

REVIEW OF ENVIRONMENTAL FACTORS (REF) SHOALWATER INFRASTRUCTURE – MOSS VALE RD URAs PART 3: CAMBEWARRA RESERVOIR



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1. PROPOSAL AND LOCATION

1.1 Proposed activity

Shoalhaven Water is currently planning and undertaking the development of water and sewerage infrastructure to service and facilitate development of the Moss Vale Rd Urban Release Areas (URAs).

Review of Environmental Factors (REF) Shoalwater Infrastructure – Moss Vale Rd URAs Part 1: Moss Vale Rd Water Lead-in (Council reference D20/402515) provided environmental assessment for the construction of a water main from Cambewarra, running approximately 1.575km eastward along Main Rd and the south-east along Moss Vale Rd, as a water lead-in, to service the Moss Vale Rd Urban Release Areas (URAs).

Review of Environmental Factors (REF) Shoalwater Infrastructure – Moss Vale Rd URAs Part 2: Sewer Infrastructure (Council reference D20/456925) provided environmental assessment for the construction of sewage infrastructure including three sewer pump stations, rising mains and gravity mains, to service the Moss Vale Rd Urban Release Areas (URAs).

The subject of the current report is the proposed construction of an additional 3.5ML reservoir with associated infrastructure and site works at the site of an existing 2.3ML reservoir, on Reservoir Lane, Cambewarra.

The new reservoir is intended to provide additional storage for the Moss Vale Road URAs, in addition to providing operational flexibility for the Cambewarra water supply.

The proposal would include the following works:

- Construction of a 3.5ML reservoir (circa 26m outside diameter and 8m high base to ceiling plus ancillary components) and associated features including hardstand work area, pressure manifold and transmitter, external ladder, roof access hatch, side access, overflow with scour protection, connection to existing rising main and supply lines.
- Construction of new fencing around the perimeter of Lot 4 DP 618527, with deviation inside the property boundary to avoid impact to threatened *Solanum celatum* plants.
- Construction of site access road from existing Reservoir Lane access point.
- Establishment and maintenance of a 10m APZ around both the new and existing reservoirs (note that this APZ would encroach into the neighbouring private property and would be established under agreement with the landowner).
- Associated earthworks (cut and fill). Earthworks and foundation design to be undertaken in detailed design phase with consideration to the geotechnical investigations.
- Associated vegetation removal including for access, earthworks, construction of reservoir, construction of fencing, and establishment of APZ. The required clearing would effectively be the entirety of the newly configured compound in Lot 4 DP 618527, in addition to a 2m access buffer around the fence-line and a small portion of the APZ extending into private land (Part Lot 2 DP 1146993).



• Fencing and associated clearing would avoid impact to threatened *Solanum celatum* plants (listed as Endangered under the NSW *Biodiversity Conservation Act 2016*) which were recorded at the south-west corner of the site. Temporary protective fencing shall be installed during the works with appropriate signage to restrict access.

Refer to MVR Cambewarra Reservoir final concept design plans by GHD for more detailed information (see Appendix A, D21/281357).

Shoalhaven City Council (SCC) is the proponent and the determining authority under Part 5 of the EP&A Act. The environmental assessment of the proposed activity and associated environmental impacts has been undertaken in the context of Clause 228 of the *Environmental Planning and Assessment Regulation 2000*. In doing so, this Review of Environmental Factors (REF) helps to fulfil the requirements of Section 5.5 of the Act that SCC examine and take 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 activity would be undertaken primarily within Council owned Lot 4 DP 618527, Reservoir Lane, Cambewarra, and with clearing required for APZs and fence construction and maintenance extending into the adjacent private land, Part Lot 2 DP 1146933, 158 Reservoir Lane, Cambewarra. Refer to Figures 1 and 2 showing the site location and the footprint of the proposal.

Note that the existing fenced compound area does not encompass the full extent of Council owned Lot 4 DP 618527 (refer to Figure 3).

Details of affected property is presented in Table 1.

