

## **REVIEW OF ENVIRONMENTAL FACTORS (REF) ILLAROO RD PAVEMENT RESTORATION (CH 3.5km – 8.3km)**

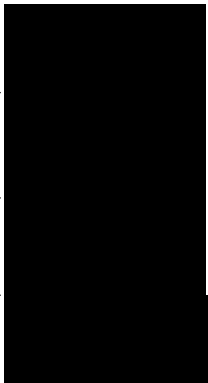
## Contents

1. PROPOSAL AND LOCATION .....	4
1.1 Overview.....	4
1.2 Location .....	5
1.3 Background and justification of proposal.....	8
2. EXISTING ENVIRONMENT.....	9
2.1 Subject site – general description .....	9
2.2 Topography, geology and soils .....	16
2.3 Terrestrial habitat and vegetation assessment.....	19
2.4 Threatened species habitat and targeted surveys .....	23
3. ASSESSMENT OF LIKELY IMPACTS ON THE ENVIRONMENT.....	26
3.1 Impacts associated with the proposal.....	26
3.2 Threatened species impact assessment (NSW).....	32
3.2.1 Part 7A Fisheries Management Act 1994 .....	32
3.2.2 Part 7 Biodiversity Conservation Act 2016.....	32
3.3 Threatened species impact assessment (Commonwealth EPBC Act 1999) .....	43
3.4 Indigenous heritage.....	47
3.5 Non-indigenous heritage.....	49
3.6 Acid Sulfate Soils.....	50
3.7 Riparian corridors, Water Quality & Key Fish Habitat.....	50
3.8 Flood liable land .....	52
3.9 Other.....	53
3.10 EP&A Regulation – Section 171 matters of consideration .....	53
4. PERMISSIBILITY.....	58
4.1 Environmental Planning & Assessment Act 1979.....	58
4.2 Other.....	59
5. CONSULTATION WITH GOVERNMENT AGENCIES.....	62
5.1 Transport & Infrastructure SEPP .....	62
6. COMMUNITY ENGAGEMENT .....	64
7. ENVIRONMENTAL SAFEGUARDS AND MEASURES TO MINIMISE IMPACTS.....	65
8. SIGNIFICANCE EVALUATION & DECISION STATEMENT.....	69
9. REFERENCES .....	70
APPENDIX A – Design plans.....	73
APPENDIX B – Threatened Species Likelihood of Occurrence .....	74

## Document control

Item	Details
Project	Review of Environmental Factors – Illaroo Rd Pavement Restoration (CH 3.5km - 8.3km)
Client	City Services, Shoalhaven City Council
Prepared By	City Services, Shoalhaven City Council

## Document status

Version	Author / Reviewer*	Name	Signed	Date
V1.0	Author	Jeff Bryant		01/07/2024
	Reviewer	Geoff Young		1/07/2024
	Minor revision	Jeff Bryant		05/08/2024
	Minor revision	Jeff Bryant		09/09/2024

\*Review and endorsement statement:

"I certify that I have reviewed and endorsed the contents of this REF document and, to the best of my knowledge, it is in accordance with the EP&A Act, the EP&A Regulation and the Guidelines approved under clause 170 of the EP&A Regulation, and the information it contains is neither false nor misleading".

## Assessment and approvals overview

Item	Details
Assessment type	Division 5.1 (EP&A Act) - Review of Environmental Factors (REF)
Proponent	Shoalhaven City Council
Determining authority / authorities	Shoalhaven City Council
Required approvals (consents, licences and permits)	Nil
Required publication	Yes: this REF must be published on the determining authority's (Council's) website or the NSW planning portal, in accordance with clause 171(4) EP&A Regulation 2021 (as a matter of "public interest").

## 1. PROPOSAL AND LOCATION

### 1.1 Overview

This Review of Environmental Factors (REF) addresses the potential environmental impacts of – and provides mitigation measures for – a proposal for pavement restoration of Illaroo Rd from chainage (CH) 3.5 km to CH 8.3 km, North Nowra / Tapitallee.

The proposal includes:

- Pavement restoration of Illaroo Rd from CH 3.5 km to CH 8.3 km involving:
  - 200 mm cement stabilisation to the existing pavement with a 150 mm gravel overlay and bitumen seal (raising pavement height by 150 mm).
  - Deeper pavement may be applied to low-stability locations identified by geotechnical investigation.
  - Deep lift asphalt to intersections:
    - Karana Dr
    - Moondara Dr
    - Hockeys Lane
    - Gypsy Point Rd
    - Bingarra Lane
    - Koloona Dr
    - Tapitallee Rd
    - Browns Mountain Rd
  - Relocation / construction of table drains where required to ensure acceptable shoulder width and batter gradient.
  - Modifications to driveways where required to ensure smooth transitions, acceptable gradients and effective drainage (e.g. dish drains or pipe culverts) along road (expected to occur within existing driveway footprints).
  - Earthworks including cut and fill to design surface and construction of shoulders, batters and table drains.
  - Installation of line-marking and signage.
- Replacement of culverts and pits where existing are undersized:

Approx. Chainage (m)	Existing culvert	Proposed culvert	Other
3710	375 mm dia.	1500 x 750 mm RCBC	Replace existing pit with 2100 x 900 mm letterbox pit. Extend lower headwall.
3870		900 x 300 mm RCBC	Provide new 900 x 900 mm letterbox pit.
4770	450 mm dia.	900 x 300 mm RCBC	New precast headwalls. Extend pipe through gravel footpath.
5260	2 x 450 mm dia.	1200 x 450 mm RCBC	New pre-cast headwalls
5780	2 x 600 mm dia.	1200 x 600 mm RCBC	New pre-cast headwalls
6140	2 x 450 mm dia.	2 x 450 mm dia. RCP	Like-for-like replacement

6440	2 x 525 mm dia.	1500 x 750 mm RCBC	Extend lower headwall. Remove upper headwall. New 1500 x 2000 mm pit with double 1500 x 1500 mm grates.
7110		N/A	New 1500 x 2000 pit with dual 1500 x 1500 letterbox grate with connected new 900 x 900 junction pit.
7460		N/A	New 3000 x 2000 mm pit with dual 900 x 900 grates.

- Provision of concrete lined table drain on both sides of the road from CH7530 to CH7840.
- The proposal requires the clearing of 10,310 m<sup>2</sup> (canopy cover) native vegetation including the removal of approximately 241 trees, along a 4.8 km linear road-edge site.
- Establishment of a temporary construction compound.
- The proposal would also involve the implementation of safeguards and mitigation measures (Section 7) to minimise direct and indirect impacts on the environment.
- Works may be staged or reduced in linear scope at the western end. This would not affect the outcome of this assessment, nor prescribed safeguards.

Refer to Figures 1 and 2 and design drawings in Appendix 1.

Shoalhaven City Council (SCC) is the proponent and the determining authority under Part 5 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). This Review of Environmental Factors (REF) provides an assessment of the proposed activity and associated impacts on the environment, in the context of Division 5.1 of the Act and section 171 of the *Environmental Planning and Assessment Regulation 2021*, and in doing so, satisfies the requirement of section 5.5 of the Act, that SCC examines and takes into account to the fullest extent possible, all matters affecting or likely to affect the environment by reason of the activity.

### 1.2 Location

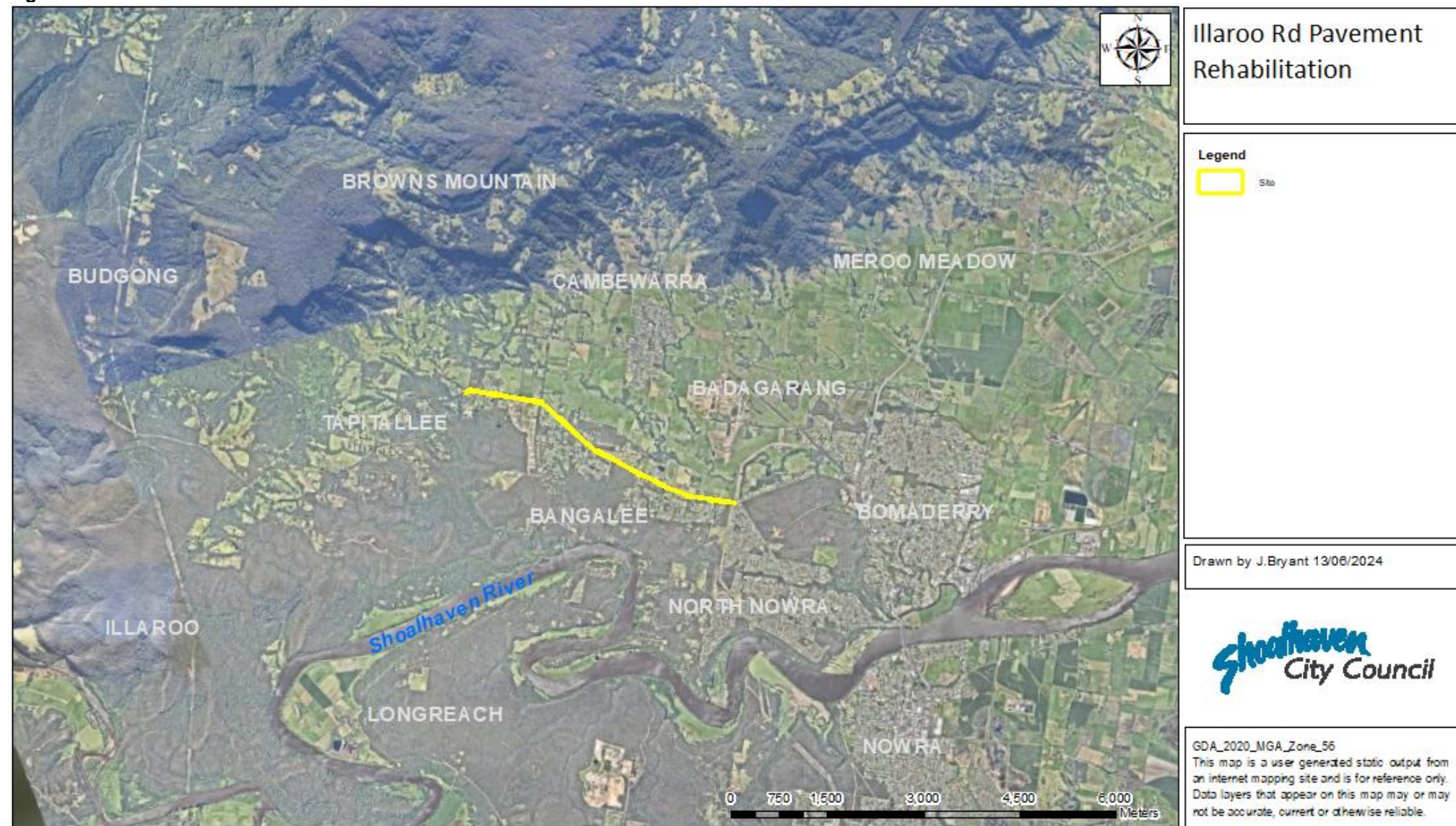
The proposed works would occur entirely within the road reserves of Illaroo Rd and intersecting roads.

Details of affected land are provided in Table 1.

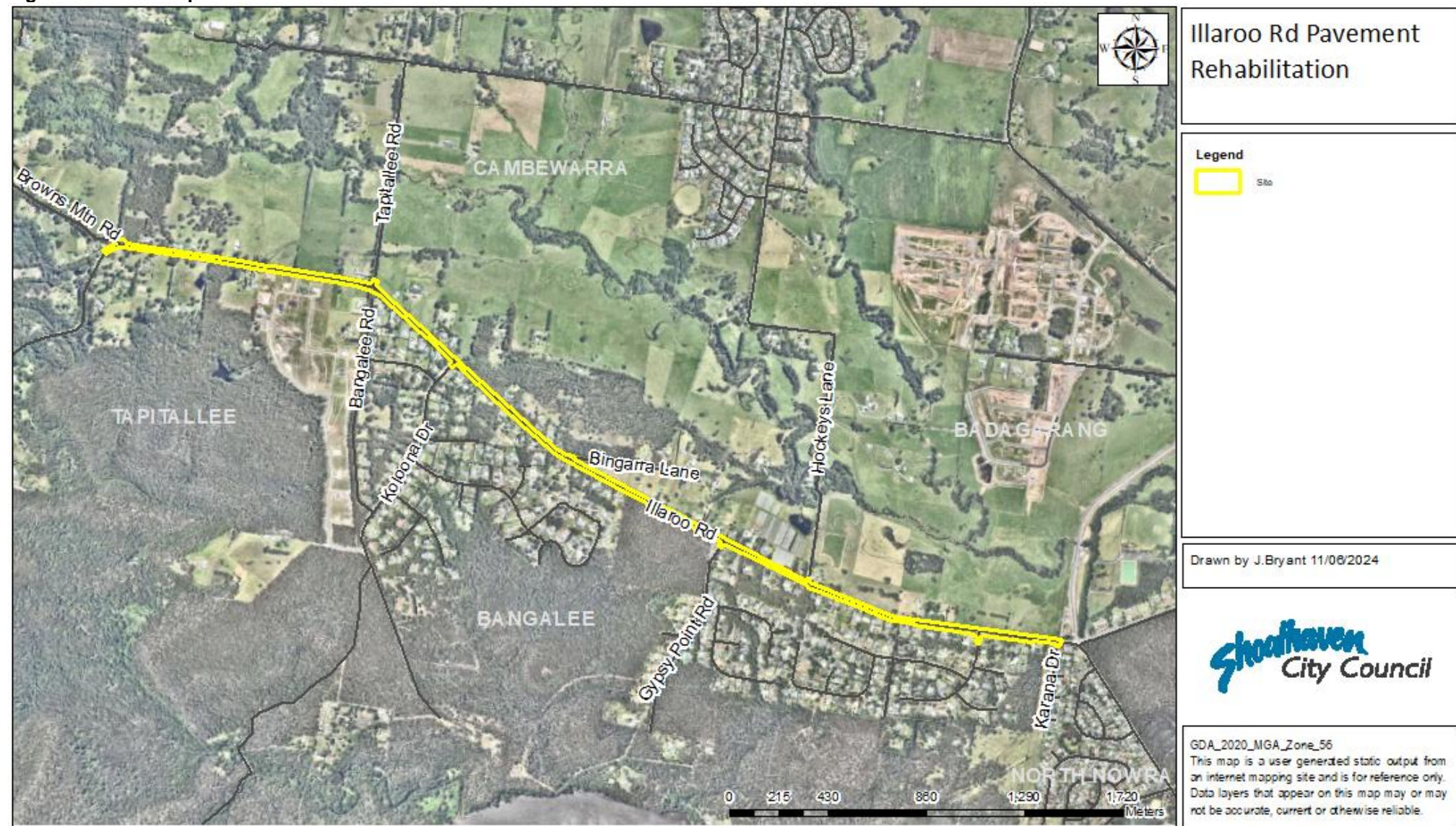
**Table 1. Property affected by the proposal**

Lot / DP	Description	Land owner / manager	Other pertinent information
-	Illaroo Rd	Shoalhaven City Council	
-	Karana Dr	Shoalhaven City Council	
-	Moondara Dr	Shoalhaven City Council	
-	Hockeys Lane	Shoalhaven City Council	
-	Gypsy Point Rd	Shoalhaven City Council	
-	Bingarra Lane	Shoalhaven City Council	
-	Koloona Dr	Shoalhaven City Council	
-	Tapitallee Rd	Shoalhaven City Council	
-	Browns Mountain Rd	Shoalhaven City Council	

**Figure 1. Site location**



**Figure 2. Illaroo Rd pavement restoration - site**



### 1.3 Background and justification of proposal

The proposal would rehabilitate the pavement over a degraded section of Illaroo Rd.

The existing pavement is in an advanced state of disrepair, with the compromised pavement prone to rapid deterioration in increasingly frequent extreme rain events, requiring continual maintenance of pothole filling and patching.

The vehicle speed limit has been reduced and signage installed on an ongoing temporary basis advising of hazardous road conditions.

Under-performing stormwater infrastructure has been identified as inhibiting timely discharge of stormwater which exacerbates ongoing degradation of the road.

Replacement of undersized culverts and reconstruction of table drains is proposed to improve stormwater discharge and minimise occurrences of water sheeting or pooling on the pavement.

Increasing the pavement height would further minimise stormwater inundation of the pavement and would generally increase the resilience and asset life of the road. Deeper pavement would be applied to low-stability locations identified by geotechnical investigation.

Raising of the pavement would necessitate relocation of table drains in some instances to ensure acceptable shoulder width and batter gradient.

## 2. EXISTING ENVIRONMENT

### 2.1 Subject site – general description

The site was assessed by a Council Environmental Officer on 23<sup>rd</sup>, 27<sup>th</sup>, 28<sup>th</sup> May and 10<sup>th</sup> July 2024.

Site investigations involved vegetation and habitat assessment, recording all flora species within and immediately adjacent to the subject site, determination of vegetation communities, targeted survey for potentially occurring threatened flora species and investigation of habitat availability on site, including for potentially occurring cryptic flora species.

The site comprises the formed road reserve of Illaroo Rd from CH 3.5 km to CH 8.3 km, roughly from Karana Cl to Browns Mountain Rd, and extending into the junctions of Karana Dr, Moondara Dr, Hockeys Lane, Gypsy Point Rd, Bingarra Lane, Koloona Dr, Tapitallee Rd and Browns Mountain Rd.

Predominantly developed R5 Large-Lot Residential zoned land occurs along the south side of Illaroo Rd from approximately 100m west of Karana Dr, to beyond Ringtail Loop towards the western end of the site. Land to the south of Illaroo Rd at the western end of the site is zoned RU2 Rural Landscape. RU1 Primary Production zoned land occurs along the north side of Illaroo Rd from Karana Dr through to Browns Mountain Rd, in addition to a 100m band adjacent to the west side of Karana Dr. Land to the north of Illaroo Rd, immediately west of Browns Mountain Rd, is zoned RU4 Primary Production Small Lots.

A gravel shared-user path (SUP) occurs on the northern side of Illaroo Rd from Karana Cr through to Tapitallee Rd.

Land to the north of the SUP is predominantly cleared pasture or agricultural land, with occasional rural residential properties, scattered roadside trees and rare patches of native vegetation.

Bands of trees or scattered trees of varying species and age class occur along the southern road verge for much of the site. The understorey along the verge is generally disturbed and is often turfed or containing exotic invasive shrubs.

Relatively intact native vegetation extends south from the road verge at one location near the middle of the site (shown in Photo 6), extending south over a parcel of Nowra Local Aboriginal Land Council land.

Two unnamed, first order (Strahler) watercourses intersect the site between Karana Dr and Moondara Dr at approx. CH 3710 m, and between Tapitallee Rd and Browns Mountain Rd at approx. CH 7470 m.

Photos 1 through 12 show the site, available habitat and relevant features.

**Photo 1. Illaroo Rd facing west (approx.) from eastern end of site (CH3620).**



**Photo 2. Table drain relocation and tree removal required (CH3800).**



**Photo 3. West of Moondara Dr – tree removal required (CH3980)**



**Photo 4. Some tree removal required (CH4120)**



**Photo 5. Likely tree removal required and extension of drain beneath path (CH4720)**



**Photo 6. Tree and groundcover vegetation removal required (CH5320)**



**Photo 7. Footbridge east of Bingarra Lane – asbestos cement pipe to be removed or made safe prior to works (CH5780)**



**Photo 8. Some tree removal required (CH5900)**



**Photo 9. Footbridge and culvert east of Koloona Dr (CH6440)**



**Photo 10. Tree removal required opposite Tapitallee Rd (CH6920)**



**Photo 11. Concrete lined drain proposed (CH7500)**



**Photo 12. Western end of site facing Browns Mountain Rd (CH8040)**



## 2.2 Topography, geology and soils

Through much of the subject site, Illaroo Rd is relatively flat at around 60 m above-sea-level (ASL), with gently undulating sections. The lowest point of the site is 42 m ASL associated with a watercourse between Karana Dr and Moondara Dr. A rise occurs at the western end of the site from a drainage line at 66 m ASL up to the highest point of the site at 86 m ASL near Browns Mountain Rd. Refer to Figure 4 below.

The underlying geology is mapped as Berry Siltstone throughout most of the site, with a small area of alluvial floodplain deposits associated with the watercourse between Karana Dr and Moondara Dr, and a small area of alluvial terrace deposits associated with a low-lying depression in proximity to Koloona Drive. Nowra Sandstone occurs to the south of the site and may influence soils and vegetation in proximity to the site. Refer to Figure 5 below.

The subject site is mapped as Class 5 Acid sulfate soils (A.S.S) through the entirety of the site, with no other classes mapped in proximity (refer to Figure 3).

**Figure 3. Acid Sulfate Soils mapped in proximity to the site**

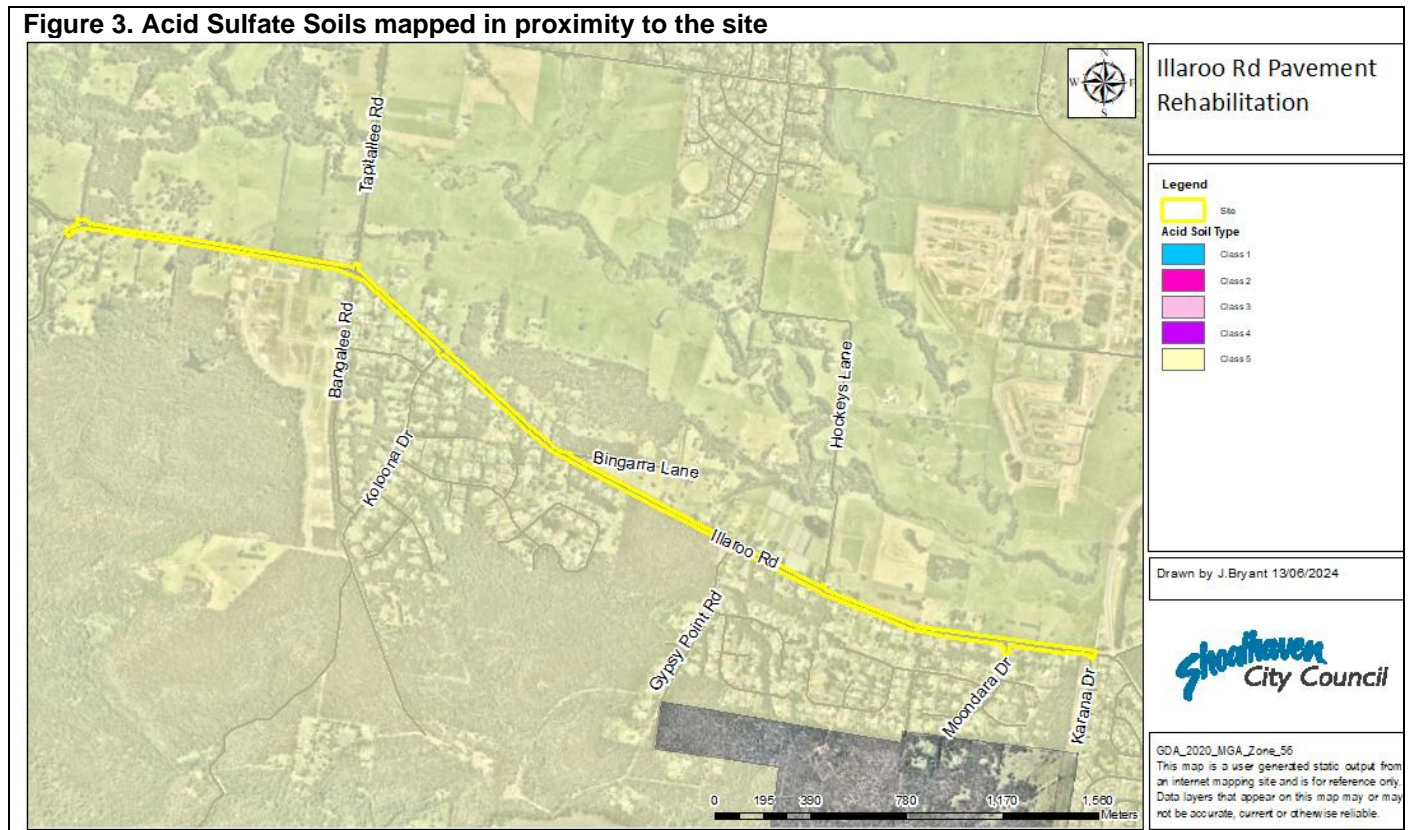


Figure 4. Topography over and in proximity to the site

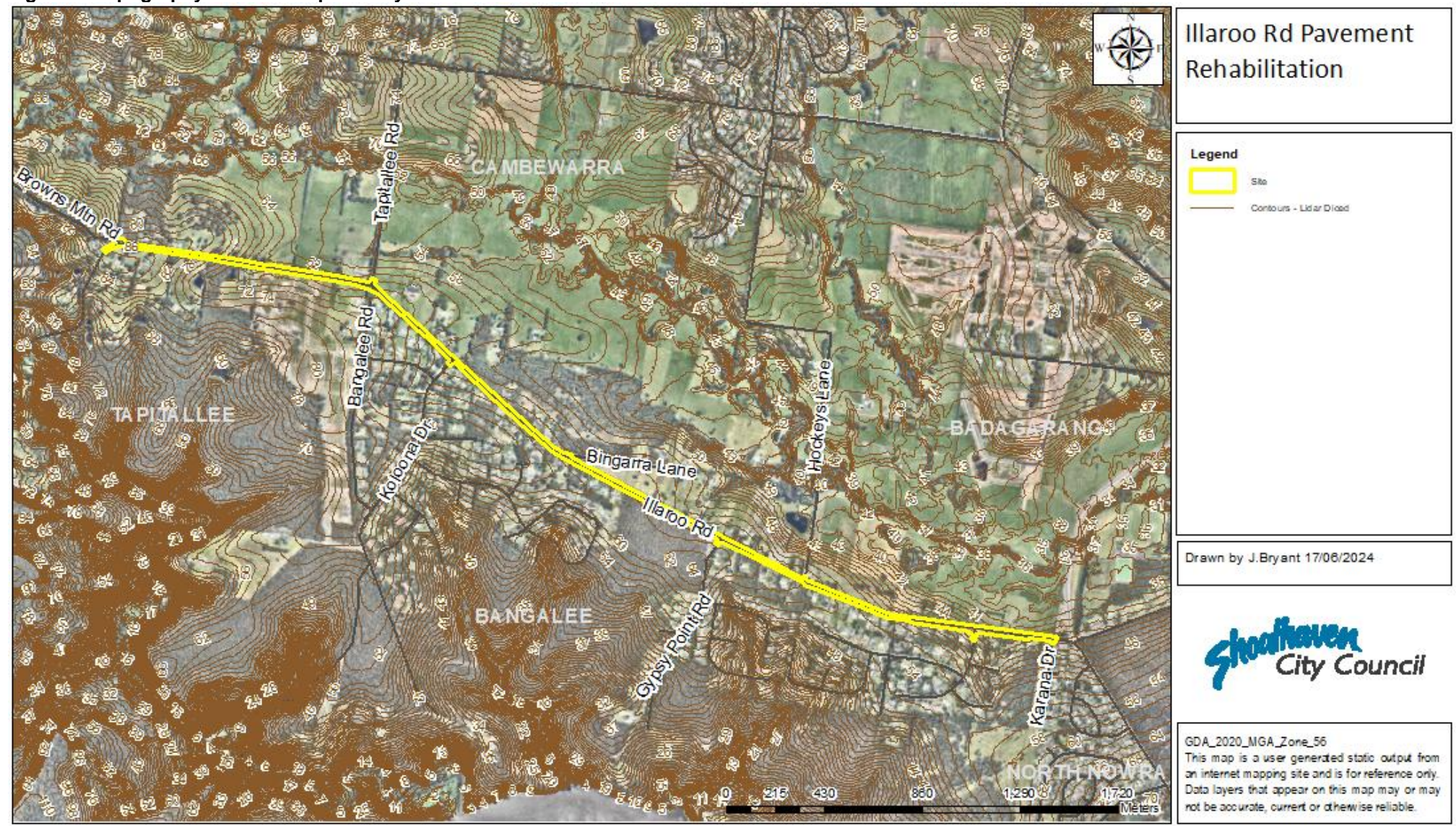
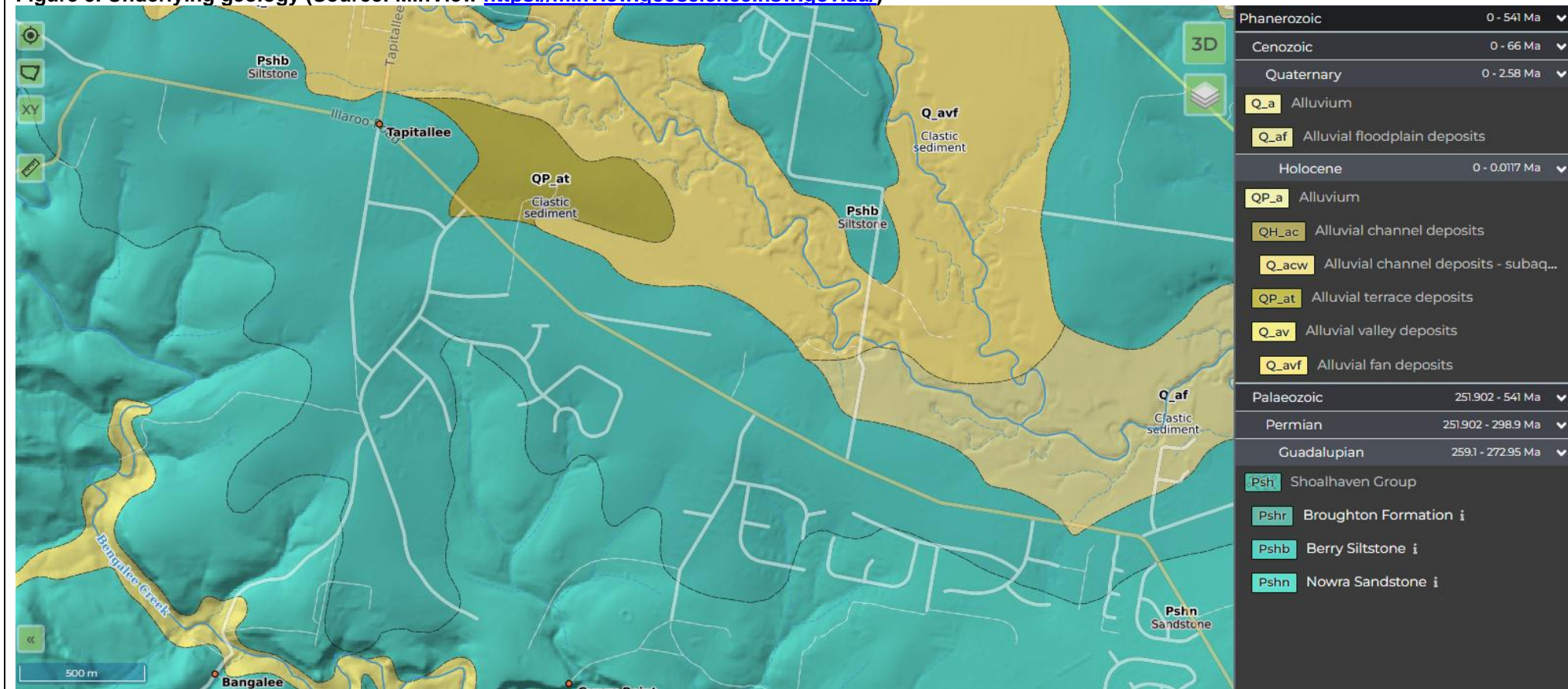


Figure 5. Underlying geology (Source: MinView <https://minview.geoscience.nsw.gov.au/>)



### 2.3 Terrestrial habitat and vegetation assessment

NSW Plant Community Type (PCT) (2020) vegetation mapped as occurring in proximity to the site includes (refer to Figure 6 and Figure 7):

- PCT3267 Shoalhaven Foothills Turpentine Forest
- PCT3268 Shoalhaven Foothills Turpentine-Ironbark Moist Forest
- PCT3270 Shoalhaven Lowland Wet Gully Forest
- PCT3273 South Coast Lowland Shrub-Grass Forest
- PCT3327 Illawarra Lowland Red Gum Grassy Forest
- PCT3588 Shoalhaven Foothills Bloodwood Heathy Forest
- PCT3654 Shoalhaven Lowland Bloodwood Shrub Forest

PCT3327 Illawarra Lowland Red Gum Grassy Forest is associated with NSW Illawarra Lowlands Grassy Woodland TEC and Commonwealth Illawarra and South Coast Lowland Forest and Woodland TEC. No other PCTs listed above are associated with any endangered ecological communities (EECs).

