

























Legend

- Impact assessment area
- Impact area
- Southern Myotis
- 💋 Cumberland Plain Land Snail

Figure 11.4 Threatened fauna habitat polygons



Matter: 31617, Date: 23 September 2021, Prepared for: CW, Prepared by: LW, Last edited by: lwilson Location: P:\31600s\31617\Mapping\31617_Working\31617_BDAR2020_LW







<u>Legend</u>

- Impact assessment area
- Impact area
- 💋 Cumberland Plain Land Snail

Figure 11.5 Threatened fauna habitat polygons



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<u>Legend</u>

- Impact assessment area
- Impact area
- Southern Myotis
- 💋 Cumberland Plain Land Snail

Figure 11.14 Threatened fauna habitat polygons



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9. Commonwealth matters

9.1 Project assessment against the EPBC Act

The project is being assessed under the Bilateral agreement (section 45 of the EPBC Act), however, some duplication remains between the consideration of NSW listed threatened species and communities and those listed nationally. On this basis an assessment of the likelihood of occurrence of nationally listed biota occurring in the impact area and whether a significant impact is likely to result from the project has been undertaken. Assessments of significant impacts on threatened species and ecological communities presented here are limited to biota recorded or identified as having a medium or higher likelihood of occurrence in the impact area and that may be impacted by construction and/or operation of the project.

The project was declared a controlled action on 03 December 2020, with threatened species and ecological communities, migratory species, World Heritage properties and National Heritage places deemed the relevant 'controlling provisions' (EPBC Act referral 2020/8816). The project will be assessed under the Bilateral agreement relating to environmental assessment between the Commonwealth of Australia and NSW.

Since the EPBC Referral was lodged the impact area has continued to be refined and consolidated for the EIS submission, and detailed ecological investigations have been completed. On this basis, an updated likelihood of occurrence and impact assessment using current information about the impact area and its biodiversity values has been prepared (Table 40). As the controlled action decision specifies listed threatened species and ecological communities, and listed migratory species as controlling provisions. Impacts associated with World Heritage properties and National Heritage places are outside the scope of this assessment, and Ramsar wetlands are not considered as they are not assessed to be controlling provisions.

Assessment documentation prepared for the purposes of approval under the EPBC Act must, in addition to providing sufficient information for a decision in accordance with the Act, address the matters outlined in Schedule 4 of the Environment Protection and Biodiversity Conservation Regulations 2000.

A list of biodiversity related MNES considered likely, or to be at some risk of being significantly impacted by the project was provided in the revised SEARs (DPIE 2021), based on the Project Referral (Biosis 2020b) and the DAWE Reporting Tool and is provided below:

- Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest (Critically Endangered).
- Regent Honeyeater Anthochaera phrygia (Critically Endangered).
- Swift Parrot Lathamus discolor (Critically Endangered).
- Macquarie perch Macquaria australasica (Endangered).

One additional MNES, Camden White Gum, known to occur in the vicinity of the project's impact area, and along the banks of the Nepean River where impacts associated with altered hydrology as a result of the project may occur, which therefore has also been considered to be at risk of significant impact.

All relevant EPBC Act listed species and ecological communities, and listed migratory species considered herein are listed in Table 40, along with a summary of the evidence used to conclude whether a significant impact is likely or unlikely to occur as a result of the project.

Assessments have been undertaken in accordance with the Significant Impact Guidelines 1.1 - Matters of National Environmental Significance (CoA 2013), for *Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest*, Regent Honeyeater, Swift Parrot and Camden White Gum, all considered to be potentially



significantly impacted by the project (Appendix 6). Significant impacts have been assessed as unlikely to occur to these MNES as a result of the project and are addressed further in the following sections.

Macquarie Perch is subject to a separate assessment as part of the aquatic ecological assessment for the project (CTE 2021) and are not specifically assessed in this report.

River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria was listed as Critically Endangered under the EPBC Act in December 2020 (DAWE 2020), after the controlled action was referred and the determination was released for the project on 3 December 2020. As the TEC was not listed at the time of the controlled action decision, it is not considered part of the controlling provisions and therefore further consideration of significant impacts under the EPBC Act is not required.

It is noted that based on TEC modelling undertaken by Biosis utilising best available vegetation mapping data, a conservative estimate of approximately 2.59 hectares of potential EPBC Act listed vegetation occurs within the project's impact area and a further approximately 5.30 hectares of potential EPBC Act listed vegetation occurs within the project's impact assessment area.

9.1.1 Strategic assessment of the South West Growth Centre

Under the EPBC Act, the Commonwealth minister may agree to undertake a strategic assessment on the impacts of actions under a policy, plan or program. An agreement was signed to undertake a strategic assessment of the Sydney growth centres on 11 November 2009.

SEPP (Sydney Region Growth Centres) 2006 was gazetted and granted biodiversity certification of the areas covered by the SEPP. This removes the need for threatened species assessment under the EP&A Act for areas that have been certified.

In December 2011, the Australian Government environment minister endorsed the program document, *Sydney Growth Centres Strategic Assessment: Program Report*. The endorsement of this program allows the Commonwealth minister to consider giving approval to actions that are taken in accordance with the endorsed program.