Lot / DP	Owner / Land Manager	Comments
Lot 4 DP 618527	SCC	Freehold Council operational land
Part Lot 2 DP 1146993	Private	Establishment and maintenance of the proposed APZ and fence-line would be carried out under suitable agreement with landowner

Table 1. Affected property



Figure 1. Site location



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Shoalhaven water – Moss Vale Part 3: Cambewarra Reservoir D21/302103





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2. EXISTING ENVIRONMENT

2.1 Habitat and vegetation assessment

Site survey was undertaken by a Council Environmental Officer on 22nd June 2021. The survey involved vegetation and habitat assessment, recording of all flora species within and immediately adjacent to the subject site, determination of vegetation communities, investigation of fauna signs, and targeted survey for potentially occurring threatened flora species (including *Solanum celatum, Rhodamnia rubescens, Zieria tuberculata* and *Hibbertia stricta* subsp. *furcatula*).

The site comprises a fenced triangular compound containing an existing reservoir, bordered by Reservoir Lane to the east and partly vegetated rural land to the north-west and south-west.

The site is disturbed and modified as a result of clearing, earthworks and landscaping associated with the existing reservoir. Fill to level the existing compound site was evident, extending beyond the existing footprint. Additionally, cleared areas exist adjacent to the fenced compound as a result of fence-line maintenance and an access track within the adjacent property (Part Lot 2 DP 1146993). The age class of trees, particularly to the south, containing no old growth, indicated that the area had been cleared in the past (refer to Photos 4, 5 and 6).

The fenced compound contains planted, non-endemic and ornamental trees including Flooded Gum (*Eucalyptus grandis*), Tallowwood (*Eucalyptus microcorys*), Silky Oak (*Grevillea robusta*), Snow-in-Summer (*Melaleuca armillaris*) and Prickly-leaved Paperbark (*M. styphelioides*). Two relatively small (20cm DBH), endemic Sydney Blue Gum (*Eucalyptus saligna*) trees occur within the existing compound. The understorey within the compound and around the fenced perimeter is cleared and modified, containing Kikuyu (*Cenchrus clandestinus*), invasive exotic Panic Grass (*Ehrharta erecta*), Paddys Lucerne (*Sida rhombifolia*) and Lantana (*Lantana camara*), with low native shrubs and groundcovers including *Pittosporum undulatum, Oplismenus aemulus, Geranium homeanum, Dichondra repens, Desmodium varians Commelina Pandorea pandorana, Clematis aristada* and *Hardenbergia violacea*.

Vegetation communities mapped as occurring within and immediately around the site are shown in Figure 4 and include:

- Biometric SR652 Sydney Blue GumXBangalay Lilly Pilly moist forest in gullies and on sheltered slopes, southern Sydney Basin
- Biometric SR516 Blackbutt Turpentine Bangalay moist open forest on sheltered slopes and gullies, southern Sydney Basin
- Biometric SR568 Lilly Pilly Sassafras Stinging Tree subtropical/warm temperate rainforest on moist fertile lowlands, southern Sydney Basin

Native vegetation immediately outside the fenced area is mapped as SR652, but appears to be influenced by SR516, being dominated by Turpentine (*Syncarpia glomulifera*) and Sydney Blue Gum (*Eucalyptus saligna*). This vegetation features a relatively dense canopy with a sparse, open understorey containing *Acacia irrorata, A. melanoxylon, Notelaea longifolia, N. venosa, Diospyros australis, Pittosporum multiflorum, Ozothamnus diosmifolius, Hibbertia scandens, Morinda jasminoides* and *Pandorea pandorana*. Exotic invasive plants including Lantana, Moth



Vine (*Araujia sericifera*), Camphor Laurel (*Cinnamomum camphora*) and Wild Tobacco (*Solanum mauritianum*) are also present.



Pastured paddocks dominated by Kikuyu, Paspalum (*Paspalum dilatatum*), Giant Parramatta Grass (*Sporobolus fertilis*) and Whiskey Grass (*Andropogon virginicus*) occur to the east and in part to the north and south of the site.

