorded and habitat for this species within the study area is not optimal as there is limited leaf litter. Nevertheless, these areas are still considered to be potential habitat, especially given the cryptic nature of this species and that suitable habitat is also likely to exist within the connected areas of RFEF in the Claremont Creek riparian corridor.

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.

Whilst the CPLS has not been recorded within the study area, there is marginal habitat for this species present within areas of CPW at the site. The proposed works will result in the removal of a small area; approximately 0.27 ha of potential habitat in the south east of the study area. However, the vegetation to be removed is degraded and this species has not been recorded at the site.

Given the degraded nature of the study area, small amount of potential habitat to be removed (0.27 ha) and that similar habitat exists within the locality and adjacent to the site (riparian corridor). It is unlikely that the proposal would place a local viable population at risk of extinction.

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

Not applicable. The CPLS 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.

Not applicable. The CPLS is not 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 proposed works will result in the removal of approximately 0.27 ha of potential habitat in the south east of the study area.

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

This species has not been recorded at the site although the proposal will result in the removal of part of a stand of CPW (potential habitat) in the south east of the site. Potential habitat for this species is present outside of the study area along Claremont Creek adjacent to the study area which adjoins similar patches of CPW and Alluvial Woodland in the locality.

The CPLS does not require large areas to maintain a viable population and have been demonstrated to be highly structured at very short distances (2 m) and after about 350 m the populations are random. Therefore, individuals within a 350 m radius are more likely to be related than they would be if found more than this distance apart (Clark et al., 2004). Although the proposal will remove potential habitat for this species, it is unlikely that the stand of vegetation is important for the maintenance of genetic diversity and no individuals were recorded. Therefore, it is unlikely that the proposal would place any populations within the locality at risk of extinction as this species in known to be able to maintain viable populations in small areas.

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 proposed CPW clearance will result in the removal of approximately 0.27 ha of potential habitat for this species. However, similar areas of CPW (approximately 10.5 ha) serving as potential habitat for the species will remain within the locality. Therefore, it is unlikely that the habitat to be removed would be considered important to the long-term survival of the species within the locality.

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

No critical habitat for this species has been identified on the Register of Critical Habitat.

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

This species has been assigned to the Landscape species management stream under the Saving our Species program. The study area does not fall under any sites listed as a key management site for this species. Therefore the proposed works do not conflict with any recovery plan 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.

A number of Key Threatening Processes (KTP) are relevant to this proposal with respect to the CPLS. These include:

- clearing of native vegetation
- invasion of native plant communities by exotic perennial grasses.

The proposal will result in the removal of approximately 0.27 ha of potential habitat for this species. The vegetation to be removed includes a small, fragmented stand of vegetation that supports an understorey of exotic grasses. Therefore it is considered unlikely that the proposal would significantly exacerbate the clearing of native vegetation KTP.

The KTP, invasion of native plant communities by exotic perennial grasses, is relevant to this proposal. However, mitigation measures will be implemented to prevent the spread of weeds into stands of native vegetation outside of the development area. Therefore, it is unlikely that any areas would become further infested by exotic species as a consequence of the proposal.

Conclusion

Although the proposal would result in the removal of 0.27 ha of potential habitat for this species, the proposed clearance is considered unlikely to be significant for the following reasons:

- The CPLS does not require large areas to maintain a viable population and have been demonstrated to be highly structured at very short distances (2 m) and after about 350 m the populations are random (Clark et al., 2004). Therefore although the proposal is likely to potential habitat for this species, it is unlikely to be placed at risk of extinction or genetic inbreeding within the locality as this species in known to be able to maintain viable populations in small areas.
- The proposed clearance is small with respect to the amount of potential habitat within the locality and adjacent areas
- Mitigation measures will be implemented to prevent indirect impacts of the proposal on the remaining areas of potential habitat.

Consequently a Species Impact Statement (SIS) is not required for this species.

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