In February 2012, the minister approved classes of actions associated with implementing the Sydney Growth Centres Strategic Assessment: Program report.

Strategic assessment and subsequent approval of the *Sydney Growth Centres Strategic Assessment: Program Report* has resulted in removal of the need for impacts to MNES, occurring on areas of Existing Certified land within the project's impact area (and impact assessment area), MNES to be assessed under the EPBC Act.

9.2 MNES within the impact area and impact assessment area

A summary of all MNES recorded, or considered to have the potential to occur, within the impact area and impact assessment area are provided in Table 39. Further detail is provided in Sections 7 and 8.



Table 39 MNES within the impact area and impact assessment area

MNES	EPBC listing status	Potential habitat within the impact area (Figure 5)	Breeding habitat	Foraging habitat	Important populations	Critical habitat
Cumberland Plain Shale Woodlands and Shale- Gravel Transition Forest	Critically Endangered Ecological Community	PCTs 724 and 849	N/A	N/A	N/A	N/A
Cooks River/Castlereagh Ironbark Forest of the Sydney Basin Bioregion	Critically Endangered Ecological Community	PCT 725	N/A	N/A	N/A	N/A
Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland ecological community	Endangered Ecological Community	PCT 1800	N/A	N/A	N/A	N/A
Camden White Gum Eucalyptus benthamii	Vulnerable	PCTs 835, 849 and 1105	N/A	N/A	Known remnant population at Wallacia, which includes those individuals in the impact assessment area, considered important for genetic diversity (CoA 2014).	None declared
Downy Wattle Acacia pubescens	Vulnerable	PCTs 724, 725, 849, 883 and 1083	N/A	N/A	None specified. However the population within Lansdowne Reserve could be considered an important population due to its large size and presence in a conservation reserve,	None declared



MNES	EPBC listing status	Potential habitat within the impact area (Figure 5)	Breeding habitat	Foraging habitat	Important populations	Critical habitat
					making it potentially a population key to the long-term survival of the species.	
Nodding Geebung Persoonia nutans	Endangered	PCTs 724, 725 and 883	N/A	N/A	All populations are considered important.	None declared
Small-flower Grevillea Grevillea parviflora subsp. parviflora	Vulnerable	PCTs 724, 725, 883 and 1083	N/A	N/A	None specified	None declared
Spiked Rice-flower Pimelea spicata	Endangered	PCT 849 and 835 (Norris 2021).	N/A	N/A	All populations are considered important.	None declared
Sydney Bush-pea Pultenaea parviflora	Vulnerable	PCTs 724, 725, 883 and 1083	N/A	N/A	None specified	None declared
Broad-headed Snake Hoplocephalus bungaroides	Vulnerable	PCTs 1083, 1105 and 1181	Rocky habitat adjacent to sclerophyll forest. Gravid females remain in rocky habitat using cooler, shaded rocks and crevices (Webb and Shine 1998)	Rocky habitat and adjacent sclerophyll woodland.	None specified	None declared
Brush-tailed Rock Wallaby <i>Petrogale penicillata</i>	Vulnerable	PCTs 1083	Rocky habitat with an abundant supply of ledges, caves and potential pathways, plus a northerly aspect were found to be important for rock-wallabies to breed (Short 1982)	Sclerophyll forests with an abundance of rocky habitat as described adjacent.	 NSW populations include (DSE 2010): Warrumbungle Range Mt Kaputar Wollemi National Park and Jenolan Caves Nattai National Park population 	None declared



MNES	EPBC listing status	Potential habitat within the impact area (Figure 5)	Breeding habitat	Foraging habitat	Important populations	Critical habitat
					ShoalhavenMacleay Gorges region	
Dural Land Snail <i>Pommerhelix duralensis</i>	Endangered	PCTS 724, 725 and 1181.	The interface region between shale-derived and sandstone-derived soils, with forested habitats that have good native cover and woody debris (EES 2021b)	As per breeding habitat.	All populations are considered important.	None declared
Giant Burrowing Frog Heleioporus australiacus	Vulnerable	PCTs 724, 725, 883, 1083 and 1181	Breeding habitat of this species is generally soaks or pools within first or second order streams (EES 2021a). No breeding habitat has found to be present within the impact area.	The species is known to spend 95% of its time its non-breeding habitat up to 300 m from breeding sites (EES 2021x), only marginal forage habitat occurs within the impact area along the Warragamba River.	None specified	None declared
Green and Golden Bell Frog <i>Litoria aurea</i>	Vulnerable	None predicted to occur (Lemckert 2021).	No breeding habitat I present within the impact area (Lemckert 2021).	No local populations of Green and Golden Bell Frog occur within the impact area (Lemckert 2021) and as such no forage habitat is considered to be present.	None specified	None declared
Grey-headed Flying-fox Pteropus poliocephalus	Vulnerable	No breeding habitat (camps) within the project area and species known to forage across	No breeding camps area present within the impact area or impact assessment area.	All native vegetation within the impact area provides potential forage habitat for the species.	None specified as no distinct populations can be discerned.	None declared



