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Addendum Biodiversity Assessment Report



Henry Lawson Drive Upgrade Stage 1B

Addendum Biodiversity Assessment Report

Prepared for: Transport for NSW

15 November 2023 Version: 1.0 Final

PROJECT NUMBER	2022-004			
PROJECT NAME	Addendum Biodiversity Assessment Report			
PROJECT ADDRESS	Henry Lawson Drive Upgrade Stage 1B			
PREPARED FOR	Transport for NSW			
AUTHOR/S	Karen Spicer			
REVIEW	Technical	QA	Version	Date to client
	Sarah Cardenzana		1.0 – Final	2 November 2023
	Karen Spicer		2.0 - Draft	6 November 2023
	Karen Spicer		1.0 – Final	15 November 2023
ACKNOWLEDGEMENTS	Lachlan Mitchell, Aurecon			
LICENCES	Scientific Licence		SL101557	
	Bionet Sensitive Species Data Licence		1115	
	Animal Research Authority Ethics Licence		Fauna Surveys and Monitoring (16/346)	
	Scientific Collection - Aquatic		P19/0009-1.0 & OUT19/2602	

This report should be cited as: 'Ecoplanning (2023). Addendum Biodiversity Assessment Report– Henry Lawson Drive Upgrade Stage 1B. Prepared for Transport for NSW.'

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Glossary and abbreviations

Acronym	Description
AoS	Assessment of significance
BAR	Biodiversity assessment report
BAM	Biodiversity assessment method
BC Act	NSW <i>Biodiversity and Conservation Act 2016</i>
EEC	Endangered ecological community
EPBC Act	Commonwealth <i>Environment Protection and Biodiversity Conservation Act 1999</i>
GDE	Groundwater dependent ecosystem
PCT	Plant community type
REF	Review of Environmental Factors
TEC	Threatened ecological community



1 Introduction

A Biodiversity Assessment Report (BAR) was prepared by Ecoplanning for Transport for NSW (Transport for NSW 2023) to assess the likely biodiversity impacts of the proposed upgrade to Henry Lawson Drive, Milperra (Stage 1B). The BAR was appended to the REF for the proposal, which was placed on public display. Since the preparation of the BAR, seven additional areas outside of the BAR subject land have been included for the proposal. This addendum report has been prepared for Transport for NSW (Transport) by Ecoplanning to assess the likely additional impacts to biodiversity from the proposal, resulting from these seven areas.

The 'study area' shown below in **Figure 1** was the area assessed during preparation of the BAR and the 'subject land' was the area to be affected by the proposed works.

Figure 1 also provides an overview of the change to the study area. This addendum BAR is to be read in conjunction with the BAR (Transport for NSW 2023).



Figure 1: The BAR study area and subject land, and the location of the seven areas extending the subject land.

2 Methodology

For consistency with the assessment in the BAR, the following factors were considered for each additional area when assessing biodiversity impacts:

- Area in hectares (ha).
- Extent of vegetation zones (ha).
- Presence of any threatened ecological communities (TEC).
- Presence of important fauna habitat features such as hollow-bearing trees or water bodies.
- Is the area located within a species polygon for *Myotis macropus* (Southern Myotis) or *Meridolum corneovirens* (Cumberland Plain Land Snail)?
- Is the area located within a mapped groundwater dependent ecosystem (GDE)?

Data collected in the field and detailed in the methodology and results section of the BAR has been used to determine the likely impacts to these areas. Survey effort is shown in **Figure 2** and **Figure 3** and demonstrates that adequate survey has been undertaken to validate the vegetation and habitat features within these additional areas. No additional field survey was required as part of this addendum REF.

The assessment of the entire subject land resulting from the additional areas has included:

- Updates to the overall impact to each vegetation zone and TEC.
- Updates to the total area of threatened species habitat affected.
- Updates to species polygon maps and subsequent updates to the Biodiversity Assessment Method (BAM) calculator to determine if additional species credits are required to be offset.
- Consideration of further impacts to GDE's and waterbodies.
- Review of Transport's offsetting thresholds and whether any have been exceeded.
- Updates to relevant assessments of significance (Section 7.3 of the NSW *Biodiversity Conservation Act*).
- Updates to relevant significant impact criteria assessments for matters of national significance (MNES) listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act* (EPBC Act).

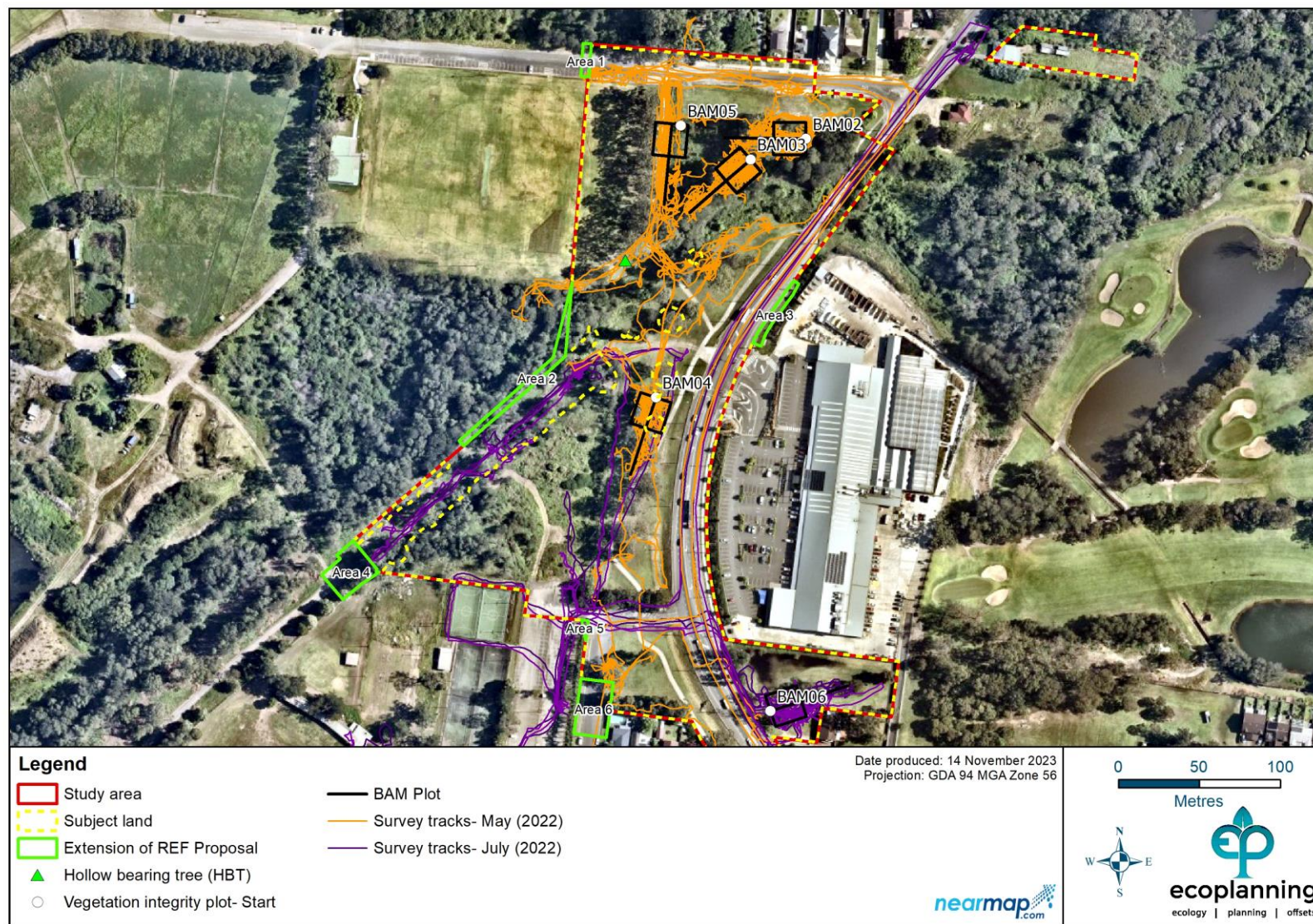


Figure 2: Survey effort relied on to assess the additional areas (north).



Figure 3: Survey effort relied on to assess additional areas (south).

3 Results

A summary of each additional area is shown in **Table 1** and demonstrates that biodiversity values are present within Area 1, 2, 4, and 6 and require further assessment. Area 3, 5 and 7 do not contain native vegetation and are comprised of exotic vegetation and existing cleared land / infrastructure. No further assessment of these areas is required.

Table 1: Summary of extensions to the subject land.

Area	Location	Description	Area (ha)	Ecoplanning validated vegetation (ha)	Important habitat features	Species polygon (ha)
1	Western end of Auld Avenue	Minor extension west of previous proposal area located wholly within existing road reserve.	0.011	0.002 ha PCT 835 0.009 ha cleared land/infrastructure	None	Yes for both Southern Myotis and CPLS.
2	West of Keys Parade	Linear elbow of land extending into native vegetation.	0.053	0.032 ha PCT 1800 0.020 ha exotic	None	Yes for Southern Myotis.
3	Flower Power	Between existing eastern side of Henry Lawson Dr and Flower Power.	0.021	0.004 ha cleared land/infrastructure. 0.016 exotic	None	No
4	South of Keys Parade	Southern extension to proposed Keys Parade.	0.063	0.041 ha PCT 1800 0.022 ha exotic	None	Yes for Southern Myotis.

Area	Location	Description	Area (ha)	Ecoplanning validated vegetation (ha)	Important habitat features	Species polygon (ha)
5	Raleigh Rd and Leisure Centre carpark	Small triangle of land location on south-east corner of entry into the Leisure centre carpark and from Raleigh Rd.	0.003	0.003 ha exotic	None	No
6	Raleigh Rd	Southern extension of proposal area along Raleigh Rd.	0.069	0.005 ha PCT 725 0.001 ha PCT 835 0.053 ha cleared land/infrastructure 0.010 ha exotic	None	Yes for Southern Myotis
7	M5 on ramp	In road corridor within M5 eastbound onramp from Henry Lawson Dr.	0.037	Overhanging canopy of PCT 835, no vegetation affected within Area 7. 0.037 cleared land/infrastructure	None	No

3.1 Native vegetation and threatened ecological communities

Native vegetation zones and their equivalent threatened ecological community (TEC) affected by the additional areas are listed below in **Table 2**. The extent of native vegetation zones is shown in **Figure 4** for additional areas in the north (Areas 1-6) and **Figure 5** for Area 7 in the south.

Table 2: Extent of vegetation zones within additional areas.