PCT mapping for the site and surrounds is little more than indicative, with the mapped vegetation communities typically occurring in the locality, but locations are often incorrectly mapped. Several of the locally occurring PCTs are very similar floristically, making confident identification challenging, particularly where vegetation is disturbed, modified and often limited to narrow bands or non-contiguous occurrences of trees with absent understorey.

Vegetation at the eastern end of the site is mapped as – and was observed to be consistent with – PCT3273 South Coast Lowland Shrub-Grass Forest. Within the site, this vegetation featured *Corymbia gummifera* with several other Eucalypt species including *Eucalyptus eugenioides* and *Angophora floribunda*. Understorey trees such as *Allocasuarina littoralis* and *Acacia filicifolia* were frequently present. The ground stratum was typically disturbed and modified, and often grassed with exotic turf species such as Buffalo Grass (*Stenotaphrum secundatum*), but where disturbance and modification was minimal, native grasses including *Entolasia marginata* and *Microlaena stipoides* were present.

A low-lying area from approx. CH 3660 m to 3810 m between Karana Dr and Moondara Dr, was dominated by *Eucalyptus amplifolia* and *Angophora floribunda* with *Melaleuca linariifolia*, *Glochidion ferdinandi* and *Parsonsia straminea*. This vegetation aligns with PCT3327 Illawarra Lowland Red Gum Grassy Forest. Available PCT mapping indicates that PCT3327 occurs in the locality, but seems to under-represent the community's extent, suggesting that it is limited to one or two very small patches adjacent to Bomaderry Creek, when in fact, remnants of this vegetation type occur along the Tapitallee Creek – Bomaderry Creek floodplain to the north of Illaroo Rd, from Moss Vale Rd to west of Tapitallee Rd, including large patches in Bernie Regan Sporting Complex.

Vegetation to the west of Moondara Dr appeared most closely aligned with PCT3654 Shoalhaven Lowland Bloodwood Shrub Forest. Canopy trees featured *Corymbia gummifera*, *Syncarpia glomulifera*, *Eucalyptus eugenioides*, with *Allocasuarina littoralis* often present as an understorey tree. Grasses including *Entolasia spp.*, *Imperata cylindrica* and *Oplismenus spp.* This vegetation continued through to Gypsy Point Rd, with occasional patches of (or influence from) other PCTs including PCT3268 (characterised by *Syncarpia glomulifera* with *Eucalyptus paniculata*, *Angophora floribunda* and *Eucalyptus scias*).

**Figure 6. Mapped vegetation communities, threatened species and habitat features in proximity to the proposal (Karana Dr to Bingarra Lane)**

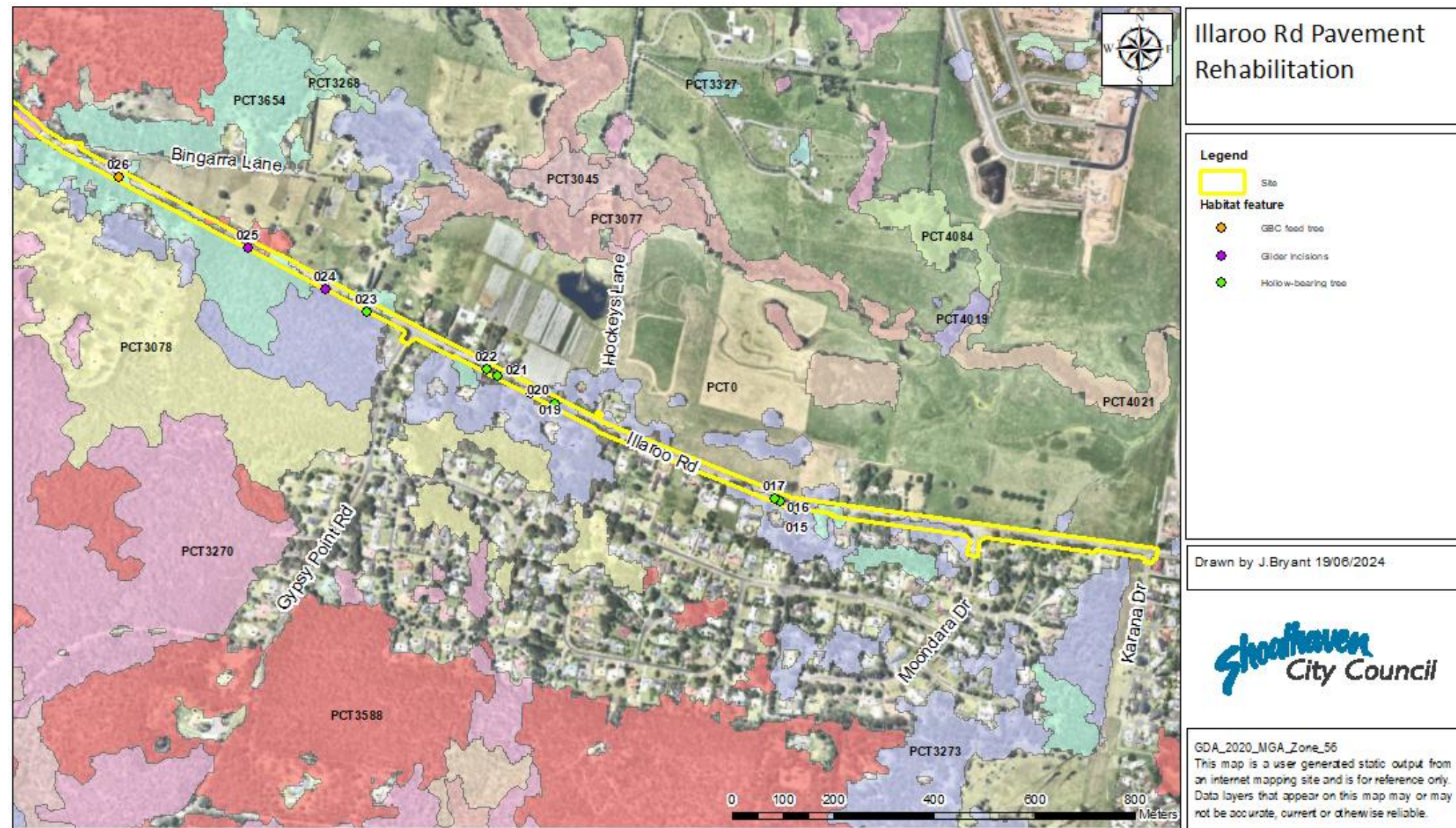
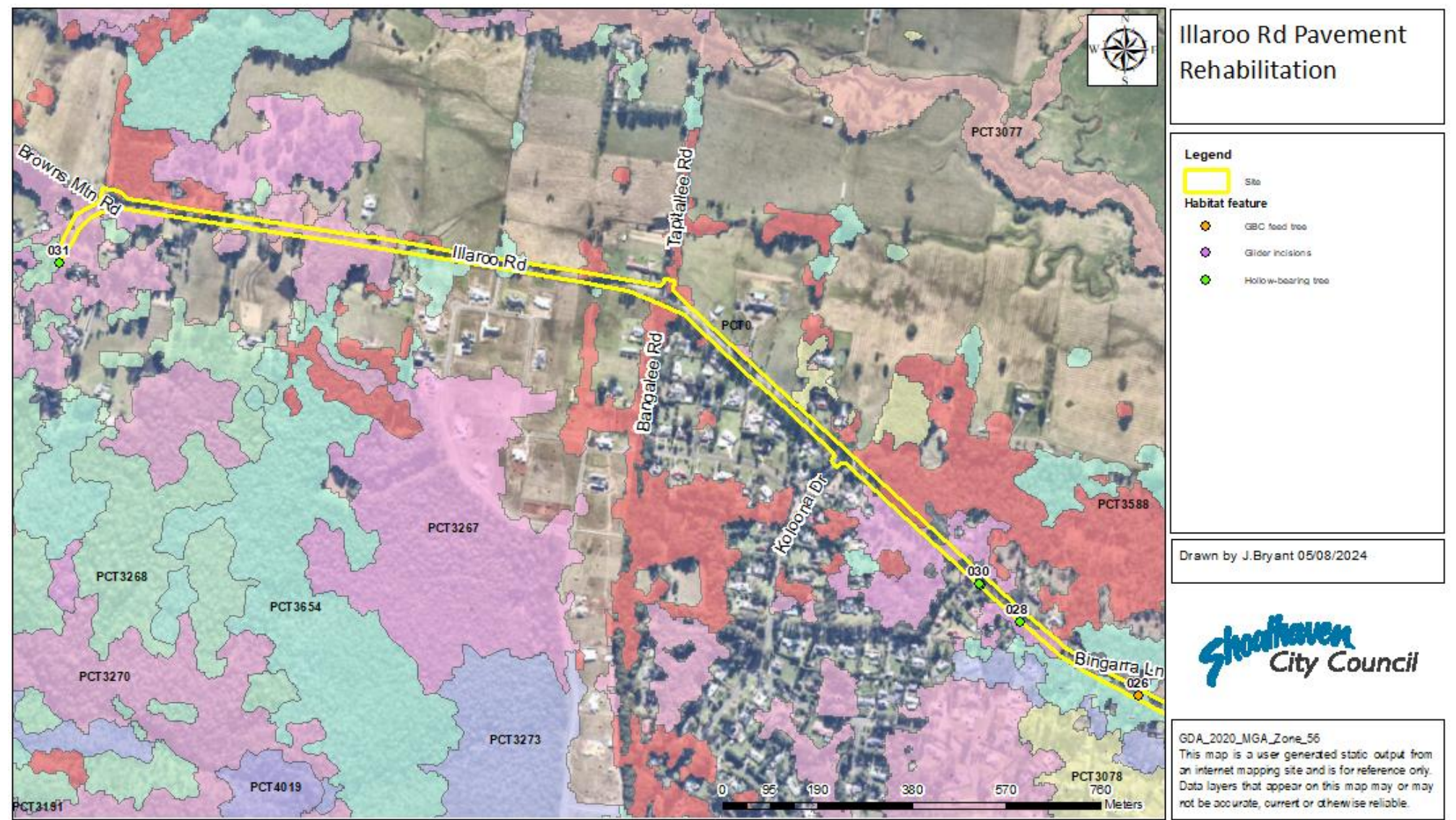


Figure 7. Mapped vegetation communities, threatened species and habitat features in proximity to the proposal (Bingarra Lane to Browns Mountain Rd)



West of Gypsy Point Rd through to Bingarra Lane (approx.), PCT3588 Shoalhaven Foothills Bloodwood Heathy Forest occurred. While the mapped vegetation and geology in this location are not consistent with PCT3588, distinct vegetative characteristics were present including a medium height, open canopy dominated by *Eucalyptus sclerophylla*, *Corymbia gummifera* and scattered *Eucalyptus consideriana* and *Allocasuarina littoralis*, and a shrub layer featuring Proteaceae species including *Lambertia Formosa*, *Banksia spinulosa*, *Persoonia* species and *Petrophile pedunculata*.

West of Bingarra Lane through to Koloona Dr (approx.) vegetation was consistent with PCT3273 South Coast Lowland Shrub-Grass Forest, with canopy species featuring *Eucalyptus globoidea*, *Corymbia gummifera*, *Angophora floribunda* and *Syncarpia glomulifera*, scattered *Melaleuca linariifolia* and *Glochidion ferdinandi*, and an open, grassy understorey including *Parsonsia straminea* and *Lomandra longifolia*.

West of Koloona Dr (approx.) PCT3270 Shoalhaven Lowland Wet Gully Forest occurred, dominated by *Eucalyptus saligna x botryoides* with *Corymbia maculata*, *Eucalyptus eugenioides* and *Corymbia gummifera* with an open grassy understorey including *Entolasia stricta* and *Cymbopogon refractus*.

As the elevation increased towards the western end of the site, PCT3267 Shoalhaven Foothills Turpentine Forest occurred with *Corymbia maculata* being prolific and scattered *Eucalyptus paniculata* present.

**Table 2. Flora species recorded within and adjacent to the site**

<p><u>Canopy species</u></p> <p><i>Angophora floribunda</i> (Rough-barked Apple)</p> <p><i>Corymbia gummifera</i> (Red Bloodwood)</p> <p><i>Corymbia maculata</i> (Spotted Gum)</p> <p><i>Eucalyptus amplifolia</i> (Cabbage Gum)</p> <p><i>Eucalyptus consideriana</i> (Yertchuk)</p> <p><i>Eucalyptus eugenioides</i> (Blue Stringybark)</p> <p><i>Eucalyptus globoidea</i> (White Stringybark)</p> <p><i>Eucalyptus paniculata</i> (Grey Ironbark)</p> <p><i>Eucalyptus saligna x botryoides</i> (Southern Blue Gum)</p> <p><i>Eucalyptus scias</i> (Large-fruited Red Mahogany)</p> <p><i>Eucalyptus sclerophylla</i> (Scribbly Gum)</p> <p><i>Syncarpia glomulifera</i> (Turpentine)</p> <p><u>Mid-storey species</u></p> <p><i>Acacia binervata</i> (Two-veined Hickory)</p> <p><i>Acacia filicifolia</i> (Fern-leaved Wattle)</p> <p><i>Acacia floribunda</i> (White Sally Wattle)</p> <p><i>Acacia ulicifolia</i> (Prickly Moses)</p> <p><i>Allocasuarina littoralis</i> (Black She-oak)</p> <p><i>Banksia spinulosa</i> (Hairpin Banksia)</p> <p><i>Bursaria spinosa</i> (Blackthorn)</p> <p><i>Exocarpos cupressiformis</i> (Cherry Ballart)</p> <p><i>Glochidion ferdinandi</i> (Cheese Tree)</p> <p><i>Lambertia formosa</i> (Mountain Devil)</p>	<p><u>Groundcover species</u></p> <p><i>Cyathochaeta diandra</i> (Cyathochaeta)</p> <p><i>Cymbopogon refractus</i> (Barbed-wire Grass)</p> <p><i>Dianella caerulea</i> (Blue Flax Lily)</p> <p><i>Entolasia marginata</i> (Wiry Panic Grass)</p> <p><i>Entolasia stricta</i> (Wiry Panic Grass)</p> <p><i>Hardenbergia violacea</i> (Purple Coral Pea)</p> <p><i>Hibbertia aspera</i> (Rough Guinea Flower)</p> <p><i>Imperata cylindrica</i> (Blady Grass)</p> <p><i>Lepidosperma laterale</i> (Sword Sedge)</p> <p><i>Lomandra longifolia</i> (Spikey Mat-rush)</p> <p><i>Lomandra obliqua</i> (Fish Bones)</p> <p><i>Lomatia ilicifolia</i> (Holly Lomatia)</p> <p><i>Microlaena stipoides</i> (Weeping Meadow Grass)</p> <p><i>Oplismenus aemulus</i> (Basket Grass)</p> <p><i>Parsonsia straminea</i> (Common Silk Pod)</p> <p><i>Xanthorrhoea resinosa</i> (Grass Tree)</p> <p><u>Exotic invasive species</u></p> <p><i>Agapanthus praecox</i> (Agapanthus)</p> <p><i>Andropogon virginicus</i> (Whiskey Grass)</p> <p><i>Asparagus officinalis</i> (Common Asparagus)</p> <p><i>Bidens pilosa</i> (Bidens)</p> <p><i>Cenchrus clandestinus</i> (Kikuyu)</p> <p><i>Cynodon spp.</i> (Couch)</p> <p><i>Hypochaeris glabra</i> (Cat's Ears)</p>
---	---

<i>Melaleuca linariifolia</i> (Flax-leaf Paperbark) <i>Ozothamnus diosmifolius</i> (White Dogwood) <i>Persoonia laevis</i> (Geebung) <i>Persoonia linearis</i> (Narrow-leaved Geebung) <i>Pimelea linifolia</i> (Rice Flower) <i>Pittosporum undulatum</i> (Sweet Pittosporum)	<i>Lantana camara</i> (Lantana) <i>Paspalum dilatatum</i> (Caterpillar Grass) <i>Paspalum urvillei</i> (Vasey Grass) <i>Plantago lanceolata</i> (Plantain) <i>Raphiolepis indica</i> (Indian Hawthorn) <i>Setaria</i> spp. (Pigeon Grass) <i>Sporobolus africanus</i> (Parramatta Grass) <i>Sporobolus fertilis</i> (Giant Parramatta Grass) <i>Stenotaphrum secundatum</i> (Buffalo Grass) <i>Tagetes minuta</i> (Stinking Roger) <i>Thunbergia alata</i> (Black Eyed Susan) <i>Trifolium repens</i> (White Clover) <i>Verbena</i> spp. (Purple Top)
---	---

## 2.4 Threatened species habitat and targeted surveys

Habitat assessments for threatened fauna species and cryptic threatened flora species (including threatened terrestrial orchids such as *Cryptostylis hunteriana*, *Genoplesium baueri*, *Pterostylis gibbosa*, and *P. vernalis*), in addition to targeted survey for non-cryptic threatened flora species (including *Eucalyptus langleyi*, *Hibbertia stricta* subsp. *furcatula*, *Solanum celatum*, *Syzygium paniculatum* and *Zieria baeuerlenii*), were carried out in conjunction with general flora surveys.

Habitat features recorded during investigations are presented in Table 3 (below) and Figures 6 and 7 (above). See also, Photo 13 and Photo 14 below.

Thirteen (13) hollow-bearing trees (HBTs) containing hollows of varying size were recorded within the site.

Two (2) Red Bloodwood Trees containing old glider incision scars were recorded within the site. The scars were consistent with Sugar Glider incisions.

One (1) Black She-oak was recorded with chewed cones beneath it, indicating recent feeding of Glossy Black Cockatoos. Investigations as part of an assessment in 2021 for a Shoalhaven Water infrastructure project recorded evidence of Glossy Black Cockatoo feeding on a different, nearby tree (Bryant 2021).

A common wombat burrow occurring in close proximity to the road verge on 515 Illaroo Rd at approx. CH4860-4900, was reported by the property owner. Inspection by Council's Environmental Officer concluded that the burrow was exploratory only, being short (less than 3 m) and was unoccupied. Although the species is not threatened, the burrow shall be reinspected by Council's Environmental Officer prior to excavation or tree removal in the vicinity. An exclusion process shall be undertaken if any animal is present.

Due to the level of disturbance and modification of groundcover through the footprint of the site, no suitable habitat for threatened terrestrial orchids (including *Cryptostylis hunteriana*, *Genoplesium baueri*, *Pterostylis gibbosa*, and *P. vernalis*) was considered to occur. Targeted survey for locally occurring threatened orchids was therefore not warranted.

No threatened flora species (including *Eucalyptus langleyi*, *Hibbertia stricta* subsp. *furcatula*, *Solanum celatum*, *Syzygium paniculatum* and *Zieria baeuerlenii*) were identified within or in proximity to the site during vegetation surveys.

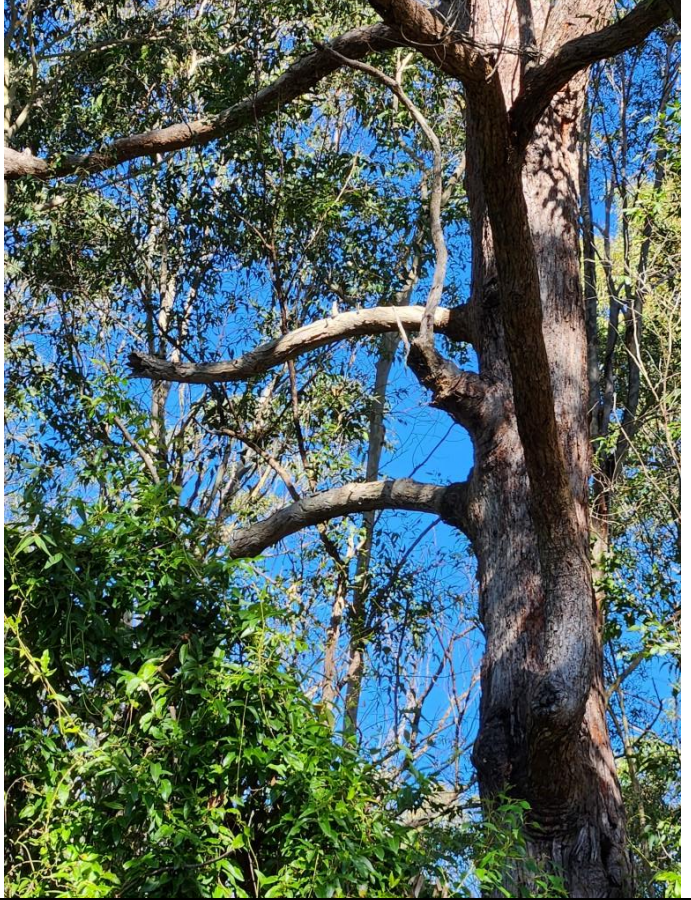
Endangered ecological community (EEC) associations are discussed in Section 3.2.2.

**Table 3. Habitat features and threatened species recorded in proximity to site (coordinates GDA2020:MGA56)**

Name	Type	Easting	Northing	Description	Impacted on by proposal?
015	Hollow-bearing tree	277370	6141631	Large Spotted Gum with 10x30cm slot hollow.	No
016	Hollow-bearing tree	277338	6141646	Very large Southern Blue Gum with multiple 5cm hollows and possible 20cm stem junction hollow (depth uncertain).	No
017	Hollow-bearing tree	277328	6141650	Very large Southern Blue Gum with 5cm and 10cm hollows.	No
018	Hollow-bearing tree	276892	6141834	Very large Spotted Gum with minor (depth uncertain) 5cm snap out hollow in low, dead branch over the road. Tree is very close to road and likely to require removal.	Yes – removed
019	Hollow-bearing tree	276845	6141859	Very large Spotted Gum with 5cm hollow.	No
020	Hollow-bearing tree	276832	6141866	Very large Spotted Gum with 5cm and multiple 10cm hollows (stem, chimney and snap-out).	No
021	Hollow-bearing tree	276779	6141893	Spotted Gum with detached hollow branch caught in canopy with 5-10cm hollows.	Yes – removed
022	Hollow-bearing tree	276757	6141903	Large Red-fruited Mahogany with horizontal 10cm pipe hollow.	Yes – removed
023	Hollow-bearing tree	276517	6142022	Scribbly Gum with 5cm x 50cm slot hollow. Base of tree is 3+m from existing drain.	No
024	Glider incisions	276437	6142067	Red Bloodwood with old sugar glider incisions.	Yes – removed
025	Glider incisions	276281	6142149	Red Bloodwood with old sugar glider incisions.	Yes – removed
026	GBC feed tree	276026	6142288	Allocasuarina littoralis Glossy Black Cockatoo feed tree.	Yes – removed
028	Hollow-bearing tree	275788	6142438	Large Scribbly Gum with multiple hollows: 2x5cm, 2x10cm (one containing an active bee hive), 1x15cm.	No
029	Hollow-bearing tree	275709	6142511	Scribbly Gum with 5cm hollow.	No
030	Hollow-bearing tree	275705	6142514	Scribbly Gum with multiple 5cm hollows.	No
031	Hollow-bearing tree	273856	6143159	Southern Blue Gum with multiple hollows incl. significant 15x60cm slot and inverted hollow.	No

**Photo 13 (left). Habitat feature #021 – hollow branch caught in canopy**

**Photo 14 (right). Habitat feature #022 – Large Red-fruited Mahogany tree with 10 cm pipe hollow**



### 3. ASSESSMENT OF LIKELY IMPACTS ON THE ENVIRONMENT

#### 3.1 Impacts associated with the proposal

The proposal would involve impacts associated with the following:

- Native vegetation removal to approx. 10,310 m<sup>2</sup> canopy extent would occur along a 4.8 km linear site, characterised as an existing disturbed edge (indicated in Figures 8, 9 and 10 below), including:
    - A total of 241 native trees are likely to require removal as a result of the proposal, including:
      - Red Bloodwood x 60 trees ranging from 10 cm to 80 cm DBH (Diameter at Breast Height)
      - Scribbly Gum x 41 trees ranging from 10 cm to 90 cm DBH
      - Spotted Gum x 37 trees ranging from 10 cm to 1.5 m DBH
      - Turpentine x 23 trees ranging from 10 cm to 50 cm DBH
      - Black She-oak x 18 trees ranging from 10 cm to 30 cm DBH
      - Rough-barked Apple x 15 trees ranging from 10 cm to 50 cm DBH
      - Southern Blue Gum x 14 trees ranging from 10 cm to 80 cm DBH
      - Blue-leaved Stringybark x 10 trees ranging from 10 cm to 60 cm
      - White Stringybark x 6 trees ranging from 10 cm to 60 cm DBH
      - Cabbage Gum x 4 trees ranging from 10 cm to 50 cm DBH
      - Cheese Tree x 4 trees ranging from 20 cm to 50 cm DBH
      - Flax-leaved Paperbark x 2 trees ranging from 10 cm to 15 cm DBH
      - Large Fruited Red Mahogany x 2 trees ranging from 60 cm to 70 cm DBH
      - Grey Ironbark x 2 trees ranging from 15 cm to 50 cm DBH
      - Cherry Ballart x 1 tree of 20 cm DBH
      - Fern-leaf Wattle x 1 tree of 10 cm DBH
      - Willow Hakea x 1 tree of 15 cm DBH
- Table 4 provides a register of tree species with approximate sizes likely to be removed. Note that smaller trees and saplings of size less than 10cm DBH were considered understorey vegetation and were not individually recorded.
- Native vegetation to be removed occurs on existing, disturbed edges. No additional fragmentation or isolation of native vegetation would occur.
- Approximately 150m<sup>2</sup> Illawarra Lowland Grassy Woodland endangered ecological community (EEC) would be impacted on.
  - Three (3) hollow-bearing trees, two (2) glider feed trees (presumed Sugar Glider) and one (1) Glossy Black Cockatoo feed tree would be removed. Habitat that would be removed associated with the three HBTs includes:
    - One minor (depth uncertain) 5cm snap out hollow in a low, dead branch over the road (habitat feature #018). This hollow appears to be poorly formed and is unlikely to be suitable for use by any fauna other than frogs or small lizards.
    - One detached hollow branch caught in canopy with 5-10cm hollows (habitat feature #021). This branch contains suitable potential habitat for fauna including microbats, small possums and small gliders. This branch could be readily relocated.
    - One horizontal 10cm pipe hollow (habitat feature #022). This tree contains suitable potential habitat for fauna including microbats, small possums and

small gliders. Vigorous callus tissue growth visible around the base of the dead branch suggests that it is unlikely that the hollowed section of branch extends into trunk of the tree. The branch could therefore be temporarily plugged at the open end, cut through at the sealed end and then safely relocated containing any resident fauna. An inspection camera (endoscope) would be used to check for resident fauna and confirm the depth of the hollow.