MNES	EPBC listing status	Potential habitat within the impact area (Figure 5)	Breeding habitat	Foraging habitat	Important populations	Critical habitat
		all native and exotic vegetation within the study area and broader region.				
Koala Phascolarctos cinereus	Vulnerable	PCTs 724, 725, 781, 835, 849, 883, 1083, 1105, 1181 and 1800.	Native vegetation supporting an abundance of feed tree species.	Native vegetation supporting an abundance of feed tree species.	None declared. The concept of 'important populations' is not used in the Koala Referral Guidelines (CoA 2014a). Sufficient information was not available at the time of writing to adequately identify and separate the nature of any important populations throughout the range of the listed species (CoA 2014a).	None declared. Impact area found to score 4 (not critical habitat) in the EPBC Act Referral Koala habitat assessment tool (refer Table 40)
Large-eared Pied Bat <i>Chalinolobus dwyeri</i>	Vulnerable	No breeding habitat identified within the impact area and impact assessment area. Species known to forage within native vegetation throughout the region.	Sandstone caves, escarpments, disused mines.	Fertile valley habitat in close proximity to sandstone cliffs utilised for roosting.	None relevant to the project are specified.	None declared
Regent Honeyeater Anthochaera phrygia	Critically Endangered	PCTs 724, 725, 781, 835, 849, 883, 1083, 1105, 1181 and 1800.	Intact native vegetation with an abundance of spring/summer flowering eucalypts.	All native vegetation within the impact area provides potential forage habitat for the species.	All populations are considered important.	All breeding and foraging habitat in areas where the species is likely to occur has been declared critical to the survival of the species.



MNES	EPBC listing status	Potential habitat within the impact area (Figure 5)	Breeding habitat	Foraging habitat	Important populations	Critical habitat
Swift Parrot Lathamus discolor	Critically Endangered	PCTs 724, 725, 781, 835, 849, 883, 1083, 1105, 1181 and 1800.	Species does not breed in NSW.	All native vegetation within the impact area provides potential forage habitat for the species.	All populations are considered important.	None declared on mainland Australia.
Eastern Ospey Pandion cristatus	Migratory	PCTs 724, 781, 835, 883, 1083, 1105 and 1800.	Nests are made high up in dead trees or in dead crowns of live trees, usually within one kilometre of the sea (EES 2021c)	Riparian woodland and open water.	N/A	N/A
Fork-tailed Swift <i>Apus pacificus</i>	Migratory	This species is exclusively aerial within the region (CoA 2015) and not subject to impacts.	Species breeds in Siberia.	Mostly occur over dry or open habitats, including riparian woodland and tea-tree swamps, low scrub, heathland or saltmarsh (DAWE 2021a)	N/A	N/A
White-bellied Sea Eagle Haliaeetus leucogaster	Migratory	PCTs 724, 725, 781, 835, 849, 883, 1083, 1105, 1181 and 1800.	Breeding habitat consists of mature tall open forest, open forest, tall woodland, and swamp sclerophyll forest close to foraging habitat (EES 2021d)	Habitats are characterised by the presence of large areas of open water including larger rivers, swamps, lakes, and the sea, and associated coastal dunes, tidal flats, grassland, heathland, woodland, and forest (including rainforest) (EES 2021d).	N/A	N/A
White-throated Needletail <i>Hirundapus caudacutus</i>	Migratory	This species is almost exclusively aerial within the region (CoA 2015).	Species breeds in eastern Siberia, north- eastern China and Japan.	White-throated Needletails almost always forage aerially, at heights up to 'cloud	N/A	N/A



MNES	EPBC listing status	Potential habitat within the impact area (Figure 5)	Breeding habitat	Foraging habitat	Important populations	Critical habitat
				level', above a wide variety of habitats ranging from heavily treed forests to open habitats, such as farmland, heathland or mudflats (DAWE 2021)		



9.3 Survey for MNES

Habitat assessments to determine suitable microhabitats for threatened species across the impact area and impact assessment area have been completed. With suitable foraging and low potential breeding habitat identified for a number of species within the impact area. Targeted surveys have been undertaken for all threatened plants listed in Table 39, as well as a number of other EPBC Act listed species considered less likely to be impacted by the project (refer Table 27 and Appendix 2). Targeted surveys were also undertaken for Giant Burrowing Frog, Brush-tailed Rock Wallaby, Large-eared Pied Bat, Eastern Osprey and White-bellied Sea Eagle. No targeted surveys have been undertaken for the Regent Honeyeater or Swift Parrot. These species were not recorded during the diurnal bird surveys for Cockatoo and Raptor species, with Bionet records indicating these species are uncommon visitors to the study area. Further detail of surveys undertaken is provided in Section 8.2.

9.4 MNES potentially impacted by the project

The likelihood of occurrence of MNES within the impact area and subsequent potential impacts were assessed through desktop and field-based assessments. The details of the survey methodology and assessment outcomes are outlined in Sections 7 and 8 of this report, as well as in Table 40 below.