Vegetation zone	Hectares	Total (ha)	TEC (ha) BC Act
PCT 725 – Broad-leaved Ironbark – Melaleuca decora shrubby open forest: Low	Area 6 – 0.005	0.005	Cooks River/Castlereagh Ironbark Forest in the Sydney Basin Bioregion (EEC)
PCT 835 Forest Red Gum – Rough-barked Apple grassy woodland: Moderate	Area 1 – 0.002 Area 6 – 0.001	0.003	River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions (EEC)
PCT 1800 – Swamp Oak open forest on riverflats of the Cumberland Plain and Hunter Valley: Moderate	Area 2 – 0.032 Area 4 – 0.041	0.074	Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions (EEC)
Total native vegetation		0.082	
Exotic	Area 2 – 0.020 Area 3 – 0.016 Area 4 - 0.021 Area 5 – 0.003 Area 6 – 0.010	0.071	N/A
Cleared land / infrastructure	Area 1 – 0.009 Area 3 – 0.004 Area 6 – 0.053 Area 7 – 0.037	0.103	N/A
Total area		0.256	

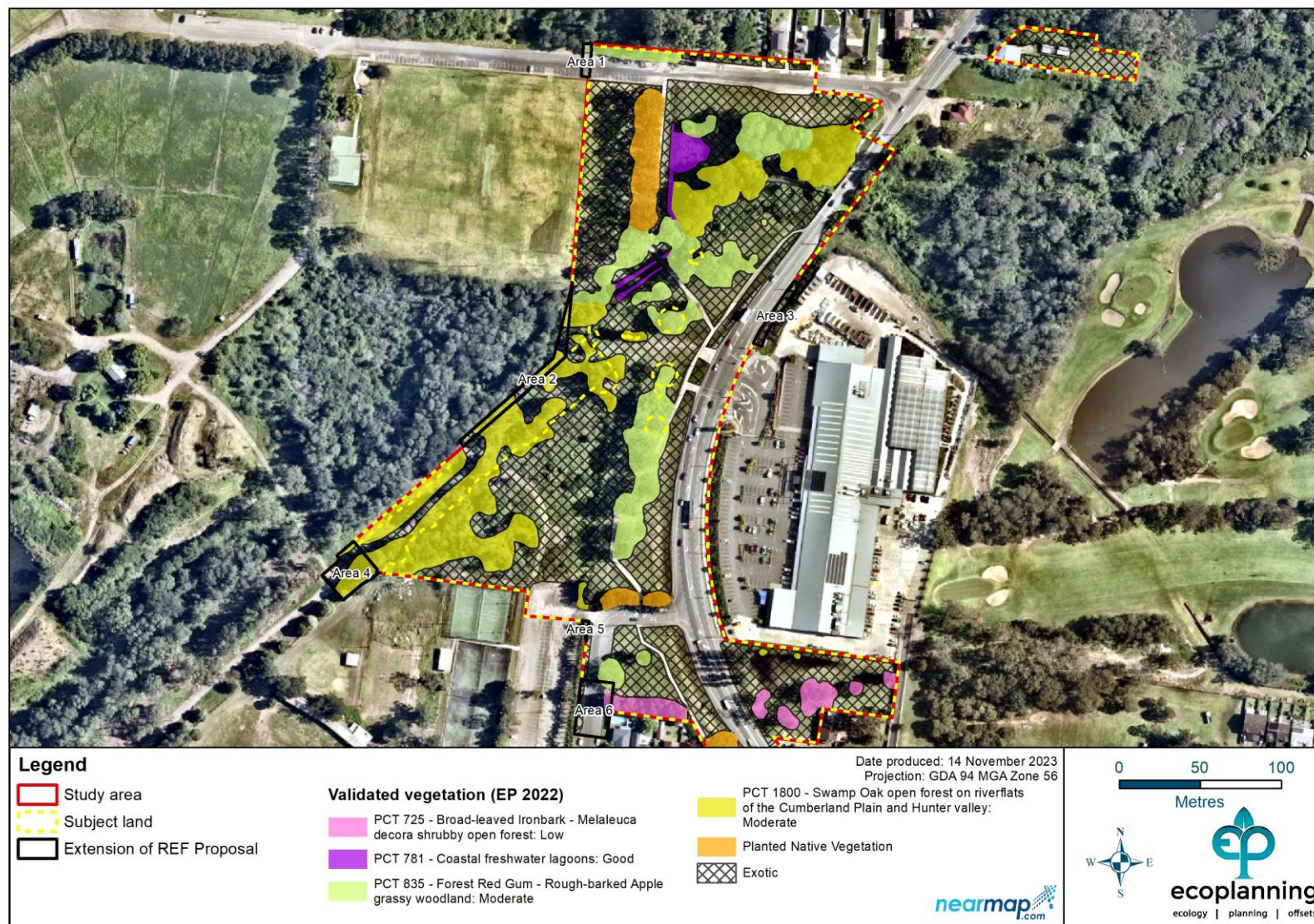


Figure 4: Validated vegetation and additional areas (north).



Figure 5: Validated vegetation and additional areas (south).

In total, an additional 0.082 ha of native vegetation (also associated with TECs) would be impacted as a result of the additional areas. This includes an additional 0.005 ha of Cooks River/Castlereagh Ironbark Forest in the Sydney Basin Bioregion; 0.003 ha of River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions; and 0.074 ha of Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions.

All of these TECs are listed endangered ecological communities (EEC) under the BC Act. As discussed in Section 3.3 of the BAR, the condition criteria for listing of equivalent TECs under the EPBC Act is not met within the subject land. The additional areas do not affect this outcome and there are no EPBC Act listed TECs within the subject land. Subsequent assessment of impacts for these three TECs have been updated in Section 4 and **Appendix A** of this report.

A comparison of the previous impact on native vegetation and the updated values is shown **Table 3**.

Table 3: Updated impacts to native vegetation within the subject land.

PCT	PCT Name	Condition	TEC	BAR impact area (ha)	Updated impact area (ha)
725	Broad-leaved Ironbark - Melaleuca decora shrubby open forest on clay soils of the Cumberland Plain, Sydney Basin Bioregion	Low	Cooks River/Castlereagh Ironbark Forest in the Sydney Basin Bioregion, (BC Act listed EEC)	0.14	0.145
781	Coastal freshwater lagoons of the Sydney Basin Bioregion and South East Corner Bioregion	Good	Sydney Freshwater Wetlands in the Sydney Basin Bioregion, (BC Act listed EEC)	0.08	0.08
835	Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion	Moderate	River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions (BC Act listed EEC)	2.16	2.163
1067	Parramatta Red Gum woodland on moist alluvium of the Cumberland Plain, Sydney Basin Bioregion	Moderate	Castlereagh Swamp Woodland Community (BC Act EEC)	0.00	0

PCT	PCT Name	Condition	TEC	BAR impact area (ha)	Updated impact area (ha)
1800	Swamp Oak open forest on riverflats of the Cumberland Plain and Hunter valley	Moderate	Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions (BC Act listed EEC)	0.68	0.754
N/A	Planted Native Vegetation	-	-	2.62	2.62
			Total vegetated area	5.68	5.762

3.2 Fauna and aquatic habitat

Fauna habitat features within the study area are discussed in Section 3.5.2 of the BAR. There were no important habitat features recorded within the additional areas.

Area 2 is located close to the Milperra Drain, which was assessed in the BAR (refer to Section 2.6 and 3.6). No additional impacts beyond those discussed in the BAR (refer to Section 5.1.4) are anticipated by the addition of Area 2 to the subject land.

3.3 Threatened species habitat

No threatened flora species were recorded within the study area and none are expected to occur in the additional areas (see Section 3.5.1 of the BAR).

Threatened fauna species determined to have a moderate likelihood of occurrence within the subject land is discussed in Section 5.1.2 of the BAR. In particular, Table 5-2 of the BAR has been reproduced below in **Table 4** to account for additional areas' vegetation removal. Southern Myotis and Cumberland Plain Land Snail are Species credit species, and the extent of habitat affected is the same as their species polygon. The remaining species are Ecosystem species, as breeding habitat is not present in the subject land for dual credit species. Some of these species are listed under the EPBC Act as shown in **Table 4**.

Table 4: Updated summary of direct impacts on threatened fauna habitat.

Species name	EPBC Act	BC Act	Credit type ¹	Potential occurrence	Associated habitat in subject land	BAR impact (ha)	Updated impact (ha)
<i>Artamus cyanopterus cyanopterus</i> (Dusky Woodswallow)	-	Vulnerable	Ecosystem	Moderate	PCT 725 PCT 781 PCT 835 PCT 1800	3.06	3.15
<i>Daphoenositta chrysoptera</i> (Varied Sittella)	-	Vulnerable	Ecosystem	Moderate	PCT 725 PCT 835 PCT 1800	2.98	3.06
<i>Falsistrellus tasmaniensis</i> (Eastern False Pipistrelle)	-	Vulnerable	Ecosystem	Moderate	PCT 725 PCT 781 PCT 835 Planted Native Vegetation	5.68	5.77
<i>Glossopsitta pusilla</i> (Little Lorikeet)	-	Vulnerable	Ecosystem	Moderate	PCT 725 PCT 781 PCT 835 PCT 1800 Planted Native Vegetation	5.68	5.77
<i>Haliaeetus leucogaster</i> (White-bellied Sea-Eagle)	-	Vulnerable	Ecosystem	Moderate	PCT 725 PCT 781 PCT 835 PCT 1800	3.06	3.15
<i>Hirundapus caudacutus</i> (White-throated Needle-tail)	Migratory	Vulnerable	Ecosystem	Moderate	PCT 725 PCT 781 PCT 835 PCT 1800	3.06	3.15
<i>Meridolum corneovirens</i>	-	Vulnerable	Species	Moderate	PCT 835 containing leaf litter	1.02*	1.01*^

Species name	EPBC Act	BC Act	Credit type ¹	Potential occurrence	Associated habitat in subject land	BAR impact (ha)	Updated impact (ha)
(Cumberland Plain Land Snail)							
<i>Micronomus norfolkensis</i> (Eastern Coastal Free-tailed Bat)	-	Vulnerable	Ecosystem	Moderate	PCT 725 PCT 781 PCT 835 PCT 1800 Planted Native Vegetation	5.68	5.77
<i>Miniopterus australis</i> (Little Bent-winged Bat)	-	Vulnerable	Ecosystem	Moderate	PCT 725 PCT 781 PCT 835 PCT 1800 Planted Native Vegetation	5.68	5.77
<i>Miniopterus orianae oceanensis</i> (Large Bent-winged Bat)	-	Vulnerable	Ecosystem	Moderate	PCT 725 PCT 781 PCT 835 PCT 1800 Planted Native Vegetation	5.68	5.77
<i>Myotis macropus</i> (Southern Myotis)	-	Vulnerable	Species	Moderate	All native vegetation within 200 m of water bodies	2.11*	2.21*
<i>Ninox strenua</i> (Powerful Owl)	-	Vulnerable	Ecosystem	Moderate	PCT 725 PCT 835 PCT 1800	2.98	3.06
<i>Pandion cristatus</i> (Eastern Osprey)	-	Vulnerable	Ecosystem	Moderate	PCT 781 PCT 835 PCT 1800	2.92	3.00

Species name	EPBC Act	BC Act	Credit type ¹	Potential occurrence	Associated habitat in subject land	BAR impact (ha)	Updated impact (ha)
<i>Pteropus poliocephalus</i> (Grey-headed Flying-fox)	Vulnerable	Vulnerable	Ecosystem	Moderate	PCT 725 PCT 781 PCT 835 PCT 1800 Planted Native Vegetation	5.68	5.77
<i>Saccolaimus flaviventris</i> (Yellow-bellied Sheathtail-bat),	-	Vulnerable	Ecosystem	Moderate	PCT 725 PCT 781 PCT 835 PCT 1800 Planted Native Vegetation	5.68	5.77
<i>Scoteanax rueppellii</i> (Greater Broad-nosed Bat)	-	Vulnerable	Ecosystem	Moderate	PCT 725 PCT 835 PCT 1800 Planted Native Vegetation	5.60	5.68
				*As per species polygon. ^Area error in BAR adjusted (see explanation in Section 3.4).			