- Earthworks including cut and fill to design surface and creation of shoulders and batters for:
  - 200 mm cement stabilisation to the existing pavement with a 150 mm gravel overlay and bitumen seal (raising pavement height by 150 mm), with Deep lift asphalt to intersections, Karana Dr, Moondara Dr, Hockeys Lane, Gypsy Point Rd, Bingarra Lane, Koloona Dr, Tapitallee Rd and Browns Mountain Rd, and deeper pavement applied to low-stability locations identified by geotechnical investigation.
  - Construction of shoulders, batters and table drains, including relocation of table drains where required.
  - Replacement of seven (7) culverts and installation of one new culvert.

Excavation and construction works would involve the installation and maintenance of sediment and erosion controls to minimise impacts associated with water contamination and sediment movement and deposition.

Potential impacts on the environment, including indirect impacts have been considered, including:

- Impacts on threatened species;
- Impacts on indigenous and non-indigenous heritage;
- Impacts on water quality, the riparian zone and key fish habitat;
- Impacts associated with flood liable land.

Each of these is discussed below.

Figure 8. Impact footprint and likely tree removal (canopy extent) – Karana Dr to Gypsy Point Rd, including Illawarra Lowland Grassy Woodland (ILGW).

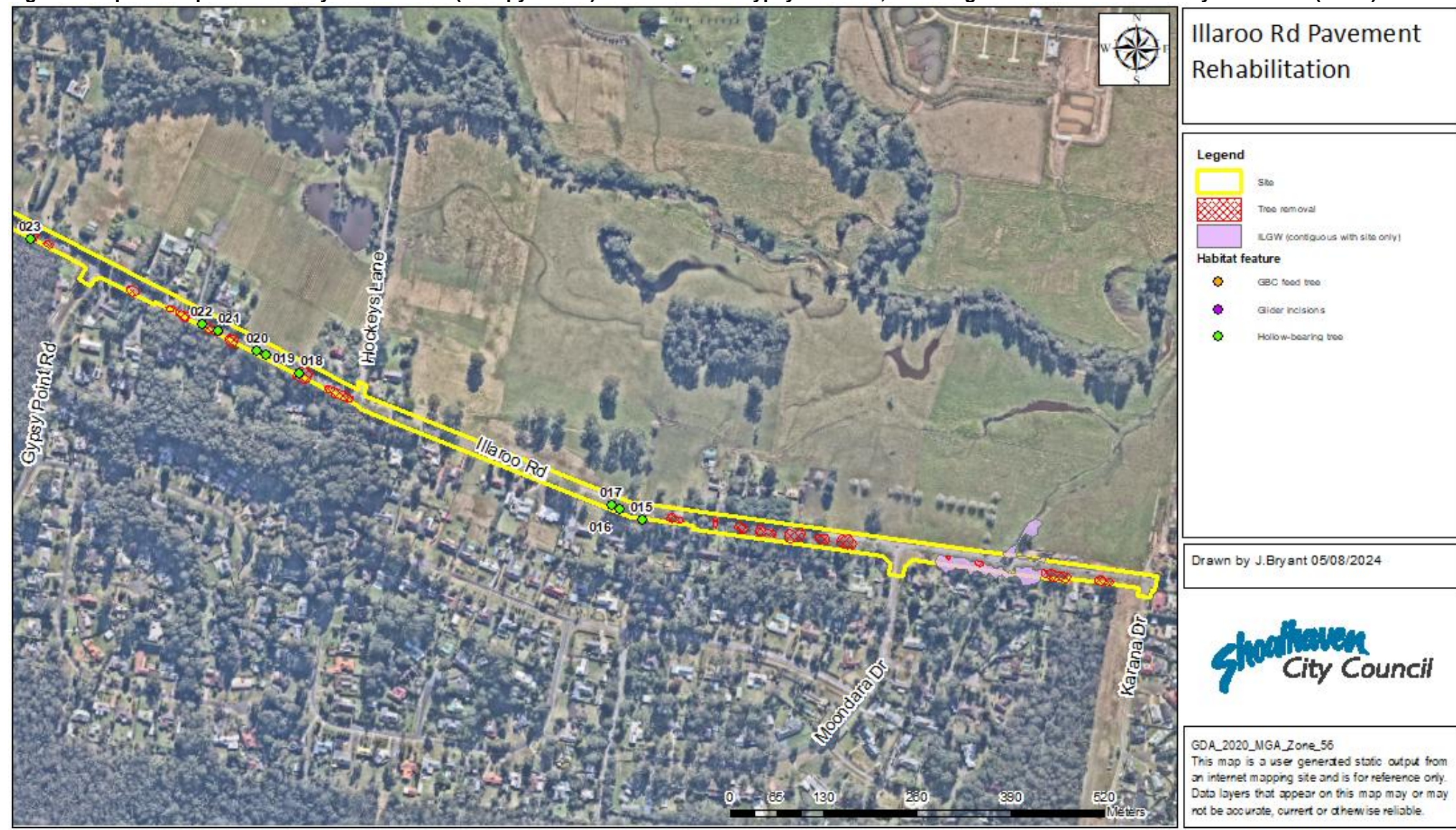


Figure 9. Impact footprint and likely tree removal – Gypsy Point Rd to Koloona Dr

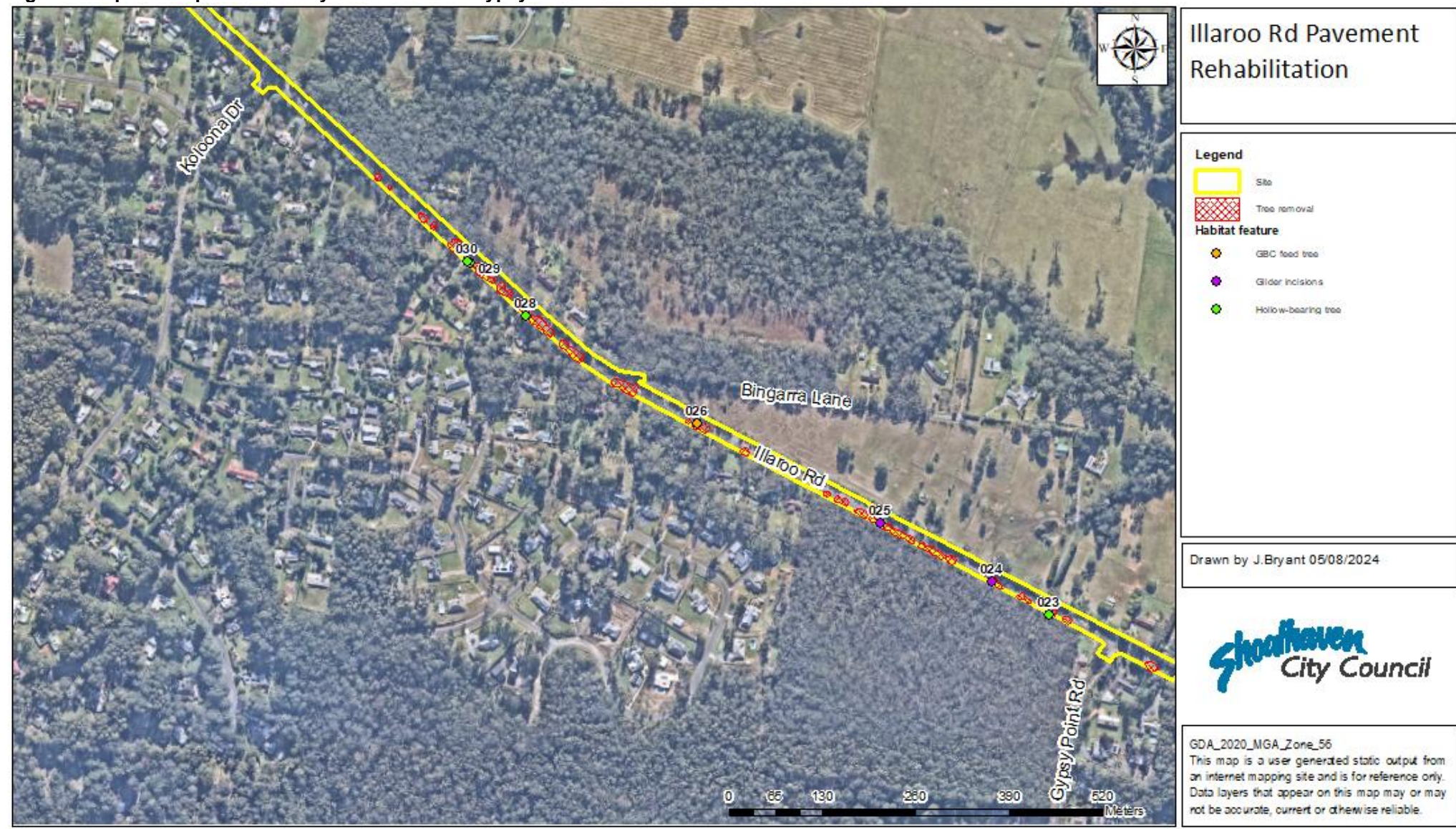
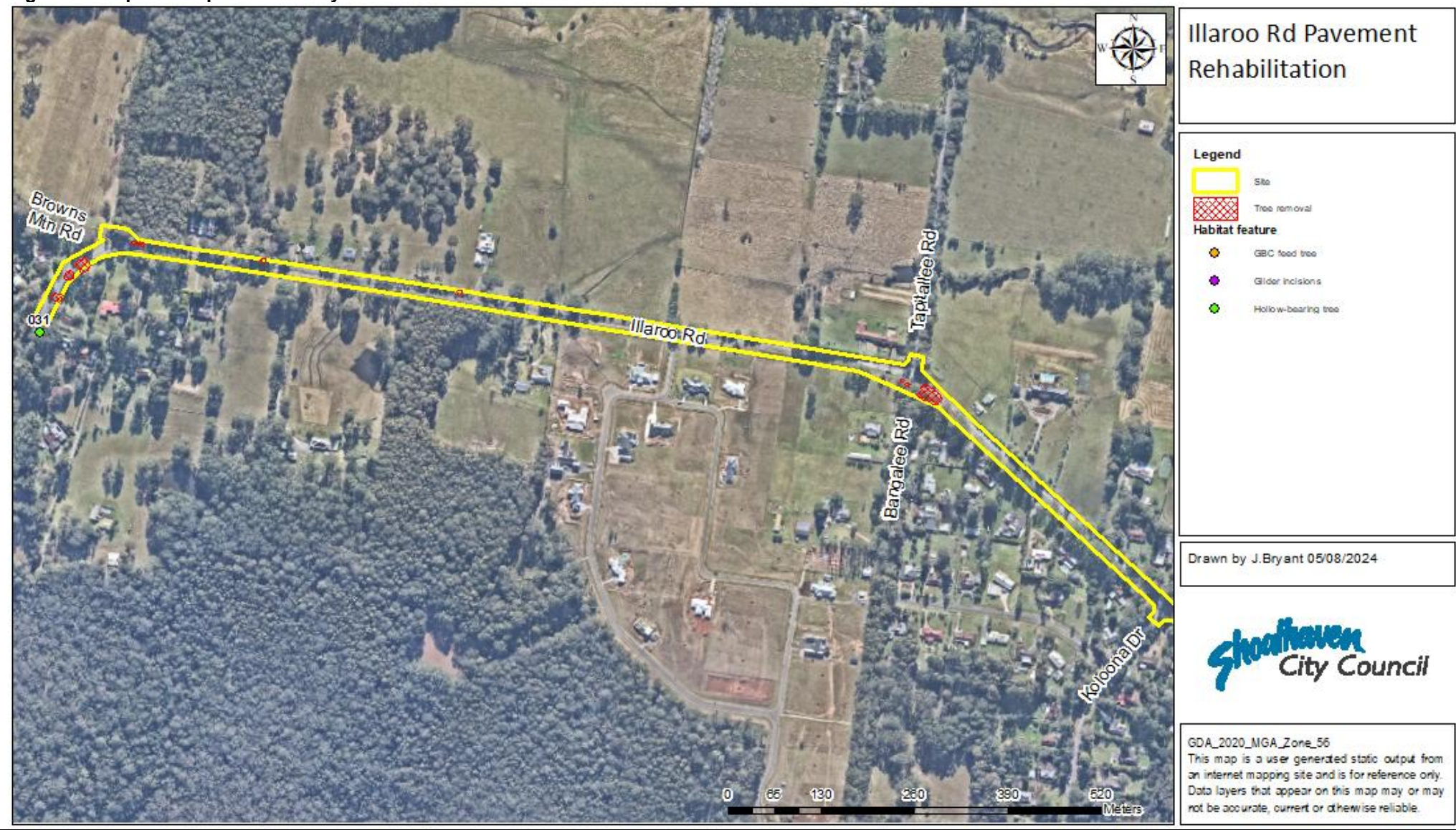


Figure 10. Impact footprint and likely tree removal – Koloona Dr to Browns Mountain Rd



**Table 4. Tree removal register**

Species	Common name	Size range (cm) – Diameter at Breast Height (DBH)	Count
<i>Acacia filicifolia</i>	Fern-leaf Wattle	<b>10</b>	<b>1</b>
<i>Allocasuarina littoralis</i>	Black She-Oak	<b>10-30</b> (10, 10, 10, 10, 10, 10, 25, 25, 10, 30, 30, 15, 15, 10, 30, 10, 15, 10)	<b>18</b>
<i>Angophora floribunda</i>	Rough-barked Apple	<b>10-50</b> (50, 15, 10, 30, 30, 30, 30, 30, 50, 10, 10, 30, 40, 20, 50)	<b>15</b>
<i>Corymbia gummifera</i>	Red Bloodwood	<b>10-80</b> (40, 40, 40, 20, 15, 15, 10, 15, 10, 30, 30, 20, 10, 15, 20, 30, 15, 60, 15, 15, 30, 20, 20, 20, 10, 20, 25, 15, 40, 20, 30, 15, 20, 10, 40, 60, 40, 15, 20, 40, 40, 60, 50, 50, 80, 60, 60, 10, 10, 15, 10, 40, 60, 15)	<b>60</b>
<i>Corymbia maculata</i>	Spotted Gum	<b>10-150</b> (25, 50, 80, 15, 70, 50, 110, 15, 10, 10, 40, 20, 15, 15, 30, 30, 20, 10, 30, 40, 60, 40, 80, 40, 30, 60, 80, 120, 150, 80, 50, 20, 60, 10, 10, 80, 60, 70, 20, 10, 20, 10, 90)	<b>37</b>
<i>Eucalyptus amplifolia</i>	Cabbage Gum	<b>10-50</b> (20, 50, 20, 10)	<b>4</b>
<i>Eucalyptus eugenioides</i>	Blue-leaved Stringybark	<b>10-60</b> (30, 20, 30, 60, 10, 10, 15, 15, 30, 20)	<b>10</b>
<i>Eucalyptus globoidea</i>	White Stringybark	<b>10-60</b> (20, 10, 20, 60, 50, 20)	<b>6</b>
<i>Eucalyptus paniculata</i>	Grey Ironbark	<b>15-50</b> (15, 50)	<b>2</b>
<i>Eucalyptus saligna x botryoides</i>	Southern Blue Gum	<b>10-80</b> (40, 80, 20, 60, 60, 40, 40, 50, 40, 40, 30, 40, 10, 60)	<b>14</b>
<i>Eucalyptus scias</i>	Large Fruited Red Mahogany	<b>60-70</b> (70, 60)	<b>2</b>
<i>Eucalyptus sclerophylla</i>	Scribbly Gum	<b>10-90</b> (70, 90, 50, 60, 60, 10, 35, 20, 10, 30, 20, 20, 20, 20, 30, 20, 40, 20, 30, 10, 30, 40, 20, 30, 40, 30, 15, 50, 25, 30, 40, 70, 40, 40, 10, 10, 10, 10, 50, 80, 40)	<b>41</b>
<i>Exocarpos cupressiformis</i>	Cherry Ballart	<b>20</b>	<b>1</b>
<i>Glochidion ferdinandi</i>	Cheese Tree	<b>20-50</b> (20, 20, 20, 50)	<b>4</b>
<i>Hakea salicifolia</i>	Willow Hakea	<b>15</b>	<b>1</b>
<i>Melaleuca linariifolia</i>	Flax-leaved Paperbark	<b>10-15</b> (10, 15)	<b>2</b>
<i>Syncarpia glomulifera</i>	Turpentine	<b>10-50</b> (40, 40, 10, 30, 30, 30, 10, 20, 30, 30, 20, 20, 10, 10, 50, 30, 30, 50, 10, 10, 10, 20, 30)	<b>23</b>
<b>TOTAL</b>			<b>241</b>

### 3.2 Threatened species impact assessment (NSW)

Section 1.7 of the EP&A Act 1979 applies the provisions of Part 7 of the NSW *Biodiversity Conservation Act 2016* and Part 7A of the *NSW Fisheries Management Act 1994* that relate to the operation of the Act in connection with the terrestrial and aquatic environment. Each are addressed below.

#### 3.2.1 Part 7A Fisheries Management Act 1994

Part 7A relates to threatened species conservation.

There are no threatened species listed under the Act which are mapped as occurring in proximity to the site, or likely to occur in proximity to the site.

Works affecting waterways or riparian corridors would be limited to two unnamed, first order (Strahler) ephemeral watercourses intersect the site between Karana Dr and Moondara Dr at approx. CH 3710 m, and between Tapitallee Rd and Browns Mountain Rd at approx. CH 7470 m.

Erosion and sediment controls would be implemented to minimise impacts of erosion of sediment on the waterway. Refer to section 3.7 of this REF for more information.

No marine vegetation or threatened marine fauna would be directly impacted by the proposal.

The proposal is therefore unlikely to result in any impact on threatened entities or their habitat, or contribute significantly to key threatening processes, as listed under Part 7A of the Act.

The proposed activity therefore does not require an Environmental Impact Statement (EIS) or Species Impact Statement (SIS) under the Act.

#### 3.2.2 Part 7 Biodiversity Conservation Act 2016

An assessment of the potential for NSW threatened flora and fauna species occurring on-site or otherwise being impacted by the proposal was undertaken (refer to Appendix B). The following species and endangered ecological communities are known to occur on-site or are considered to have some potential to occur on-site or be otherwise impacted by the proposal, and therefore required further assessment under Part 7 of the NSW *Biodiversity Conservation Act 2016*:

- *Artamus cyanopterus cyanopterus* Dusky Woodswallow
- *Callocephalon fimbriatum* Gang-gang Cockatoo
- *Calyptorhynchus lathamii lathamii* Glossy Black-cockatoo
- *Daphoenositta chrysoptera* Varied Sittella
- *Glossopsitta pusilla* Little Lorikeet
- *Lathamus discolor* Swift Parrot
- *Cercartetus nanus* Eastern Pygmy-possum
- *Pteropus poliocephalus* Grey-headed Flying-fox
- *Micronomus norfolkensis* Eastern Coastal Free-tailed Bat
- *Falsistrellus tasmaniensis* Eastern False Pipistrelle
- *Scoteanax rueppellii* Greater Broad-nosed Bat
- *Miniopterus australis* Little Bent-winged Bat
- *Myotis macropus* Southern Myotis
- *Saccolaimus flaviventris* Yellow-bellied Sheath-tail-bat

- Illawarra Lowlands Grassy Woodland in the Sydney Basin Bioregion

Section 7.3 of the Act provides a ‘five-part’ test to determine whether a proposed development or activity is likely to significantly affect threatened species or ecological communities, or their habitats. Each Part is addressed below:

***Part A - In the case of a threatened species, whether the proposed development or activity is likely to have an adverse effect on the lifecycle of the species such that a viable local population of the species is likely to be place at risk of extinction.***

Threatened small to medium sized forest birds: Dusky Woodswallow (*Artamus cyanopterus cyanopterus*) and Varied Sittella (*Daphoenositta chrysoptera*)

The Dusky Woodswallow is a medium-sized bird (16-19.5 cm, 35 g), mostly dark grey-brown merging to blackish on its longish tail. The species is widespread in eastern, southern and south-western Australia, occurring throughout most of New South Wales, but is sparsely scattered in, or largely absent from, much of the upper western region. Most breeding activity occurs on the western slopes of the Great Dividing Range. The Dusky Woodswallow primarily inhabits dry, open eucalypt forests and woodlands, including mallee associations, with an open or sparse understorey of eucalypt saplings, acacias and other shrubs, and ground-cover of grasses or sedges and fallen woody debris. It has also been recorded in shrublands, heathlands and very occasionally in moist forest or rainforest, also being found in farmland, usually at the edges of forest or woodland. The species primarily eats invertebrates, mainly insects, which are captured whilst hovering or sallying above the canopy or over water and occasionally will take nectar, fruit and seed. It also frequently hovers, sallies and pounces under the canopy, primarily over leaf litter and dead timber. Depending on location and local climatic conditions (primarily temperature and rainfall), the Dusky Woodswallow can be resident year round or migratory. In NSW, after breeding, birds migrate to the north of the state and to south-eastern Queensland, while Tasmanian birds migrate to south-eastern NSW after breeding. Migrants generally depart between March and May, heading south to breed again in spring. There is some evidence of site fidelity for breeding. Although Dusky Woodswallows generally breed as solitary pairs or occasionally in small flocks, large flocks may form around abundant food sources in winter. Large flocks may also form before migration, which is often undertaken with other species. The species nests in an open, cup-shape, made of twigs, grass, fibrous rootlets and occasionally casuarina needles, and may be lined with grass, rootlets or infrequently horsehair, occasionally unlined. Nest sites vary greatly, but generally occur in shrubs or low trees, living or dead, horizontal or upright forks in branches, spouts, hollow stumps or logs, behind loose bark or in a hollow in the top of a wooden fence post. Nest sites may be exposed or well concealed by foliage (OEH 2017a).

The Varied Sittella is a small (10cm) and highly mobile tree creeper with a sharp, slightly upturned bill, short tail, barred undertail, and yellow eyes and feet. Varied Sittellas are more active and acrobatic among branches than the larger tree creepers. They fly into the heads of trees, typically working their way down branches and trunk with constant motion. The species inhabits eucalypt forests and woodlands, especially those containing rough-barked species and mature smooth-barked gums with dead branches, mallee and Acacia woodland. It feeds on arthropods gleaned from crevices in rough or decorticating bark, dead branches, standing dead trees and small branches and twigs in the tree canopy. It builds a cup-shaped nest of plant fibres and cobwebs in an upright tree fork high in the living tree canopy, and often re-uses the same fork or tree in successive years (OEH 2017c).

Available habitat is marginal, comprising vegetation occurring on the existing road edge, and with disturbed and modified (typically absent) understorey.

Marginal foraging habitat exists over vegetated areas the site for Dusky Woodswallow, but the species is unlikely to breed in this part of NSW.

Marginal foraging habitat and low-potential nesting habitat occurs for Varied Sittella over vegetated areas of the site.

Dusky Woodswallow and Varied Sittella were not observed during surveys. No nests were observed in trees proposed for removal.

All vegetation removal would occur in a narrow band along the existing road edge, generally with other trees retained behind.

Trees that would be removed are not part of important movement corridors. Fragmentation resulting from canopy and understorey gaps would be negligible and is unlikely to affect the movement of any locally occurring fauna.

It is unlikely that any bird species would rely on the vegetation proposed for removal for foraging, nesting or movement.

No active nests would be removed during clearing works. Any nests present shall be inspected.

Extensive high-quality vegetation would remain in proximity to the site including within protected National Parks and Wildlife Service (NPWS) land (e.g. Bomaderry Regional Park and Tapitallee Nature Reserve) and Crown Reserve (e.g. Bangalee Reserve).

It is therefore considered unlikely that Dusky Woodswallow or Varied Sittella would be impacted by the proposed works and the proposed activity is unlikely to have an adverse effect on the lifecycle of these species such that a viable local population of either of these species is likely to be placed at risk of extinction.

Threatened parrots and cockatoos: Gang-gang Cockatoo (*Callocephalon fimbriatum*), Glossy Black-cockatoo (*Calyptorhynchus lathami*), Little Lorikeet (*Glossopsitta pusilla*) and Swift Parrot (*Lathamus discolor*)

The Gang-gang Cockatoo generally spends spring and summer in tall mountain forests and woodlands, particularly in heavily timbered and mature wet sclerophyll forests. In autumn and winter, the species often moves to lower altitudes in drier more open eucalypt forests and woodlands, particularly box-gum and box-ironbark assemblages, or in dry forest in coastal areas and often found in urban areas. It may also occur in sub-alpine Snow Gum (*Eucalyptus pauciflora*) woodland and occasionally in temperate rainforests. Gang-gang Cockatoo favours old growth forest and woodland attributes for nesting and roosting. Nests are located in hollows that are 10 cm in diameter or larger and at least 9 m above the ground in eucalypts. Breeding is generally from Oct-Jan (OEH 2022b). Preferred hollows are usually vertical or pointing steeply upward (Morcombe 2004).

The Glossy Black-cockatoo (*Calyptorhynchus lathami*) inhabits open forest and woodlands of the coast and the Great Dividing Range where stands of She-oak occur. Black She-oak (*Allocasuarina littoralis*) and Forest She-oak (*A. torulosa*) are important foods. Inland populations feed on a wide range of She-oaks, including Drooping She-oak, *Allocasuarina diminuta*, and *A. gymnathera*. Belah is also utilised and may be a critical food source for some populations. In the Riverina, birds are associated with hills and rocky rises supporting Drooping She-oak, but also recorded in open woodlands dominated by Belah (*Casuarina cristata*). The species feeds almost exclusively on the seeds of several species of she-oak (*Casuarina* and *Allocasuarina* species), shredding the cones with the massive bill. Glossy Black-cockatoo is dependent on large hollow-bearing eucalypts for nest sites. A single egg is laid between March and May (OEH 2022c). Potential nest trees contain

hollows that are; (i) at least 8 m above the ground; and (ii) in stems with a diameter of at least 30 cm; and (iii) hollow diameter is at least 15 cm; and (iv) stem angle is at least 45 degrees and may be near-vertical or vertical (NSW Government 2022).

The Little Lorikeet forages primarily in the canopy of open Eucalyptus forest and woodland, yet also finds food in Angophora, Melaleuca and other tree species. Riparian habitats are particularly used, due to higher soil fertility and hence greater productivity. Isolated flowering trees in open country, e.g., paddocks, roadside remnants and urban trees also help sustain viable populations of the species. The species feeds mostly on nectar and pollen, occasionally on native fruits such as mistletoe, and only rarely in orchards. The Little Lorikeet is gregarious, travelling and feeding in small flocks (<10), though often with other lorikeets. Flocks numbering hundreds are still occasionally observed and may have been the norm in past centuries. The species roosts in treetops, often distant from feeding areas. Nests are in proximity to feeding areas if possible, most typically selecting hollows in the limb or trunk of smooth-barked Eucalypts. Entrance is small (3 cm) and usually high above the ground (2–15 m). These nest sites are often used repeatedly for decades, suggesting that preferred sites are limited. Riparian trees often chosen, including species like *Allocasuarina*. The nesting season extends from May to September. In years when flowering is prolific, Little Lorikeet pairs can breed twice, producing 3-4 young per attempt. However, the survival rate of fledglings is unknown (OEH 2022e).

The Swift Parrot is small parrot about 25 cm long. This species breeds in Tasmania during spring and summer, migrating in the autumn and winter months to south-eastern Australia from Victoria and the eastern parts of South Australia to south-east Queensland. In NSW it mostly occurs on the coast and south-west slopes. It migrates to the Australian south-east mainland between February and October. On the mainland they occur in areas where eucalypts are flowering profusely or where there are abundant lerp (from sap-sucking bugs) infestations. Favoured feed trees include winter flowering species such as Swamp Mahogany *Eucalyptus robusta*, Spotted Gum *Corymbia maculata*, Red Bloodwood *C. gummifera*, Forest Red Gum *E. tereticornis*, Mugga Ironbark *E. sideroxylon*, and White Box *E. albens*. Commonly used lerp infested trees include Inland Grey Box *E. microcarpa*, Grey Box *E. moluccana*, Blackbutt *E. pilularis*, and Yellow Box *E. melliodora*. The Swift Parrot returns to some foraging sites on a cyclic basis depending on food availability. Following winter they return to Tasmania where they breed from September to January, nesting in old trees with hollows and feeding in forests dominated by Tasmanian Blue Gum *Eucalyptus globulus* (OEH 2022g).

Suitable nesting hollows for each of these birds occur in proximity to but not within the site. Three hollow-bearing trees (HBTs) would be removed as part of the proposal – none of which contains suitable nesting hollows for parrots or cockatoos.

Potential foraging habitat (i.e., *Allocasuarina littoralis*) for Glossy Black Cockatoo occurs scattered along the site. Evidence of feeding by the species (i.e. crushed cones) was observed at one tree within the site in proximity to Bingarra Lane. This feed tree would be removed as part of the proposal. *A.littoralis* is available extensively within and in proximity to the site. Numerous feed trees have been recorded along West Cambewarra Rd; within Bomaderry Creek Regional Park; and Mahogany Creek riparian corridor. Investigations as part of an assessment in 2021 for a Shoalhaven Water infrastructure project recorded evidence of Glossy Black Cockatoo feeding on a different, nearby tree (Bryant 2021). Evidence of feeding on the same tree was not observed during current investigations, indicating that the species does not rely on returning to the same trees to forage. The removal of one feed tree would therefore not impact substantially on the availability of foraging habitat for Glossy Black Cockatoo.