Following these assessments and determination on the referral to the federal Minister (Biosis 2020b), those MNES determined as having potential to be significantly impacted by the project by either DAWE (DAWE 2021), or Biosis, include:

- Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest
- Regent Honeyeater
- Swift Parrot
- Macquarie perch (assessed in CTE [2021])
- Camden White Gum

A number of additional MNES have been identified as potentially impacted by the project. These MNES were not identified as being subject to significant impacts (DAWE 2021), however, based on key habitat components and population considerations are identified in Table 39, and an updated assessment of likely occurrence (following the completion of field investigations), expected impacts is presented in Table 40. Potentially significant impacts are assessed in Appendix 6.

Further detail on the type of impacts to MNES is also provided in Section 11.



MNES	October 2020 referral likelihood assessment (Biosis 2020b)	Referral Decision (DAWE 2020)	Updated likelihood of occurrence based on survey	Potential impacts	Rationale	Significant impact criteria self-assessment undertaken and result (see Appendix 5 for details)
Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest (CEEC, EPBC Act)	Recorded within impact area and impact assessment area.	Likely to be significantly impacted.	Recorded within impact area and impact assessment area.	Direct impacts to 1.88 ha of the TEC.	The project has successfully avoided and minimised impacts to Cumberland Plain Shale Woodlands and Shale- Gravel Transition Forest TEC such that residual direct impacts are expected to be 1.88 ha, with potential indirect impacts to patches totalling 5.53 ha occurring within the impact assessment area. This level of impact has been assessed as unlikely to lead to a significant impact to the listed ecological community. Detailed assessment is included in Appendix 6.	Project unlikely to result in a significant impact to the TEC (refer Appendix 5).
Cooks River/Castlereagh Ironbark Forest of the Sydney Basin Bioregion (CEEC, EPBC Act)	Recorded within impact area and impact assessment area.	Not likely to be significantly impacted.	Recorded within impact area and impact assessment area.	No impact.	The project has successfully avoided all direct impact to Cooks River/Castlereagh Ironbark Forest TEC. The TEC occurs within the impact area within Existing Certified Land only, and as such is not subject to assessment under the EPBC Act due to the strategic assessment of the western Sydney growth centres.	Assessment not undertaken. A conservative over-estimate of impacts was included in the Commonwealth Referral document (Biosis 2020b) and DAWE concluded the impact not to be significant.
Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland ecological community (EEC, EPBC Act)	Recorded within impact area and impact assessment area.	Not likely to be significantly impacted.	Recorded within impact area and impact assessment area.	Direct impacts to 0.22 ha of the TEC.	 The project has successfully avoided and minimised impacts to Coastal Swamp Oak Forest TEC such that residual impacts are expected to be just 0.22 ha. This level of impact is small enough to be considered unlikely to lead to a significant impact to the listed ecological community. Furthermore the project is considered unlikely to: Result in substantial fragmentation of the TEC, or increase fragmentation in the landscape. 	Assessment not undertaken. An accurate estimate of final impacts was included in the Commonwealth Referral document (Biosis 2020b) and DAWE concluded the impact not to be significant.

Table 40 Summary of relevant EPBC threatened species and ecological communities



MNES	October 2020 referral likelihood assessment (Biosis 2020b)	Referral Decision (DAWE 2020)	Updated likelihood of occurrence based on survey	Potential impacts	Rationale	Significant impact criteria self-assessment undertaken and result (see Appendix 5 for details)
					 Impact upon habitat critical to the survival or recovery of the TEC. Result in substantial changes to abiotic factors and hydrology relevant to the survival of the TEC. Negatively impact upon the floristic composition of the TEC. Result in a reduction of the quality of any patch of any of the TEC. 	
Camden White Gum <i>Eucalyptus</i> <i>benthamii</i> (Vulnerable)	Recorded within impact assessment area only.	Not likely to be significantly impacted.	Recorded within impact assessment area, and downstream of impact assessment area along the banks of the Nepean River.	No individual plants will be directly impacted. Changes in hydrological patterns supporting a small portion of the important population from Bents Basin to Wallacia due to increased frequency of inundation during median flow events in the Nepean River.	 Potential impacts will occur to a small percentage of individual plants and total potential habitat comprising the important population recorded from Bents Basin to Wallacia. Potential impacts include: Increased inundation frequency for up to 12 individual trees, from a recorded population of 713 individuals. Increased inundation frequency for up to 0.54 ha of known habitat, from a total of 34.92 ha of known habitat supporting the population. Altered hydrology is not expected to have a substantial or significant impact to seeding recruitment for either population. Further detail and rationale is provided in Appendix 5. 	Project unlikely to result in a significant impact to the species (refer Appendix 5).
Downy Wattle Acacia pubescens	Recorded within impact area and	Not likely to be significantly	Recorded within impact area and	Direct impact to up to 7	Downy Wattle occurs within the Biodiversity Stewardship Site (former BioBank site) at Lansdowne, NSW which is	Assessment not undertaken due to low level of impact to