3.4 Species polygons

Section 3.5.3 of the BAR discusses the calculation of two species polygons that require offsetting, being for *Myotis macropus* (Southern Myotis) and *Meridolum corneovirens* (Cumberland Plain Land Snail).

Areas of potential habitat within the subject land for Cumberland Plain Land Snail includes unmown areas of PCT 835 (Moderate condition) as it contains a good cover of leaf litter and logs. Area 1 contains 0.002 ha of PCT 835 that meet these conditions, so will contribute to the species polygon for Cumberland Plain Land Snail. The 0.001 ha of PCT 835 within Area 6 will not contribute to the species polygon, as these areas are mown / slashed and do not contain habitat.

The updated species polygon for Cumberland Plain Land Snail is shown below in **Figure 6**. A total of 1.01 ha of habitat for Cumberland Plain Land Snail was identified within the entire subject land, but was incorrectly stated as 1.02 ha in the BAR. The BAM-C was updated accordingly with a species polygon of 1.01 ha. The previous credit offset requirement for Cumberland Plain Land Snail of 18 credits did not change.

The extension to the subject land has resulted in an increase to the species polygon area for Southern Myotis as outlined in **Table 5**. The updated species polygon for Southern Myotis is shown below in **Figure 8** (north) and **Figure 9** (south). The BAR identified a total of 2.11 ha of Southern Myotis habitat within the subject land, which has increased to 2.21 ha. The BAM-C has been updated and the previous credit offset requirement for Myotis of 32 credits has increased to 34 credits.

Table 5: Additional areas and their contribution to the species polygon for Southern Myotis.

PCT	Condition	Additional area	Total area (ha) for species polygon
PCT 725 - Broad-leaved Ironbark - Melaleuca decora shrubby open forest on clay soils of the Cumberland Plain, Sydney Basin Bioregion	Low	0	0.016
PCT 781 - Coastal freshwater lagoons of the Sydney Basin Bioregion and South East Corner Bioregion	Good	0	0.084
PCT 835 - Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion	Moderate	0.008	1.362
PCT 1800 - Swamp Oak open forest on riverflats of the Cumberland Plain and Hunter valley	Moderate	0.069	0.749
Total area		0.078	2.211



Figure 6: Updated species polygon for *Meridolum corneovirens* (Cumberland Plain Land Snail) (north).



Figure 7: Species polygon for *Meridolum corneovirens* (Cumberland Plain Land Snail) (south).



Figure 8: Updated species polygon for Southern Myotis (north).

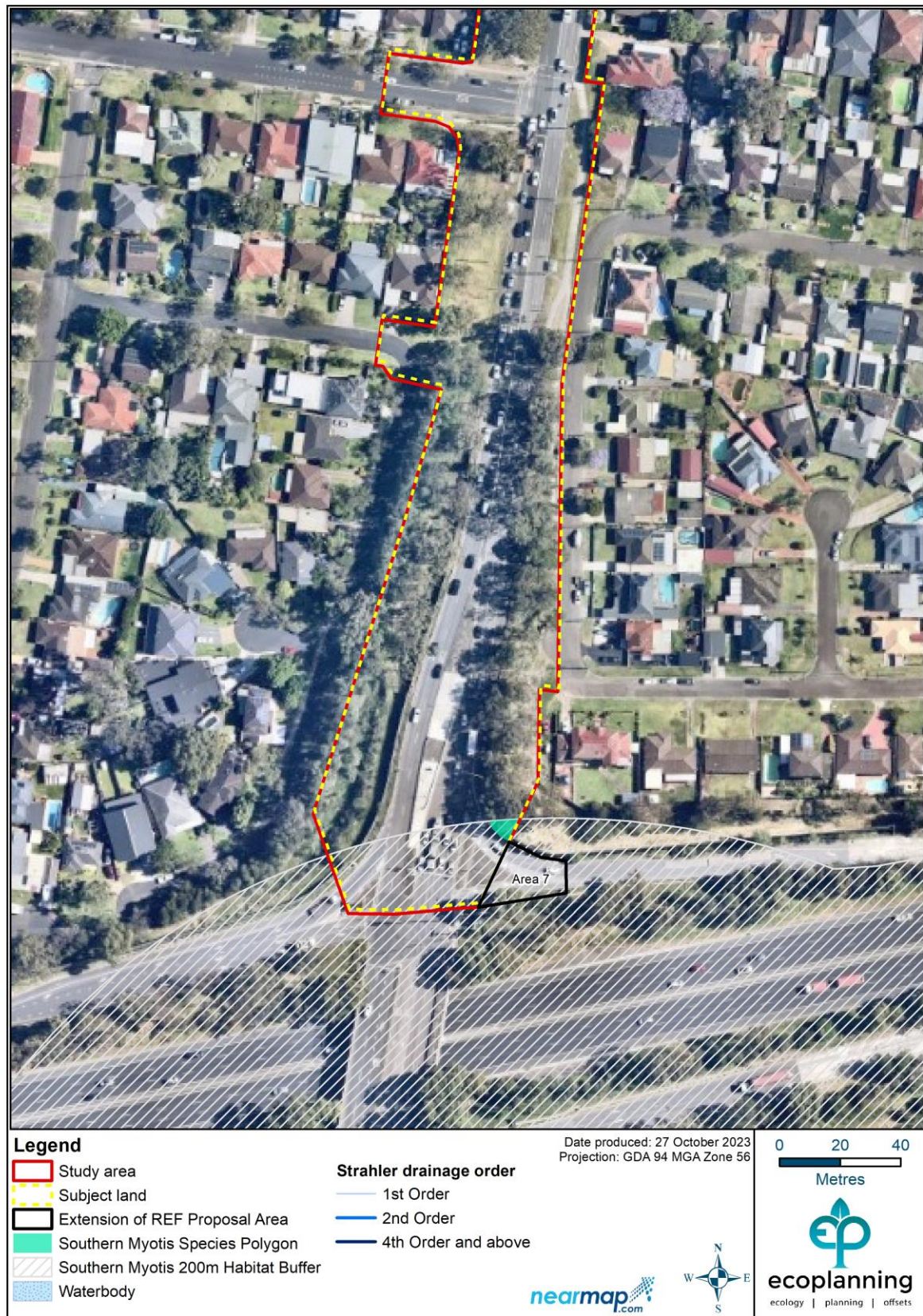


Figure 9: Species polygon for Southern Myotis (south).

3.5 Groundwater dependent ecosystems (GDE)

Section 3.4 and 5.1.6 of the BAR address potential impacts to groundwater dependent ecosystems (GDE's). Area 2 intersects land mapped as high potential of GDE (BOM 2017) (refer to **Figure 10**). The vegetation associated with terrestrial GDE's within Area 2 is PCT 1800 Cumberland Swamp Oak Riparian Forest, which is associated with fresh water. The addition of Area 2 to the subject land will not increase the extent or degree of potential impacts to GDE's compared to that identified in the BAR.



Figure 10: Area 2 and interaction with mapped high potential GDE.

4 Impact assessment

Assessments of significance were undertaken within the BAR for threatened species, populations and ecological communities that have been recorded in the study area or are assumed present as they have a moderate to high likelihood of occurrence (see Section 5.4 and Appendix D and E of the BAR).

Overall, the additional impact areas are very small (between 0.005 to 0.080 ha), and there will be no change to the conclusions reached in the assessments of significance. Nevertheless, the relevant assessments of significance (AoS) have been updated in **Appendix A** for BC listed threatened TECs and species and **Appendix B** for EPBC Act listed MNES, to include the additional impacts to habitat. As the area of impact for *Meridolum corneovirens* (Cumberland Plain Land Snail) decreased slightly (due to previous mapping errors), there has been no update to this AoS.

5 Transport offsetting thresholds

5.1 Threatened ecological communities

Section 7.1 of the BAR discusses the offsetting thresholds as part of Transport's No Net Loss Guidelines. The BAR identified that no EEC's required offsetting under these Guidelines. The additional areas included into the subject land would not alter this conclusion.

Within the BAR, River-Flat Eucalypt Forest on Coastal Floodplains EEC is represented by PCT 835 and is comprised of 1.44 ha of remnant / regrowth and 0.72 ha of roadside planted native vegetation (assigned to this vegetation zone based on species composition and landscape position). The additional area of PCT 835 within Area 1 (0.002 ha) and Area 6 (0.001 ha) are consistent with remnant / regrowth vegetation. Therefore, the total area of PCT 835 remnant / regrowth is now 1.443 ha, which is still below the 2 ha threshold for requiring offsetting.

The updated impact area for the other two EEC's are now:

- 0.145 ha of Cooks River/Castlereagh Ironbark Forest (BC Act EEC), and
- 0.754 ha of Swamp Oak Floodplain Forest (BC Act EEC)

Both of these EECs are below the Transport offsetting threshold of 2 ha and therefore do not require offsetting.