Potential foraging habitat (including flowers of Eucalypts) for Gang-gang Cockatoo, Little Lorikeet and Swift Parrot occurs throughout the site.

Removal of potential foraging habitat for Gang-gang Cockatoo, Little Lorikeet and Swift Parrot would occur as part of the proposal. All vegetation removal would occur in a narrow band along the existing road edge, generally with other trees retained behind.

Trees that would be removed are not part of important movement corridors. Fragmentation resulting from canopy and understorey gaps would be negligible and is unlikely to affect the movement of any locally occurring fauna.

It is unlikely that any bird species would rely on the vegetation proposed for removal for foraging, nesting or movement.

Extensive high-quality vegetation would remain in proximity to the site including within protected NPWS land (e.g. Bomaderry Regional Park and Tapitallee Nature Reserve) and Crown Reserve (e.g. Bangalee Reserve).

It is therefore considered unlikely that the Gang-gang Cockatoo, Glossy Black Cockatoo, Little Lorikeet and Swift Parrot would be impacted by the proposed works and the proposed activity is unlikely to have an adverse effect on the lifecycle of the species such that a viable local population of either of these species is likely to be placed at risk of extinction.

#### Eastern Pygmy-possum (*Cercartetus nanus*)

Eastern Pygmy-possums are tiny (15 to 43 grams) active climbers, with almost bare, prehensile (capable of curling and gripping) tails, and relatively big, forward-pointing ears. They are light-brown above and white below. Adults have a head and body length between 70 - 110 mm and a tail length between 75 - 105 mm. The Eastern Pygmy-possum is found in south-eastern Australia, from southern Queensland to eastern South Australia and in Tasmania. In NSW it extends from the coast inland as far as the Pilliga, Dubbo, Parkes and Wagga Wagga on the western slopes. It is found in a broad range of habitats from rainforest through sclerophyll (including Box-Ironbark) forest and woodland to heath, but in most areas woodlands and heath appear to be preferred, except in north-eastern NSW where they are most frequently encountered in rainforest. The Eastern Pygmy-possum feeds largely on nectar and pollen collected from banksias, eucalypts and bottlebrushes; an important pollinator of heathland plants such as banksias; soft fruits are eaten when flowers are unavailable. It also feeds on insects throughout the year; this feed source may be more important in habitats where flowers are less abundant such as wet forests. The species shelters in tree hollows, rotten stumps, holes in the ground, abandoned bird-nests, Ringtail Possum (*Pseudocheirus peregrinus*) dreys or thickets of vegetation, (e.g. grass-tree skirts). Nest-building appears to be restricted to breeding females; tree hollows are favoured but spherical nests have been found under the bark of eucalypts and in shredded bark in tree forks. Eastern Pygmy-possums appear to be mainly solitary, each individual using several nests, with males having non-exclusive home-ranges of about 0.68 hectares and females about 0.35 hectares. Young can be born whenever food sources are available, however most births occur between late spring and early autumn. They are agile climbers, but can be caught on the ground in traps, pitfalls or postholes; generally nocturnal. This species frequently spends time in torpor especially in winter, with body curled, ears folded and internal temperature close to the surroundings (OEH 2022a).

Potential habitat for Eastern Pygmy Possum exists adjacent to the site within heathy, woodland vegetation featuring Proteaceae shrubs between Gypsy Point Rd and Bingarra Lane.

Works in this area would involve removal of trees and some native groundcover vegetation along the existing table drain batter. Dense shrubby undergrowth providing foraging habitat for Eastern Pygmy Possum occurs further inside the vegetation edge, but along the edge, groundcover vegetation is disturbed and primarily consisting of native grasses such as Blady Grass and Kangaroo Grass, with only rare occurrences of shrubs such as Mountain Devil.

One hollow bearing tree was recorded in this area in proximity to the works footprint, but tree would not require removal.

No potential den or refuge habitat for Eastern Pygmy Possum would be removed.

Removal of a small number of potential food source shrubs along the disturbed edge would constitute a negligible loss of foraging habitat for Eastern Pygmy Possum.

Fragmentation resulting from canopy and understorey gaps would be negligible and is unlikely to affect the movement of any locally occurring fauna.

It is therefore considered unlikely that Eastern Pygmy Possum would be impacted by the proposed works and the proposed activity is unlikely to have an adverse effect on the lifecycle of the species such that a viable local population of either of these species is likely to be placed at risk of extinction.

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

The Grey-headed Flying-fox is the largest Australian bat, with a head and body length of 23 - 29 cm. It has dark grey fur on the body, lighter grey fur on the head and a russet collar encircling the neck. The wing membranes are black and the wingspan can be up to 1 m. It can be distinguished from other flying-foxes by the leg fur, which extends to the ankle. Grey-headed Flying-foxes are generally found within 200 km of the eastern coast of Australia, from Rockhampton in Queensland to Adelaide in South Australia. In times of natural resource shortages, they may be found in unusual locations. This species occurs in subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps as well as urban gardens and cultivated fruit crops. Roosting camps are generally located within 20 km of a regular food source and are commonly found in gullies, close to water, in vegetation with a dense canopy. Individual camps may have tens of thousands of animals and are used for mating, and for giving birth and rearing young. Annual mating commences in January and conception occurs in April or May; a single young is born in October or November. Site fidelity to camps is high; some camps have been used for over a century. GHFF can travel up to 50 km from the camp to forage; commuting distances are more often <20 km. They feed on the nectar and pollen of native trees, in particular Eucalyptus, Melaleuca and Banksia, and fruits of rainforest trees and vines, also foraging in cultivated gardens and fruit crops (OEH 2020a).

No GHFF camps occur in close proximity to the site. The nearest camp currently occurs at Illowra Wetlands / Bomaderry Creek, approximately 3 km to the south-east of the site<sup>1</sup>.

Foraging habitat for the Grey-headed Flying-fox exists within the site as flowering Eucalypts and Paperbarks.

Approximately 10,310 m<sup>2</sup> canopy cover would be removed along a 4.8 km length of existing disturbed road edge. Extensive high-quality vegetation would remain in proximity to the site including within protected NPWS land (e.g. Bomaderry Regional Park and Tapitallee Nature

---

<sup>1</sup> National Flying-fox Monitoring Viewer <http://www.environment.gov.au/webgis-framework/apps/ffc-wide/ffc-wide.jsf>

Reserve) and Crown Reserve (e.g. Bangalee Reserve). The impact on foraging habitat for this species would therefore be negligible.

The proposed vegetation removal would not result in any fragmentation of habitat.

No barriers to movement affecting this species would be introduced.

Works would occur during normal construction hours, so would be unlikely to affect the primarily nocturnal foraging activities of this species.

It is considered unlikely therefore that the Grey-headed Flying-fox would be impacted by the proposed works and the proposed activity is unlikely to have an adverse effect on the lifecycle of the species such that a viable local population of any of these species is likely to be placed at risk of extinction.

Threatened microchiropteran bats: Eastern Coastal Free-tailed Bat (*Micronomus norfolkensis*), Eastern False Pipistrelle (*Falsistrellus tasmaniensis*), Greater Broad-nosed Bat (*Scoteanax rueppelli*), Little Bent-wing Bat *Miniopterus australis*, Southern Myotis (*Large-footed Myotis*) (*Myotis Macropus*) and Yellow-bellied Sheath-tail-bat *Saccolaimus flaviventris*

Eastern Coastal Freetail-Bat (*Micronomus norfolkensis*) occurs in dry sclerophyll forest, woodland, swamp forests and mangrove forests east of the Great Dividing Range. The species roosts mainly in tree hollows but will also roost under bark or in man-made structures. It will usually change breeding sites regularly (every few days), rendering it very difficult to confirm breeding sites. It has been known to occasionally aggregate in large breeding groups (including in buildings). It is usually solitary but has also been recorded roosting communally. The Eastern Freetail-Bat is considered to be probably insectivorous (OEH 2024a).

Eastern False Pipistrelle prefers moist habitats, with trees taller than 20 m. The species generally roosts in eucalypt hollows but has also been found under loose bark on trees or in buildings, however roost requirements are poorly known. It hunts beetles, moths, weevils and other flying insects above or just below the tree canopy. It hibernates in winter. Females are pregnant in late spring to early summer (OEH 2017b).

Greater Broad-nosed Bat (*Scoteanax rueppellii*) utilises a variety of habitats from woodland through to moist and dry eucalypt forest and rainforest, though it is most commonly found in tall wet forest. Although this species usually roosts in tree hollows, it has also been found in buildings. The species forages after sunset, flying slowly and directly along creek and river corridors at an height of 3 - 6 m. Open woodland habitat and dry open forest suits the direct flight of this species as it searches for beetles and other large, slow-flying insects; this species has been known to eat other bat species. Little is known of its reproductive cycle, however a single young is born in January; prior to birth, females congregate at maternity sites located in suitable trees, where they appear to exclude males during the birth and raising of the single young (OEH 2024b).

Little Bentwing-bat (*Miniopterus australis*) occurs in moist eucalypt forest, rainforest, vine thicket, wet and dry sclerophyll forest, Melaleuca swamps, dense coastal forests and banksia scrub. It is generally found in well-timbered areas. Little Bentwing-bats roost in caves, tunnels, tree hollows, abandoned mines, stormwater drains, culverts, bridges and sometimes buildings during the day, and at night forage for small insects beneath the canopy of densely vegetated habitats. They often share roosting sites with the Common 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 Eastern Bentwing-bats (*Miniopterus schreibersii*) 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 (OEH 2020b).

Southern Myotis (*Myotis macropus*) generally roosts in groups of 10 - 15 close to water in caves, mine shafts, hollow-bearing trees, storm water channels, buildings, under bridges and in dense foliage. The species is dependent on waterways with pools of 3m wide or greater for foraging, with habitat surrounding the waterways (usually within 200m) being used for breeding and roosting. The species will forage over streams and pools catching insects and small fish by raking their feet across the water surface. In NSW females have one young each year usually in November or December (OEH 2020c).

Yellow-bellied Sheath-tail-bat (*Saccolaimus flaviventris*) roosts singly or in groups of up to six, in tree hollows and buildings; in treeless areas they are known to utilise mammal burrows. When foraging for insects, it flies high and fast over the forest canopy, but lower in more open country. The species forages in most habitats across its very wide range, with and without trees and appears to defend an aerial territory. Breeding has been recorded from December to mid-March, when a single young is born. Seasonal movements of the species are unknown; there is speculation about a migration to southern Australia in late summer and autumn (OEH 2022h).

Microbat young are typically born around November-December, with weaning around the following January-February (Richards & Hall 2012)

The site is considered to contain potential foraging habitat for each of these microbats. Potential roosting habitat for hollow-dependent microbats occurs in hollow-bearing trees (HBTs) within the site. Numerous HBTs offering potential roosting habitat occur in proximity to the site.

Only two potential microbat roosting features would be impacted on as a result of the proposal, each of which would be inspected and relocated with minimal disturbance and minimal risk of harm to any potential resident fauna:

- One detached hollow branch caught in canopy with 5-10cm hollows (habitat feature #021 – see Photo 13). This branch could be readily relocated.
- One horizontal 10cm pipe hollow (habitat feature #022 – see Photo 14). Vigorous callus tissue growth visible around the base of the dead branch suggests that it is unlikely that the hollowed section of branch extends into trunk of the tree. The branch could therefore be temporarily plugged at the open end, cut through at the sealed end and then safely relocated containing any resident fauna. An inspection camera (endoscope) would be used to check for resident fauna and confirm the depth of the hollow.

No impacts to caves or crevices would occur.

Approximately 10,310 m<sup>2</sup> canopy cover would be removed along a 4.8 km length of existing disturbed road edge. Extensive high-quality vegetation would remain in proximity to the site including within protected NPWS land (e.g. Bomaderry Regional Park and Tapitallee Nature Reserve) and Crown Reserve (e.g. Bangalee Reserve). The impact on foraging habitat for these species would therefore be negligible.

Works would occur during normal construction hours, so would not affect the nocturnal foraging activities of these species.

Fragmentation resulting from canopy and understorey gaps would be negligible and is unlikely to affect the movement of any locally occurring fauna.

No barriers to movement affecting microbat species would be introduced.

It is therefore considered unlikely that Eastern False Pipistrelle, Greater Broad-nosed Bat, Eastern Bentwing-bat or Large-eared Pied Bat would be impacted by the proposed works, and the proposed activity is unlikely to have an adverse effect on the lifecycle of these species such that a viable local population of any of these species is likely to be placed at risk of extinction.

**Part 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 following EECs are mapped as occurring within or in proximity to the site; are associated with vegetation communities which are mapped as occurring within or in proximity to the site; and have indicative species which were recorded as occurring within or in proximity to the site during investigations:

- Illawarra Lowlands Grassy Woodland in the Sydney Basin Bioregion

Illawarra Lowlands Grassy Woodland in the Sydney Basin Bioregion

Illawarra Lowlands Grassy Woodland (ILGW) occurs on relatively gently sloping to undulating lands less than about 200 m elevation on Berry Siltstone, Budgong Sandstone and Quaternary alluvium. This community comprises vegetation types that occupy the Illawarra coastal plain and escarpment foothills. Characteristic tree species in the Illawarra Lowlands Grassy Woodland are *Eucalyptus tereticornis*, *Eucalyptus eugenioides*, *Eucalyptus longifolia*, *Eucalyptus bosistoana* and *Melaleuca decora*. The understorey is not necessarily grassy as moist forest vegetation types are also included within this broad community. Common shrub species include *Acacia mearnsii* and *Dodonaea viscosa* subsp. *angustifolia* (NSW Scientific Committee 2011a; OEH 2022d).

The underlying geology of the site is predominantly Berry Siltstone, with areas of alluvial deposits associated with creeks (refer to Figure 5).

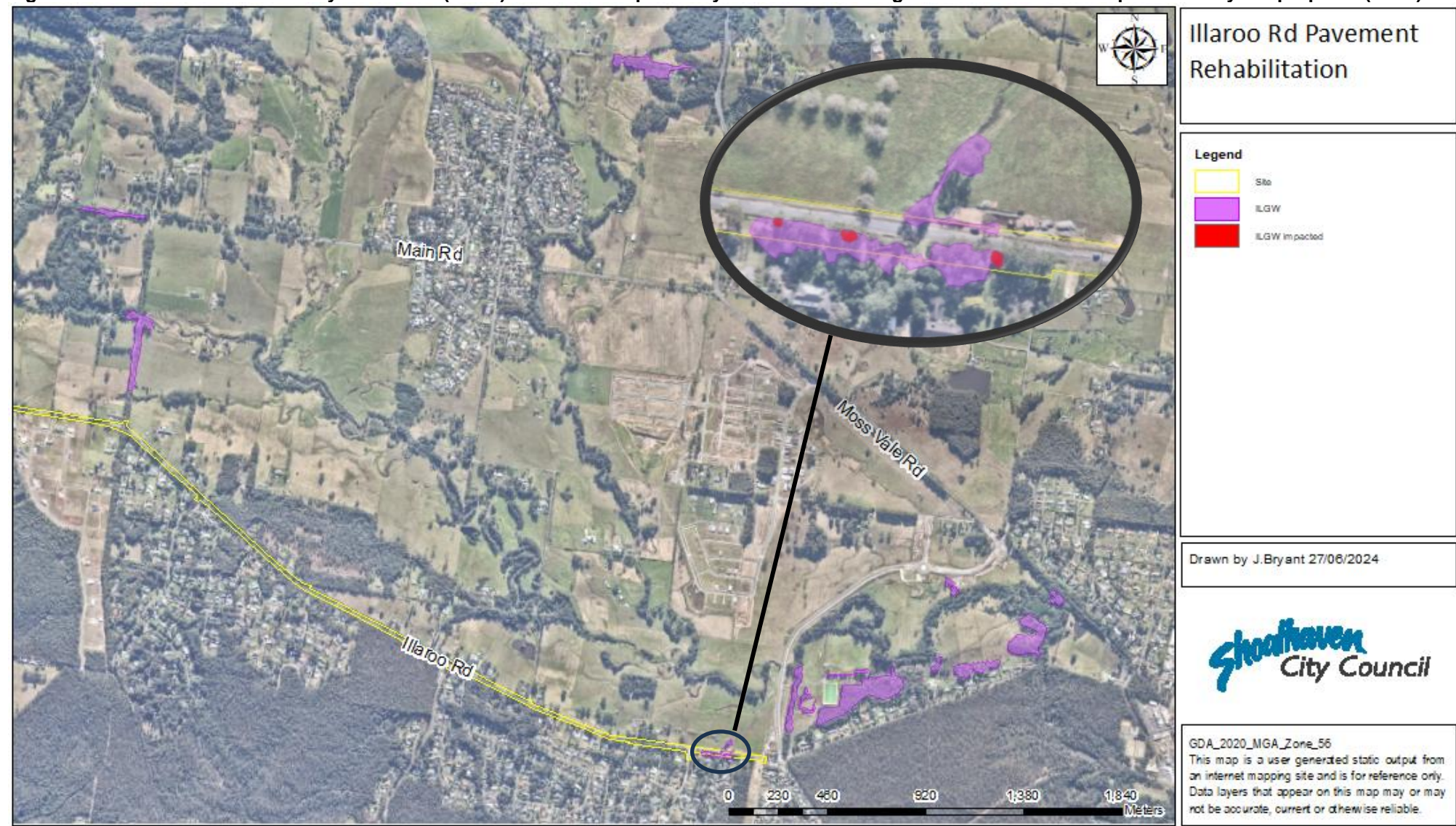
Under the current NSW Plant Community Type (PCT) classification, Illawarra Lowlands Grassy Woodland EEC is associated with PCT3327 Illawarra Lowland Red Gum Grassy Woodland. Available PCT mapping indicates that PCT3327 occurs in the locality, but seems to under-represent the community's extent, suggesting that it is limited to one or two very small patches adjacent to Bomaderry Creek.

Locally, *Eucalyptus amplifolia* occurs as an indicative species of ILGW in place of – and sometimes in addition to – *E.tereticornis*. Based on visual inspections and aerial photography, it is estimated that at least 12.17 ha of remnant ILGW patches occurs in varying condition in the locality between Illaroo Rd, Moss Vale Rd and to the west of Tapitalle Rd, including large patches in Bernie Regan Sporting Complex (refer to Figure 11).

Within the site, a low-lying area occurs from approx. CH 160 m to 310 m between Karana Dr and Moondara Dr, with vegetation dominated by *Eucalyptus amplifolia* and *Angophora floribunda* with *Melaleuca linariifolia*, *Glochidion ferdinandi* and *Parsonsia straminea*. This was identified as a 3260 m<sup>2</sup> patch of PCT3327 Illawarra Lowland Red Gum Grassy Forest and is considered to be representative of ILGW.

Approximately 150 m<sup>2</sup> of this ILGW patch would be removed as part of the proposal.

Figure 11. Illawarra Lowland Grassy Woodland (ILGW) within and in proximity to the site showing ILGW that would be impacted on by the proposal (inset)



The proposed vegetation removal impacting on ILGW would occur along the existing disturbed road edge and would retain vegetation behind.

The removal of ILGW would represent a 4.6% loss from the contiguous patch and a 0.1% loss of the EEC from the locality.

The proposal would not result in sediment movement, changes to soil characteristics or hydrology, nor introduction of invasive species or edge effects that might impact indirectly on the EEC.

The proposal would therefore not involve a significant removal of the EEC, and would not result in the fragmentation or isolation of areas of ILGW EEC, nor adversely affect the extent or composition of ILGW EEC such that a local occurrence of the EEC will be placed at risk of extinction.

***Part 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***
- (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.***

No important habitat for threatened species would be removed or otherwise significantly impacted (see Part A).

No EEC would be fragmented or isolated, nor removed or modified to an extent that would affect the long-term survival of the EEC occurring in the locality (refer to Part B).

The proposal will therefore not affect the long-term survival of any threatened species or endangered ecological community in the locality.

***Part 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 “areas of outstanding biodiversity values” have been declared in the City of Shoalhaven.

***Part 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.***

Key threatening processes listed in the NSW *Biodiversity Conservation Act 2016* considered relevant to the proposed activity include:

- Clearing native vegetation

Clearing of native vegetation is listed as a key threatening process, defined by the Scientific Committee's determination (OEH 2021) as:

*the destruction of a sufficient proportion of one or more strata (layers) within a stand or stands of native vegetation so as to result in the loss, or long-term modification, of the structure, composition and ecological function of a stand or stands.*

Clearing of native vegetation has been shown to:

- cause widespread fragmentation of ecological communities;
- reduce the viability of ecological communities by disrupting ecological functions;
- result in the destruction of habitat and loss of biological diversity;
- lead to soil and bank erosion, increased salinity and loss of productive land.

The proposal would involve the clearing of approximately 10,310 m<sup>2</sup> (canopy extent) native vegetation including approximately 241 trees (0.1 m to 1.5 m diameter at breast height (DBH)).

All vegetation removal would occur along a linear, existing disturbed roadside edge and would not result in increased fragmentation.

Removal of habitat features would be limited to two glider feed trees (presumed Sugar Glider) and one Glossy Black Cockatoo feed tree from a location where suitable feed trees are in ample supply, and three hollow-bearing trees – one of which is unlikely to be suitable for use by any fauna other than frogs or small lizards and two which would be relocated to suitable vegetation – again from a location where hollow features are in ample supply.

Disturbed areas would be stabilised following completion of works.

Revegetation with trees is not possible or appropriate within disturbed areas of the site.

Compensatory planting in other locations is however, recommended as a mitigation measure.

The impact of the proposal with regard to clearing of native vegetation, is not considered to be significant as it is unlikely to lead to:

- destruction of habitat causing a loss of biological diversity and extinction of species or loss of local genotypes.
- fragmentation of populations resulting in limited gene flow between small, isolated populations, reduced potential to adapt to environmental change and loss or severe modification of the interactions between species.
- riparian zone degradation such as bank erosion leading to sedimentation that affects aquatic communities – the riparian corridor would be stabilised as a result of the works.
- disturbance of habitat which may permit the establishment and spread of exotic species which may displace native species.
- loss of leaf litter, removing habitat for a wide variety of vertebrates and invertebrates.
- significant reduction of habitat for threatened species or ecological communities.

### 3.3 Threatened species impact assessment (Commonwealth EPBC Act 1999)

A Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) Protected Matters Report was generated on 27<sup>th</sup> June 2024. An EPBC Protected Matters Report provides general guidance on matters of national significance and other matters protected by the EPBC Act in the area selected. Of those threatened species and endangered ecological communities reported as likely occurring or having habitat within the area of the report, the following were considered to have potential habitat on the site and requiring of further assessment undertaken in Table 5 below:

- Gang-gang Cockatoo *Callocephalon fimbriatum* (E)
- South-eastern Glossy Black-cockatoo *Calyptorhynchus lathami* (V)
- Swift Parrot *Lathamus discolor* (CE)
- Grey-headed Flying-fox *Pteropus poliocephalus* (V)
- Illawarra and south coast lowland forest and woodland ecological community (CE)

(CE – Critically Endangered; E – Endangered; V – Vulnerable; M – Migratory).

Refer also to Likelihood of Occurrence Table in Appendix B.

Additional species listed under the Act, including migratory species, may occur occasionally transiently over or in the vicinity of the proposed activity but would not be affected by the proposal.

**Table 5. EPBC Significant impact assessment**

<b><i>Vulnerable species - Significant impact criteria</i></b> Species to consider: <ul style="list-style-type: none"> <li>• <b>South-eastern Glossy Black-cockatoo (GBC)</b></li> <li>• <b>Grey-headed Flying-fox (GHFF)</b></li> </ul>	
<b>Criteria</b>	<b>Assessment</b>
lead to a long-term decrease in the size of an important population of a species	The proposed activity will not directly impact on a known local population of GBC or GHFF, will not affect or disrupt breeding, will not impact on known feed trees, and will have only a negligible impact on potential foraging and refuge habitat. Refer to Section 3.2.2 for more information.
reduce the area of occupancy of an important population	No
fragment an existing important population into two or more populations	No
adversely affect habitat critical to the survival of a species	No important habitat for any of these species will be impacted by the proposed activity. No breeding, and only minimal potential foraging habitat for GBC and GHFF would be impacted. Refer to Section 3.2.2 for more information.
disrupt the breeding cycle of an important population	Works would not affect breeding habitat. Refer above and to Section 3.2.2 for more information.
modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	No important habitat will be impacted by the proposed activity. Refer to Section 3.2.2 for more information.
result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	No invasive species will be introduced
introduce disease that may cause the species to decline	No disease will be introduced
interfere substantially with the recovery of the species	No
<b><i>Critically endangered and endangered species - Significant impact criteria</i></b> Species to consider: <ul style="list-style-type: none"> <li>• <b>Gang-gang Cockatoo (GGC)</b></li> <li>• <b>Swift Parrot (SP)</b></li> </ul>	
<b>Criteria</b>	
lead to a long-term decrease in the size of a population	The proposed activity will not directly impact on a known local population of GGC or SP, will not affect or disrupt breeding or impact on breeding habitat, and will have only a negligible impact on potential foraging habitat of

	GGC and SP. Refer to Section 3.2.2 for more information.
reduce the area of occupancy of the species	No
fragment an existing population into two or more populations	No
adversely affect habitat critical to the survival of a species	No critical habitat for these species will be impacted by the proposed activity. Refer to Section 3.2.2 for more information.
disrupt the breeding cycle of a population	Works would not affect breeding habitat. Refer above and to Section 3.2.2 for more information.
modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	No important habitat will be impacted by the proposed activity. Refer to Section 3.2.2 for more information.
result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat	No invasive species will be introduced
introduce disease that may cause the species to decline	No disease will be introduced
interfere with the recovery of the species	No
<b><i>Critically endangered and endangered ecological communities - Significant impact criteria</i></b> Communities to consider: <b>Illawarra and south coast lowland forest and woodland ecological community (ISCLF&amp;W)</b>	
<b>Criteria</b>	<b>Assessment</b>
reduce the extent of an ecological community	At least 12.17 ha ISCLF&W is considered to occur in the locality with 3260 m <sup>2</sup> of the EEC occurring contiguous with the site. An area of 150 m <sup>2</sup> ISCLF&W would be removed which equates to only a 4.6% loss from the contiguous patch and a 0.1% loss of the EEC from the locality.  The proposed vegetation removal impacting on ILGW would occur along the existing disturbed road edge and would retain vegetation behind.  Refer to Section 3.2.2 for more information.
fragment or increase fragmentation of an ecological community, for example by clearing vegetation for roads or transmission lines adversely affect habitat critical to the survival of an ecological community	No. Refer above and to Section 3.2.2 for more information.
modify or destroy abiotic (non-living) factors (such as water, nutrients, or soil) necessary for an ecological	The proposal would not result in sediment movement, changes to soil characteristics or hydrology, nor introduction of invasive species or edge effects that might impact indirectly on the EEC.

	Refer to Section 3.2.2 for more information.
community's survival, including reduction of groundwater levels, or substantial alteration of surface water drainage patterns	No. Refer above and to Section 3.2.2 for more information.
cause a substantial change in the species composition of an occurrence of an ecological community, including causing a decline or loss of functionally important species, for example through regular burning or flora or fauna harvesting	No. Refer above and to Section 3.2.2 for more information.
cause a substantial reduction in the quality or integrity of an occurrence of an ecological community, including, but not limited to: assisting invasive species, that are harmful to the listed ecological community, to become established, or causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants into the ecological community which kill or inhibit the growth of species in the ecological community	No. Refer above and to Section 3.2.2 for more information.
interfere with the recovery of an ecological community	No
<b>Summary</b>	The proposed vegetation removal would not adversely affect the extent or composition of Illawarra and south coast lowland forest and woodland ecological community, would not fragment and would not affect the recovery or increase the likelihood of extinction of any EEC.

### *Conclusion of EPBC Significant Impact Assessment*

The proposal is therefore unlikely to have an adverse effect on a vulnerable, endangered, critically endangered or migratory species or its habitat, nor on the extent or integrity of an endangered ecological community such that its local occurrence is likely to be placed at risk of extinction.

No other matters of significance, i.e.:

- Ramsar wetlands of international importance;
- Commonwealth marine environment;
- world heritage properties;
- national heritage places;
- the Great Barrier Reef Marine Park;
- nuclear actions; or
- a water resource, in relation to coal seam gas development and large coal mining development;

would be affected as a result of the proposed activity.

Further assessment and referral to the Commonwealth is therefore not required.

### 3.4 Indigenous heritage

Under Section 86 of the NSW *National Parks and Wildlife Act 1974* (NPW Act) it is an offence to disturb, damage, or destroy any Aboriginal object without an Aboriginal Heritage Impact Permit (AHIP). The Act, however, provides that if a person who exercises 'due diligence' in determining that their actions will not harm Aboriginal objects has a defence against prosecution if they later unknowingly harm an object without an AHIP (Section 87(2) of the Act). To affect this, the NSW Department of Environment, Climate Change and Water have prepared the *Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales* (hereafter referred to as the 'Due Diligence Guidelines') to assist individuals and organisations to exercise due diligence when carrying out activities that may harm Aboriginal objects and to determine whether they should apply for an AHIP.