MNES	October 2020 referral likelihood assessment (Biosis 2020b)	Referral Decision (DAWE 2020)	Updated likelihood of occurrence based on survey	Potential impacts	Rationale	Significant impact criteria self-assessment undertaken and result (see Appendix 5 for details)
(Vulnerable)	impact assessment area.	impacted.	impact assessment area.	individual's plants and 0.16 ha of habitat.	situated at the eastern end of the Brine Pipeline. At the time of establishment as a BioBank site, the Downy Wattle population numbered 1, 594 individuals (OEH 2015). As such the population could be considered an 'Important Population' due to its large size and presence in a conservation reserve, making it potentially a population key to the long-term survival of the species. However impacts to 7 individuals or >0.5% of the estimated total number of individuals, and to a similarly small portion of the species habitat, is unlikely to result in significant impacts to the population.	this MNES. Impacts have increased marginally from those presented in the Commonwealth Referral document (Biosis 2020b) due to design refinement, however the residual impacts of the project are considered highly unlikely to be significant.
Nodding Geebung <i>Persoonia nutans</i> (Endangered)	Potential to occur within impact area and impact assessment area.	Not likely to be significantly impacted.	Not recorded within impact area or impact assessment area.	No impact.	The species will not be impacted by the project.	Assessment not undertaken due to low likelihood of this species occurring.
Small-flower Grevillea <i>Grevillea</i> <i>parviflora</i> subsp. <i>parviflora</i> (Vulnerable)	Potential to occur within impact area and impact assessment area.	Not likely to be significantly impacted.	Not recorded within impact area or impact assessment area.	No impact.	The species will not be impacted by the project.	Assessment not undertaken due to low likelihood of this species occurring.
Spiked Rice- flower <i>Pimelea spicata</i> (Endangered)	Potential to occur within impact area and impact assessment area.	Not likely to be significantly impacted.	Although no populations have previously been recorded within the impact area (including during	No individual plants will be subject to direct impacts. A total of 2.99 ha of potential	Based on BioNet Atlas database records and the mapped distribution of potential habitat within the impact area (PCT 849 and PCT 835) it is considered that the species has the potential to occur. Although no populations have previously been recorded within the impact assessment area, there is a reasonable likelihood that the species is present. For the	Assessment not undertaken due to no direct impacts known populations and thus no important populations. Project impacts are considered highly unlikely to

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MNES	October 2020 referral likelihood assessment (Biosis 2020b)	Referral Decision (DAWE 2020)	Updated likelihood of occurrence based on survey	Potential impacts	Rationale	Significant impact criteria self-assessment undertaken and result (see Appendix 5 for details)
			field assessment for the current project), there is a reasonable likelihood that the species is present (Norris 2021).	habitat will be impacted (Norris 2021).	most part, the impact area is linear, confined to road corridors and adjacent private land, however those areas with the greatest likelihood of occurrence are those where tree canopy is more continuous, and where a regenerating shrub layer has been mapped by the project (Norris 2021).	result in a long-term decrease in population size, reduce the species' area of occupancy, fragment a population, adversely affect critical habitat, impact the quality/availability of habitat such that the species is likely to decline, or interfere with the recovery of the species. Impacts have increased somewhat from those presented in the Commonwealth Referral document from an estimated 1.97 ha to 2.99 ha (Biosis 2020b) due to completion of species expert desktop mapping.
Sydney Bush-pea Pultenaea parviflora (Vulnerable)	Potential to occur within impact area and impact assessment area.	Not likely to be significantly impacted.	Recorded within impact area and impact assessment area.	No individual plants will be subject to direct impacts. A total of 4 individuals plants occur in the impact assessment area and 0.01 ha of habitat will be	Sydney Bush-pea individuals within the impact assessment area, and outside the areas of strategically assessed land, are not considered an 'important population', and therefore project impacts are highly unlikely to be significant.	Assessment not undertaken due to only minor direct impacts, within non- strategically assessed areas, to this MNES. Impacts have decreased from those presented in the Commonwealth Referral document (Biosis 2020b) due to subsequent field surveys, however the residual



MNES	October 2020 referral likelihood assessment (Biosis 2020b)	Referral Decision (DAWE 2020)	Updated likelihood of occurrence based on survey	Potential impacts	Rationale	Significant impact criteria self-assessment undertaken and result (see Appendix 5 for details)
				directly impacted.		impacts of the project are considered highly unlikely to be significant.
Broad-headed Snake Hoplocephalus bungaroides (Vulnerable)	Potential to occur within impact area and impact assessment area.	Not likely to be significantly impacted.	Not recorded within impact area or impact assessment area.	Direct removal of 1.56 ha of potential habitat.	Broad-headed Snake is restricted to the sandstone ranges in the Sydney Basin and within a radius of approximately 200 kilometre of Sydney (Cogger et al. 1993; NSW NPWS 2001). The current distribution of this species extends from Wollemi National Park in the north, the Clyde River catchment in ranges south-west of Nowra in the south, east to the Royal National Park and near Illawarra, and west to the upper Blue Mountains at Blackheath and Newnes. Major populations occur in the Blue Mountains, southern Sydney, an area north-west of the Cumberland Plain, and the Nowra hinterland (NSW NPWS 2001). Broad-headed Snakes occupy discrete home ranges of <4 hectares, with males' home ranges not overlapping, and juvenile snakes dispersing a maximum distance of approximately 375 m (Webb and Shine 1997). Therefore the project is highly unlikely to impact upon habitat that potentially supports more than one or two individuals. Furthermore any population that may be present within the impact area is considered unlikely to be an 'important population' as the population is unlikely to be a key source population for breeding or dispersal, be a population necessary for maintaining genetic diversity, and it does not occur near the limit of the species range.	Assessment not undertaken. A conservative over-estimate of impacts was included in the Commonwealth Referral document (Biosis 2020b) and DAWE concluded the impact not to be significant.