The vegetation occurring within and in proximity to the site does not constitute an endangered ecological community (EEC). No EEC is mapped as occurring closer than 500m (approx.) from the site (refer to Figure 5).

No hollow-bearing trees (HBTs) were recorded as occurring within or in close proximity to the site.

No Glossy Black Cockatoo or Glider feed tree species (e.g. *Allocasuarina littoralis, Corymbia gummifera* and *Eucalyptus punctata*) were noted within the site. No signs of large Forest Owl use of the site (e.g. whitewash) was noted.

Minor fauna scratchings in the soil that appeared to have been partly washed out by rain were noted in a small area to the south of the existing fenced compound. Due to the disturbed nature of the diggings, it was not apparent whether they were signs of bandicoot use of the site or possibly rabbits or other fauna.

One patch of *Solanum celatum* containing approximately 30 plants within a roughly elliptic footprint approximately 12m x 6m, was recorded at the south-west corner of Lot 4 DP 618527 on the edge



of disturbed and cleared land. All plants exhibited insect damage on leaves and most of the plants appeared to be suffering dieback, possibly as a result of off-target herbicide control of nearby Lantana. Ten of the plants possessed healthy foliage. The likelihood of recovery of the remaining plants is uncertain.

Photos 1 through 7 below show the site and any relevant features.





Photo 1. Site showing existing reservoir (facing south approx.)



Photo 2. Site facing south-west showing area of proposed APZ











Photo 5. South of existing fenced compound (facing east)



Photo 6. Area to the south of the existing fenced compound where *Solanum celatum* occurs (facing southeast)



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Photo 7. Solanum celatum occurs in proximity to the proposal



3. ASSESSMENT OF LIKELY ENVIRONMENTAL IMPACTS

3.1 Impacts associated with the proposal

The proposal would involve the following disturbance and impacts:

- Clearing of native and exotic vegetation for access (refer to Figure 6), earthworks, construction of reservoir, construction of fencing, and establishment and maintenance of APZs comprising:
 - Clearing of approximately 1590m² native vegetation (SR652 and SR516) outside the existing fenced compound area. Vegetation includes Turpentine (*Syncarpia glomulifera*) and Sydney Blue Gum (*Eucalyptus saligna*) trees, with a sparse, open understorey containing *Acacia irrorata, A. melanoxylon, Notelaea longifolia, N. venosa, Diospyros australis, Pittosporum multiflorum, Ozothamnus diosmifolius, Hibbertia scandens, Morinda jasminoides* and *Pandorea pandorana.*
 - Clearing of approximately 1455m² planted ornamental trees including Flooded Gum (*Eucalyptus grandis*), Tallowwood (*Eucalyptus microcorys*), Silky Oak (*Grevillea robusta*), Snow-in-Summer (*Melaleuca armillaris*) and Prickly-leaved Paperbark (*M. styphelioides*), with minor shrubs and exotic and native groundcover including Kikuyu, Oplismenus aemulus, Geranium homeanum, Dichondra repens, Desmodium varians, Commelina Pandorea pandorana, Clematis aristada and Hardenbergia violacea.
 - Fencing and associated clearing would **avoid impact to** *Solanum celatum* plants which were recorded at the south-west corner of the site.
 - No hollow-bearing trees or significant feed trees would be removed or otherwise impacted.
 - No habitat considered significant for threatened flora or any native fauna would be removed or otherwise impacted.
- Earthworks for new reservoir foundation, hardstand area and access road only. Cut and fill volumes and footprint shall be determined in detailed design phase with consideration to the geotechnical investigations. Revision of this REF shall be undertaken as appropriate.

Potential indirect impacts associated with the proposal include the following:

• Shadowing of adjacent flora and habitat from new reservoir with circa 26m outside diameter and 8m high base to ceiling plus ancillary components.