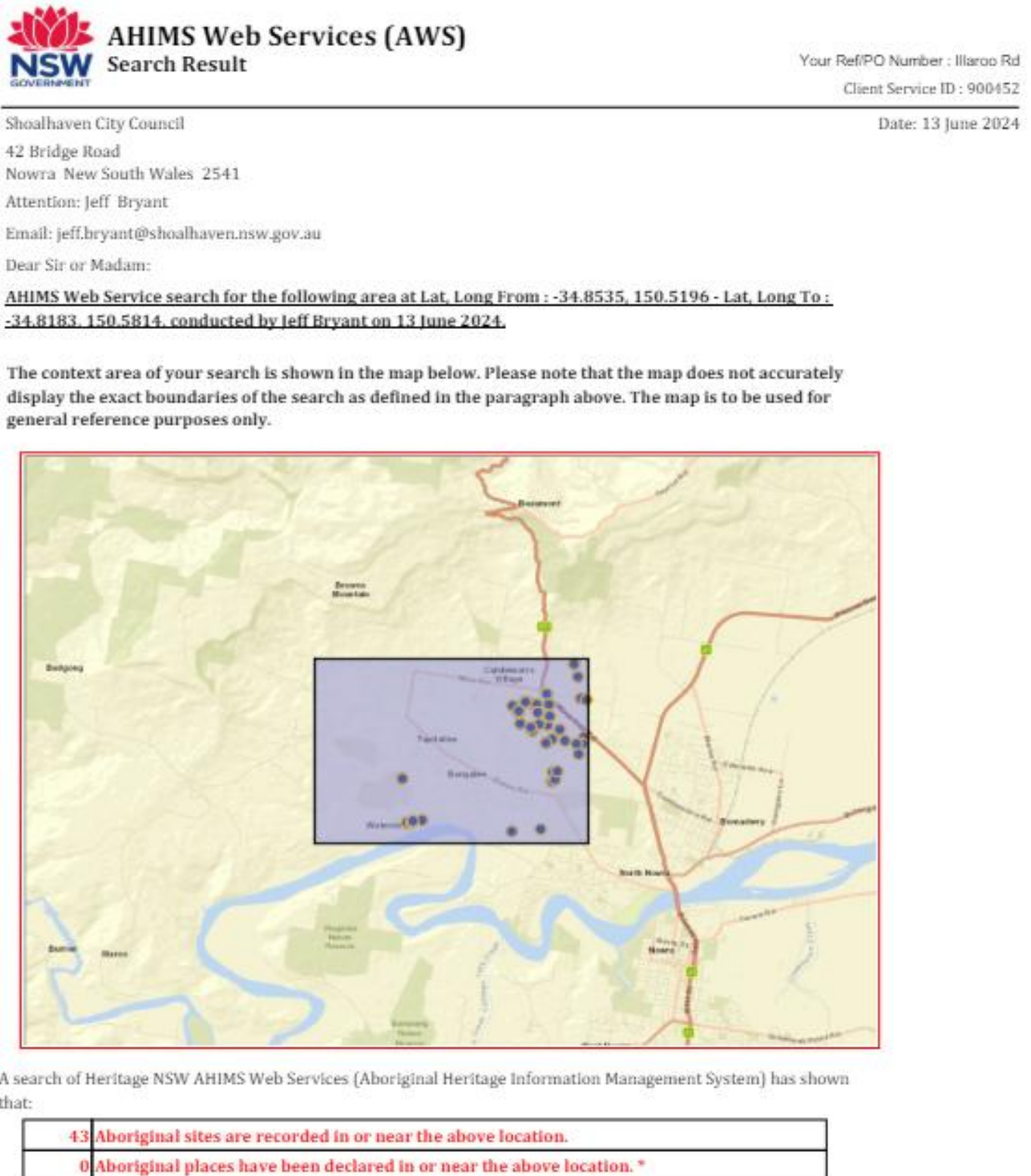
Landscape features that are regarded as indicating a higher potential for Aboriginal objects include:

- within 200m of waters, or
- located within a sand dune system, or
- located on a ridge top, ridge line or headland, or
- located within 200m below or above a cliff face, or within 20m of or in a cave, rock shelter, or a cave mouth.

The site contains a minor, first order (Strahler), ephemeral watercourse, but does not occur within 200 m of any substantial creek or other significant landscape features with a propensity for Aboriginal objects.

Numerous records of Aboriginal heritage are recorded on the Aboriginal Heritage Information Management System (AHIMS) as occurring in the locality (refer to Figure 12). Most of these are associated with Bomaderry Creek and its floodplain, to the north of the Illaroo Rd. No records of Aboriginal heritage occur within or in close proximity to the site.

**Figure 12. Results of AHIMS Aboriginal heritage search**



The Due Diligence Guidelines define disturbed land as follows:

*“Land is disturbed if it has been the subject of a human activity that has changed the land’s surface, being changes that remain clear and observable. Examples include ploughing, construction of rural infrastructure (such as dams and fences), construction of roads, trails and tracks (including fire trails and tracks and walking tracks), clearing vegetation, construction of buildings and the erection of other structures, construction or installation of utilities and other similar services (such as above or below ground electrical infrastructure, water or sewerage pipelines, stormwater drainage and other similar infrastructure) and construction of earthworks.”*

The area that would be affected by the proposal could be described as ‘disturbed land’ (as defined in the NSW Department of Environment, Climate Change and Water’s Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales 2010) by virtue of the land being subject to past disturbance associated with clearing and construction and maintenance of Illaroo Rd and its stormwater infrastructure.

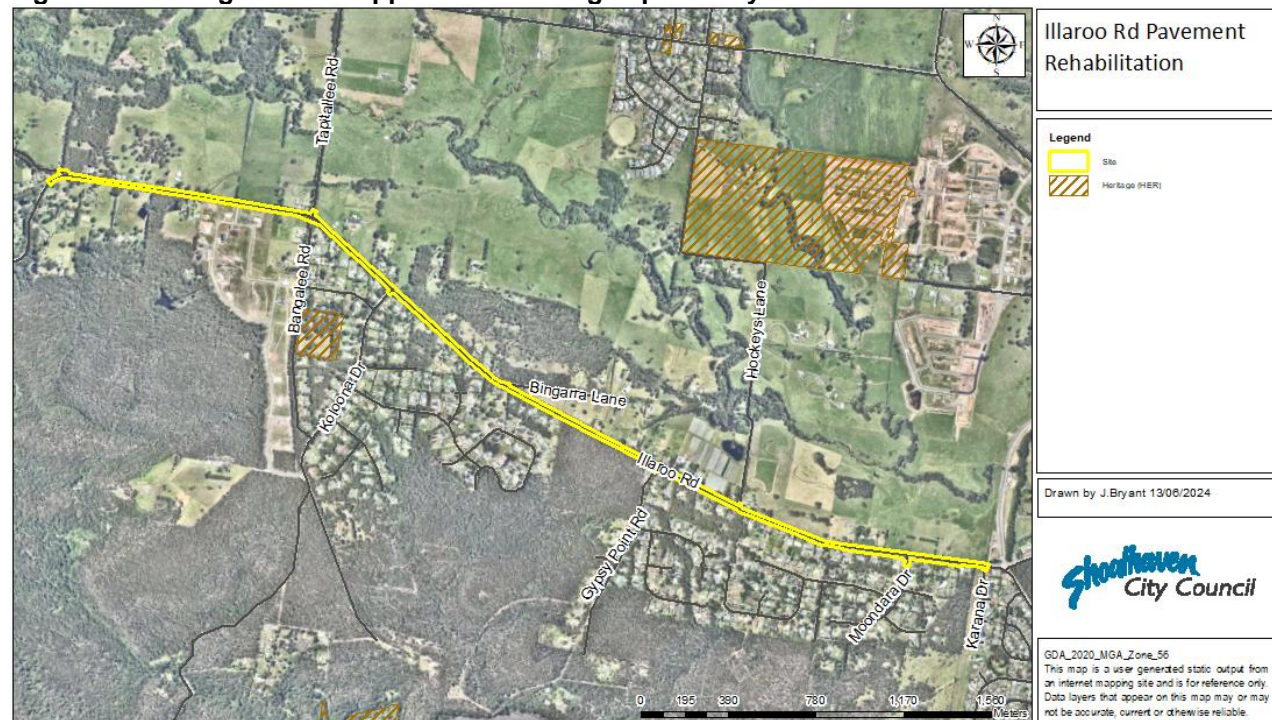
The subject area is therefore of low archaeological potential due to landform type and previous high levels of disturbance.

As no recorded Aboriginal objects would be impacted by the proposal and it is unlikely that Aboriginal objects occur, the proposal can proceed with caution. If any Aboriginal objects, including human skeletal remains are encountered during construction, works must cease immediately and the NSW Environment Hotline notified.

### 3.5 Non-indigenous heritage

No items of local heritage significance or any items on the State Heritage Register or listed in the Shoalhaven Local Environmental Plan occur in close proximity to the site such that the proposed works might impact them (refer to Figure 13).

**Figure 13. Heritage items mapped as occurring in proximity to the site**



### 3.6 Acid Sulfate Soils

The site is mapped as containing Class 5 Acid Sulfate Soil (A.S.S.), refer to Figure 14.

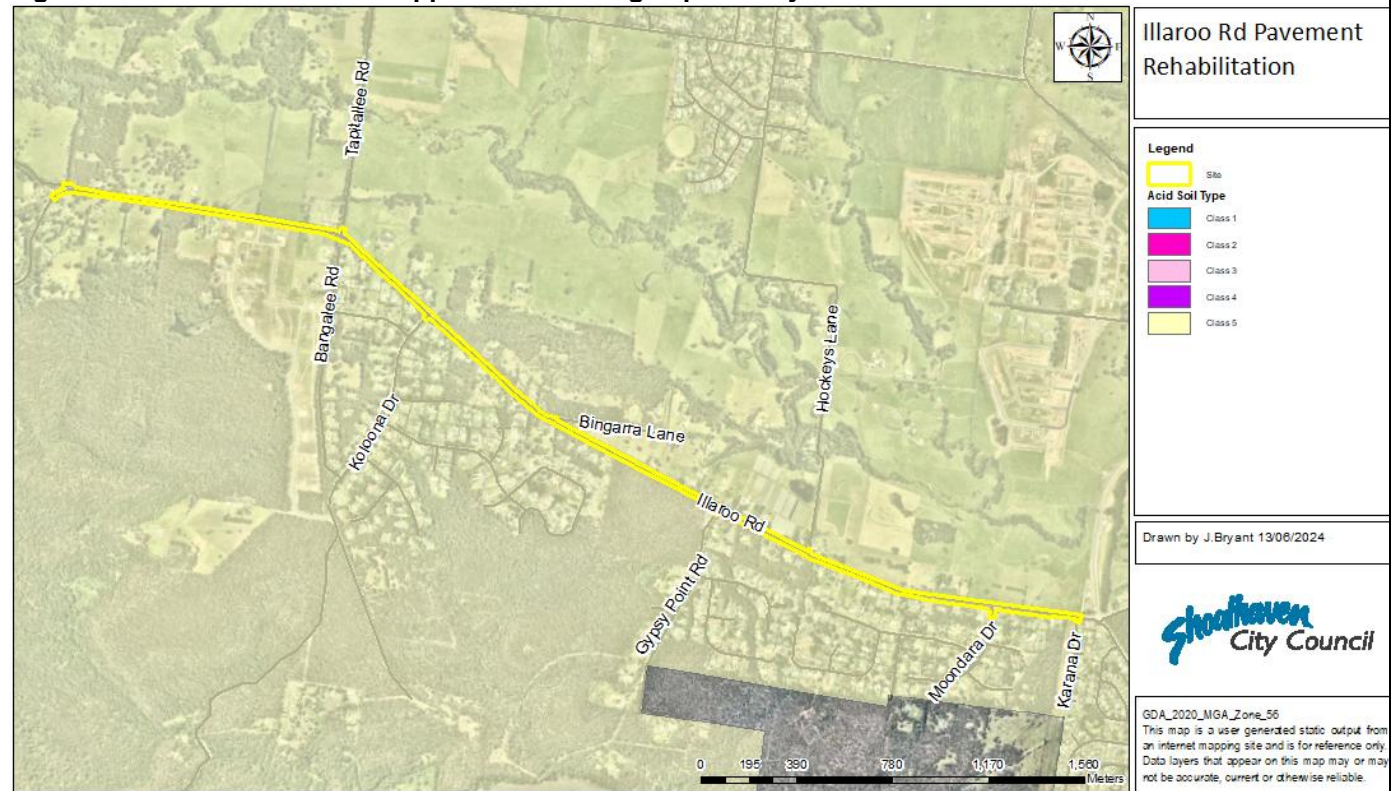
The *Shoalhaven Local Environment Plan 2014* (SLEP) indicates that a risk of exposure of Acid Sulfate Soil exists on land mapped as Class 5 A.S.S. where works would occur within 500 metres of adjacent Class 1, 2, 3 or 4 land that is below 5 metres Australian Height Datum and by which the watertable is likely to be lowered below 1 metre Australian Height Datum on adjacent Class 1, 2, 3 or 4 land.

The proposal would not occur within 500 m of Class 1, 2, 3 or 4 land, and would not result in any lowering of the watertable.

It is therefore unlikely that Acid Sulfate Soil exposure would occur.

No further consideration is warranted.

**Figure 14. Acid Sulfate Soils mapped as occurring in proximity to the site**



### 3.7 Riparian corridors, Water Quality & Key Fish Habitat

Impacts on riparian corridors, water quality and Key Fish Habitat (KFH) were considered regarding the following:

- Likely and potential impacts on vegetation as a result of construction activities;
- Sediment movement into waterways as a result of construction activities;
- Dredging and reclamation activities in KFH requiring permit under the *Fisheries Management Act 1994*.

No KFH occurs within or in close proximity to the site. No works would occur which affect KFH requiring a permit under the *Fisheries Management Act 1994*.

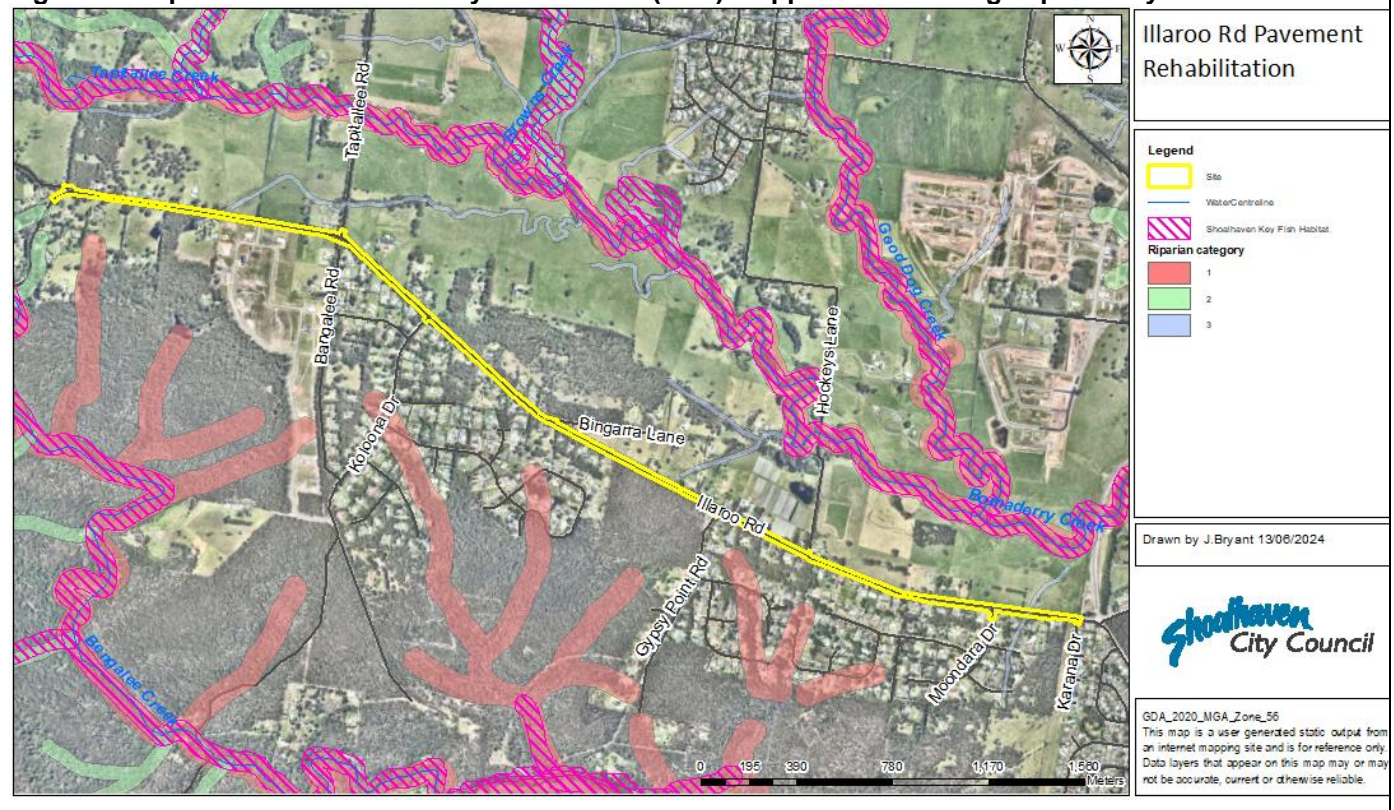
No named or otherwise significant watercourses occur within or in close proximity to the site.

Two unnamed, first order (Strahler) watercourses intersect the site between Karana Dr and Moondara Dr at approx. CH 3710 m, and between Tapitallee Rd and Browns Mountain Rd at approx. CH 7470 m.

A category 3 riparian corridor associated with an unnamed, first order (Strahler) watercourse intersects the site between Karana Dr and Moondara Dr at approx. CH 3710 m. Works in the immediate vicinity of this watercourse and riparian corridor would include pavement restoration, replacement of the existing 375 mm pipe culvert with a 1500 x 750 box culvert, replacement of the existing inlet pit with a 2100 mm x 900 mm letterbox pit, and extension of the downstream headwall. No vegetation removal would be required.

Another category 3 riparian corridor associated with an unnamed, first order (Strahler) watercourse intersects the site between Tapitallee Rd and Browns Mountain Rd at approx. CH 7470 m. Works in the immediate vicinity of the watercourse and riparian corridor would be limited to pavement restoration and construction of a new 3000 mm x 2000 mm pit with dual 900 mm x 900 mm grates on the inlet side. No vegetation removal would be required. A concrete-lined table drain would be constructed upslope and west of the inlet from CH4010 m to CH4340 m along both sides of Illaroo Rd. This would address existing severe scouring of the table drain and reduce impacts on the watercourse and riparian corridor associated with sediment deposition.

**Figure 15. Riparian corridors and Key Fish Habitat (KFH) mapped as occurring in proximity to the site**



Erosion and sediment controls would be implemented to reduce the risk of impacts on the riparian corridor and waterway associated with sediment movement during construction.

Stabilisation of disturbed areas would occur following completion of works.

The proposal would therefore not result in significant impacts on riparian corridors, water quality or key fish habitat.

### 3.8 Flood liable land

Land which is mapped as flood-labile occurs in the vicinity of Koloona Drive, associated with a minor, unnamed tributary of Tapitallee Creek (refer to Figure 16).

In this location the proposal involves an increase in pavement height of 150 mm and an increase in culvert capacity, with twin 525 mm pipes to be replaced by a 1500 x 750 box culvert.

The proposal was referred to Council's Floodplain Management Team for review. The response received (SCC reference D24/249219) indicated no concern over potential flood impacts resulting from the proposal:

*"As a general comment, any upsizing of culverts should ideally be accompanied by a flood impact assessment to demonstrate that proposed increased culvert capacity does not adversely impact downstream property owners from increased flood affectation.*

*Having that said, for the proposed upgrades along Illaroo Rd, I think the above would be more of a "nice to have" than a "must have".*

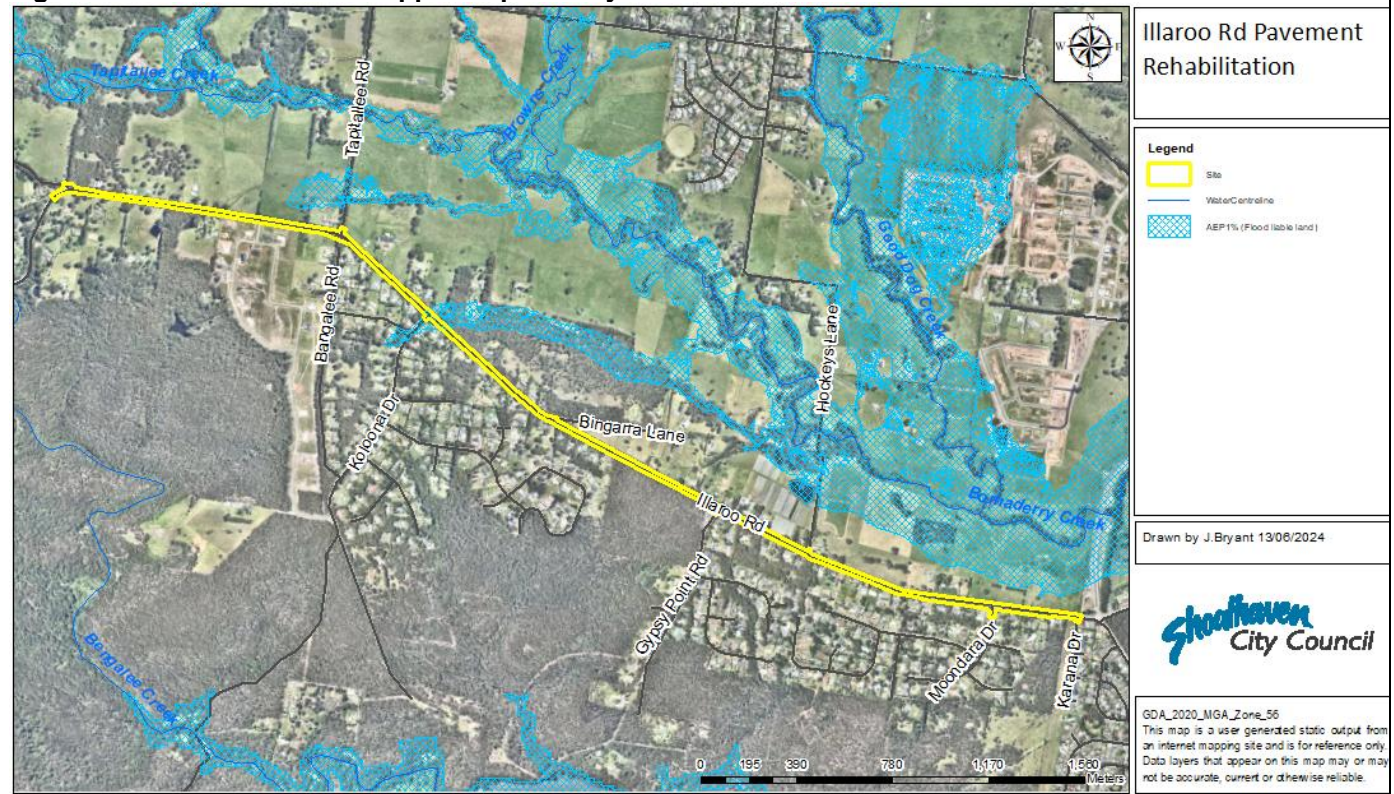
*The road crossing near Koloona Dr is the only crossing that was included in the hydraulic modelling extent of Council's Bomaderry Creek Floodplain Risk Management Study & Plan, which is why it also is the only crossing mapped as flood liable. It also appears that the culvert was not included in the model resulting in an incorrect representation of flood behaviour at this location. It is noted that the upstream catchments of all culverts are rather limited in size (i.e., Illaroo Rd is running close to the ridge of the catchment). As such, it is unlikely that increasing culvert sizes would significantly impact downstream flood conditions.*

*Furthermore, I have looked at each crossing and noted that there are no residential dwellings in vicinity of the culvert crossings that are likely to be adversely impacted by the proposed works.*

*Based on the above, I do not have any concerns relating to the proposed works."*

No further consideration is warranted.

**Figure 16. Flood liable land mapped in proximity to the site**



### 3.9 Other

In the context of this environmental assessment, the area to be affected by the proposed activity:

- is not an Aboriginal Place in the context of the NSW National Parks and Wildlife Act 1974, nor is it known to contain Aboriginal artefacts;
- is not mapped as “potentially contaminated land”.

### 3.10 EP&A Regulation – Section 171 matters of consideration

Section 171(2) of the *Environmental Planning and Assessment Regulation 2021* lists the factors to be taken into account when consideration is being given to the likely impact of an activity on the environment under Part 5 of the EP&A Act. The following assessment in Table 5 deals with each of the factors in relation to the proposed activity.

**Table 5. Section 171 Matters of consideration**

Does the proposal:	Assessment	Reason
a) Have any environmental impact on a community?	Positive	The proposal involves restoration of a degraded section of Illaroo Rd from chainage (CH) 3.5 km to CH 8.3 km, North Nowra / Tapitallee.

		<p>The proposal would require temporary disruption and delays to traffic.</p> <p>Temporary disruption to services including water supply may be required as part of the proposal.</p> <p>The proposed activity would not have any impact on other community services and infrastructure such as wastewater, waste management, educational, medical or social services.</p>
b) Cause any transformation of a locality?	Positive	<p>The locality's current use would remain relatively unchanged, with enhanced access and safety of vehicular travel.</p>
c) Have any environmental impact on the ecosystem of the locality?	Low adverse	<p>The five-part test of significance (Section 3.2 of this REF) concludes that the proposed activity would not have a significant impact upon threatened species or endangered ecological communities.</p> <p>Removal of native vegetation would occur only along existing disturbed edges, with no anticipated significant impacts on ecological communities or ecological connectivity.</p> <p>Refer to Sections 3.2.2 and 3.3 of this REF for more information.</p> <p>No food resources critical to the survival of a particular species would be removed.</p> <p>Aquatic ecosystems are not likely to be adversely affected by the proposed activity and there is not likely to be any long-term or long-lasting impact through the input of sediment and nutrient into the ecosystem.</p> <p>Environmental safeguards and mitigation measures (Section 7 of this REF) would be employed to minimise risk of impacts.</p>
d) Cause a diminution of the aesthetic, recreational, scientific or other environmental quality or value of a locality?	Negligible	<p>The proposal would not have more than a negligible impact on aesthetic, recreational, scientific or environmental values.</p>
e) Have any effect on a locality, place or building having aesthetic, anthropological, archaeological, architectural, cultural, historical, scientific, or social significance or other special value for present or future generations?	Positive	<p>The site of the proposed activity has no significant aesthetic, anthropological, archaeological, architectural, cultural, historical, scientific or social values.</p> <p>No items in the vicinity of the work site which are listed on the State Heritage Register and the Shoalhaven Local environmental Plan would be impacted by the proposal.</p> <p>The site is not within an Aboriginal Place declared under the <i>National Parks and Wildlife Act 1974</i>.</p> <p>In accordance with the NSW Department of Environment, Climate Change and Water's Due Diligence Code of Practice, the proposed activity does not require an Aboriginal Heritage Impact Permit as the activity is unlikely to harm an Aboriginal artefact (refer to Section 3.4 of this REF).</p>

f) Have any impact on the habitat of protected fauna (within the meaning of the Biodiversity Conservation Act 2016)?	Low-adverse	<p>Impacts on habitat features would be minimal and managed in such a way as to minimise risk to potential resident fauna. Habitat features that would be impacted are in ample supply in proximity to the proposal.</p> <p>The five-part test of significance, provided in Section 3.2 of this REF, concludes that the proposed activity would not have a significant impact upon threatened fauna.</p> <p>The specified environmental mitigation measures (Section 7 of this REF) would mitigate indirect impacts to fauna and habitat including through control of sediment.</p>
g) Cause any endangering of any species of animal, plant or other form of life, whether living on land, in water or in the air?	Negligible	<p>The five-part test of significance, provided in Section 3.2 of this REF, concludes that the proposed activity would not have a significant impact upon threatened fauna.</p> <p>Refer to Sections 3.2.2 and 3.3 of this REF for more information.</p> <p>There are no species likely to rely on the site of the proposed works to the extent that modification would put them further in danger.</p>
h) Have any long-term effects on the environment?	Low-adverse	<p>Works would be relatively short term and the noise generated will occur during normal working hours.</p> <p>The proposed activity would not use hazardous substances or use or generate chemicals which may build up residues in the environment.</p> <p>The possible impacts have been discussed in detail under Section 3 of this REF. Refer also to the conclusions and recommendations in Section 7 of this REF.</p>
i) Cause any degradation of the quality of the environment?	Low-adverse	<p>Aquatic ecosystems are not likely to be affected by the proposed activity and there is not likely to be any long-term or long-lasting impact through the input of sediment and nutrient into the ecosystem.</p> <p>The proposal would not intentionally introduce noxious weeds, vermin, or feral animals into the area or contaminate the soil.</p> <p>Environmental safeguards and mitigation measures (Section 7 of this REF) would be employed to minimise risk of impacts.</p>
j) Cause any risk to the safety of the environment?	Negligible	<p>The proposed activity would not involve hazardous wastes and would not lead to increased bushfire or landslip risks.</p> <p>The proposal is not anticipated to adversely affect flood or tidal regimes, or exacerbate flooding risks.</p>
k) Cause any reduction in the range of beneficial uses of the environment?	Negligible	<p>The site and local environment will remain relatively unchanged. The proposal is consistent with the existing land use. The proposal is not anticipated to result in further degradation of the site or surrounding land.</p>
l) Cause any pollution of the environment?	Low adverse	<p>The proposal would involve a temporary and local increase in noise during the construction phase due to the use of machinery.</p>