5.2 Species credits

As discussed in Section 3.4, the species polygons for both Species credit species, Cumberland Plain Land Snail and Southern Myotis, were updated based on the additional areas. For Cumberland Plain Land Snail, the BAM-C was updated with a species polygon of 1.01 ha, which did not affect the number of credits (18) required. The updated species polygon for Southern Myotis of 2.21 ha was entered into the BAM-C and the previous credit offset requirement of 32 credits has increased to 34 credits. **Appendix C** displays the relevant section of the BAM-C credit report.

6 Conclusion

This BAR Addendum has assessed the biodiversity values and impacts from the addition of seven small areas to the subject land for the proposed Stage 1B upgrade to Henry Lawson Drive, Milperra. Existing field data was used to assess impacts.

The updated subject land will result in the additional small loss of native vegetation comprising three different vegetation zones and associated TECs. The total increase in native vegetation impact is 0.082 ha.

While Area 2 intersects with mapped GDEs, this is not expected to result in additional impacts beyond those discussed in the BAR.

No important additional fauna habitat features, such as hollow-bearing trees will be affected by the additional areas. However, impacts to fauna habitat for threatened species will be marginally increased. The species polygons for Southern Myotis and Cumberland Plain Land Snail were updated. This resulted in no change to the species credits for Cumberland Plain Land Snail, but an additional 2 Southern Myotis species credits will be required (total of 34 credits).

Updated assessments of significance have concluded that a significant impact to TECs and threatened species will not result from the additional areas to the subject land. The Transport offset thresholds were assessed against the updated impact areas and as previously stated in the BAR, no offsets for TEC's are required.

7 References

Department of Agriculture, Water and the Environment (DAWE) (2021). National Recovery Plan for the Grey-headed Flying-fox 'Pteropus poliocephalus'. Access at: <https://www.dcceew.gov.au/sites/default/files/documents/recovery-plan-grey-headed-flying-fox.pdf>

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Appendix A Updates to relevant assessments of significance (Section 7.3 of the NSW Biodiversity Conservation Act)

Threatened woodland birds: *Artamus cyanopterus cyanopterus* (Dusky Woodswallow) and *Daphoenositta chrysoptera* (Varied Sittella).

These species have been grouped together based on similarities in habitat and species ecology. Both species are listed as vulnerable under the BC Act.

Varied Sittella live in eucalypt forests and woodlands, occurring across most of NSW from coastal environments to the far west, excluding the treeless deserts and open grasslands. Varied Sittella inhabit eucalypt forest and woodlands, preferring those containing rough-barked species and mature smooth-barked gums with dead branches, mallee and Acacia woodland. Varied Sittella forage in rough or decortivating bark, dead branches, standing dead trees and small branches and twigs in the tree canopy for arthropods on which they feed. Varied Sittella build nests (cup-shaped) out of plant fibres and cobwebs in an upright tree fork high in the living canopy, and often continue to use the same fork or tree in successive years.

The Dusky Woodswallow occupies a variety of habitats, including open forest, woodlands and disturbed lands, such as roadsides and golf courses. The Dusky Woodswallow is separated into two separate populations. The western population occurs in southwestern Australia and the eastern population is found from the Atherton Tableland in Queensland, south to Tasmania and west to the Eyre Peninsula, South Australia. Dusky Woodswallow nests colonially in 'neighbourhoods', although are nomadic and migrate north during autumn (specifically the eastern population). The main source of food for Dusky Woodswallow is insects, which are taken on the wing, from foliage and on the ground, however, they also consume small amount of nectar from *Eucalyptus* spp.

Specific impacts:

- Approximately 3.15 ha of potential habitat foraging and/or breeding for *Artamus cyanopterus cyanopterus* (Dusky Woodswallow).
- Approximately 3.06 ha of potential foraging and/or breeding habitat for *Daphoenositta chrysoptera* (Varied Sittella).

a) in the case of a threatened species, whether the proposed development or activity 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

These species are highly mobile and may intermittently use the study area for foraging and/or breeding. No records of these species currently exist for within the study area, with the nearest records occurring 1.2km from the study area for Dusky Woodswallow, and 0.3km from the study area for Varied Sittella. These species were also not incidentally recorded during field surveys. The study area is predominately degraded and fragmented, although areas of habitat connectivity exist within the northern and southern portions. Given large areas of potential habitat exist to the south-west of the study area,

it is unlikely these species would solely rely on the study area for foraging and/or breeding. Stage 1B is therefore unlikely to have an adverse effect on the life cycle of these species such that a viable local population of the species is likely to be placed at risk of extinction.

b) in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:

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,

N/A

c) in relation to the habitat of a threatened species or ecological community

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

ii. whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and

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

Stage 1B will impact approximately 3.15 ha of potential foraging and/or breeding habitat for Dusky Woodswallow and approximately 3.06 ha of potential foraging and/or breeding habitat for Varied Sitella. Stage 1B is situated within an urban area, with most impacts affecting roadside vegetation that is highly degraded and fragmented. Nonetheless, vegetated areas adjacent to the northern and southern boundaries of the study area may provide some connectivity to the vegetation to the east of Henry Lawson Drive. The removal of vegetation within the study area may therefore lead to habitat fragmentation between the east and west of Henry Lawson Drive. The impact is however considered to be minor given the low extent and quality of the habitat to the east.

Whilst foraging and breeding habitat is important for these species, larger areas of similar habitat extend beyond the study area, particularly to the southwest. Therefore, in the context of available foraging and breeding resources within the locality, the habitat in the study area is not considered important for the long-term survival of these species.

d) whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly),

No declared areas of outstanding biodiversity occur within the study area or locality.

e) whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process.

The following key threatening processes are of relevance to this species:

- Clearing of native vegetation
- Removal of dead wood and trees.

Conclusion

Although potential habitat exists for Dusky Woodswallow and Varied Sittella within the study area, this habitat is marginal and potentially used intermittently for foraging. Larger and more suitable areas of habitat exist within the locality, particularly in the vegetation directly southwest of the study area. As such, removal of vegetation within the study area is unlikely to result in a significant impact on these species.

***Glossopsitta pusilla* (Little Lorikeet)**

Glossopsitta pusilla (Little Lorikeet) is a vulnerable species listed under the BC Act. It is a small parrot which is distributed widely across coastal areas of eastern Australia and the Great Divide from Cape York to South Australia. Within NSW the species occurs from coastal areas to as far west as Dubbo and Albury.

The species primarily forages in the canopy of open eucalypt forest and woodland, though it also utilises other trees including *Angophora* spp., *Melaleuca* spp. and other tree species. Riparian habitats are commonly used, due to higher soil fertility and greater productivity. It forages mostly on nectar and pollen and only occasionally on native fruits such as mistletoes.

The species roosts in canopy vegetation and nesting occurs in hollow bearing eucalypts in proximity to feeding areas if possible, most typically selecting hollows in the limb or trunk of smooth-barked Eucalypts. Hollows are typically small and located high above the ground with riparian trees often chosen, including *Allocasuarina* spp.

The Little Lorikeet is threatened by a number of processes including the extensive clearing of woodlands for agriculture, particularly large old Eucalypt trees on fertile soils which produce more nectar. Additionally, the loss of old HBTs has reduced nest sites, and increased competition with other native and exotic species including the introduced Honeybee.

Specific impacts:

- Approximately 5.77 ha of potential foraging and/or breeding habitat for *Glossopsitta pusilla* (Little Lorikeet).

a) in the case of a threatened species, whether the proposed development or activity 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

This species is highly mobile and may intermittently use the study area for foraging and/or breeding. Although no records of this species currently exist within the study area, several exist within the wider locality, including in proximity to the study area. The study area is predominately degraded and fragmented, although areas of habitat connectivity exist within the northern and southern portions. Given large areas of potential habitat exist to the south-west of the study area, and the high mobility of this species, it is unlikely this species would solely rely on the study area for foraging and/or breeding. Stage 1B is therefore unlikely to have an adverse effect on the life cycle of this species, such that a viable local population of the species is likely to be placed at risk of extinction.

b) in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:

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,

N/A

c) *in relation to the habitat of a threatened species or ecological community*

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

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

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

Stage 1B will impact approximately 5.77 ha of potential foraging habitat for this species, as well as the removal of one hollow-bearing tree. Stage 1B is situated within an urban area, with most impacts to occur within roadside vegetation that is degraded and fragmented. Nonetheless, vegetated areas adjacent to the northern and southern boundaries of the study area may provide some connectivity to native vegetation east of Henry Lawson Drive. The removal of vegetation within the study area may therefore lead to habitat fragmentation between the east and west of Henry Lawson Drive. The impact is considered to be minor given the low extent and quality of the habitat to the east, and the high mobility of this species.

Whilst foraging and breeding habitat is important for this species, larger areas of more suitable habitat exist beyond the study area, particularly to the southwest. Therefore, in the context of available foraging and breeding resources within the locality, the habitat in the study area is not considered to be important for the long-term survival of this species.

d) *whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly),*

No declared areas of outstanding biodiversity occur within the study area or locality.

e) *whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process.*

The following key threatening processes are of relevance to this species:

- Clearing of native vegetation
- Removal of dead wood and trees.
- Loss of Hollow-bearing Trees.

Conclusion

Although potential habitat exists for Little Lorikeet within the study area, this habitat is thought to be marginal, potentially used intermittently for foraging. Larger and more

suitable areas of habitat exist within the locality, particularly within vegetation directly southwest of the study area. As such, removal of vegetation within the study area is unlikely to result in a significant impact on this species.

***Pteropus poliocephalus* (Grey-headed Flying-fox)**

Pteropus poliocephalus (Grey-headed Flying-fox) is a vulnerable species listed under the BC Act. It occurs within 200km of the eastern coastline of Australia, from Rockhampton in Queensland to Adelaide in South Australia. It prefers subtropical and temperate rainforest, tall sclerophyll forests and woodlands, as well as heaths and swamps. Roosting areas are often selected upon their proximity to a regular food source (within 20km), often in gullies, close to water, or in vegetation with a dense canopy. This species roosts communally in large, established camps which support several thousand individuals. The Grey-headed Flying-fox can travel up to 50km from camp to forage (typically <20km), where they feed on nectar and pollen from *Eucalyptus*, *Banksia* and *Melaleuca* spp., as well as the fruits of native and exotic species.