The shading effect of the reservoir is not anticipated to be significant, nor would it impact nearby vegetation beyond the proposed APZ and internal clearing. The vegetation present is adapted to relatively dense canopy coverage. No light dependent / sensitive flora occurs in close proximity to the proposed reservoir that it would be impacted by shading. Shading from the existing reservoir does not have any notable effect on vegetation adjacent to the compound.





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• Risk of impact to native fauna (particularly gliders and bat species) associated with fencing.

Fencing shall not include barbed-wire or razor-wire or other similar products that would increase the risk injury to native fauna.

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.

- Part 7A Fisheries Management Act 1994

Part 7A relates to threatened species conservation. As the proposed activity would not affect aquatic environments supporting vegetation or species protected under this section of the Act, further consideration is unnecessary.

- 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:

- Solanum celatum
- Eastern Bentwing-bat *Miniopterus orianae oceanensis*
- Eastern False Pipistrelle Falsistrellus tasmaniensis
- Eastern Freetail-Bat *Micronomus norfolkensis*
- Greater Broad-nosed Bat Scoteanaux ruepelli
- Large-eared Pied Bat Chalinobolus dwyeri
- Little Bent-wing Bat *Miniopterus australis*
- Southern Myotis (Large-footed Myotis) Myotis Macropus
- Yellow-bellied Sheathtail-bat Saccolaimus flaviventris
- Grey-headed Flying-fox *Pteropus poliocephalus*
- Southern Brown Bandicoot *Isoodon obesulus obesulus*

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.

Solanum celatum

Solanum celatum is a shrub to 1 - 2.5 m high, with grey to white branches which are densely covered with hairs and sparsely armed with prickles. The species grows in rainforest clearings, or in wet sclerophyll forest, normally recorded in disturbed margins and clearings. It is restricted to an area from Wollongong to just south of Nowra, and west to Bungonia. The majority of records are prior to 1960 and the majority of populations are considered likely to have been lost to clearing. Flowers (August to October) are purple and have contrasting orange stamens. Leaves are elliptical to lanceolate, without lobes, 4.6 - 12.5 cm long, 1.5 - 3.5 cm wide, with the upper leaf surface grey-green and lower leaf surface yellowish-white. The fruit is a green smooth globular berry, 13 - 16 mm diameter. *Solanum celatum* is a fire sensitive obligate seeder, with adults plants killed by fire and recruitment occurring from a soil stored seed bank (OEH 2018).

One patch of *Solanum celatum* containing approximately 30 plants within a roughly elliptic footprint approximately 12m x 6m, was recorded at the south-west corner of Lot 4 DP 618527 on the edge of disturbed and cleared land (refer to Figure 2, Photos 6 and 7).

All plants exhibited insect damage on leaves and most of the plants appeared to be suffering dieback, possibly as a result of off-target herbicide control of nearby Lantana. Ten of the plants possessed healthy foliage. The likelihood of recovery of the remaining plants with dieback is uncertain.

Fencing and associated clearing would avoid direct impact to *Solanum celatum* plants. The fenceline shall be deviated to avoid cutting through the edge of the population, and shall provide a buffer of at least 2m to the nearest plant (refer to Figures 2 and 6). Temporary protective fencing shall be installed during the works with appropriate signage to restrict access and advise of the presence of threatened flora and the need to avoid harm to it. The landholders and residents of Part Lot 2 DP 1146993 where the species largely occurs, shall be advised of the presence of the population and its threatened status, and encouraged to ensure its ongoing protection.

The species typically occurs on disturbed edges, so would not be affected by the removal of vegetation in proximity to its occurrence.

Shading from the proposed reservoir is not anticipated to affect *Solanum celatum*. The height of the reservoir would be 8.2m base to ceiling plus ancillary components, and would be located at least 26m to the north-east of the plants. Any shading towards the plants from the reservoir would occur for a short early morning period during Winter and would not affect their health. The associated clearing would result in a more open microhabitat in proximity to the occurrence of *Solanum celatum* which would likely benefit the population.

It is considered unlikely therefore that *Solanum celatum* 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.