		<p>Minor sediment disturbance may result from works, but this is anticipated to be minimal and would be captured and managed during works and stabilised following works.</p> <p>Sediment and erosion control in accordance with the Blue Book will be implemented to minimise movement of sediment into waterways.</p> <p>It is unlikely that the activity (including the environmental impact mitigation measures) would result in water or air pollution, spillages, dust, odours, vibration or radiation.</p> <p>The risk of contamination and spills from machinery including fuel and hydraulic fluids would be minimised through safeguards and mitigation measures (refer to Section 7 of this REF).</p>
m) Have any environmental problems associated with the disposal of waste?	Negligible	<p>Waste generated as part of the proposal shall be re-used in accordance with resource recovery exemptions or taken to a licensed waste facility.</p> <p>There would be no trackable waste, hazardous waste, liquid waste, or restricted solid waste as described in the NSW <i>Protection of the Environment Operations Act 1997</i>.</p>
n) Cause any increased demands on resources (natural or otherwise) which are, or are likely to become, in short supply?	Low adverse	<p>The amount of resources that would be used are not considered significant and would not increase demands on current resources such that they would become in short supply.</p>
o) Have any cumulative environmental effect with other existing or likely future activities?	Negligible	<p>The assessed low adverse or negligible impacts of the proposal are not likely to interact.</p> <p>Mitigation measures (refer to Section 7 of this REF) shall be implemented to minimise the risk of cumulative environmental effects.</p>
p) Any impact on coastal processes and coastal hazards, including those under projected climate change conditions	Low adverse	<p>The proposed activity would have no effect on coastal processes including those projected under climate change conditions.</p> <p>The site is not located in a coastal hazard area.</p>
q) Any applicable local strategic planning statement, regional strategic plan or district strategic plan made under Division 3.1 of the Act	Positive	<p>The proposed activity meets Planning Priority 2 (Delivering Infrastructure) of the <i>Shoalhaven 2040 Strategic Land-use Planning Statement</i>  <a href="https://doc.shoalhaven.nsw.gov.au/displaydoc.aspx?record=D20/437277">https://doc.shoalhaven.nsw.gov.au/displaydoc.aspx?record=D20/437277</a></p> <p>The proposed activity is not inconsistent with the Illawarra Shoalhaven Regional Plan 2041 (ISRP):  <a href="https://www.planning.nsw.gov.au/-/media/Files/DPE/Plans-and-policies/Plans-for-your-area/Regional-plans/Illawarra-Shoalhaven-Regional-Plan-05-21.pdf">https://www.planning.nsw.gov.au/-/media/Files/DPE/Plans-and-policies/Plans-for-your-area/Regional-plans/Illawarra-Shoalhaven-Regional-Plan-05-21.pdf</a></p>

r) Any other relevant environmental factors	N/A	
---	-----	--

## 4. PERMISSIBILITY

### 4.1 Environmental Planning & Assessment Act 1979

Section 4.1 (Development that does not need consent) of the *Environmental Planning and Assessment Act 1979* (EP&A Act) states that:

*“If an environmental planning instrument provides that specified development may be carried out without the need for development consent, a person may carry the development out, in accordance with the instrument, on land to which the provision applies.”*

In this regard, section 2.109(1) of the NSW *State Environmental Planning Policy (Transport and Infrastructure) 2021* (Infrastructure SEPP) provides that:

*“Development for the purpose of a road or road infrastructure facilities may be carried out by or on behalf of a public authority without consent on any land...”*

Section 2.137(1) of the Infrastructure SEPP states:

*“Development for the purpose of stormwater management systems may be carried out by or on behalf of a public authority without consent on any land”.*

Additionally, clause 2.113(1) of the Transport & Infrastructure SEPP provides that (underlined for emphasis):

*“Development for any of the following purposes is exempt development if it is carried out by or on behalf of a public authority or the Minister responsible for Crown roads (within the meaning of the Roads Act 1993) in connection with a road or road infrastructure facilities and complies with section 2.20—*

*(a) erection, installation, maintenance, reconstruction or replacement of any of the following, and any associated landscaping works—*

*...*

*(iii) directional, safety or other advisory signs relating to road works or the use of existing road infrastructure facilities,*

*(iv) pedestrian and cyclist facilities (such as footpaths, street lighting, kerb adjustments and ramps, pedestrian fences, refuges, holding rails, and bollards),*

*...*

*(xi) pavement and road surface markings (such as bus lane markings), lane delineators, electric pavement lights, detection loops and traffic counters,*

*...*

*(xiii) culverts, drains and other works to improve the quality or control of stormwater runoff,*

*...”*

The road pavement restoration and stormwater components of the proposal each constitute an ‘activity’ for the purposes of Part 5 of the EP&A Act, and can be carried out by (or on behalf of) a public authority as development without consent. Environmental impact assessment under Part 5 of the EP&A Act is required, including consideration of matters outlined in Section 171 of the EP&A Regulation 2021. This REF provides this assessment and ensures that Council as determining authority in consideration of the activity, meets its obligation under s5.5 of the EP&A

Act, to examine and take into account to the fullest extent possible, all matters affecting or likely to affect the environment by reason of the activity.

The EP&A Act provides that exempt development can be carried out without requirement for environmental impact assessment under Division 5.1 (EP&A Act Section 1.6).

Exempt development components are included in this REF to ensure that the proposal is carried out in a manner which considers and minimises potential impacts to the environment, and that Council satisfies all obligations with regard to environmental assessment and authorisation.

### 4.2 Other

A summary of other relevant legislation and permissibility is provided in Table 6 below.

**Table 6. Summary of other relevant legislation and permissibility**

<b>NSW STATE LEGISLATION</b>	
<b><i>Environmental Planning and Assessment Act 1979 (EP&amp;A Act)</i></b>	
Permissible    ✓    Not permissible <input type="checkbox"/>	
<b>Justification:</b> The Transport and Infrastructure SEPP provides for the proposed works to be undertaken without development consent (refer above). In circumstances where development consent is not required, the environmental assessment provisions outlined in Part 5 of the Act are required to be complied with. This REF fulfils this requirement.	
<b><i>Shoalhaven Local Environmental Plan 2014 (SLEP)</i></b>	
Permissible    ✓    Not permissible <input type="checkbox"/>	
<b>Justification:</b> Under the SLEP the proposed activity may have required development consent. The provisions of SEPP Infrastructure, however, prevail over the SLEP where there is an inconsistency by virtue of Section 3.28 of the EP&A Act. Consequently, development consent is not required.	
<b><i>Protection of the Environment Operations Act 1997</i></b>	
Permissible    ✓    Not permissible <input type="checkbox"/>	
<b>Justification:</b> The proposed activity does not constitute scheduled development work or scheduled activities as listed in Schedule 1 of the Act. The proposed activity therefore does not require an environmental protection licence.	
<b><i>National Parks and Wildlife Act 1974 (NP&amp;W Act)</i></b>	
Permissible    ✓    Not permissible <input type="checkbox"/>	
<b>Justification:</b> <ul style="list-style-type: none"> <li>The proposed activity would not encroach into National Park estate.</li> </ul>	

- The Act provides the basis for the legal protection and management of Aboriginal sites in NSW. Under Sections 86 and 90 of the Act it is an offence to disturb an Aboriginal object or knowingly destroy or damage, or cause the destruction or damage to, an Aboriginal object or place, except in accordance with a permit of consent under section 87 and 90 of the Act.
- As there are no recorded sites or visible objects and as the site is on 'disturbed land', the Due Diligence Guidelines requires no further assessment as it is reasonable to conclude that there is a low probability of objects occurring in the area of the proposed activity and an AHIP is not required. Refer to Section 3.4 for more information.

### **Fisheries Management Act 1994**

Permissible ☒ Not permissible ☐

The proposed activity:

- would not affect declared aquatic reserves (Part 7, Division 2 of the Act);
- would not involve dredging or reclamation in Key Fish Habitat (Part 7, Division 3);
- would not involve or result in the blocking the passage of fish (s.219);
- would not impact mangroves and marine vegetation (Part 7, Division 4);
- would not involve disturbance to gravel beds where salmon or trout spawn (s.208 of the Act);
- does not involve the release of live fish (Part 7, Division 7);
- does not involve the construction of dams and weirs (s.218);
- would not impact declared threatened species of endangered ecological communities (Part 7A);
- does not constitute a declared key threatening process (Part 7A); and
- would not use explosives in a watercourse (Clauses 70 and 71 of the *Fisheries Management (General) Regulation 2019*).

### **Heritage Act 1977**

Permissible ☒ Not permissible ☐

Justification:

- The proposed activity would not disturb an item of state heritage significance.
- The Act also provides statutory protection to relics, archaeological deposits, artefacts or deposits. Section 139 to 146 of the Act require that excavation that is likely to contain, or is believed may contain, archaeological relics is undertaken in accordance with an excavation permit issued by the Heritage Council. The Act defines an archaeological relic as "*any deposit, artefact, object or material evidence that:*
  - relates to the settlement of the area that comprises New South Wales, not being Aboriginal settlement; or*
  - is of state and local heritage significance"*

As the site has little to no archaeological potential, a permit is not required.

### **Biodiversity Conservation Act 2016**

Permissible ☒ Not permissible ☐

Justification:

- The proposed activity is unlikely to have a significant impact on species and communities listed in the schedules of the Act (refer to Section 3.2).
- The proposed development is not within an area declared to be of “outstanding biodiversity value” as defined in the Act.
- The design and mitigation measures (Section 7) would ensure that no *serious and irreversible impacts on biodiversity values* (as defined by the BC Act) occur at the site of the proposed activity.

The proposed activity therefore is not deemed to be *likely to significantly affect threatened species* and an environmental impact statement (EIS) or a Biodiversity Development Assessment Report (BDAR) is not required.

It is also a defence to a prosecution for an offence under Part 2 of the Act (harming animals, picking plants, damaging the habitat of threatened species or ecological communities *etc*) if the work was essential for the carrying out of an activity by a determining authority within the meaning of Part 5 of the Environmental Planning and Assessment Act 1979 after compliance with that Part. The activity will not remove vegetation that is listed under Schedule 1 Threatened Species, Schedule 2 Threatened ecological communities and Schedule 6 Protected Plants. Therefore the activity is considered permissible as this REF has been prepared and determined in accordance with the EP&A Act.

### **Water Management Act 2000**

Permissible ☒ Not permissible ☐

Justification:

- Local councils are exempt from s.91E(1) of the Act in relation to all controlled activities that they carry out in, on or under waterfront land by virtue of clause 41 of the *Water Management (General) Regulation 2018*.
- The proposal would not interfere with the aquifer and therefore an interference licence is not required (s.91F).

### **COMMONWEALTH LEGISLATION**

#### **Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EP&BC Act)**

Permissible ☒ Not permissible ☐

Justification:

The proposed activity would not be undertaken on Commonwealth land and no matters of National Environmental Significance are likely to be significantly impacted by the proposed activity (Section 3.3). The proposed activity is therefore not a controlled action and does not require commonwealth referral.

#### **Commonwealth *Native Title Act 1993***

Permissible ☒ Not permissible ☐

The proposal would occur entirely within public road reserves to which Native Title does not apply.

## 5. CONSULTATION WITH GOVERNMENT AGENCIES

### 5.1 Transport & Infrastructure SEPP

#### Section 2.10 – Development with impacts on council-related infrastructure or services

As custodians of the roads and stormwater infrastructure in this location, the Shoalhaven City Council (SCC) Roads Asset Manager and SCC District Engineer – North have reviewed and provided input on the proposal during its development.

The proposal has been referred to Shoalhaven Water for consideration of potential impacts on water infrastructure occurring within the road footprint and to arrange relocation of an affected hydrant (SCC reference D24/123075).

The proposal would not cause disruption to or closure of a public place that is under a council's management and control.

Further consultation under section 2.10 is therefore not required.

#### Section 2.11 – Development with impacts on local heritage

No impacts to any local heritage item would occur (refer to Section 3.5 of this REF).

Consultation under Section 2.11 is therefore not required.

#### Section 2.12 – Development with impacts on flood liable land

The proposal would occur on land which is mapped as being flood-labile.

The proposal involves an increase in pavement height and an increase in culvert capacity on land mapped as flood liable in the vicinity of Koloona Drive.

The proposal has been referred to Council's Floodplain Management Team for review of potential flood related risks and impacts. The response received (SCC reference D24/249219) indicated no concern over potential flood impacts resulting from the proposal.

Refer to Section 3.8 of this REF for more information.

#### Section 2.13 – Consultation with State Emergency Service—development with impacts on flood liable land

The proposal would occur on land which is mapped as being flood-labile and would be carried out under a relevant provision for Section 2.13.

Notification to NSW State Emergency Service Risk Reduction was provided on 1<sup>st</sup> July 2024 in accordance with Section 2.13. A response was received (SCC reference D24/291539) which expressed no concerns, but provided general advice to consider potential impacts, risks and disruptions associated with the proposal in its planning and implementation.

#### Section 2.14 – Development with impacts on certain land within the coastal zone

The proposal would not occur within a coastal vulnerability area. Consultation is therefore not required.

#### Section 2.15 – Consultation with public authorities other than councils

In consideration of the consultation requirements specified under Section 2.15 of the Infrastructure SEPP, the proposed activity:

- would not be undertaken on adjacent to land reserved under the *National Parks and Wildlife Act 1974* or in Zone E1 or in equivalent zones.
- does not comprise a fixed or floating structure in or over navigable waters
- would not increase the amount of artificial light in the night sky and located on land within the dark sky region as identified on the dark sky region map
- would not be undertaken within Defence communications facility buffer (only relevant to the defence communications facility near Morundah)
- would not be undertaken on land in a mine subsidence district within the meaning of the *Mine Subsidence Compensation Act 1961*

#### Section 2.16 – Consideration of Planning for Bush Fire Protection (PBP)

The proposed activity is not a type applicable to this clause *i.e.* health services facilities, correctional centres and residential accommodation. Consideration of PBP is therefore not required.

#### Summary

No further consultation with government agencies under Part 2.2, Division 1 of the Transport & Infrastructure SEPP is required.

## 6. COMMUNITY ENGAGEMENT

Affected residents, landowners and sensitive receivers in proximity to the proposed works shall be notified directly prior to commencement.

Notification of upcoming works and potential delays shall be provided to users of Illaroo Rd via variable message boards prior to commencement.

## 7. ENVIRONMENTAL SAFEGUARDS AND MEASURES TO MINIMISE IMPACTS

Note that safeguards are prescribed unless stated otherwise.

Safeguard / Measure		Responsibility												
<b>Works planning, approvals, consultation &amp; notification</b>														
1. Consultation with Shoalhaven Water shall be completed with consideration of potential impacts on water infrastructure occurring within the road footprint and to arrange relocation of infrastructure as required. This shall include arrangements to remove or make-safe the asbestos pipe which is exposed near Bingarra Lane.	SCC Project Manager													
2. Affected residents, landowners and sensitive receivers in proximity to the proposed works shall be notified directly prior to commencement.	SCC Project Manager													
3. Notification of upcoming works and potential delays shall be provided to users of Illaroo Rd via variable message boards prior to commencement.	SCC Project Manager / Construction Contractor													
<b>Site Establishment</b>														
4. An appropriate traffic management plan shall be developed and implemented to minimise disruption and reduce risk of incident along Illaroo Rd during works.	Construction Contractor													
5. Construction compounds, machinery, vehicles and stockpiles shall be located within the construction footprint, or otherwise in existing cleared areas approved by the SCC Project Manager (and relevant land custodian) and shall not encroach into native vegetation, including the drip zone of trees.	SCC Project Manager; Construction Contractor													
<b>Construction works</b>														
6. Construction works shall be within the times shown below with works generating high noise and/or vibration levels scheduled during less sensitive time periods.	Construction contractor													
<table><tr><th>Construction hours</th><th>Monday to Friday</th><th>Saturday</th><th>Sunday and public holidays</th></tr><tr><td>Standard construction hours</td><td>7:00 am to 6:00 pm</td><td>8:00 am to 1:00 pm</td><td>No work<sup>1</sup></td></tr><tr><td>Construction activities with impulsive or</td><td>8:00 am to 5:00 pm<sup>2</sup></td><td>9:00 am to 1:00 pm<sup>2</sup></td><td>No work<sup>1</sup></td></tr></table>	Construction hours	Monday to Friday	Saturday	Sunday and public holidays	Standard construction hours	7:00 am to 6:00 pm	8:00 am to 1:00 pm	No work <sup>1</sup>	Construction activities with impulsive or	8:00 am to 5:00 pm <sup>2</sup>	9:00 am to 1:00 pm <sup>2</sup>	No work <sup>1</sup>		
Construction hours	Monday to Friday	Saturday	Sunday and public holidays											
Standard construction hours	7:00 am to 6:00 pm	8:00 am to 1:00 pm	No work <sup>1</sup>											
Construction activities with impulsive or	8:00 am to 5:00 pm <sup>2</sup>	9:00 am to 1:00 pm <sup>2</sup>	No work <sup>1</sup>											

Safeguard / Measure					Responsibility
	tonal noise emissions				
<sup>1</sup> Emergency works to protect persons, property and the environment permitted  <sup>2</sup> Works may be carried out in continuous blocks not exceeding three hours each with a minimum respite from those activities and works of not less than one hour between each block. 'Continuous' includes any period during which there is less than a one hour respite between ceasing and recommencing any of the work the subject of this condition.					
7. Erosion and sediment controls in accordance with the 'Blue Book' (Landcom 2004) shall be installed and maintained to prevent the entry of sediment into waterways. Erosion and sediment controls shall be maintained in good working order for the duration of the works and subsequently until the site has been stabilised and the risk of erosion is minimal.					Construction Contractor
8. Significant habitat features (including hollow-bearing trees) in proximity to works shall be delineated and protected from encroachment and other impacts during adjacent works.					Construction Contractor; SCC Environmental Officer
9. All machinery to be used shall be cleaned, degreased and in good working order prior to entering the site.					Construction Contractor
10. The contractor shall keep an emergency spill kit on-site at all times with procedures to contain and collect any leakage or spillage of fuels, oils and greases from plant and equipment.					Construction Contractor
11. No major equipment maintenance works shall be undertaken on-site.					Construction Contractor
12. Any waste generated on site shall be reused in accordance with relevant Resource Recovery Orders and Exemptions, or otherwise disposed of at a licenced waste facility.					Construction Contractor
13. If engineering fill is imported to the site, all conditions prescribed in the applicable Resource Recovery Exemptions shall be complied with, including: <ul style="list-style-type: none"> <li>ensuring the producer of the waste has complied with the applicable Order such as testing and validation</li> <li>ensuring the material has met all chemical and other material requirements specified in the applicable Order</li> <li>keeping a written record of the following for a period of six years:               <ul style="list-style-type: none"> <li>the quantity of material received</li> <li>the name and address of the supplier</li> </ul> </li> </ul>					Construction Contractor
14. Any application of the waste road material to land within the road reserve for road purposes shall be in accordance with The Excavated Public Road Material Exemption 2014 ( <a href="http://www.epa.nsw.gov.au/resources/waste/publicroadRRE14.pdf">http://www.epa.nsw.gov.au/resources/waste/publicroadRRE14.pdf</a> ) and The Excavated Public Road Material Order					Construction Contractor

Safeguard / Measure	Responsibility
<p>2014 (<a href="http://www.epa.nsw.gov.au/resources/waste/publicroadRR014.pdf">http://www.epa.nsw.gov.au/resources/waste/publicroadRR014.pdf</a>), particularly:</p> <ul style="list-style-type: none"> <li>a) the excavated public road material can only be applied to land within the road corridor for public road related activities including road construction, maintenance and installation of road infrastructure facilities</li> <li>b) the excavated public road material can only be stored within the road corridor at the site where it is to be applied to land</li> <li>c) the excavated public road material cannot be applied to private lands</li> </ul>	
<p>15. If Virgin Excavated Natural Material (VENM) is taken to the site (i.e. without chemical testing and validation):</p> <ul style="list-style-type: none"> <li>a. the material must meet the definition of VENM.</li> <li>b. the supplier must fill out and complete the <i>VENM Certificate</i> (<a href="http://www.epa.nsw.gov.au/waste/virgin-material.htm">http://www.epa.nsw.gov.au/waste/virgin-material.htm</a>)</li> <li>c. The completed <i>VENM Certificate</i> shall be kept for at least six years and provided to the EPA upon any request.</li> </ul>	Construction Contractor
<p>16. Native vegetation removal and pruning shall be undertaken only to the extent required to construct and maintain the proposed infrastructure.</p>	Construction Contractor
<p>17. Tree protection measures in accordance with AS4970 – <i>Protection of trees on development sites</i> shall be implemented to minimise the risk of impact to the structural root zones of trees to be retained.</p>	Construction Contractor
<p>18. Trees to be removed shall be felled into the development footprint, or otherwise removed in such a way as to avoid damage to surrounding vegetation to be retained.</p>	Construction Contractor;
<p>19. Impact to the structural root zones of trees to be retained shall be avoided to every practical extent.</p>	Construction Contractor;
<p>20. Hollow-bearing trees to be removed shall be inspected by Council's Environmental Officer or other suitably qualified ecologist, via elevated work platform (EWP) prior to removal, for the purpose of identifying and relocating any resident fauna to suitable alternative habitat.</p> <p>Immediately following inspection, hollow limbs identified in section 3.1 of this REF shall be relocated to nearby vegetation outside of the proposal footprint.</p>	SCC Environmental Officer; Construction Contractor;
<p>21. The wombat burrow on 515 Illaroo Rd (approx. CH4860-4900) shall be inspected by Council's Environmental Officer</p>	SCC Environmental Officer;

<b>Safeguard / Measure</b>	<b>Responsibility</b>
prior to excavation or tree removal in this vicinity. Exclusion shall be undertaken if any animal is present.	Construction Contractor;
22. No machinery, vehicles or stockpiles shall encroach into native vegetation which is to be retained.	Construction Contractor
23. Pruning of trees where required is to be undertaken in accordance with AS 4373-1996 "Pruning of Amenity Trees".	Construction Contractor;
24. In the event that any wildlife be significantly disturbed or injured during works, Council's Environmental Officers are to be contacted on 4429 3405, or if unavailable, Wildlife Rescue – South Coast should be contacted on 0418 427 214, to rescue and relocate the animal(s).	Construction Contractor;
25. Staff working at the site will be instructed to stop work immediately on identification of any suspected Aboriginal heritage artefact. If any objects are found, NSW Department of Planning, Industry and Environment (ph:131 555) shall be contacted.	Construction Contractor;
26. Disturbed road verges, batters and other grassed or vegetated areas shall be stabilised following construction e.g. with jute mesh and seeding or hydromulch containing suitable grass species or similar.	Construction Contractor
27. Remediation of construction compound areas shall involve removal of all stockpiled material, dressing and turfing or seeding of grassed areas, as required to return the area to its existing state prior to establishment of the compound.	Construction Contractor
28. It is recommended that compensatory tree replacement be undertaken within the site (if possible) and/or in nearby areas, e.g. 125 Moss Vale Rd (proposed Bomaderry Creek Conservation Area).  Tree replacement shall involve the planting of endemic tree tube-stock (or larger) at a ratio of at least 2 replacement plants to every 1 tree removed (i.e. 482 trees minimum, to replace the proposed 241 to be removed). Species selection shall be consistent with endemic vegetation at planting location(s) – to be approved by Council's Environmental Officer.	SCC Project Manager; SCC District Engineer – Northern; SCC Environmental Officer
<b>Post construction</b>	
29. An asset form shall be trimmed to file 44574E on commissioning of the assets in Accordance with POL15/8 Asset Accounting Policy section 3.1.4 and POL16/79 Asset Management Policy section 3.3.	SCC Project Manager

## 8. SIGNIFICANCE EVALUATION & DECISION STATEMENT

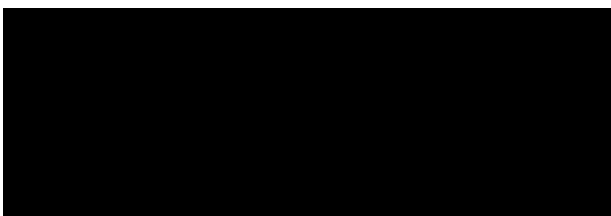
This Review of Environmental Factors has assessed the likely environmental impacts, in the context of Part 5 of the *Environmental Planning and Assessment Act 1979*, of a proposal by Shoalhaven City Council for pavement restoration of Illaroo Rd from chainage (CH) 3.5 km to CH 8.3 km, North Nowra / Tapitallee.

In consideration of the proposal as described in Section 1, in accordance with any design plans referred to in this report, and assuming the implementation of all proposed safeguards and mitigation measures (Section 7), it is determined that:

1. It is unlikely that there will be any significant environmental impact as a result of the proposed activity and an Environmental Impact Statement is not required.
2. The proposed activity will not be carried out in a declared area of outstanding biodiversity value and is not likely to significantly affect threatened species, populations or ecological communities, or their habitats, and a Species Impact Statement / BDAR is not required.
3. No statutory approvals, licences, permits or external government consultations are required.
4. The proposed activity may proceed.

In accepting and adopting this REF, Shoalhaven City Council commits to ensuring the implementation of the proposed safeguards and mitigation measures identified in this report (Section 7) to minimise and/or prevent detrimental environmental impacts.

### Determined by:



Michael Berzins  
Manager – Works and Services  
Shoalhaven City Council

Date: 10/12/2024

## 9. REFERENCES

- Bryant, J. 2021. *Review of Environmental Factors (REF) Shoalwater Infrastructure – Moss Vale Rd URAs – Part 4: Water Reticulation*. SCC reference D21/470203.
- DAWE (Department of Agriculture, Water and the Environment, Australian Government). 2021. *Species Profiles and Threats Database* (online database). Available at <https://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl>
- DECCW (Department of Environment, Climate Change and Water, NSW) 2010 Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales.
- DoE (Department of Environment, Commonwealth of Australia). 2013. *Matters of National Environmental Significance Significant Impact Guidelines 1.1*. Available at: <http://155.187.2.69/epbc/guidelines-policies.html>
- EES (Environment, Energy and Science – NSW Department of Planning, Industry and the Environment). 2020. *Surveying threatened plants and their habitats*.
- Fisheries Scientific Committee 2007 *Determination: Degradation of Native Riparian Vegetation along New South Wales Water Courses*.  
[https://www.dpi.nsw.gov.au/data/assets/pdf\\_file/0009/636534/FR19-riparian-vegetation.pdf](https://www.dpi.nsw.gov.au/data/assets/pdf_file/0009/636534/FR19-riparian-vegetation.pdf)
- Morcombe, M. 2004. *Field Guide to Australian Birds*. Steve Parish Publishing, Australia.
- NSW Government. 2021. *Threatened Biodiversity Data Collection* (online database). Available at: [https://www.environment.nsw.gov.au/AtlasApp/UI\\_Modules/TSM\\_Default.aspx](https://www.environment.nsw.gov.au/AtlasApp/UI_Modules/TSM_Default.aspx)
- NSW Scientific Committee. 2011a. *Illawarra Lowlands Grassy Woodland in the Sydney Basin Bioregion - Determination to make a minor amendment to Part 3 of Schedule 1 of the Threatened Species Conservation Act*. Available from: <https://www.environment.nsw.gov.au/Topics/Animals-and-plants/Threatened-species/NSW-Threatened-Species-Scientific-Committee/Determinations/Final-determinations/2011-2012/Illawarra-Lowlands-Grassy-Woodland-in-the-Sydney-Basin-Bioregion-minor-amendment-Determination>
- NSW Scientific Committee. 2011b. *River-Flat Eucalypt Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions - Determination to make a minor amendment to Part 3 of Schedule 1 of the Threatened Species Conservation Act*. Available at: <https://www.environment.nsw.gov.au/Topics/Animals-and-plants/Threatened-species/NSW-Threatened-Species-Scientific-Committee/Determinations/Final-determinations/2011-2012/River-Flat-Eucalypt-Forest-on-Coastal-floodplains-minor-amendment-Determination>
- NSW Scientific Committee. 2011c. *Swamp Sclerophyll Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions - Determination to make a minor amendment to Part 3 of Schedule 1 of the Threatened Species Conservation Act*. Available at: <https://www.environment.nsw.gov.au/Topics/Animals-and-plants/Threatened-species/NSW-Threatened-Species-Scientific-Committee/Determinations/Final-determinations/2011-2012/Swamp-Sclerophyll-Forest-on-Coastal-Floodplains-of-the-NSW-North-Coast-minor-amendment-Determination>
- OEH (NSW Office of Environment and Heritage). 2017a. *Dusky Woodswallow – profile*. Available at: <https://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=20303>

- OEH (NSW Office of Environment and Heritage). 2017b. *Eastern False Pipistrelle* – profile. Available at: <https://threatenedspecies.bionet.nsw.gov.au/profile?id=10331>
- OEH (NSW Office of Environment and Heritage). 2017c. *Varied Sittella* – Profile. Available at: <https://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=20135>
- OEH (NSW Office of Environment and Heritage). 2018. *Threatened species Test of Significance Guidelines*. OEH, 59 Goulburn St Sydney NSW 2000.
- OEH (NSW Office of Environment and Heritage). 2020a. *Grey-headed Flying-fox* - profile. Available from: <https://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=10697>
- OEH (NSW Office of Environment and Heritage). 2020b. *Little Bent-wing Bat* – profile. Available at: <https://threatenedspecies.bionet.nsw.gov.au/profile?id=10533>
- OEH (NSW Office of Environment and Heritage). 2020c. *Southern Myotis* – profile. Available at: <https://threatenedspecies.bionet.nsw.gov.au/profile?id=10549>
- OEH (NSW Office of Environment and Heritage). 2020d. *Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions* – profile. Available at: <https://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=10786>
- OEH (NSW Office of Environment and Heritage). 2021. *Clearing of native vegetation*- profile. Available at: <https://www.environment.nsw.gov.au/threatenedSpeciesApp/profile.aspx?id=20023>
- OEH (NSW Office of Environment and Heritage). 2022a. *Eastern Pygmy-possum* – Profile. Available at: <https://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=10155>
- OEH (NSW Office of Environment and Heritage). 2022b. *Gang-gang Cockatoo* – profile. Available from: <https://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=10975>
- OEH (NSW Office of Environment and Heritage). 2022c. *Glossy Black-Cockatoo* – profile. Available from: <https://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=10140>
- OEH (NSW Office of Environment and Heritage). 2022d. *Illawarra Lowlands Grassy Woodland in the Sydney Basin Bioregion - Sydney Basin* - profile. Available at: <https://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=10426>
- OEH (NSW Office of Environment and Heritage). 2022e. *Little Lorikeet* – profile. Available from: <https://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=20111>
- OEH (NSW Office of Environment and Heritage). 2022f. *River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions* – profile. Available at: <https://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=10787>
- OEH (NSW Office of Environment and Heritage). 2022g. *Swift Parrot* – profile. Available from: <https://threatenedspecies.bionet.nsw.gov.au/profile?id=10455>
- OEH (NSW Office of Environment and Heritage). 2022h. *Yellow-bellied Sheath-tail-bat* – profile. Available at: <https://threatenedspecies.bionet.nsw.gov.au/profile?id=10741>

- OEH (NSW Office of Environment and Heritage). 2024a. *Eastern Coastal Free-tailed Bat – profile*.  
Available at: <https://threatenedspecies.bionet.nsw.gov.au/profile?id=10544>
- OEH (NSW Office of Environment and Heritage). 2024b. *Greater Broad-nosed Bat – profile*.  
Available at: <https://threatenedspecies.bionet.nsw.gov.au/profile?id=10748>
- Richards, G.C. & Hall, L.S. 2012. *A natural history of Australian bats: Working the night shift*.  
CSIRO Publishing: Collingwood, Victoria.