MNES	October 2020 referral likelihood assessment (Biosis 2020b)	Referral Decision (DAWE 2020)	Updated likelihood of occurrence based on survey	Potential impacts	Rationale	Significant impact criteria self-assessment undertaken and result (see Appendix 5 for details)
					Therefore project impacts are highly unlikely to be significant to the Vulnerable listed species.	
Brush-tailed Rock Wallaby Petrogale penicillata	Not included.	N/A	Not recorded within impact area or impact assessment area	Direct removal of 1.56 ha of potential habitat.	The species has previously been recorded within the vicinity of the Warragamba Dam, Warragamba River and Bents Basin Road, however only the record from near Warragamba Dam is considered contemporary, being from 1999 (other records are from 1978 and 1905). Based on the presence of these records there is some potential for the species to use the habitat present within the impact area. Targeted surveys were undertaken in October 2010, and December 2020 to January 2021, and the species was not recorded. Based on these surveys the likely occurrence of the species in the impact area is considered to be very low.	Assessment not undertaken. Species presence considered to be very low, and the likelihood of a significant impact is nil.
Dural Land Snail <i>Pommerhelix duralensis</i> (Vulnerable)	Potential to occur within impact area and impact assessment area	Not likely to be significantly impacted	There is potential for the species to be found in areas of suitable habitat within the project's impact area and impact assessment area (Clark 2021b).	Direct removal of 1.45 ha of expert mapped habitat.	The species has been recorded from the following PCTs, which are found within the project's impact area; PCT 1083 and PCT 1181. The species will potentially be found in any remaining intact or relatively intact remnants / patches of suitable habitat, especially if there is a well-developed leaf litter layer, plenty of woody debris on the ground, mixture of native grasses and few exotic/invasive species. It can also be found at the boundaries of plant communities that do provide suitable habitat and those that typically do not, such as where Shale Sandstone Transition Forest adjoins Cumberland Plain Woodland. For the current assessment this includes those vegetation zones mapped in Intact and Thinned condition states. There is potential for the species to be found in areas of	Assessment not undertaken. Impacts to habitat form a small component of commensurate and contiguous habitat present adjacent to the impact area. Potential impacts to 1.45 ha of habitat were included in the Commonwealth Referral document (Biosis 2020b) and DAWE concluded the impact not to be significant.



MNES	October 2020 referral likelihood assessment (Biosis 2020b)	Referral Decision (DAWE 2020)	Updated likelihood of occurrence based on survey	Potential impacts	Rationale	Significant impact criteria self-assessment undertaken and result (see Appendix 5 for details)
					suitable habitat within the project's impact area and impact assessment area not subject to targeted survey, or that have been surveyed but conditions were not conducive to detecting the species at the time of the survey, especially if there is plenty of leaf litter and woody debris.	
Giant Burrowing Frog <i>Heleioporus australiacus</i> (Vulnerable)	Potential to occur within impact area and impact assessment area.	Not likely to be significantly impacted.	Not recorded within impact area or impact assessment area.	No impact.	The species will not be impacted by the project.	Assessment not undertaken due to low likelihood of this species occurring.
Green and Golden Bell Frog <i>Litoria aurea</i> (Vulnerable)	Potential to occur within impact area and impact assessment area.	Not likely to be significantly impacted.	No current population of the species occurs within or surrounding the impact area or impact assessment area (Lemckert 2021).	No impact.	The single recent (2019) record of the species proximal to the impact area at Luddenham is considered likely to represent a dispersing individual only, and no populations of the species are considered likely to occur in the vicinity of the project area (Lemckert 2021).	Assessment not undertaken due to low likelihood of this species occurring.
Grey-headed Flying-fox <i>Pteropus</i> <i>poliocephalus</i> (Vulnerable)	Grey-headed Flying-fox camp recorded in impact assessment area at Wallacia.	Not likely to be significantly impacted.	Camp no longer present within impact area or impact assessment area. Based on redesign of project alignment. Species known	Direct removal of 13.77 ha of forage habitat. Potential indirect impact to non- maternity camp during construction.	The Grey-headed Flying-fox camp at Wallacia does not meet the definition of a nationally-important flying-fox camp as the camp was found to contain approximately 2000 individuals and is considered a colonial roost comprised of adult and sub-adult males with no gravid or lactating females or dependent young present. Therefore the population is not considered to be an 'important population', and therefore project impacts are	Assessment not undertaken due to low level of impact to this MNES. Furthermore impact were conservatively described in the Commonwealth Referral document (Biosis 2020b) and DAWE concluded the impact not to be significant.