Microchiropteran bats: Eastern Bentwing-bat (*Miniopterus orianae oceanensis*); Eastern False Pipistrelle (*Falsistrellus tasmaniensis*); Eastern Freetail-Bat (*Micronomus norfolkensis*); Greater Broad-nosed Bat (*Scoteanaux ruepelli*); Large-eared Pied Bat (*Chalinobolus dwyeri*), Little Bentwing Bat (*Miniopterus australis*), Southern Myotis (Large-footed Myotis) (*Myotis macropus*) and Yellow-bellied Sheathtail-bat *Saccolaimus flaviventris*

Eastern Bentwing-bat (*Miniopterus orianae oceanensis*) primarily roosts in caves, but it also uses derelict mines, storm-water tunnels, buildings and other man-made structures. The species forms discrete populations centred on a maternity cave that is used annually in spring and summer for the birth and rearing of young. Maternity caves have very specific temperature and humidity regimes. At other times of the year, populations disperse within about 300 km range of maternity caves. Cold caves are used for hibernation in southern Australia. Breeding or roosting colonies can number from 100 to 150,000 individuals. The species hunts in forested areas, catching moths and other flying insects above the tree tops (OEH 2017e).

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

Eastern 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 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 altitude 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 2017c).

Large-eared Pied Bat (*Chalinolobus dwyeri*) roosts in caves (near their entrances), crevices in cliffs, old mine workings and in the disused, bottle-shaped mud nests of the Fairy Martin (*Petrochelidon ariel*), frequenting low to mid-elevation dry open forest and woodland close to these features. Females have been recorded raising young in maternity roosts (c. 20-40 females) from November through to January in roof domes in sandstone caves and overhangs. They remain loyal to the same cave over many years. The species is found in well-timbered areas containing gullies. The relatively short, broad wing combined with the low weight per unit area of wing

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indicates manoeuvrable flight. This species probably forages for small, flying insects below the forest canopy. It is likely to hibernate through the coolest months. It is uncertain whether mating occurs early in winter or in spring (OEH 2017f).

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 2017g).

Southern Myotis (Myotis Macropus) generally roost 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 2017i).

Yellow-bellied Sheathtail-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 2017j).

The site contains suitable foraging habitat for each of the above-listed microbats, but does not contain potential roosting habitat (hollow-bearing trees, caves or culverts) for any of these species.

Potential foraging habitat that would be removed comprises approximately 1590m² native vegetation (SR652 and SR516) outside the existing fenced compound area and approximately 1455m² planted ornamental trees within the existing fenced compound. This area is insignificant and negligible in the context of extensive available foraging habitat in the broader locality, including Cambewarra, Beaumont, Cambewarra Mountain, Browns Mountain, Red Rocks and Tapitallee (refer to Figures 1 and 4)

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

It is considered unlikely therefore that the Eastern Bentwing Bat, Eastern False Pipistrelle, Eastern Freetail-Bat, Greater Broad-nosed Bat, Large-eared Pied Bat, Little Bentwing-bat, Southern Myotis



and Yellow-bellied Sheathtail-bat 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.

Grey-headed Flying-fox

The Grey-headed Flying-fox (*Pteropus poliocephalus*) 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. Greyheaded 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 2017d).

The site contains suitable foraging habitat for Grey-headed Flying Fox (flowering Eucalypt trees).

No GHFF camps occur in close proximity to the site. The nearest camp currently occurs at Bomaderry Creek / Illowra Wetlands, approximately 6.8km south-west of the site¹.

Potential foraging habitat that would be removed comprises approximately 1590m² native vegetation (SR652 and SR516) outside the existing fenced compound area and approximately 1455m² planted ornamental trees within the existing fenced compound. This area is insignificant and negligible in the context of extensive available foraging habitat in the broader locality, including Cambewarra, Beaumont, Cambewarra Mountain, Browns Mountain, Red Rocks and Tapitallee (refer to Figures 1 and 4)

Foraging and roosting habitat will therefore not be removed or otherwise significantly impacted as a result of the proposal.