**APPENDIX A – Design plans**

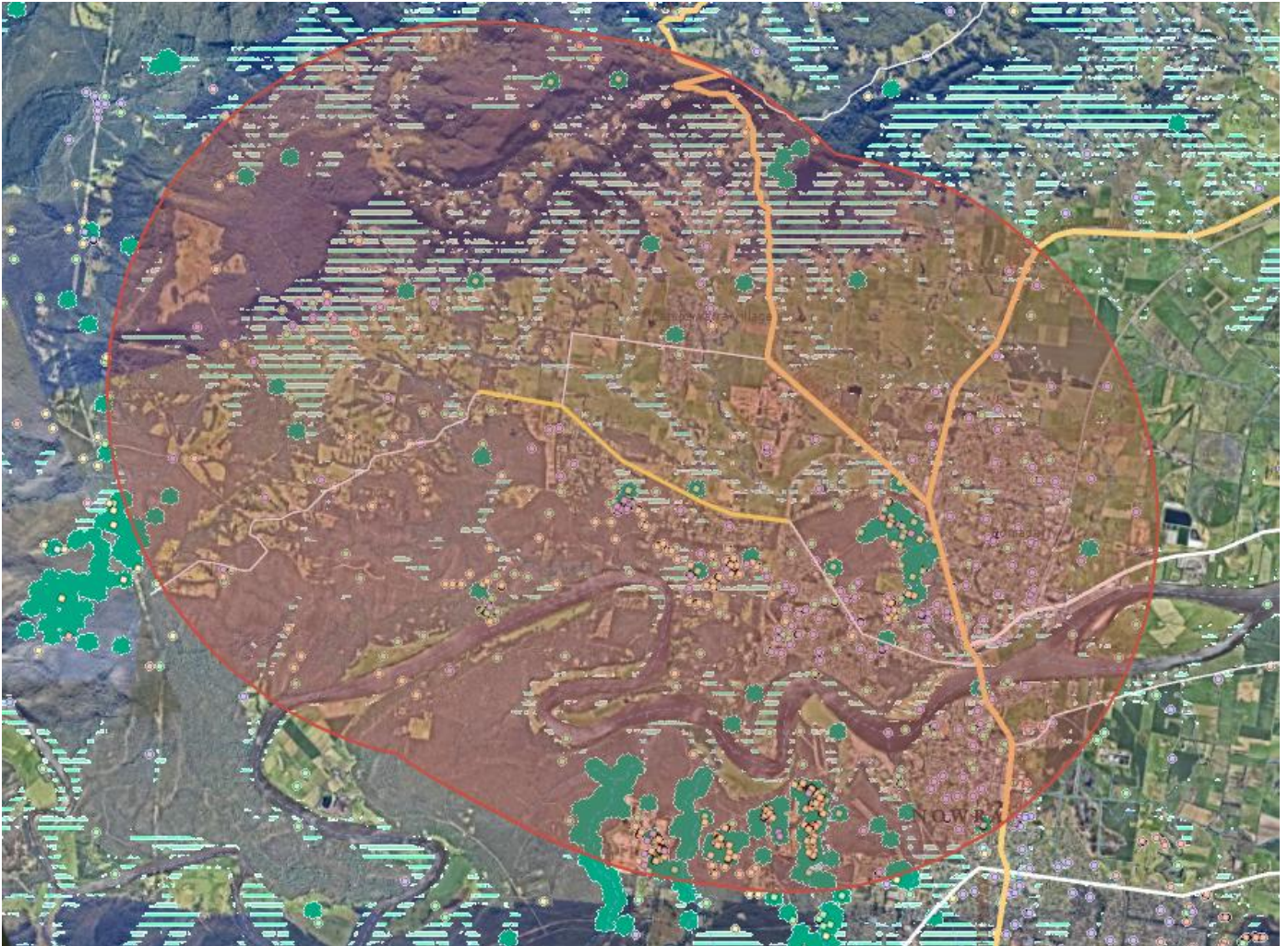
**“ILLAROO ROAD UPGRADE WORKS”**

**(Tender Issue Design)**

**Westlake Punnet & Associates Pty Ltd**

**(SCC Reference D24/392101)**

## APPENDIX B – Threatened Species Likelihood of Occurrence



**NSW Threatened Species Likelihood of Occurrence Table**

The table of likelihood of occurrence evaluates the likelihood of threatened species to occur on the subject site. This list is derived from previously recorded species within a 5 km radius (taken from NSW BioNet Atlas) around the subject site. Ecology information unless otherwise stated, has been obtained from the *Threatened Biodiversity Profile Search* on the NSW OEH (Office of Environment & Heritage) online database (<https://www.environment.nsw.gov.au/threatenedspeciesapp/>).

**Likelihood of occurrence in study area**

1. Unlikely – Species, population or ecological community is not likely to occur. Lack of previous recent (<25 years) records and suitable potential habitat limited or not available in the study area.
2. Likely – Species, population or ecological community could occur and study area is likely to provide suitable habitat. Previous records in the locality and/or suitable potential habitat in the study area.
3. Present – Species, population or ecological community was recorded during the field investigations.

**Possibility of impact**

1. Unlikely – The proposal would be unlikely to impact this species or its habitats. No NSW *Biodiversity Conservation Act 2016* “Test of Significance” or EPBC Act significance assessment is necessary for this species.
2. Likely – The proposal could impact this species, population or ecological community or its habitats. A NSW *Biodiversity Conservation Act 2016* “Test of Significance” and/or EPBC Act significance assessment is required for this species, population or ecological community.

**Note that where further assessment is deemed required, this is undertaken within the REF as a Test of Significance (in the case of NSW listed species) or an EPBC Significant Impact Assessment (in the case of Commonwealth listed species).**

## Review of Environmental Factors Part 5 Assessment EP&A Act 1979

<b>Endangered Ecological Community name</b>	<b>Status</b>	<b>Likelihood of presence within areas impacted by the activity</b>
<i>Bangalay Sand Forest of the Sydney Basin and South East Corner Bioregions (BC Act)</i>	Endangered - NSW BC Act	Site investigations confirmed that the EEC does not occur within or in close proximity to the site, such that there is any risk of impact on the EEC as a result of the proposal.
<i>Coastal Saltmarsh in the NSW North Coast, Sydney Basin and South East Corner Bioregions (BC Act)</i> <i>Subtropical and Temperate Coastal Saltmarsh (EPBC Act)</i>	Endangered - NSW BC Act Vulnerable - Commonwealth EPBC Act	Site investigations confirmed that the EEC does not occur within or in close proximity to the site, such that there is any risk of impact on the EEC as a result of the proposal.
<i>Freshwater wetlands on coastal floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions (BC Act)</i>	Endangered - NSW BC Act	Site investigations confirmed that the EEC does not occur within or in close proximity to the site, such that there is any risk of impact on the EEC as a result of the proposal.
<i>Illawarra Lowlands Grassy Woodland in the Sydney Basin Bioregion (BC Act)</i> <i>Illawarra and south coast lowland forest and woodland ecological community (EPBC Act)</i>	Endangered - NSW BC Act Critically Endangered - Commonwealth EPBC Act	Indicative species and habitat present. Vegetation community present is associated with the EEC. Further assessment was undertaken in s3.2.2 of this REF.
<i>Illawarra Subtropical Rainforest in the Sydney Basin Bioregion (BC Act)</i> <i>Illawarra– Shoalhaven subtropical rainforest of the Sydney Basin Bioregion (EPBC Act)</i>	Endangered - NSW BC Act Critically Endangered - Commonwealth EPBC Act	This EEC is mapped as potentially occurring in proximity to the site, associated with PCT3077 Illawarra Complex Dry Rainforest and PCT3078 Illawarra Lowland Wet Vine Forest. Neither of these PCTs were observed within or in proximity to the site. Site investigations confirmed that the EEC does not occur within or in close proximity to the site, such that there is any risk of impact on the EEC as a result of the proposal.
<i>Littoral Rainforest in the New South Wales North Coast, Sydney Basin and South East Corner Bioregions (BC Act)</i> <i>Littoral Rainforest and Coastal Vine Thickets of Eastern Australia (EPBC Act)</i>	Endangered - NSW BC Act Critically Endangered - Commonwealth EPBC Act	Site investigations confirmed that the EEC does not occur within or in close proximity to the site, such that there is any risk of impact on the EEC as a result of the proposal.

## Review of Environmental Factors Part 5 Assessment EP&A Act 1979

<i>Milton Ulladulla Subtropical Rainforest in the Sydney Basin Bioregion (BC Act)</i> <i>Illawarra– Shoalhaven subtropical rainforest of the Sydney Basin Bioregion (EPBC Act)</i>	Endangered - NSW BC Act Critically Endangered - Commonwealth EPBC Act	Site investigations confirmed that the EEC does not occur within or in close proximity to the site, such that there is any risk of impact on the EEC as a result of the proposal.
<i>River-flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions (BC Act)</i> <i>River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria (EPBC Act)</i>	Endangered - NSW BC Act Critically Endangered - Commonwealth EPBC Act	The EPBC listed EEC is mapped as potentially occurring in proximity to the site, associated with PCT4019 Coastal Alluvial Bangalay Forest. This PCT was not observed within or in proximity to the site. Site investigations confirmed that the EEC does not occur within or in close proximity to the site, such that there is any risk of impact on the EEC as a result of the proposal.
<i>Robertson Basalt Tall Open-forest in the Sydney Basin and South Eastern Highlands Bioregions (BC Act)</i>	Critically Endangered – NSW BC Act	Site investigations confirmed that the EEC does not occur within or in close proximity to the site, such that there is any risk of impact on the EEC as a result of the proposal.
<i>Swamp oak floodplain forest of the NSW North Coast, Sydney Basin and South East Corner bioregions (BC Act)</i> <i>Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland ecological community (EPBC Act)</i>	Endangered - NSW BC Act Endangered - Commonwealth EPBC Act	Site investigations confirmed that the EEC does not occur within or in close proximity to the site, such that there is any risk of impact on the EEC as a result of the proposal.
<i>Swamp sclerophyll forest on coastal floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions (BC Act)</i> <i>Coastal Swamp Sclerophyll Forest of New South Wales and South East Queensland (EPBC Act)</i>	Endangered - NSW BC Act Endangered - Commonwealth EPBC Act	This EEC is mapped as potentially occurring in proximity to the site, associated with PCT4019 Coastal Alluvial Bangalay Forest and PCT4021 Coastal Creekline Dry Shrubby Swamp Forest. These PCTs were not observed within or in proximity to the site. Site investigations confirmed that the EEC does not occur within or in close proximity to the site, such that there is any risk of impact on the EEC as a result of the proposal.

## Review of Environmental Factors Part 5 Assessment EP&A Act 1979

Species name	Common name	Type	Status	Species information & habitat requirements	Likelihood of presence within areas impacted by the activity
<i>Calochilus pulchellus</i>	Pretty Beard Orchid	Flora	Endangered NSW BC Act	The habitat of this species varies considerably. At Vincentia the species grows in dense low wet heath in wet sand over sandstone. In Booderee National Park it grows in a tall heathy association. In Morton National Park on the Little Forest Plateau it occurs in low heath among scattered clumps of emergent eucalypts and Banksia in shallow coarse white sand over sandstone, in a near-escarpment area subject to strong orographic precipitation.	Unlikely. No suitable habitat present. Verge vegetation and habitat is disturbed and modified.
<i>Cryptostylis hunteriana</i>	Leafless tongue Orchid	Flora	Vulnerable EPBC Act Vulnerable NSW BC Act	Occurs in a wide variety of habitats from moist sandy soil to dense heathland, sedgeland and verges of fire trails. The larger populations typically occur in woodland dominated by Scribbly Gum ( <i>Eucalyptus sclerophylla</i> ), Silvertop Ash ( <i>E. sieberi</i> ), Red Bloodwood ( <i>Corymbia gummifera</i> ) and Black Sheoak ( <i>Allocasuarina littoralis</i> ); appears to prefer open areas in the understorey of this community and is often found in association with the Large Tongue Orchid ( <i>C. subulata</i> ) and the Tartan Tongue Orchid ( <i>C. erecta</i> ).	Unlikely. No suitable habitat present. Verge vegetation and habitat is disturbed and modified.
<i>Eucalyptus langleyi</i>	Albatross Mallee	Flora	NSW BC Act Vulnerable EPBC Act Vulnerable	Found in Mallee shrub land on poorly drained, shallow, sandy soils on sandstone.	Unlikely. Habitat is unsuitable. Not observed during comprehensive flora surveys.
<i>Genoplesium baueri</i>	Bauer's Midge Orchid	Flora	Endangered EPBC Act Endangered NSW BC Act	Grows in dry sclerophyll forest and moss gardens over sandstone.	Unlikely. No suitable habitat present. Verge vegetation and habitat is disturbed and modified.
<i>Hibbertia stricta subsp. furcatula</i>		Flora	Endangered NSW BC Act	Habitat of the Southern Sydney population is broadly dry eucalypt forest and woodland. This population appears to occur mainly on upper slopes and above the Woronora River gorge escarpment, at or near the interface between the Lucas Heights soil landscape and Hawkesbury sandstone. Toelken & Miller (2012) note that the species usually grows in 'gravelly loam or clay soil in heath under open woodland'. Habitat of the South Coast population is poorly recorded, but appears to be dry sclerophyll forest or woodland associations in sandy soils over sandstone.	Unlikely. Not observed during comprehensive flora surveys.

## Review of Environmental Factors Part 5 Assessment EP&A Act 1979

Species name	Common name	Type	Status	Species information & habitat requirements	Likelihood of presence within areas impacted by the activity
<i>Pterostylis pulchella</i>	Waterfall Greenhood	Flora	NSW BC ACT Vulnerable EPBC Act Vulnerable	A highly specialised and localised species, growing in sheltered, humid rocky habitats between 450m-850m altitude on the Illawarra escarpment at Fitzroy Falls, Upper Bundanoon Creek, Minnamurra Falls, Belmore Falls and Barrengarry Mtn (Jones 2021). Grows in moss on rocks, sheltered stream banks and rock crevices near waterfalls in moisture retentive loam (Stephenson 2011). Flowers appear from February to May	Unlikely. No suitable habitat present.
<i>Pterostylis ventricosa</i>		Flora	Critically endangered NSW BC Act	Predominantly in more open areas of tall coastal eucalypt forest often dominated by one or more of the following tree species:- Turpentine, Spotted Gum, Grey Ironbark, Blackbutt, White Stringybark, Scribbly Gum and Sydney Peppermint. Often favours more open areas such as along powerline easements and on road verges where the tree overstorey has been removed or thinned. Grows in a range of groundcover types, including moderately dense low heath, open sedges and grasses, leaf litter, and mosses on outcropping rock. Soil type ranges from moisture retentive grey silty loams to grey sandy loams. Sometimes found in skeletal soils on sandstone rock shelves	Unlikely. No suitable habitat present. Verge vegetation and habitat is disturbed and modified.
<i>Pterostylis vernalis</i>		Flora	Critically Endangered EPBC Act Critically Endangered NSW BC Act	<i>Pterostylis vernalis</i> grows in open sites in shallow soil over sandstone sheets, in heath and heathy forest.	Unlikely. No suitable habitat present. Verge vegetation and habitat is disturbed and modified.
<i>Rhodamnia rubescens</i>	Scrub Turpentine	Flora	Critically Endangered NSW BC Act	Found in littoral, warm temperate and subtropical rainforest and wet sclerophyll forest usually on volcanic and sedimentary soils.	Unlikely. Habitat is unsuitable. Not observed during comprehensive flora surveys.
<i>Solanum celatum</i>		Flora	NSW BC Act Endangered	Grows in rainforest clearings or in wet sclerophyll forests. Flowers August to October and produces fruit between December and January. Normally recorded in disturbed margins and clearings.	Unlikely. Habitat is unsuitable. Not observed during comprehensive flora surveys.

## Review of Environmental Factors Part 5 Assessment EP&A Act 1979

Species name	Common name	Type	Status	Species information & habitat requirements	Likelihood of presence within areas impacted by the activity
<i>Syzygium paniculatum</i>	Magenta Lilly Pilly	Flora	Vulnerable EPBC Act Endangered NSW BC Act	On the south coast the Magenta Lilly Pilly occurs on grey soils over sandstone, restricted mainly to remnant stands of littoral (coastal) rainforest.	Unlikely. Not observed during comprehensive flora surveys.
<i>Triplarina nowraensis</i>	Nowra Heath Myrtle	Flora	NSW BC Act Endangered EPBC Act Endangered	Nowra Heath Myrtle occurs on poorly drained, gently sloping sandstone shelves or along creek lines underlain by Nowra Sandstone. The sites are often treeless or have a very open tree canopy due to the impeded drainage.	Unlikely. Habitat is unsuitable. Not observed during comprehensive flora surveys.
<i>Zieria baeuerlenii</i>	Bomaderry Zieria	Flora	NSW BC Act Endangered EPBC Act Endangered	Occurs on skeletal sandy loam overlaying sandstone, on a rocky plateau amongst sandstone boulders in either shrubby open forest, shrubby woodland or closed shrub.	Unlikely. Habitat is unsuitable. Not observed during comprehensive flora surveys.
<i>Zieria tuberculata</i>	Warty Zieria	Flora	NSW BC Act Vulnerable EPBC Act Vulnerable	Grows in heath amongst rocky outcrops on rain forest edges and in tall forest and shrubland.	Unlikely. Habitat is unsuitable. Not observed during comprehensive flora surveys.
<i>Heleioporus australiacus</i>	Giant Burrowing Frog	Amphibian	Vulnerable EPBC Act Vulnerable NSW BC Act	Found in heath, woodland and open dry sclerophyll forest on a variety of soil types except those that are clay based. Spends more than 95% of its time in non-breeding habitat in areas up to 300 m from breeding sites. While in these areas, individuals burrow below the soil surface or in the leaf litter. Individual frogs occupy a series of burrow sites, some of which are used repeatedly. Breeding habitat of this species is generally soaks or pools within first or second order streams. They are also commonly recorded from 'hanging swamp' seepage lines and where small pools form from the collected water. Frogs breed after heavy rain mainly in late summer and Autumn from February to April. Eggs usually laid out of water in a moist burrow in sandy clay banks of smaller creeks, dams or ephemeral pools in forest (Anstis 2017).	Unlikely to occur. No suitable habitat is available.

## Review of Environmental Factors Part 5 Assessment EP&A Act 1979

Species name	Common name	Type	Status	Species information & habitat requirements	Likelihood of presence within areas impacted by the activity
<i>Litoria aurea</i>	Green and Golden Bell Frog	Amphibian	Vulnerable EPBC Act Endangered NSW BC Act	Marshes, dams and stream-sides, particularly those containing bullrushes ( <i>Typha</i> spp.) or spikerushes ( <i>Eleocharis</i> spp.). Optimum habitat for the species includes water-bodies that are unshaded, free of predatory fish such as Plague Minnow ( <i>Gambusia holbrooki</i> ), with a grassy area nearby and diurnal sheltering sites available. Some sites, particularly in the Greater Sydney region occur in highly disturbed areas (OEH 2017).	Unlikely to occur. No suitable habitat is available.
<i>Mixophyes balbus</i>	Stuttering Frog	Amphibian	Endangered NSW BC Act	The Stuttering Frog inhabits rainforest, Antarctic beech and wet sclerophyll forests (Cogger 2000). The species depends on freshwater streams and riparian vegetation for breeding and habitation. No records are known from riparian habitat that has been disturbed (Mahony et al. 1996).	Unlikely to occur. No suitable habitat is available.
<i>Anthochaera phrygia</i>	Regent Honeyeater	Bird	Critically endangered EPBC Act Critically endangered NSW BC Act	Temperate woodlands and open forests- and drier coastal woodlands in some years (flowering coastal woodlands and forests including box-ironbark woodland, and riparian forests-that exhibit large numbers of mature trees, high canopy cover and abundance of mistletoes) Key eucalypt species include Mugga Ironbark, Yellow Box, Blakely's Red Gum, White Box and Swamp Mahogany. Also utilises: <i>Eucalyptus microcarpa</i> , <i>E. punctata</i> , <i>E. polyanthemos</i> , <i>E. moluccana</i> , <i>Corymbia robusta</i> , <i>E. crebra</i> , <i>E. caleyi</i> , <i>C. maculata</i> , <i>E. mckieana</i> , <i>E. macrorhyncha</i> , <i>E. laevopinea</i> , and <i>Angophora floribunda</i> . Nectar and fruit from the mistletoes <i>Amyema miquelii</i> , <i>A. pendula</i> and <i>A. cambagei</i> are also eaten during the breeding season.	Possibly occurring in proximity to the site or transiently over the site, but unlikely to utilise habitat within the site that would be impacted.

## Review of Environmental Factors Part 5 Assessment EP&A Act 1979

Species name	Common name	Type	Status	Species information & habitat requirements	Likelihood of presence within areas impacted by the activity
<i>Ardenna pacifica</i>	Wedge-tailed Shearwater	Bird	Migratory EPBC Act	A pelagic, marine bird known from tropical and subtropical waters. The species tolerates a range of surface-temperatures and salinities, but is most abundant where temperatures are greater than 21 °C and salinity is greater than 34.6 ‰. In tropical zones the species may feed over cool nutrient-rich waters. The species has been recorded in offshore waters of eastern Victoria and southern NSW, mostly over continental slope with sea-surface temperatures of 13.9–24.4 °C and usually off the continental shelf in north-west Australia.	Unlikely to occur. No suitable habitat.
<i>Artamus cyanopterus cyanopterus</i>	Dusky Woodswallow	Bird	Vulnerable NSW BC Act	The Dusky Woodswallow is often reported in woodlands is eastern, southern and southwestern Australia. In New South Wales it is widespread from coast to inland, including the western slopes of the great Diving Range and farther west. It is often reported in woodlands and dry open sclerophyll forests, usually dominated by eucalyptus, including mallee associations. It has also been recorded in shrublands and heathlands and various modified habitats including regenerating forests; very occasionally in moist forests of rainforests. At sites where Dusky Woodswallows are recorded the understorey is typically open with sparse eucalypt saplings, acacias and other shrubs, including heath. The ground cover may consist of grasses, sedges or open ground, often with coarse woody debris. Birds are often observed in farmland usually at the edges of forests, woodlands or in roadside remnants or wind breaks with dead timber. Nesting occurs from late September to late February, with eggs present between October and early December. They nest in an open shallow untidy cup, frequently in an open hollow, crevice or stump.	Possibly occurring within the site. Further assessment in s3.2.2.
<i>Burhinus grallarius</i>	Bush Stone-curlew	Bird	NSW BC Act Endangered	Inhabits open forests and woodlands with a sparse grassy ground layer and fallen timber. Largely nocturnal, being especially active on moonlit nights. Nest on the ground in a scrape or small bare patch.	Unlikely to occur. No suitable habitat present.

## Review of Environmental Factors Part 5 Assessment EP&A Act 1979

Species name	Common name	Type	Status	Species information & habitat requirements	Likelihood of presence within areas impacted by the activity
<i>Callocephalon fimbriatum</i>	Gang-gang Cockatoo	Bird	Vulnerable NSW BC Act	Tall mountain forests and woodlands, particularly in heavily timbered and mature wet sclerophyll forests. In winter, may occur at lower altitudes in drier more open eucalypt forests and woodlands, and often found in urban areas. preferring more open eucalypt forests and woodlands, particularly in box-ironbark assemblages, or in dry forest in coastal areas. Favours old growth attributes for nesting and roosting	Possibly occurring within the site. Further assessment in s3.2.2.
<i>Calyptrorhynchus lathamii lathamii</i>	Glossy Black-cockatoo	Bird	Vulnerable NSW BC Act	The GBC inhabits open forest and woodlands of the coast where stands of she-oak occur. In the Jervis Bay region they feed almost exclusively on the seeds of the black she-oak <i>Allocasuarina littoralis</i> , shredding the cones with their bill	Possibly occurring within the site. Further assessment in s3.2.2.
<i>Circus assimilis</i>	Spotted Harrier	Bird	Vulnerable NSW BC Act	The Spotted Harrier occurs throughout the Australian mainland, except in densely forested or wooded habitats or the coast, escarpment and ranges, and rarely in Tasmania. Individuals disperse widely in NSW and comprise a single population.	Possibly occurring in proximity to the site or transiently over the site, but unlikely to utilise habitat within the site that would be impacted.
<i>Daphoenositta chrysoptera</i>	Varied Sittella	Bird	Vulnerable NSW BC Act	Inhabits eucalypt forests and woodlands, especially those containing rough-barked species and mature smooth-barked gums with dead branches, mallee and Acacia woodland	Possibly occurring within the site. Further assessment in s3.2.2.
<i>Dasyornis brachypterus</i>	Eastern Bristlebird	Bird	Endangered EPBC Act Endangered NSW BC Act	Sedgeland/heathland/dry sclerophyll and woodlands- / requires thick shrub/heath layer for shelter, nesting and foraging	Unlikely to occur. No suitable habitat present.
<i>Glossopsitta pusilla</i>	Little Lorikeet	Bird	Vulnerable NSW BC ACT	Forages primarily in the canopy of open Eucalyptus forest and woodland, yet also finds food in Angophora, Melaleuca and other tree species. Riparian habitats are particularly used, due to higher soil fertility and hence greater productivity. Isolated flowering trees in open country, e.g. paddocks, roadside remnants and urban trees also help sustain viable populations of the species. Roosts in treetops, often distant from feeding areas. Nests in proximity to feeding areas if possible, most typically selecting hollows in the limb or trunk of smooth-barked Eucalypts. Entrance is small (3 cm) and usually high above the ground (2–15 m). These nest sites are often	Possibly occurring within the site. Further assessment in s3.2.2.

## Review of Environmental Factors Part 5 Assessment EP&A Act 1979

Species name	Common name	Type	Status	Species information & habitat requirements	Likelihood of presence within areas impacted by the activity
				used repeatedly for decades, suggesting that preferred sites are limited. Riparian trees often chosen, including species like <i>Allocasuarina</i>	
<i>Haematopus longirostris</i>	Pied Oystercatcher	Bird	Endangered NSW BC Act	Favours intertidal flats of inlets and bays, open beaches and sandbanks. Forages on exposed sand, mud and rock at low tide, for molluscs, worms, crabs and small fish. Nests mostly on coastal or estuarine beaches although occasionally they use saltmarsh or grassy areas. Nests are shallow scrapes in sand above the high tide mark, often amongst seaweed, shells and small stones.	Unlikely to occur. No suitable habitat present.
<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle	Bird	NSW BC Act Vulnerable Migratory EPBC Act	Found in coastal habitats (especially those close to the sea-shore) and around terrestrial wetlands in tropical and temperate regions of mainland Australia and its offshore islands. The habitats occupied by the sea-eagle are characterized by the presence of large areas of open water (larger rivers, swamps, lakes, the sea). Birds have been recorded in (or flying over) a variety of terrestrial habitats. The species is mostly recorded in coastal lowlands, but can occupy habitats up to 1400 m above sea level on the Northern Tablelands of NSW and up to 800 m above sea level in Tasmania and South Australia. Birds have been recorded at or in the vicinity of freshwater swamps, lakes, reservoirs, billabongs, saltmarsh and sewage ponds. They also occur at sites near the sea or sea-shore, such as around bays and inlets, beaches, reefs, lagoons, estuaries and mangroves. Terrestrial habitats include coastal dunes, tidal flats, grassland, heathland, woodland, forest (including rainforest) and even urban areas. Breeding has been recorded on the coast, at inland sites, and on offshore islands. Breeding territories are located close to water, and mainly in tall open forest or woodland, although nests are sometimes located in other habitats such as dense forest (including rainforest), closed scrub or in remnant trees on cleared land. Forages over large expanses of open water; this is particularly true of birds that occur in coastal environments close to the sea-shore, where they forage over in-shore waters. However, the White-bellied Sea-Eagle will also forage over open terrestrial habitats (such as grasslands). Birds may move to and congregate in favorable sites during drought or food shortage.	Unlikely to occur. No suitable habitat present.