Specific impacts:

- Approximately 5.77 ha of potential foraging habitat for *Pteropus poliocephalus* (Grey-headed Flying-fox).

a) in the case of a threatened species, whether the proposed development or activity 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

This species is highly mobile and may intermittently use the study area for foraging. Although no records of this species currently exist within the study area, multiple records exist within the wider locality, including proximity to the study area. The study area is predominately degraded and fragmented, although areas of habitat connectivity exist within the northern and southern portions. Given large areas of potential habitat exist to the south-west of the study area, and the high mobility of this species, it is unlikely this species would solely rely on the study area for foraging. The species does not breed within the study area and the closest camp is located approximately 4.5km northwest of the study area at Cabramatta. Stage 1B is therefore unlikely to have an adverse effect on the life cycle of this species such that a viable local population of the species is likely to be placed at risk of extinction.

b) in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:

- 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,***

N/A

c) in relation to the habitat of a threatened species or ecological community

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

ii. whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and

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

Stage 1B will impact approximately 5.77 ha of potential foraging habitat for Grey-headed Flying-fox. No breeding camps are present within the study area. Stage 1B is situated within an urban area, with most impacts to occur within roadside vegetation that is highly degraded and fragmented. Nonetheless, vegetated areas adjacent to the northern and southern boundaries of the study area may provide some connectivity to the vegetation to the east of Henry Lawson Drive. The removal of vegetation within the study area may therefore lead to habitat fragmentation between the east and west of Henry Lawson Drive. The impact is considered minor given the low extent and quality of the habitat to the east, and the high mobility of this species.

Whilst foraging habitat is important for this species, larger areas of suitable habitat extend beyond the study area, particularly to the southwest. Therefore, in the context of available foraging resources within the locality, the habitat in the study area has not been assessed as important for the long-term survival of this species.

d) whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly),

No declared areas of outstanding biodiversity occur within the study area or locality.

e) whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process.

The following key threatening processes are of relevance to this species:

- Clearing of native vegetation

Conclusion

Although potential habitat exists for Grey-headed Flying-fox within the study area, this habitat would be used intermittently for foraging during flowering of native and planted native vegetation. Larger and more suitable areas of habitat exist within the locality, particularly in the vegetation directly southwest of the study area. As such, removal of vegetation within the study area is unlikely to result in a significant impact on this species.

Threatened raptors: *Haliaeetus leucogaster* (White-bellied Sea-Eagle) and *Pandion cristatus* (Eastern Osprey)

These species have been grouped together based on similarities in habitat and species ecology. All species are listed as Vulnerable under the BC Act.

The White-bellied Sea-Eagle is found along the coastline of mainland Australia and Tasmania, as well as extending into some larger inland waterways, especially those found in eastern Australia. The habitats used by this species are found around large areas of open water including large rivers, lakes, by the sea and have been found in areas such as swamps, saltmarsh, inlets, lagoons and mangroves. Feeding and diet includes mainly aquatic animals such as turtles and fish as well as being known to feed on dead prey found along the waterline. White-bellied Sea-Eagles commonly use trees for observing prey and for building stick nests, which can be used for multiple breeding seasons. They breed between May and October. They are known to become very sensitive to human presence when breeding (Menkhorst et al., 2017).

The Eastern Osprey is found around the entire Australia coastline, except for Victoria and Tasmania. They are common around the northern coast, especially on rocky shorelines, islands and reefs. The species is uncommon to rare or absent from closely settled parts of south-eastern Australia. There are a handful of records from inland areas. Eastern Osprey favour coastal areas, especially the mouths of large rivers, lagoons and lakes.

Specific impacts:

- Approximately 3.15 ha of potential foraging habitat for *Haliaeetus leucogaster* (White-bellied Sea-Eagle).
- Approximately 3 ha of potential foraging habitat for *Pandion cristatus* (Eastern Osprey).

a) *in the case of a threatened species, whether the proposed development or activity 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*

Both these species are highly mobile and may intermittently use the study area for foraging. No records of these species currently exist for within the study area, and the species was not recorded during targeted fauna surveys, including no stick nests (breeding habitat). Both species have been recorded 0.3km from the study area. The study area is predominately degraded and fragmented, although areas of habitat connectivity exist within the northern and southern portions. Given large areas of potential habitat exist to the south-west of the study area, it is unlikely these species would solely rely on the study area for foraging. No breeding habitat was evident within the study area, as no stick nests were observed during the habitat assessment survey. Stage 1B is therefore unlikely to have an adverse effect on the life cycle of these species such that a viable local population of these species is likely to be placed at risk of extinction.

b) *in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:*

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,

N/A

c) in relation to the habitat of a threatened species or ecological community

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

ii. whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and

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

Stage 1B will impact approximately 3.15 ha of potential foraging habitat for White-bellied Sea-Eagle and approximately 3 ha of potential foraging habitat for Eastern Osprey. Stage 1B is situated within an urban area, with most impacts to occur within roadside vegetation that is highly degraded and fragmented. Nonetheless, vegetated areas adjacent to the northern and southern boundaries of the study area may provide some connectivity to the vegetation to the east of Henry Lawson Drive. The removal of vegetation within the study area may therefore lead to habitat fragmentation between the east and west of Henry Lawson Drive. The impact is however considered to be minor given the low extent and quality of the habitat to the east.

Whilst foraging habitat is important for these species, larger areas of suitable habitat extend beyond the study area, particularly to the southwest and along the Georges River corridor. Therefore, in the context of available foraging resources within the locality, the habitat in the study area is not considered important for the long-term survival of these species.

d) whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly),

No declared areas of outstanding biodiversity occur within the study area or locality.

e) whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process.

The following key threatening processes are of relevance to this species:

- Clearing of native vegetation
- Removal of dead wood and trees.

Conclusion

Although potential habitat exists for White-bellied Sea Eagle and Eastern Osprey within the study area, this habitat is thought to be marginal, potentially used intermittently for foraging. Larger areas of more suitable habitat exist within the locality, particularly in the vegetation directly southwest of the study area along the Georges River corridor. As such, removal of vegetation within the study area is unlikely to result in a significant impact on these species.

***Ninox strenua* (Powerful Owl)**

The Powerful Owl inhabits a range of vegetation types, from woodland and open sclerophyll forest to tall open wet forest and rainforest. It requires large tracts of forest or woodland habitat but can occur in fragmented landscapes as well. The species breeds and hunts in open or closed sclerophyll forest or woodlands and occasionally hunts in open habitats. It roosts by day in dense vegetation comprising species such as *Syncarpia glomulifera* (Turpentine), *Allocasuarina littoralis* (Black She-oak), *Acacia melanoxylon* (Blackwood), *Angophora floribunda* (Rough-barked Apple), *Exocarpus cupressiformis* (Cherry Ballart) and several eucalypt species. The main prey items are medium-sized arboreal marsupials, particularly the Greater Glider, Common Ringtail Possum and Sugar Glider. Powerful Owls nest in large tree hollows (at least 0.5m deep), in large eucalypts (diameter at breast height of 80-240 cm) that are at least 150 years old. While the female and young are in the nest hollow the male Powerful Owl roosts nearby (10-200 m) guarding them, often choosing a dense "grove" of trees that provide concealment from other birds.

Specific impacts:

- Approximately 3.06 ha of potential foraging habitat for *Ninox strenua* (Powerful Owl).

a) *in the case of a threatened species, whether the proposed development or activity 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*

This species has moderate mobility (home range ~ 400ha in good habitats) and may intermittently use the study area for foraging. No breeding habitat is present within the study area, as suitable sized hollows are absent. Although no records of this species currently exist within the study area, several exist within the wider locality, including in close proximity to the study area. The study area is predominately degraded and fragmented, although areas of habitat connectivity exist within the northern and southern portions. While Stage 1B may remove some habitat for prey species such as *Pseudocheirus peregrinus* (Common Ringtail Possum), common birds such as *Trichoglossus moluccanus* (Rainbow Lorikeets), *Cacatua galerita* (Sulphur-crested Cockatoo), *Gymnorhina tibicen* (Australian Magpie) and the Grey-headed Flying-fox (*Pteropus poliocephalus*), these species are likely to continue to be present within the surrounding area and within the locality. Furthermore, given large areas of more suitable habitat exist to the south-west of the study area, as well as the mobility of this species, it is unlikely this species would solely rely on the study area for foraging. Stage 1B is therefore unlikely to have an adverse effect on the life cycle of this species such that a viable local population of the species is likely to be placed at risk of extinction.

b) *in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:*

- 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,

N/A

c) in relation to the habitat of a threatened species or ecological community

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

ii. whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and

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

Stage 1B will impact approximately 3.06 ha of potential foraging habitat for this species. No breeding habitat would be impacted, as no suitably sized hollow-bearing trees are present within the study area. Stage 1B is situated within an urban area, with most impacts to occur within roadside vegetation that is highly degraded and fragmented. Nonetheless, vegetated areas adjacent to the northern and southern boundaries of the study area may provide some connectivity to the vegetation to the east of Henry Lawson Drive. The removal of vegetation within the study area may therefore lead to habitat fragmentation between the east and west of Henry Lawson Drive. The impact is however considered to be minor given the low extent and quality of the habitat to the east, and the mobility of this species.

Whilst foraging habitat is important for this species, larger areas of more suitable habitat exist beyond the study area, particularly to the southwest. Therefore, in the context of available foraging resources within the locality, the habitat in the study area has not been assessed as important for the long-term survival of this species.

d) whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly),

No declared areas of outstanding biodiversity occur within the study area or locality.

e) whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process.

The following key threatening processes are of relevance to this species:

- Clearing of native vegetation
- Removal of dead wood and trees.

Conclusion

Although foraging potential habitat exists for Powerful Owl within the study area, this habitat is thought to be marginal, potentially used intermittently for foraging. Larger and

more suitable areas of habitat exist within the locality, particularly in the vegetation directly southwest of the study area. As such, it is not thought that the removal of vegetation within the study area is likely to result in a significant impact on this species.

Cave-dwelling microbats: *Miniopterus australis* (Little Bent-winged Bat) and *Miniopterus orianae oceanensis* (Large Bent-winged Bat)

These species have been grouped together based on similarities in habitat and species ecology. Both species are listed as Vulnerable under the BC Act.

The Little Bent-winged Bat occurs along the east coast of Australia ranging from Cape York Qld south to Wollongong, NSW. They are generally found in well-timbered areas of moist eucalypt forest, rainforest, vine thicket, wet and dry sclerophyll forest, Melaleuca swamps, dense coastal forests and banksia scrub. It can be distinguished from the Common Bentwing-Bat by its smaller size. They roost in caves, tunnels, tree hollows, abandoned mines, stormwater drains, culverts and bridges with foraging occurring at night for small insects beneath the canopy of densely vegetated habitats. They often share roosting sites with the Large Bentwing-bat and, in winter, the two species may form mixed clusters. In NSW the largest maternity colony is in close association with a large maternity colony of Large Bentwing-bats and appears to depend on the large colony to provide the high temperatures needed to rear its young. Maternity colonies form in spring and birthing occurs in early summer. Males and juveniles disperse in summer. Only five nursery sites /maternity colonies are known in Australia.