Works would occur during normal construction hours, so would not affect the 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

 ¹ National Flying-fox monitoring viewer: <u>http://www.environment.gov.au/webgis-framework/apps/ffc-wide/ffc-wide.jsf</u>

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the species such that a viable local population of any of these species is likely to be placed at risk of extinction.

Southern Brown Bandicoot (Isoodon obesulus obesulus)

The Southern Brown Bandicoot is a terrestrial marsupial with a patchy distribution. It is found in south-eastern NSW, east of the Great Dividing Range south from the Hawkesbury River, southern coastal Victoria and the Grampian Ranges, south-eastern South Australia, south-west Western Australia and the northern tip of Queensland. 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 grounddwelling 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. The Southern Brown Bandicoot nests 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 Xanthorrhoea 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. Mating occurs any time of the year, usually following heavy rain. Two or three litters of 2-4 young may be produced annually. The gestation period of 11-12 days is the shortest known of any marsupial while young remarkably become independent around 60 days after being born (OEH 2017h).

Minimal potential foraging habitat for Southern Brown Bandicoot occurs within and beyond the south and west edges of the site where open understorey occurs with loamy soil that is not comprised of fill material or compacted (refer to Photos 2 and 6).

Minor fauna scratchings in the soil that appeared to have been partly washed out by rain were noted in a small area to the south of the existing fenced compound. Due to the disturbed nature of the diggings, it was not apparent whether they were signs of bandicoot use of the site or possibly rabbits or other fauna.

Potential foraging habitat that would be removed is less than 1590m² native vegetation (SR652 and SR516) outside the existing fenced compound area, where much of this area is fill material or compacted where an access track occurs (Photo 2). It is considered that Southern Brown Bandicoot, if present in proximity to the site, would not rely on this potential foraging habitat.

Extensive undisturbed habitat of higher quality occurs to the west and north-west of the site (refer to Figures 1 and 4).

No nests or burrows occur within or in proximity to the area to be impacted by the proposal.

It is considered unlikely therefore that the Southern Brown Bandicoot 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.



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

There are no endangered ecological communities occurring within or in close proximity to the site, such that there is any risk of impact as a result of the proposal. Refer to Figure 5 above.

The proposal is therefore unlikely to adversely affect or modify the extent or composition of any EEC such that its local occurrence is likely to be placed at risk of extinction.

Part C - In relation to the habitat of a threatened species or ecological community:

- (iii)the extent to which habitat is likely to be removed or modified as a result of the proposed development or activity
- (iv)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
- (v) 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.

Clearing of native vegetation is listed as a key threatening process, defined by the Scientific Committee's determination 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 requires the clearing of approximately 1590m² native vegetation (SR652 and SR516) outside the existing fenced compound area and approximately 1455m² planted ornamental trees within the existing fenced compound, for essential infrastructure to support the development of the Moss Vale Road Urban Release Areas.

The proposal utilises and expands upon an existing reservoir compound and involves clearing of native vegetation only to the extent required for construction of the proposed infrastructure and establishment of a minimal APZ (10m) to protect the infrastructure.

The population of *Solanum celatum* occurring on and adjacent to the south-west corner of the site will be retained and protected through the clearing and construction phase.

There would be no destruction of important habitat nor impact to any locally occurring threatened species (see Part 1).

The proposed vegetation clearing would therefore not result in fragmentation of ecological communities or disrupt ecological function.

The impacts of the key threatening process of clearing of native vegetation would therefore be minimised and managed as part of the proposal.

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 20th July 2021. Of those threatened species and endangered ecological communities reported as likely occurring or having habitat within the area of the report, none were considered to have potential habitat within the site and require further assessment.

- Southern Brown Bandicoot *Isoodon obesulus obesulus* (Endangered)
- Grey-headed Flying-fox *Pteropus poliocephalus* (Vulnerable)

Additional, highly mobile species including migratory birds may occur occasionally and transiently within the vicinity of the proposed activity but would not be affected by the proposal.