MNES	October 2020 referral likelihood assessment (Biosis 2020b)	Referral Decision (DAWE 2020)	Updated likelihood of occurrence based on survey	Potential impacts	Rationale	Significant impact criteria self-assessment undertaken and result (see Appendix 5 for details)
			to forage within the impact are and impact assessment area.		highly unlikely to be significant to the Vulnerable listed species. More broad-scale impacts to the species forage habitat are considered negligible within the species range and extent of occurrence.	
Koala Phascolarctos cinereus (Vulnerable)	Potential to occur within impact area and impact assessment area.	Not likely to be significantly impacted.	Not recorded within impact area or impact assessment area.	Direct removal of 13.77 ha of potential habitat.	 The EPBC Act referral guidelines for the vulnerable koala (CoA 2014) contains a habitat assessment tool to help define whether habitat on a site is considered 'habitat critical to the survival of Koala', and therefore whether loss of that habitat is likely to be considered a significant impact for the purposes of the EPBC Act. The impact area has been divided into two sections based on the characteristics of the potential Koala habitat present, with those sections being east of the Nepean River and west of the Nepean River. Habitats east of the Nepean River are deemed not to meet the criteria for 'habitat critical to the survival of Koala' based on: No records of the species within 2 kilometres of the impact area. Some degree of threats in the form of vehicle strike and dog attack. Habitats not representing areas likely to contribute to the recovery of the species. 	Assessment not undertaken. An estimate of 13.1 hectares of impacts was included in the Commonwealth Referral document (Biosis 2020b) and DAWE concluded the impact not to be significant.



MNES	October 2020 referral likelihood assessment (Biosis 2020b)	Referral Decision (DAWE 2020)	Updated likelihood of occurrence based on survey	Potential impacts	Rationale	Significant impact criteria self-assessment undertaken and result (see Appendix 5 for details)
					 A 2018 record of Koala within 2 kilometres of the impact area. Vegetation comprising at least 2 known Koala feed trees. A small portion of the habitats in the impact area being contiguous with the habitats present in the broader Blue Mountains area. Little of no evidence of Koala mortality from vehicle strike or dog attack. The referral guidelines (CoA 2016) state: Loss of habitat that is not habitat critical to the survival of the species is highly unlikely to have a significant impact on the Koala for the purposes of the EPBC Act. The loss of 2 ha, or less, of marginal quality habitat critical to the survival (habitat score of 5) is highly unlikely to have a significant impact on the Koala for the purposes of the EPBC Act. The loss of between 2 and 20 ha of habitat critical to the survival may have a significant impact on the Koala for the purposes of the EPBC Act. The loss of between 2 and 20 ha of habitat critical to the survival may have a significant impact on the Koala for the purposes of the EPBC Act. Whether this is more likely or unlikely depends on the characteristics of your action. With regards to the above: Impacts east of the Nepean River are considered unlikely to result in a significant impact to Koala, as the habitat is not 'critical to the survival of the species'. Impacts west of the Nepean River are also considered unlikely to result in a significant impact to Koala. This is due to: 	



MNES	October 2020 referral likelihood assessment (Biosis 2020b)	Referral Decision (DAWE 2020)	Updated likelihood of occurrence based on survey	Potential impacts	Rationale	Significant impact criteria self-assessment undertaken and result (see Appendix 5 for details)
					 Approximately 2.05 ha of habitat removal (within 2kilometres of the 2018 Koala record). Project impacts considered to be of a low level of severity due to impacted habitats being considered marginal quality habitat critical to the survival (score of 6). Habitats being generally in 'thinned' ecological condition, and generally not part of larger contagious areas. 	
Large-eared Pied Bat <i>Chalinolobus</i> <i>dwyeri</i> (Vulnerable)	Potential to occur within impact area and impact assessment area.	Not likely to be significantly impacted.	Recorded within impact area and impact assessment area. Species considered highly unlikely to be roosting or breeding within the impact area or impact assessment area.	Direct removal of 3.48 ha of potential forage habitat. Direct and indirect impacts to potential breeding habitat at the environmental flows treated water outlet near the Warragamba Dam.	Large-eared Pied Bat occurs from Shoalwater Bay in central Queensland to Ulladulla in south-eastern NSW. In NSW, the species is generally rare with a very patchy distribution. It is found in the north east at Coolah Tops, Mt Kaputar and Warrumbungle National Park and in sandstone areas of the Sydney Basin and the western slopes and plains including Pilliga Nature Reserve (DERM, 2011). The area of occupancy is estimated to be 9,120 kilometre2 (DoEE, 2018). The population of Large-eared Pied Bat relevant to the project is not considered an 'important population' of the species. This is due to the population being unlikely to be key source population for breeding or dispersal, due to no known breeding roosts in the vicinity of the impact area, it is not considered likely to be a population necessary for maintaining genetic diversity due to its occurrence in a well- known portion of the specie's range, and it does not occur near the limit of the species range. The species National Recovery Plan (DERM 2011) notes an important population is present at Shoalwater Bay in Queensland, and notes that	Assessment not undertaken due to low level of impact to this MNES. Impacts have increased marginally from those presented in the Commonwealth Referral document (Biosis 2020b) due to subsequent survey work detecting potential breeding habitat in the form of a vertical (vent) shaft, and high sandstone cliff line habitat on the far side of the Warrgamba River, however the residual impacts of the project are considered highly unlikely to be significant.