The Large Bent-winged Bat occupies a range of forested environments (including wet and dry sclerophyll forests), along the coastal portion of eastern Australia, and through the Northern Territory and Kimberley area (subject to subdivision of this species). This species forages from just above the tree canopy, to many times the canopy height in forested areas, and will use open areas where it is known to forage at lower levels. Moths appear to be the main dietary component. This highly mobile species is capable of large regional movements in relation to seasonal differences in reproductive behaviour and winter hibernation. Though, individuals often use numerous roosts (including, mines, culverts, stormwater channels, buildings, and occasionally tree-hollows), it congregates in large numbers at a small number of nursery caves to breed and hibernate.

Specific impacts:

- Approximately 5.77 ha of potential foraging habitat for *Miniopterus australis* (Little Bent-winged Bat).
- Approximately 5.77 ha of potential foraging habitat for *Miniopterus orianae oceanensis* (Large Bent-winged Bat).

a) *in the case of a threatened species, whether the proposed development or activity 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*

These species are highly mobile and may intermittently use the study area for foraging. No breeding habitat is present within the study area. While there are no records of these species within the study area, several records exist within the wider locality, including in proximity to the study area. The study area is predominately degraded and fragmented, although areas of habitat connectivity exist within the northern and southern portions. Given large areas of more suitable habitat exist to the south-west of the study area, and the high mobility of these species, it is unlikely these species would solely rely on the study area for foraging. Stage 1B is therefore unlikely to have an adverse effect on the

life cycle of this species such that a viable local population of these species is likely to be placed at risk of extinction.

b) in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:

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,

N/A

c) in relation to the habitat of a threatened species or ecological community

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

ii. whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and

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

Stage 1B will impact approximately 5.77 ha of potential foraging habitat for Little Bent-winged Bat and Large Bent-winged Bat. No breeding habitat would be impacted, as no caves or other breeding structures were present within the study area. Stage 1B is situated within an urban area, with most impacts to occur within roadside vegetation that is highly degraded and fragmented. Nonetheless, vegetated areas adjacent to the northern and southern boundaries of the study area may provide some connectivity to the vegetation to the east of Henry Lawson Drive. The removal of vegetation within the study area may therefore lead to habitat fragmentation between the east and west of Henry Lawson Drive. The impact is however considered to be minor given the low extent and quality of the habitat to the east, and the mobility of these species.

Whilst foraging habitat is important for this species, larger areas of more suitable habitat exist beyond the study area, particularly to the southwest. Therefore, in the context of available foraging resources within the locality, the habitat within the study area is not considered important for the long-term survival of these species.

d) whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly),

No declared areas of outstanding biodiversity occur within the study area or locality.

e) whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process.

The following key threatening processes are of relevance to this species:

- Clearing of native vegetation
- Removal of dead wood and trees.

Conclusion

Although foraging potential habitat exists for Little Bent-winged Bat and Large Bent-winged Bat within the study area, this habitat is thought to be marginal, potentially used intermittently for foraging. Larger and more suitable areas of habitat exist within the locality, particularly in the vegetation directly southwest of the study area. As such, it is not thought that the removal of vegetation within the study area is likely to result in a significant impact on this species.

Hollow-dependent microbats: *Falsistrellus tasmaniensis* (Eastern False Pipistrelle), *Micronomus norfolkensis* (Eastern Coastal Free-tailed Bat), *Myotis macropus* (Southern Myotis), *Saccolaimus flaviventris* (Yellow-bellied Sheathtail-bat) and *Scoteanax rueppellii* (Greater Broad-nosed Bat).

These species have been grouped together based on similarities in habitat and species ecology. All species are listed as Vulnerable under the BC Act.

The Eastern False Pipistrelle is a wide-ranging species, occurring along the southeast coast of Australia with records from Southeast Queensland, New South Wales, Victoria and Tasmania. The species occurs in sclerophyll forests from the Great Dividing Range to the coast, and generally prefers wet habitats where trees are more than 20m high. Roosting occurs in hollow trunks of eucalypt trees, usually in single sex colonies, but the species has been recorded roosting in caves, under loose bark and occasionally in old wooden buildings. Their flight pattern is high and fast and they forage within or just below the tree canopy. They feed on a variety of prey including moths, rove beetles, weevils, plant bugs, flies and ants.

The Eastern Coastal Free-tail bat occurs along the coastal regions of eastern Australia. In NSW its range expands west out over the Great Diving Range. The habitat preference of the Eastern Coastal Freetail-bat is poorly known, however it has been observed to occur in dry eucalypt forest, coastal woodland, riparian zones and wet sclerophyll forests. This species forages for moths above forest canopy and along forest edges, and also consumes ground-based invertebrates (e.g. ants and beetles). Hollow bearing trees are their preferred roosting sites.

The Southern Myotis is found along the coastal band from the north-west of Australia, across to the top end and south to western Victoria. This species forages over streams and pools, catching insects and small fish by raking their feet across the water surface. Southern Myotis roost in tree hollows, caves, culverts and under bridges, in groups of 10 – 15 individuals, often close to water. Potential threats to the Southern Myotis include, clearing adjacent to foraging areas, reduction in stream water quality, affecting food resources and the loss or disturbance of roosting sites.

The Yellow-bellied Sheathtail-bat is a wide-ranging species that is found across northern and eastern Australia. They forage for insects across a range of habitats, including land with and without trees. It roosts in tree hollows and buildings, and in treeless areas are known to use mammal burrows. The Yellow-bellied Sheathtail-bat is quite distinctive and grow up to 87 mm long. It has long, narrow wings a jet-black, glossy back and a yellow belly that extends to the shoulders and a small portion of the ear.

The Greater Broad-nosed Bat occurs from north-eastern Victoria to the Atherton Tableland. In NSW, it occurs along the entire east coast but does not occur at altitudes above 500 m. It utilises a variety of habitat from woodlands through to moist and dry eucalypt forest and rainforest. It is most commonly found in tall wet forest. It usually roosts in tree hollows but has also been found in buildings.

Specific impacts:

- Approximately 5.77 ha of potential foraging and/or breeding habitat for *Falsistrellus tasmaniensis* (Eastern False Pipistrelle).

- Approximately 5.77 ha of potential foraging and/or breeding habitat for *Micronomus norfolkensis* (Eastern Coastal Free-tailed Bat).
- Approximately 2.21 ha of potential foraging and/or breeding habitat for *Myotis macropus* (Southern Myotis).
- Approximately 5.77 ha of potential foraging and/or breeding habitat for *Saccolaimus flaviventris* (Yellow-bellied Sheath-tail-bat).
- Approximately 5.68 ha of potential foraging and/or breeding habitat for *Scoteanax rueppellii* (Greater Broad-nosed Bat).

a) in the case of a threatened species, whether the proposed development or activity 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

These species were not recorded during targeted surveys (WSP 2021). Although no records of these species currently exist within the study area, several records exist within the wider locality, including in proximity to the study area. These species are highly mobile and may intermittently use the study area for foraging and/or breeding. However, only one hollow-bearing tree was recorded during the field survey, so this roosting/breeding habitat is very limited within the study area.

In terms of foraging habitat, the study area is predominately degraded and fragmented, although areas of habitat connectivity exist within the northern and southern portions. Given large areas of more suitable habitat exist to the south-west of the study area, and the high mobility of these species, it is unlikely these species would solely rely on the study area for foraging and/or breeding. Stage 1B is therefore unlikely to have an adverse effect on the life cycle of this species such that a viable local population of the species is likely to be placed at risk of extinction.

b) in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:

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,

N/A

c) in relation to the habitat of a threatened species or ecological community

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

ii. whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and

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

Stage 1B will impact approximately 2.21 ha of potential foraging habitat for Southern Myotis; 5.77 ha of potential foraging habitat for Eastern False Pipistrelle; 5.68 ha of potential foraging habitat for Greater Broad-nosed Bat; and 5.77 ha of potential foraging habitat for Eastern Coastal Free-tailed Bat and Yellow-bellied Sheath-tail-bat. Stage 1B may also result in the removal of one hollow-bearing tree which may be used as breeding habitat for these species.

Stage 1B is situated within an urban area, with most impacts affecting roadside planted native vegetation that is degraded and fragmented. Nonetheless, vegetated areas adjacent to the northern and southern boundaries of the study area may provide some connectivity to vegetation east of Henry Lawson Drive. The removal of vegetation within the study area may therefore lead to habitat fragmentation between the east and west of Henry Lawson Drive. However, the impact is considered to be minor given the low extent and quality of the habitat to the east, and the high mobility of these species.

Whilst foraging and breeding habitat is important for this species, larger areas of more suitable habitat exist beyond the study area, particularly to the southwest. Therefore, in the context of available foraging and breeding resources within the locality, the habitat in the study area has not been assessed as important for the long-term survival of this species.

d) whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly),

No declared areas of outstanding biodiversity occur within the study area or locality.

e) whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process.

The following key threatening processes are of relevance to this species:

- Clearing of native vegetation
- Removal of dead wood and trees.
- Loss of Hollow-bearing Trees.

Conclusion

Although potential habitat exists for these species within the study area, this habitat is thought to be marginal, potentially used intermittently for foraging, and less likely for breeding. Larger and more suitable areas of habitat exist within the locality, particularly in the vegetation directly southwest of the study area. As such, it is not thought that the removal of vegetation within the study area is likely to result in a significant impact on these species.

Cooks River/Castlereagh Ironbark Forest in the Sydney Basin Bioregion

Cooks River/Castlereagh Ironbark Forest (CRCIF) is listed as an endangered ecological community under the BC Act. It ranges from open forest to low woodland, with a canopy dominated by Broad-leaved Ironbark (*Eucalyptus fibrosa*) and Paperbark (*Melaleuca decora*). The canopy may also include other eucalypts such as Woollybutt (*E. longifolia*). The dense shrubby understorey consists of Prickly-leaved Paperbark (*Melaleuca nodosa*) and Peach Heath (*Lissanthe strigosa*), with a range of 'pea' flower shrubs, such as *Dillwynia tenuifolia*, Hairy Bush-pea (*Pultenaea villosa*) and Gorse Bitter Pea (*Daviesia ulicifolia*) (can be locally abundant). The sparse ground layer contains a range of grasses and herbs.