Table 2. EPBC Significant impact assessment

Critically endangered and endangered species - Significant impact criteria			
Species to consider:			
Southern Brown Bandicoot (Isoodon obesulus obesulus)			
Criteria	Assessment		
lead to a long-term decrease in the size of a	Unlikely. No direct impact to the species, nests		
population	or burrows would occur. Only a small area (less		
	than 1590m ²) of marginal foraging resources		
	would be removed.		
reduce the area of occupancy of the species	No		
fragment an existing population into two or more	No		
populations	Only 10, 10, 10, 10, 10, 10, 10, 10, 10, 10,		
adversely affect habitat critical to the survival of	Only a small area (less than 1590m ²) of		
a species	Extensive undisturbed babitat of higher quality		
	occurs to the west and north-west of the site		
	(refer to Figures 1 and 4).		
disrupt the breeding cycle of a population	No		
modify, destroy, remove, isolate or decrease the	No – refer above		
availability or quality of habitat to the extent that			
the species is likely to decline			
result in invasive species that are harmful to a	No invasive species will be introduced		
critically endangered or endangered species			
becoming established in the endangered or			
critically endangered species' habitat	No diagona ia Ukabuta ka interduce d		
Introduce disease that may cause the species to	No disease is likely to be introduced		
interfere with the recovery of the species	No		
Summary	It is considered unlikely therefore that the		
	Southern Brown Bandicoot would be		
	significantly 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		
Vulnorable species - Significant impact criteri			
vunerable species - Significant impact criteria			
Species to consider:			
Grey-headed Flying-fox (Pteropus poliocephal	us) – (GHFF)		
Criteria	Assessment		
lead to a long-term decrease in the size of an	No GHFF camps occur in close proximity to the		
important population of a species	site. The nearest camp currently occurs at		
	Bomaderry Creek / Illowra Wetlands,		
	approximately 6.8km south-west of the site.		
reduce the area of occupancy of an important	No		
population			
tragment an existing important population into	NO		
adversely affect habitat critical to the survival of	No important habitat will be impacted		
a species			
disrupt the breeding cycle of an important	No		
population			



modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	Potential foraging habitat that would be removed comprises approximately 1590m ² native vegetation (SR652 and SR516) outside the existing fenced compound area and approximately 1455m ² planted ornamental trees within the existing fenced compound. This area is insignificant and negligible in the context of extensive available foraging habitat in the broader locality, including Cambewarra, Beaumont, Cambewarra Mountain, Browns Mountain, Red Rocks and Tapitallee (refer to Figures 1 and 4)
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 is likely to be introduced
interfere substantially with the recovery of the species	No

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 this effect, 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 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 proposed activity is considered to be within 'disturbed land' as it has been subject to previous disturbance including vegetation clearing, earthworks, construction and maintenance of the existing reservoir compound, in addition to clearing and management of the adjacent farm land.

In accordance with the Due Diligence Guidelines (DECCW 2010), a search on the Aboriginal Heritage Information Management System (AHIMS) on 19th July 2021 indicated that there are no recorded Aboriginal sites or places, occurring in proximity to the proposal (refer to Figure 7 below).

As there are no recorded sites and as the area that would be impacted by the proposal is 'disturbed land', 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. An Aboriginal Heritage Impact Permit (AHIP) is not required and the work can proceed with caution.





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.

3.6 Flood liable land

The site and surrounding land is not mapped as being flood liable (refer to Figure 8).



3.7 Riparian corridors

The site contains the upper limit of Category 3 riparian corridor and occurs approximately 20m from a Category 2 riparian corridor to the west (refer to Figure 9).

The proposal would involve minimal vegetation removal and disturbance to the Category 3 riparian corridor at a point where there is no clearly defined watercourse.



Works would therefore not compromise the integrity of creek banks, nor the function of any riparian corridor in providing habitat connectivity.

Erosion and sediment controls would be installed to manage potential erosion where works and disturbance would occur on slopes and in the vicinity of creeks and watercourses.