MNES	October 2020 referral likelihood assessment (Biosis 2020b)	Referral Decision (DAWE 2020)	Updated likelihood of occurrence based on survey	Potential impacts	Rationale	Significant impact criteria self-assessment undertaken and result (see Appendix 5 for details)
					habitat supporting sandstone escarpments in the Sydney basin should be subject to recovery actions. However no important populations are listed relevant to the study area. The species SPRAT profile notes the important populations supporting higher numbers of individuals include those present in the sandstone escarpments of the Sydney Basin (Hoye 2005), however as this relates to an area of thousands of square kilometres, with well spread records of the species, the relevance of this the to the project is considered minimal. Therefore project impacts are highly unlikely to be significant to the Vulnerable listed species.	
Regent Honeyeater <i>Anthochaera</i> <i>phrygia</i> (Critically Endangered)	Potential to occur within impact area and impact assessment area.	Likely to be significantly impacted.	Potential to occur within impact area and impact assessment area.	Direct removal of 13.77 ha of forage habitat.	Regent Honeyeater is endemic to mainland south-eastern Australia where it is now patchily distributed from 100 kilometre north of Brisbane to the Adelaide area. Due to its complex movement patterns typified by migration and local nomadism, the Regent Honeyeater has what is effectively a single national population. The project will not impact upon the species' breeding habitats, nor will it impact upon area mapped as NSW EES as 'Important Areas' for the species. As such the project is not considered likely to lead to impacts to the population of the species, its habitat, or areas important for the species' recovery, to a level likely to result in a significant impact to the species. Detailed assessment is included in Appendix 6.	Project unlikely to result in a significant impact to the TEC (refer Appendix 5).
Swift Parrot Lathamus discolor	Potential to occur within	Likely to be significantly	Potential to occur within	Direct removal of 13.77 ha of	Swift Parrot breed in Tasmania and overwinter in mainland Australia (Saunders and Tzaros 2011). Breeding occurs	Project unlikely to result in a significant impact to the TEC



MNES	October 2020 referral likelihood assessment (Biosis 2020b)	Referral Decision (DAWE 2020)	Updated likelihood of occurrence based on survey	Potential impacts	Rationale	Significant impact criteria self-assessment undertaken and result (see Appendix 5 for details)
(Critically Endangered)	impact area and impact assessment area.	impacted.	impact area and impact assessment area.	forage habitat.	between September and April, after which they disperse to mainland Australia (Higgins 1999). Swift Parrots occur as a single population that is estimated to be approximately 1000 pairs which is most likely continuing to decline (Garnett et al. 2011; Saunders and Tzaros 2011). The project will not impact upon the species' breeding habitats, nor will it impact upon area mapped by NSW EES as 'Important Areas' for the species. As such the project is not considered likely to lead to impacts to the population of the species, its habitat, or areas important for the species' recovery, to a level likely to result in a significant impact to the species. Detailed assessment is included in Appendix 6.	(refer Appendix 5).
Eastern Ospey Pandion cristatus	Migratory	Not likely to be significantly impacted.	Species not recorded during targeted surveys for nests.	Negligible. No nests recorded. Potential forage habitat along major watercourses is underbored	The species is considered unlikely to nest within the impact area or impact assessment area as no nests were recorded during targeted surveys. Potential forage habitat along the Nepean River is being underbored. Some low quality potential forage habitat will be removed at the environmental flows outlet at the Warragamba River. However, large areas of higher quality commensurate habitat will remain unaffected by the project in the locality.	Assessment not undertaken. Potential impacts of the project to the species are considered negligible.
Fork-tailed Swift <i>Apus pacificus</i>	Migratory	Not likely to be significantly impacted.	Species not recorded during incidental surveys.	Negligible. Species almost entirely aerial.	The species may forage over the canopy of trees being removed by the project. However in the context of potential forage habitat available to the species within the vicinity of the project alignment, impacts are considered negligible.	Assessment not undertaken. Potential impacts of the project to the species are considered negligible.
White-bellied Sea Eagle	Migratory	Not likely to be significantly	Species recorded foraging over the	Negligible. No nests recorded.	The species is considered unlikely to nest within the impact area or impact assessment area as no nests were recorded	Assessment not undertaken. Potential impacts of the



MNES	October 2020 referral likelihood assessment (Biosis 2020b)	Referral Decision (DAWE 2020)	Updated likelihood of occurrence based on survey	Potential impacts	Rationale	Significant impact criteria self-assessment undertaken and result (see Appendix 5 for details)
Haliaeetus leucogaster		impacted.	project area, but not recorded during targeted surveys for nests.	Potential forage habitat along major watercourses is underbored	during targeted surveys. Potential forage habitat along the Nepean River is being underbored. Some low quality potential forage habitat will be removed at the environmental flows outlet at the Warragamba River. However, large areas of higher quality commensurate habitat will remain unaffected by the project in the locality	project to the species are considered negligible.
White-throated Needletail <i>Hirundapus</i> <i>caudacutus</i>	Migratory	Not likely to be significantly impacted.	Species not recorded during incidental surveys.	Negligible. Species almost entirely aerial.	The species may forage over the canopy of trees being removed by the project. However in the context of potential forage habitat available to the species within the vicinity of the project alignment, impacts are considered negligible.	Assessment not undertaken. Potential impacts of the project to the species are considered negligible.