Specific impacts:

- Approximately 0.15ha of CRCIF would be impacted by Stage 1B.
a) in the case of a threatened species, whether the proposed development or activity 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

N/A

- b) in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:**

- 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,**

The local occurrence of CRCIF includes all areas mapped as PCT 725 within the study area, plus a large area mapped directly to the east as CRCIF by DPE (2022), occurring within the confines of Bankstown Golf Course (a total of 10.43 ha). The proposed works will impact approximately 0.15 ha within a mown park, situated directly south of Flower Power and a small strip of native vegetation assigned to PCT 725 equating to 1.44% of the local occurrence of CRCIF. This occurs within the western most extent of the local occurrence. The removal of 0.15ha of CRCIF from the study area is unlikely to place the local occurrence at risk of extinction, as only a relatively small, degraded patch on the periphery of a larger patch is proposed to be removed.

The TEC within the study area has already been largely modified to the extent it only occurs as native canopy trees, as the midstorey is absent and the ground layer is exotic. The other patch of the TEC is immature plantings of canopy species characteristic of this community. The removal of CRCIF within the study area is therefore unlikely to substantially and adversely modify the composition of CRCIF, such that its local occurrence is likely to be placed at risk of extinction. The local occurrence beyond the study area will not be affected by the proposed works, and is likely to already be substantially modified as it occurs within the confines of a golf course.

- c) in relation to the habitat of a threatened species or ecological community**

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

ii. whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and

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

Approximately 0.15ha of poor condition CRCIF will be removed as part of the proposed works (1.44% of the local occurrence). The CRCIF within the study area occurs within the western extent of a much larger local occurrence mapped by DPE 2022. The removal of CRCIF will reduce the extent of the local occurrence but as it occurs on the periphery of a larger patch, will not result in fragmentation from other areas of CRCIF. It is not considered that the CRCIF within the study area is significant to the long-term survival of the TEC within the locality, considering it is highly degraded, consisting of native canopy trees with an exotic, mown ground layer.

d) whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly),

No declared areas of outstanding biodiversity occur within the study area or locality.

e) whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process.

The following key threatening processes are of relevance to this TEC:

- Clearing of native vegetation
- Removal of dead wood and trees.

Conclusion

Stage 1B is unlikely to significantly impact the local occurrence of CRCIF, as only a small amount of vegetation is proposed for removal on the edge of a larger patch that extends to the east into Bankstown Golf Club. Large areas of CRCIF directly to the east of the study area will be retained, allowing for the persistence of CRCIF within the locality.

River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions

River-flat Eucalypt Forest (RFEF) is listed as an endangered ecological community under the BC Act. As the name suggests, this EEC is found on the river flats of the coastal floodplains. It has a tall open tree layer of eucalypts, which may exceed 40m in height, but can be considerably shorter in regrowth stands or under conditions of lower site quality. While the composition of the tree stratum varies considerably, the most widespread and abundant dominant trees include *Eucalyptus tereticornis* (forest red gum), *E. amplifolia* (cabbage gum), *Angophora floribunda* (rough-barked apple) and *A. subvelutina* (broad-leaved apple). *Eucalyptus baueriana* (blue box), *E. botryoides* (bangalay) and *E. elata* (river peppermint) may be common south from Sydney, *E. ovata* (swamp gum) occurs on the far south coast, *E. saligna* (Sydney blue gum) and *E. grandis* (flooded gum) may occur north of Sydney, while *E. benthamii* is restricted to the Hawkesbury floodplain.

A layer of small trees may be present, including *Melaleuca decora*, *M. styphelioides* (prickly-leaved teatree), *Backhousia myrtifolia* (grey myrtle), *Melia azaderach* (white cedar), *Casuarina cunninghamiana* (river oak) and *C. glauca* (swamp oak). Scattered shrubs include *Bursaria spinosa*, *Solanum prinophyllum*, *Rubus parvifolius*, *Breynia oblongifolia*, *Ozothamnus diosmifolius*, *Hymenanthera dentata*, *Acacia floribunda* and *Phyllanthus gunnii*.

The groundcover is composed of abundant forbs, scramblers and grasses including *Microlaena stipoides*, *Dichondra repens*, *Glycine clandestina*, *Oplismenus aemulus*, *Desmodium gunnii*, *Pratia purpurascens*, *Entolasia marginata*, *Oxalis perennans* and *Veronica plebeia*. The composition and structure of the understorey is influenced by grazing and fire history, changes to hydrology and soil salinity and other disturbance, and may have a substantial component of exotic shrubs, grasses, vines and forbs.

Specific impacts:

- Approximately 2.17 ha of RFEF would be impacted by Stage 1B, including 0.73 ha of planted vegetation assigned to PCT 835.

a) in the case of a threatened species, whether the proposed development or activity 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

N/A

b) in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:

- 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,**

The local occurrence of RFEF includes all areas mapped as PCT 835 within the study area, plus extensive areas mapped as RFEF by DPE (2022) along the Georges River corridor (a total of 109.41 ha). The proposed works will impact on approximately 1.44 ha of degraded RFEF and 0.73 ha of planted vegetation assigned to PCT 835, equating to 1.98% of the local occurrence. This area forms a minor component to the extensive coverage of RFEF that forms part of the local occurrence. The removal of 2.17 ha of RFEF from the study area is unlikely to place the local occurrence at risk of extinction, as only a small, degraded patch on the peripheries of a larger patch is proposed to be removed.

The TEC within the study area has already been largely modified to the extent it is highly weed infested and is predominately occurring as remnant native canopy trees. A native mid-storey is absent and the ground layer is mostly exotic. The removal of RFEF within the study area is unlikely to substantially and adversely modify the composition of RFEF, such that its local occurrence is likely to be placed at risk of extinction. The local occurrence beyond the study area will not be impacted by the proposed works and is likely to already be heavily modified due to its proximity to a developed urban area.

c) in relation to the habitat of a threatened species or ecological community

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

ii. whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and

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

The proposed works will impact on approximately 2.17 ha of moderate condition RFEF (1.98% of the local occurrence). The RFEF within the study area predominately occurs along the eastern extent of the local occurrence, which extends west to the Georges River and occurs north and south of the riparian corridor. The removal of RFEF will reduce the extent of the local occurrence but as it mostly occurs on the periphery of a larger patch, will not result in significant fragmentation from other areas of RFEF. The exception being within the northern extent of the study area, where RFEF occurs to the west and east of Henry Lawson Drive. The removal of RFEF within the subject land may increase the fragmentation by extending the road corridor width.

It is not considered that the RFEF within the study area is significant to the long-term survival of the TEC within the locality, considering the large extent of RFEF within the locality, and the degraded quality of RFEF within the study area, primarily consisting of native canopy trees with a predominately exotic ground layer.

d) whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly),

No declared areas of outstanding biodiversity occur within the study area or locality.

e) whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process.

The following key threatening processes are of relevance to this TEC:

- Clearing of native vegetation
- Removal of dead wood and trees.

Conclusion

Stage 1B is unlikely to significantly impact RFEF, as only a small amount of vegetation is proposed for removal, predominately on the peripheries of a larger patch. Large areas of RFEF to the west of the study area along the Georges River will be retained, allowing for the persistence of RFEF within the locality.

Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions

Swamp Oak Floodplain Forest (SOFF) is listed as an endangered ecological community under the BC Act. It is found on the coastal floodplains of NSW. It has a dense to sparse tree layer in which *Casuarina glauca* (swamp oak) is the dominant species northwards from Bermagui. Other trees including *Acmena smithii* (lilly pilly), *Glochidion* spp. (cheese trees) and *Melaleuca* spp. (paperbarks) may be present as subordinate species, and are found most frequently in stands of the community northwards from Gosford. Tree diversity decreases with latitude, and *Melaleuca ericifolia* is the only abundant tree in this community south of Bermagui.

The understorey is characterised by frequent occurrences of vines, *Parsonsia straminea*, *Geitonoplesium cymosum* and *Stephania japonica* var. *discolor*, a sparse cover of shrubs, and a continuous groundcover of forbs, sedges, grasses and leaf litter.

The composition of the ground stratum varies depending on levels of salinity in the groundwater. Under less saline conditions prominent ground layer plants include forbs such *Centella asiatica*, *Commelina cyanea*, *Persicaria decipiens* and *Viola banksii*; graminoids such as *Carex appressa*, *Gahnia clarkei*, *Lomandra longifolia*, *Oplismenus imbecillis*; and the fern *Hypolepis muelleri*.

On the fringes of coastal estuaries, where soils are more saline, the ground layer may include the threatened grass species, *Alexfloydia repens*, as well as *Baumea juncea*, *Juncus kraussii*, *Phragmites australis*, *Selliera radicans* and other saltmarsh species.

Specific impacts:

- Approximately 0.75 ha of SOFF would be impacted by Stage 1B.

a) in the case of a threatened species, whether the proposed development or activity 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

N/A

b) in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:

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,

The local occurrence of SOFF includes all areas mapped as PCT 1800 within the study area, plus extensive areas mapped as SOFF by DPE (2022) along the Georges River corridor and a small patch to the east of Henry Lawson Drive (a total of 58.19 ha). It was noted during the site assessment that some areas mapped by DPE (2022) as RFEF may actually conform to SOFF, and as such, the local occurrence may be greater than that mapped by DPE (2022).

The proposed works will impact on approximately 0.75 ha of degraded SOFF, equating to 1.25% of the local occurrence. The area of SOFF within the subject land comprised a native canopy dominated by *Casuarina glauca*, and a predominately exotic midstorey and groundlayer. These areas form a minor component to the extensive coverage of SOFF that forms part of the local occurrence. The removal of 0.75 ha of SOFF from the study area is unlikely to place the local occurrence at risk of extinction, as only a small, degraded patch that forms part of a larger patch is proposed to be removed.

The TEC within the study area has already been largely modified to the extent it is highly weed infested and is predominately occurring as remnant native canopy trees. A native mid-storey is absent and the groundlayer is mostly exotic. The removal of SOFF within the study area is therefore unlikely to substantially and adversely modify the composition of SOFF, such that its local occurrence is likely to be placed at risk of extinction. The local occurrence beyond the study area will not be impacted by the proposed works and is likely to already be heavily modified due to its positioning within an urban area and along degraded watercourses.

c) *in relation to the habitat of a threatened species or ecological community*

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

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

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

The proposed works will impact on approximately 0.75 ha of poor condition SOFF, equating to 1.25% of the local occurrence. The SOFF within the study area predominately occurs along the western extent of the local occurrence patch, which is predominately situated along the Georges River corridor. The removal of SOFF will therefore reduce the extent of the local occurrence but as it mostly occurs on the peripheries of a larger patch, will not result in significant fragmentation from other areas of SOFF. The exception being within the northern extent of the study area, where SOFF occurs to the west and east of Henry Lawson Drive. The removal of SOFF within the study area may increase the fragmentation by extending the road corridor width.