## Review of Environmental Factors Part 5 Assessment EP&A Act 1979

Species name	Common name	Type	Status	Species information & habitat requirements	Likelihood of presence within areas impacted by the activity
<i>Hieraaetus morphnoides</i>	Little Eagle	Bird	Vulnerable NSW BC Act	Occupies open eucalypt forest, woodland or open woodland. She-oak or acacia woodlands and riparian woodlands of interior NSW are also used. Nests in tall living trees within a remnant patch, where pairs build a large stick nest in winter	Possibly occurring in proximity to the site or transiently over the site, but unlikely to utilise habitat within the site that would be impacted.
<i>Hirundapus caudacutus</i>	White-throated Needletail	Bird	Migratory EPBC Act	Almost exclusively aerial, from heights of less than 1 m up to more than 1000 m above the ground. Because they are aerial, it has been stated that conventional habitat descriptions are inapplicable, but there are, nevertheless, certain preferences exhibited by the species. Although they occur over most types of habitat, they are probably recorded most often above wooded areas, including open forest and rainforest, and may also fly between trees or in clearings, below the canopy, but they are less commonly recorded flying above woodland. They also commonly occur over heathland, but less often over treeless areas, such as grassland or swamps. When flying above farmland, they are more often recorded above partly cleared pasture, plantations or remnant vegetation at the edge of paddocks. In coastal areas, they are sometimes seen flying over sandy beaches or mudflats, and often around coastal cliffs and other areas with prominent updraughts, such as ridges and sand-dunes. They are sometimes recorded above islands well out to sea.	Unlikely to occur. No suitable habitat present.
<i>Hydroprogne caspia</i>	Caspian Tern	Bird	Migratory EPBC Act	Occur along the Australian coastline, and also occur inland along major rivers, especially in the Murray-Darling and Lake Eyre drainage basins, preferring wetlands with clear water to allow easy prey detection.	Unlikely to occur. No suitable habitat present.
<i>Ixobrychus flavicollis</i>	Black Bittern	Bird	Vulnerable NSW BC Act	Terrestrial and estuarine wetlands generally in areas of permanent water and dense vegetation that may comprise grassland, woodland forest rainforest and mangroves. Roosts in trees or on ground amongst dense reeds, nests in branches overhanging water	Unlikely to occur. No suitable habitat present.

## Review of Environmental Factors Part 5 Assessment EP&A Act 1979

Species name	Common name	Type	Status	Species information & habitat requirements	Likelihood of presence within areas impacted by the activity
<i>Lathamus discolor</i>	Swift Parrot	Bird	Endangered EPBC Act Endangered NSW BC Act	Migrates to the Australian south-east mainland between March and October. On the mainland they occur in areas where eucalypts are flowering profusely or where there are abundant lerp (from sap-sucking bugs) infestations. Favoured feed trees include winter flowering species such as Swamp Mahogany ( <i>Eucalyptus robusta</i> ), Spotted Gum ( <i>Corymbia maculata</i> ), Red Bloodwood ( <i>C. gummifera</i> ), Mugga Ironbark ( <i>E. sideroxylon</i> ), and White Box ( <i>E. albens</i> ). Commonly used lerp infested trees include Inland Grey Box <i>E. microcarpa</i> , Grey Box <i>E. moluccana</i> and Blackbutt <i>E. pilularis</i> . Return to some foraging sites on a cyclic basis depending on food availability. Following winter they return to Tasmania where they breed from September to January, nesting in old trees with hollows and feeding in forests dominated by Tasmanian Blue Gum <i>Eucalyptus globulus</i> .	Possibly occurring within the site. Further assessment in s3.2.2.
<i>Limosa lapponica</i>	Bar-tailed Godwit	Bird	Migratory EPBC Act	The Bar-tailed Godwit is found mainly in coastal habitats such as large intertidal sandflats, banks, mudflats, estuaries, inlets, harbours, coastal lagoons and bays. It is found often around beds of seagrass and, sometimes, in nearby saltmarsh. It has been sighted in coastal sewage farms and saltworks, saltlakes and brackish wetlands near coasts, sandy ocean beaches, rock platforms, and coral reef-flats. It is rarely found on inland wetlands or in areas of short grass, such as farmland, paddocks and airstrips, although it is commonly recorded in paddocks at some locations overseas. Forages near the edge of water or in shallow water, mainly in tidal estuaries and harbours. They appear not to forage at high tide and prefer exposed sandy substrates on intertidal flats, banks and beaches.	Unlikely to occur. No suitable habitat present.

## Review of Environmental Factors Part 5 Assessment EP&A Act 1979

Species name	Common name	Type	Status	Species information & habitat requirements	Likelihood of presence within areas impacted by the activity
<i>Limosa limosa</i>	Black-tailed Godwit	Bird	Vulnerable NSW BC Act	Primarily a coastal species. Usually found in sheltered bays, estuaries and lagoons with large intertidal mudflats and/or sandflats. Further inland, it can also be found on mudflats and in water less than 10 cm deep, around muddy lakes and swamps. Individuals have been recorded in wet fields and sewerage treatment works. Forages for insects, crustaceans, molluscs, worms, larvae, spiders, fish eggs, frog eggs and tadpoles in soft mud or shallow water. Roosts and loafs on low banks of mud, sand and shell bars.	Unlikely to occur. No suitable habitat present.
<i>Lophoictinia isura</i>	Square-Tailed Kite	Bird	Vulnerable NSW BC Act	Summer breeding migrant to the south-east, including the NSW south coast, arriving in September and leaving by March. Found in a variety of timbered habitats including dry woodlands and open forests. Shows a particular preference for timbered watercourses large hunting ranges of more than 100km <sup>2</sup> . Breeding is from July to February, with nest sites generally located along or near watercourses, in a fork or on large horizontal limbs.	Possibly occurring in proximity to the site or transiently over the site, but unlikely to utilise habitat within the site that would be impacted.
<i>Ninox connivens</i>	Barking Owl	Bird	Vulnerable NSW BC Act	Inhabits woodland and open forest, including fragmented remnants and partly cleared farmland. It is flexible in its habitat use, and hunting can extend in to closed forest and more open areas. Sometimes able to successfully breed along timbered watercourses in heavily cleared habitats (e.g. western NSW) due to the higher density of prey on these fertile soils. Roost in shaded portions of tree canopies, including tall midstorey trees with dense foliage such as Acacia and Casuarina species. During nesting season, the male perches in a nearby tree overlooking the hollow entrance. Requires very large permanent territories in most habitats due to sparse prey densities. Monogamous pairs hunt over as much as 6000 hectares, with 2000 hectares being more typical in NSW habitats. Two or three eggs are laid in hollows of large, old trees. Living eucalypts are preferred though dead trees are also used. Nest sites are used repeatedly over years by a pair, but they may switch sites if disturbed by predators (e.g. goannas).	Possibly occurring in proximity to the site or transiently over the site, but unlikely to utilise habitat within the site that would be impacted. No suitable nesting HBTs occur within impact footprint.

## Review of Environmental Factors Part 5 Assessment EP&A Act 1979

Species name	Common name	Type	Status	Species information & habitat requirements	Likelihood of presence within areas impacted by the activity
<i>Ninox strenua</i>	Powerful Owl	Bird	Vulnerable NSW BC Act	Coastal Woodland, Dry Sclerophyll Forest, wet sclerophyll forest and rainforest- Can occur in fragmented landscapes Roosts in dense vegetation comprising species such as Turpentine Syncarpia glomulifera, Black She-oak Allocasuarina littoralis, Blackwood Acacia melanoxylon, Rough-barked Apple Angophora floribunda, Cherry Ballart Exocarpus cupressiformis and a number of eucalypt species. requires old growth elements-hollow bearing tree resources for nesting and prey resource. Nests in large tree hollows in large eucalypts that are at least 150yrs old. Often in riparian areas. Large home range	Possibly occurring in proximity to the site or transiently over the site, but unlikely to utilise habitat within the site that would be impacted. No suitable nesting HBTs occur within impact footprint.
<i>Numenius madagascariensis</i>	Eastern Curlew	Bird	Critically Endangered EPBC Act	Most commonly associated with sheltered coasts, especially estuaries, bays, harbours, inlets and coastal lagoons, with large intertidal mudflats or sandflats, often with beds of seagrass. Occasionally, the species occurs on ocean beaches (often near estuaries), and coral reefs, rock platforms, or rocky islets. The birds are often recorded among saltmarsh and on mudflats fringed by mangroves, and sometimes use the mangroves.	Unlikely to occur. No suitable habitat present.
<i>Pachycephala olivacea</i>	Olive Whistler	Bird	Vulnerable NSW BC Act	The Olive Whistler inhabits the wet forests on the ranges of the east coast. It has a disjunct distribution in NSW chiefly occupying the beech forests around Barrington Tops and the MacPherson Ranges in the north and wet forests from Illawarra south to Victoria. In the south it is found inland to the Snowy Mountains and the Brindabella Range. Mostly inhabit wet forests above about 500m. During the winter months they may move to lower altitudes. Forage in trees and shrubs and on the ground, feeding on berries and insects. Make nests of twigs and grass in low forks of shrubs. Lay two or three eggs between September and January.	Unlikely to occur. No suitable habitat present.
<i>Pandion cristatus</i>	Eastern Osprey	Bird	NSW BC Act Vulnerable	Favour coastal areas, especially the mouths of large rivers, lagoons and lakes. Feed on fish over clear, open water. Breed from July to September in NSW. Nests are made high up in dead trees or in dead crowns of live trees, usually within one kilometre of the sea.	Unlikely to occur. No suitable habitat present.
<i>Petroica boodang</i>	Scarlet Robin	Bird	Vulnerable NSW BC Act	The Scarlet Robin is primarily a resident in dry forests and woodlands, but some adults and young birds disperse to more open habitats after breeding.	Possibly occurring in proximity to the site or transiently over the site, but unlikely to utilise

## Review of Environmental Factors Part 5 Assessment EP&A Act 1979

Species name	Common name	Type	Status	Species information & habitat requirements	Likelihood of presence within areas impacted by the activity
					habitat within the site that would be impacted.
<i>Petroica phoenicea</i>	Flame Robin	Bird	Vulnerable NSW BC ACT	Breeds in upland tall moist eucalypt forests and woodlands, often on ridges and slopes. Prefers clearings or areas with open understoreys. The ground layer of the breeding habitat is dominated by native grasses and the shrub layer may be wither sparse or dense. Occasionally occurs in temperate rainforest, and also in herbfields, heathlands, shrublands and sedgeland at high altitudes. In winter, birds migrate to drier more open habitats in the lowlands (i.e. valley below the ranges, and to the western slopes and plains. Often occurs in recently burnt areas; however, habitat becomes unsuitable as vegetation closes up following revegetation. In winter lives in dry forests, open woodlands and in pastures and native grasslands, with or without scattered trees. In winter, occasionally seen in heathland or other scrublands in coastal areas.	Possibly occurring in proximity to the site or transiently over the site, but unlikely to utilise habitat within the site that would be impacted.
<i>Pluvialis squatarola</i>	Grey Plover	Bird	EPBC Act: Migratory	Grey Plovers usually forage on large areas of exposed mudflats and beaches of sheltered coastal shores such as inlets, estuaries and lagoons. They also occasionally feed in pasture and at the muddy margins of inland wetlands such as lakes, swamps and bores. They usually roost in sandy areas, such as on unvegetated sandbanks or sand-spits on sheltered beaches or other sheltered environments such as estuaries or lagoons. In Port Phillip Bay, they roost on artificial sand islands created by dredge spoil. They less often roost on the muddy edges of estuaries or water storages such as reservoirs and salt-lakes.	Unlikely to occur. No suitable habitat present.

## Review of Environmental Factors Part 5 Assessment EP&A Act 1979

Species name	Common name	Type	Status	Species information & habitat requirements	Likelihood of presence within areas impacted by the activity
<i>Pycnoptilus floccosus</i>	Pilotbird	Bird	Vulnerable EPBC Act	Pilotbirds are small, plump, ground-dwelling birds, about 18 cm long and endemic to south-east Australia. Upland Pilotbirds occur above 600 m in the Brindabella Ranges in the Australian Capital Territory, and in the Snowy Mountains in New South Wales and north-east Victoria. Lowland Pilotbirds occur in forests from the Blue Mountains west of Newcastle, around the wetter forests of eastern Australia, to Dandenong near Melbourne. Pilotbirds are strictly terrestrial, living on the ground in dense forests with heavy undergrowth. Largely sedentary, they are typically seen hopping briskly over the forest floor and foraging on damp ground or among leaf-litter.	Unlikely to occur. No suitable habitat present.
<i>Thalasseus bergii</i>	Crested Tern	Bird	Migratory EPBC Act	Crested Terns inhabit coastal areas, offshore waters, beaches, bays, inlets, tidal rivers, salt swamps, lakes and larger rivers. The species breeds during Sep-Jan in the south and Mar-Jun in the north in large, dense colonies on small islands. Nesting occurs on sand or shingle among low vegetation behind the beaches (Pizzey & Knight 2012; Morcombe 2011)	Unlikely to occur. No suitable habitat present.
<i>Tyto novaehollandiae</i>	Masked Owl	Bird	Vulnerable NSW BC Act	Dry eucalypt forests and woodlands from sea level to 1100 m. Inhabits forest but often hunts along the edges of forests, including roadsides. The typical diet consists of tree-dwelling and ground mammals, especially rats. Pairs have a large home-range of 500 to 1000 hectares. Roosts and breeds in moist eucalypt forested gullies, using large tree hollows or sometimes caves for nesting. Requires old growth elements-hollow bearing tree resources for nesting and prey source.	Possibly occurring in proximity to the site or transiently over the site, but unlikely to utilise habitat within the site that would be impacted. No suitable nesting HBTs occur within impact footprint.
<i>Tyto tenebricosa</i>	Sooty Owl	Bird	Vulnerable NSW BC Act	Occurs in rainforest, including dry rainforest, subtropical and warm temperate rainforest, as well as moist eucalypt forests	Unlikely to occur. No suitable habitat present.
<i>Cercartetus nanus</i>	Eastern Pygmy-possum	Mammal	Vulnerable NSW BC Act	Rainforest, sclerophylla forest & woodland to heath – but heath & woodland preferred. Forages on banksias, eucalypts & bottlebrushes.	Possibly occurring within the site. Further assessment in s3.2.2.

## Review of Environmental Factors Part 5 Assessment EP&A Act 1979

Species name	Common name	Type	Status	Species information & habitat requirements	Likelihood of presence within areas impacted by the activity
<i>Dasyurus maculatus</i>	Spotted-tailed Quoll	Mammal	Endangered EPBC Act Vulnerable NSW BC Act	Recorded across a range of habitat types, including rainforest, open forest, woodland, coastal heath and inland riparian forest, from the sub-alpine zone to the coastline. Individual animals use hollow-bearing trees, fallen logs, small caves, rock outcrops and rocky-cliff faces as den sites. Mostly nocturnal, although will hunt during the day; spends most of the time on the ground, although also an excellent climber and will hunt possums and gliders in tree hollows and prey on roosting birds. Use communal 'latrine sites', often on flat rocks among boulder fields, rocky cliff-faces or along rocky stream beds or banks.	Unlikely to occur. No suitable habitat present.
<i>Isodon obesulus obesulus</i>	Southern Brown Bandicoot (eastern)	Mammal	Endangered EPBC Act Endangered NSW BC Act	Southern Brown Bandicoots are largely crepuscular (active mainly after dusk and/or before dawn). They are generally only found in heath or open forest with a heathy understorey on sandy or friable soils. They feed on a variety of ground-dwelling invertebrates and the fruit-bodies of hypogeous (underground-fruiting) fungi. Their searches for food often create distinctive conical holes in the soil. Males have a home range of approximately 5-20 hectares whilst females forage over smaller areas of about 2-3 hectares. Nest during the day in a shallow depression in the ground covered by leaf litter, grass or other plant material. Nests may be located under Grass trees <i>Xanthorrhoea</i> spp., blackberry bushes and other shrubs, or in rabbit burrows. The upper surface of the nest may be mixed with earth to waterproof the inside of the nest.	Unlikely to occur. No suitable habitat present. No evidence of presence detected.
<i>Notamacropus parma</i>	Parma Wallaby	Mammal	NSW BC Act Vulnerable	Preferred habitat is moist eucalypt forest with thick, shrubby understorey, often with nearby grassy areas, rainforest margins and occasionally drier eucalypt forest.	Unlikely to occur. No suitable habitat present.

## Review of Environmental Factors Part 5 Assessment EP&A Act 1979

Species name	Common name	Type	Status	Species information & habitat requirements	Likelihood of presence within areas impacted by the activity
<i>Petauroides volans</i>	Southern Greater Glider	Mammal	Vulnerable EPBC Act	Feeds exclusively on eucalypt leaves, buds, flowers and mistletoe. Shelter during the day in tree hollows and will use up to 18 hollows in their home range. Occupy a relatively small home range with an average size of 1 to 3 ha. Give birth to a single young in late autumn or early winter which remains in the pouch for approximately 4 months and is independent at 9 months of age. Usually solitary, though mated pairs and offspring will share a den during the breeding season and until the young are independent. Can glide up to a horizontal distance of 100m including changes of direction of as much as 90 degrees. Very loyal to their territory.	Unlikely to occur. No suitable habitat present.
<i>Petaurus australis</i>	Yellow-bellied Glider	Mammal	Vulnerable NSW BC Act	Forest with old growth elements. Large Eucalypt Hollows for denning- Inhabits mature or old growth Blackbutt-Bloodwood forest with heath understorey in coastal areas. Prefers mixed species stands with a shrub or Acacia mid storey. Feed primarily on plant and insect exudates, including nectar, sap, honeydew and manna with pollen and insects providing protein. Extract sap by incising (or biting into) the trunks and branches of favoured food trees, often leaving a distinctive 'V'-shaped scar. Very mobile and occupy large home ranges between 20 to 85 ha to encompass dispersed and seasonally variable food resources.	Unlikely to occur. No suitable habitat present. No evidence of presence detected.
<i>Petaurus norfolcensis</i>	Squirrel Glider	Mammal	NSW BC Act Vulnerable	Inhabits mature or old growth Box, Box-Ironbark woodlands and River Red Gum forest west of the Great Dividing Range and Blackbutt-Bloodwood forest with heath understorey in coastal areas. Prefers mixed species stands with a shrub or Acacia midstorey. Live in family groups of a single adult male one or more adult females and offspring. Require abundant tree hollows for refuge and nest sites. Diet varies seasonally and consists of Acacia gum, eucalypt sap, nectar, honeydew and manna, with invertebrates and pollen providing protein.	Unlikely to occur. No suitable habitat present.

## Review of Environmental Factors Part 5 Assessment EP&A Act 1979

Species name	Common name	Type	Status	Species information & habitat requirements	Likelihood of presence within areas impacted by the activity
<i>Petrogale penicillata</i>	Brush-tailed Rock-wallaby	Mammal	NSW BC Act Endangered EPBC Act Vulnerable	Occupies rocky escarpments, outcrops and cliffs with a preference for complex structures with fissures, caves and ledges, often facing north. Browse on vegetation in and adjacent to rocky areas eating grasses and forbs as well as the foliage and fruits of shrubs and trees. Shelter or bask during the day in rock crevices, caves and overhangs and are most active at night. Highly territorial and have strong site fidelity with an average home range size of about 15 ha.	Unlikely to occur. No suitable habitat present.
<i>Phascolarctos cinereus</i>	Koala	Mammal	Vulnerable NSW BC Act	Eucalypt woodland and forest Home range sizes vary with quality of habitat ranging from less than two ha to several hundred ha. Preferred tree species on the south coast are Eucalyptus amplifolia, E.viminalis, & E.tereticornis but numerous other species also known food trees.	Unlikely to occur. No suitable habitat present. Not very mobile. No recent records occur in proximity to the site.
<i>Potorous tridactylus</i>	Long-nosed Potoroo	Mammal	Vulnerable EPBC Act Vulnerable NSW BC Act	Inhabits coastal heaths and dry and wet sclerophyll forests. Dense understorey with occasional open areas is an essential part of habitat, and may consist of grass-trees, sedges, ferns or heath, or of low shrubs of tea-trees or melaleucas. A sandy loam soil is also a common feature. The fruit-bodies of hypogeous (underground-fruited) fungi are a large component of the diet of the Long-nosed Potoroo. They also eat roots, tubers, insects and their larvae and other soft-bodied animals in the soil. Often digs small holes in the ground in a similar way to bandicoots. Mainly nocturnal, hiding by day in dense vegetation - however, during the winter months animals may forage during daylight hours. Individuals are mainly solitary, non-territorial and have home range sizes ranging between 2-5 ha.	Unlikely to occur. No suitable habitat present.
<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	Mammal	Vulnerable EPBC Act Vulnerable NSW BC Act	Occur in subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps as well as urban gardens and cultivated fruit crops. Roosting camps are generally located within 20km of a regular food source and are commonly found in gullies, close to water, in vegetation with a dense canopy.	Possibly occurring within the site. Further assessment in s3.2.2.

## Review of Environmental Factors Part 5 Assessment EP&A Act 1979

Species name	Common name	Type	Status	Species information & habitat requirements	Likelihood of presence within areas impacted by the activity
<i>Sminthopsis leucopus</i>	White-footed Dunnart	Mammal	Vulnerable NSW BC Act	Dry sclerophyll forests, sedgeland or heathland- coastal dune vegetation, coastal forest, tussock grassland and woodland and forest post disturbance – open understorey layer. They shelter in bark nests in hollows under standing or fallen timber, burrows in the ground, piles of logging debris, large grass clumps such as provided by Grass Trees <i>Xanthorrhoea</i> spp. and Cycads <i>Macrozamia</i> spp. and rock crevices	Unlikely to occur. No suitable habitat present.
<i>Micronomus norfolkensis</i>	Eastern Coastal Free-tailed Bat	Microchiropteran bat	Vulnerable NSW BC Act, Vulnerable EPBC Act	Small tree hollows/fissures in bark for roosting in dry sclerophyll forest, woodland, swamp forests and mangrove forests east of the Great Dividing Range.	Possibly occurring within the site. Further assessment in s3.2.2.
<i>Falsistrellus tasmaniensis</i>	Eastern False Pipistrelle	Microchiropteran bat	NSW BC Act Vulnerable	Prefers moist habitat that contains trees greater than 20 m high with a dense understorey. They are fast flyers. Roosts in hollow trunks of eucalyptus trees, in colonies of 3 – 80. Also may roost in caves and old wooden buildings. This species changes roost every night. Roosts on consecutive nights are usually less than 750 m apart. This species has a home range of up to 136 ha (Churchill, S 2008, Australian Bats, Jacana Books, Crows Nest, NSW). Although they prefer habitat with a dense understorey, they prefer to forage along flyways to avoid the thick understorey. They prefer continuous forest and avoid remnant vegetation. However, they have been recorded in open forests (Churchill, S 2008, Australian Bats, Jacana Books, Crows Nest, NSW).	Possibly occurring within the site. Further assessment in s3.2.2.
<i>Kerivoula papuensis</i>	Golden-tipped Bat	Microchiropteran bat	Vulnerable NSW BC Act	Found in rainforest and adjacent wet and dry sclerophyll forest up to 1000m. Also recorded in tall open forest, <i>Casuarina</i> -dominated riparian forest and coastal <i>Melaleuca</i> forests. Roost mainly in abandoned hanging Yellow-throated Scrubwren and Brown Gerygone nests, also in tree hollows, dense foliage and epiphytes; located in rainforest gullies on small first- and second-order streams. Will fly up to two kilometres from roosts to forage in rainforest and sclerophyll forest on mid and upper-slopes. Specialist feeder on small web-building spiders	Unlikely to occur. Unsuitable habitat and outside typical range.

## Review of Environmental Factors Part 5 Assessment EP&A Act 1979

Species name	Common name	Type	Status	Species information & habitat requirements	Likelihood of presence within areas impacted by the activity
<i>Scoteanax rueppellii</i>	Greater Broad-nosed Bat	Microchiropteran bat	Vulnerable NSW BC Act	Found mainly in gullies and river systems that drain the Great Dividing Range, it utilises a variety of habitats from woodland through to moist and dry eucalypt forest and rainforest, below 500m, though it is most commonly found in tall wet forest. Although this species usually roosts in tree hollows, it has also been found in buildings. Forages after sunset, flying slowly and directly along creek and river corridors at an altitude of 3 - 6 m	Possibly occurring within the site. Further assessment in s3.2.2.
<i>Miniopterus orianae oceanensis</i>	Large Bent-winged Bat	Microchiropteran bat	NSW BC Act Vulnerable	Specific caves are known maternity sites with other caves being primary roosting habitat outside breeding period. Also uses derelict mines, storm-water tunnels, buildings and other man-made structures. Hunts in forested areas, catching moths and other flying insects above the tree tops.	Possibly occurring in proximity to the site or transiently over the site, but unlikely to utilise habitat within the site that would be impacted.
<i>Chalinolobus dwyeri</i>	Large-eared Pied Bat	Microchiropteran bat	Vulnerable NSW BC Act Vulnerable EPBC Act	Found mainly in areas with extensive cliffs and caves, from Rockhampton in Queensland south to Bungonia in the NSW Southern Highlands. It is generally rare with a very patchy distribution in NSW. There are scattered records from the New England Tablelands and North West Slopes. Roosts in caves (near their entrances), crevices in cliffs, old mine workings and in the disused, bottle-shaped mud nests of the Fairy Martin ( <i>Petrochelidon ariel</i> ), frequenting low to mid-elevation dry open forest and woodland close to these features	Possibly occurring in proximity to the site or transiently over the site, but unlikely to utilise habitat within the site that would be impacted.
<i>Miniopterus australis</i>	Little Bent-winged Bat	Microchiropteran bat	Vulnerable NSW BC Act	Found in moist eucalypt forest, rainforest, vine thicket, wet and dry sclerophyll forest, Melaleuca swamps, dense coastal forests and banksia scrub. Generally found in well-timbered areas. Little Bentwing-bats roost in caves, tunnels, tree hollows, abandoned mines, stormwater drains, culverts, bridges and sometimes buildings during the day, and at night forage for small insects beneath the canopy of densely vegetated habitats. They often share roosting sites with the Common Bentwing-bat and, in winter, the two species may form mixed clusters.	Possibly occurring within the site. Further assessment in s3.2.2.

## Review of Environmental Factors Part 5 Assessment EP&A Act 1979

Species name	Common name	Type	Status	Species information & habitat requirements	Likelihood of presence within areas impacted by the activity
<i>Myotis macropus</i>	Southern Myotis	Microchiropteran bat	Vulnerable NSW BC Act	This species is predominantly roosts in caves, however, is known to roost in trees and man-made structures close to water. Roosts are generally located close to water, where the bats forage in small groups of three or four. They have a strong association with streams and permanent waterways in areas that are vegetated rather than cleared (Churchill, S 2008, Australian Bats, Jacana Books, Crows Nest, NSW). They feed on small fish, prawns and aquatic macroinvertebrates. They have a preference towards large still pools, rather than flowing streams. They will also forage on aerial insects flying over water. They use their large feet to capture prey items (Churchill 2008).	Possibly occurring within the site. Further assessment in s3.2.2.
<i>Saccolaimus flaviventris</i>	Yellow-bellied Sheath-tail-bat	Microchiropteran bat	Vulnerable NSW BC Act	Roosts singly or in groups of up to six, in tree hollows and buildings; in treeless areas they are known to utilise mammal burrows. When foraging for insects, flies high and fast over the forest canopy, but lower in more open country. Forages in most habitats across its very wide range, with and without trees; appears to defend an aerial territory. Breeding has been recorded from December to mid-March, when a single young is born. Seasonal movements are unknown; there is speculation about a migration to southern Australia in late summer and autumn.	Possibly occurring within the site. Further assessment in s3.2.2.
<i>Chelonia mydas</i>	Green Turtle	Reptile	Vulnerable EPBC Act Vulnerable NSW BC Act	Ocean-dwelling species spending most of its life at sea. Eggs are laid in holes dug in beaches throughout their range.	Unlikely to occur. No suitable habitat present.
<i>Hoplocephalus bungaroides</i>	Broad-headed Snake	Reptile	Endangered NSW BC Act Vulnerable EPBC Act	The Broad-headed snake is largely confined to Triassic and Permian sandstones, including Hawkesbury, Narrabeen and Shoalhaven groups, within the coast and ranges in an area within approximately 250 km of Sydney. They are a nocturnal species that shelters in rock crevices and under flat sandstone rocks on exposed cliff edges during autumn, winter and spring. It moves from the sandstone rocks to shelter in crevices or hollows in large trees within 500 m of escarpments in summer. Feeds mostly on geckoes and small skinks; will also eat frogs and small mammals occasionally.	Unlikely to occur. No suitable habitat present.
<i>Varanus rosenbergi</i>	Rosenberg's Goanna	Reptile	NSW BC Act Vulnerable	Found in heath, open forest and woodland. Associated with termites, the mounds of which this species nests in; termite mounds are a	Unlikely to occur. No suitable habitat present.

## Review of Environmental Factors Part 5 Assessment EP&A Act 1979

Species name	Common name	Type	Status	Species information & habitat requirements	Likelihood of presence within areas impacted by the activity
				critical habitat component. Individuals require large areas of habitat. Feeds on carrion, birds, eggs, reptiles and small mammals. Shelters in hollow logs, rock crevices and in burrows, which they may dig for themselves, or they may use other species' burrows, such as rabbit warrens.	No evidence of presence detected.