It is not considered that the RFEF within the study area is significant to the long-term survival of the TEC within the locality, considering the large extent of SOFF within the locality, and the degraded quality of SOFF within the study area, primarily consisting of native canopy trees with a predominately exotic groundlayer.

d) *whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly),*

No declared areas of outstanding biodiversity occur within the study area or locality.

e) whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process.

The following key threatening processes are of relevance to this TEC:

- Clearing of native vegetation
- Removal of dead wood and trees.

Conclusion

Stage 1B is unlikely to significantly impact SOFF, as only a small amount of vegetation is proposed for removal, predominately on the peripheries of a larger patch. Large areas of SOFF to the west of the study area along the Georges River will be retained, allowing for the persistence of SOFF within the locality.

Appendix B Updated significant impact criteria assessments for matters of national significance (MNES) listed under the Commonwealth Environment Protection and Biodiversity Conservation Act (EPBC Act)

Hirundapus caudacutus (White-throated Needletail)

White-throated Needletail is listed as vulnerable and migratory under the EPBC Act. Approximately 3.15 ha of potential habitat for this species occurs within the study area.

An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:

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

Stage 1B is unlikely to lead to a long-term decrease in the size of an important population of this species, as the study area does not contain breeding habitat and this species would only intermittently forage aerially within the study area. The study area is predominately degraded and fragmented, although areas of habitat connectivity exist within the northern and southern portions. Given large areas of more suitable habitat exist to the south-west of the study area (e.g. within Deepwater Park, Voyager Point), and the high mobility of this species, it is unlikely the removal of vegetation within the study area would have a long-term impact on a population.

- ***reduce the area of occupancy of an important population***

Stage 1B is unlikely to reduce the area of occupancy of White-throated Needletail, particularly as very few records of this species exist within the locality, and this species is highly mobile, being a migratory species. The study area may be used intermittently for aerial foraging by this species, but as similar or greater quality habitat exists elsewhere within the locality, the removal of such habitat is not anticipated to significantly impact on this species.

- ***fragment an existing important population into two or more populations***

Considering the high mobility of this species, the removal of vegetation within the study area is unlikely to fragment an existing important population into two or more populations. Extensive areas of habitat will persist along the Georges River corridor and southwest of the study area, particularly within Deepwater Park and Voyager Point.

- ***adversely affect habitat critical to the survival of a species***

The habitat within the site does not provide breeding resources for this species and represents only very small portion of potential foraging habitat for this species. Therefore, Stage 1B would not adversely affect habitat critical to the survival of this species.

- ***disrupt the breeding cycle of an important population***

This species does not breed in Australia and therefore the removal of vegetation within the study area will not impact on the breeding cycle of this species.

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

Approximately 3.15 ha of potential habitat for this species occurs within the study area, which this species may utilise intermittently for aerial foraging. Given this species is migratory, highly mobile and forages widely, as well as extensive areas of potential foraging habitat elsewhere within the locality, it is unlikely that Stage 1B would decrease habitat to the extent that the species is likely to decline.

- ***result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat***

Stage 1B will not result in invasive species become established in areas of habitat for this species. Such issues would already be apparent in retained areas within the locality, as the locality is situated within a mostly urban environment. This species would also predominately aerially forage within the study area and therefore would be less likely to be impacted by invasive species.

- ***introduce disease that may cause the species to decline, or***

It is unlikely that Stage 1B would introduce disease that may cause this species to decline

- ***interfere substantially with the recovery of the species.***

Stage 1B is not likely to interfere substantially with the recovery of this species as only a small area of suboptimal foraging habitat will be removed.

Conclusion

Although potential foraging habitat exists for White-throated Needletail within the study area, this habitat is thought to be marginal, potentially used intermittently for aerial foraging. Larger and more suitable areas of habitat exist within the locality, particularly in the vegetation directly southwest of the study area. As such, it is not thought that the removal of vegetation within the study area is likely to result in a significant impact on this species.

Pteropus poliocephalus (Grey-headed Flying-fox)

Grey-headed Flying Fox is listed as vulnerable under the EPBC Act. Approximately 5.77 ha of potential habitat for this species occurs within the study area.

An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:

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

An 'important population' is defined by DotE (2013) as a population that is necessary for a species' long-term survival and recovery.

This may include populations identified as such in recovery plans, and/or that are:

- key source populations either for breeding or dispersal
- populations that are necessary for maintaining genetic diversity, and/or
- populations that are near the limit of the species range.

The Grey-headed Flying-fox is considered to be a single, mobile population with individuals distributed across Queensland, New South Wales, Victoria, South Australia, Tasmania and the ACT (DAWE 2021). As such, any individual of this species is considered to be part of an important population.

Stage 1B is unlikely to lead to a long-term decrease in the size of an important population of this species, as the study area does not contain breeding habitat and this species would only intermittently forage within the study area. The study area is predominately degraded and fragmented, although areas of habitat connectivity exist within the northern and southern portions. Given large areas of more suitable habitat exist to the south-west of the study area (e.g. within Deepwater Park, Voyager Point), and the high mobility of this species, it is unlikely the removal of vegetation within the study area would have a long-term impact on a population.

- ***reduce the area of occupancy of an important population***

Stage 1B is unlikely to reduce the area of occupancy of Grey-headed Flying-fox, particularly given this species is highly mobile. Stage 1B is situated within an urban area, with most impacts to occur within roadside vegetation that is highly degraded and fragmented. The study area may be used intermittently for aerial foraging by this species, but as similar or greater quality habitat exists elsewhere within the locality, the removal of such habitat is not anticipated to significantly impact on this species.

- ***fragment an existing important population into two or more populations***

Considering the high mobility of this species, the removal of vegetation within the study area is unlikely to fragment an existing important population into two or more populations. Extensive areas of habitat will persist along the Georges River corridor and southwest of the study area, particularly within Deepwater Park and Voyager Point.

- ***adversely affect habitat critical to the survival of a species***

The recovery plan for Grey-headed Flying-fox (DAWE 2021) states that habitat critical to the survival of the Grey-headed Flying-fox includes winter and spring vegetation communities that contain *Eucalyptus tereticornis*, *E. albens*, *E. crebra*, *E. fibrosa*, *E. melliodora*, *E. paniculata*, *E. pilularis*, *E. robusta*, *E. seeana*, *E. sideroxylon*, *E. siderophloia*, *Banksia integrifolia*, *Castanospermum australe*, *Corymbia citriodora*, *C. eximia*, *C. maculata*, *Grevillea robusta*, *Melaleuca quinquenervia* or *Syncarpia glomulifera*. These species can provide food resources during in winter and spring, during critical periods in the reproductive cycle of the Grey-headed Flying-fox (DAWE 2021).

Habitat critical to the survival of the Grey-headed Flying-fox may also be vegetation communities not containing the above tree species but which:

- contain native species that are known to be productive as foraging habitat during the final weeks of gestation, and during the weeks of birth, lactation and conception (August to May);
- contain native species used for foraging and occur within 20 km of a nationally important camp as identified on the Department's interactive flying-fox web viewer, or
- contain native and or exotic species used for roosting at the site of a nationally important Grey-Headed Flying-Fox camp, as identified on the Department's interactive flying-fox web viewer.

The subject land contains some important winter flowering resources for Grey-headed Flying-fox, including *Eucalyptus tereticornis*, *E. crebra*, *E. fibrosa* and *Corymbia maculata*. The study area occurs within 4.5km of the Cabramatta breeding camp, so foraging habitat within the study is likely to be regularly used during flowering.

However, the habitat within the site does not provide breeding resources for this species and represents a very small portion of potential foraging habitat for this species within the locality. Therefore, the proposal is unlikely to adversely affect habitat critical to the survival of this species.

- ***disrupt the breeding cycle of an important population***

This closest known camp to the study area is situated along Cabramatta Creek in Warwick Farm, approximately 4.5km north-west of the study area. As such, it is not anticipated that the removal of vegetation within the study area will not impact on the breeding cycle of this species.

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

Approximately 5.77 ha of potential habitat for this species occurs within the study area, which this species may utilise intermittently for foraging. Given this species is highly mobile and forages widely, as well as extensive areas of potential foraging habitat elsewhere within the locality, it is unlikely that Stage 1B would decrease habitat to the extent that the species is likely to decline.

- ***result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat***

Stage 1B will not result in invasive species become established in areas of habitat for this species. Such issues would already be apparent in retained areas within the locality, as the locality is situated within a mostly urban environment.

- ***introduce disease that may cause the species to decline, or***

Australian flying-foxes, including the Grey-headed Flying-fox, are natural reservoirs for at least three zoonotic diseases, meaning that they carry a disease agent that can affect humans. These include Australian Bat Lyssavirus, a rabies-like disease, and two paramyxoviruses – Hendra virus and Menangle virus (DAWE 2021). The proposed activity will not introduce such diseases to the study area. It is unlikely that Stage 1B would introduce disease that may cause this species to decline.

- ***interfere substantially with the recovery of the species.***

Stage 1B is not likely to interfere substantially with the recovery of this species as only a small area of foraging habitat will be removed.

Conclusion

Although foraging potential habitat exists for the Grey-headed Flying-fox within the study area, this habitat is thought to be marginal, potentially used intermittently for foraging. Larger and more suitable areas of habitat exist within the locality, particularly in the vegetation directly southwest of the study area. As such, it is not thought that the removal of vegetation within the study area is likely to result in a significant impact on this species.

Appendix C Updated BAM-C credit report



BAM Credit Summary Report

Vegetation zone name	Habitat condition (Vegetation Integrity)	Change in habitat condition	Area (ha)/Count (no. individuals)	Sensitivity to loss (Justification)	Sensitivity to gain (Justification)	BC Act Listing status	EPBC Act listing status	Potential SAI	Species credits
<i>Meridolum corneovirens / Cumberland Plain Land Snail (Fauna)</i>									
835_Moderate	34.8	34.8	1	Biodiversity Conservation Act listing status	Effectiveness of management in controlling threats	Endangered	Not Listed	False	18
								Subtotal	18
<i>Myotis macropus / Southern Myotis (Fauna)</i>									
835_Moderate	34.8	34.8	1.4	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Vulnerable	Not Listed	False	24
1800_Moderate	15.3	15.3	0.75	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Vulnerable	Not Listed	False	6
781_Good	63.6	63.6	0.08	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Vulnerable	Not Listed	False	3
725_Low	12.7	12.7	0.02	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Vulnerable	Not Listed	False	1
								Subtotal	34

Assessment Id

00036824/BAAS18141/22/00036825

Proposal Name

Henry Lawson Drive Upgrade Stage 1B

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