3.8Key Fish Habitat

Key Fish Habitat, mapped for the purpose of the *Fisheries Management Act 1994* does not occur within or in close proximity to the site (refer to Figure 10).





Figure 10. Key Fish Habitat mapped as occurring in proximity to the site

3.9Acid Sulfate Soils

The site is mapped as Class 5 Acid Sulfate Soils and is not within 500m of land mapped as containing other classes (refer to Figure 11).

The Shoalhaven Local Environment Plan 2014 indicates that a risk of A.S.S exposure exists for Class 5 A.S.S under the following circumstances:

Works 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.

Works would not occur within 500 metres of adjacent Class 1, 2, 3 or 4 land that is below 5 m AHD and would not involve lowering of the watertable.

It is therefore unlikely that the proposal would result in the exposure of Acid Sulfate Soils.





3.10 Other

In the context of this assessment and the proposal:

- The site has no associated Potentially Contaminated Land (PCL) records;
- The land is not subject to any Aboriginal Land Claim.

3.11 EP&A Regulation – Clause 228 matters of consideration

Clause 228(2) of the *Environmental Planning and Assessment Regulation 2000* 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 3 deals with each of the factors in relation to the proposed activity.



Table 3. Clause 228 Matters of consideration

Does the proposal:	Assessment	Reason
a) Have any environmental impact on a community?	Positive	The proposal is to construct a 3.5ML reservoir to provide additional storage required to support the development of the Moss Vale Road URAs, in addition to providing operational flexibility for the Cambewarra water supply.
		The proposal utilises and expands upon an existing reservoir compound and involves clearing of native vegetation only to the extent required for construction of the proposed infrastructure and establishment of a minimal APZ (10m) to protect the infrastructure.
		The proposed activity would not have any impact on other community services and infrastructure such as sewage, waste management, educational, medical or social services.
b) Cause any transformation of a locality?	Low adverse	The proposal would utilise and expand upon an existing reservoir compound currently surrounded by rural farmland with areas of bushland.
		The footprint of the reservoirs would be expanded, but the locality's current use would remain unchanged.
		Vegetation removal would be required, but limited to the extent required for construction of the proposed infrastructure and establishment of a 10m APZ.
c) Have any environmental impact on the	Low adverse	The five-part test of significance (Section 3.2) concludes that the proposed activity would not have a significant impact upon endangered ecological communities.
ecosystem of the locality?		No hollow-bearing trees, burrows, threatened flora species, rocky outcrops, caves or water bodies would be removed or otherwise impacted. No food resources critical to the survival of a particular species would be removed.
		Fencing and associated clearing would avoid impact to <i>Solanum celatum</i> plants which were recorded at the south-west corner of the site.
		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 (refer to Section 3.1)



		Environmental safeguards and mitigation measures (Section 6) would be employed to minimise risk of impacts.
d) Cause a diminution of the	Low adverse	Impact to the recreational and scientific values of the site would be negligible.
aesthetic, recreational, scientific or other		Impact to the aesthetic and environmental values of the locality would be low.
environmental		The proposal is an extension of the site's existing use.
quality or value of a locality?		Vegetation removal would be limited to the extent required for construction of the proposed infrastructure and establishment of a 10m APZ and would comprise planted ornamental trees and native vegetation over disturbed, modified land, with no significant habitat.
e) Have any effect on a locality, place or building having aesthetic,	Low adverse	The site of the proposed activity has no significant aesthetic, architectural, cultural, historical or scientific values. As such, the proposed activity would have no significant impact on these items.
anthropological, archaeological, architectural, cultural historical		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.
scientific, or social significance or		The site is not within an Aboriginal Place declared under the <i>National Parks and Wildlife Act</i> 1974.
other special value for present or future generations?		It is reasonable to conclude that there is a low probability of Aboriginal cultural heritage objects occurring in the area (refer to Section 3.4).
f) Have any impact on the habitat of protected fauna (within the meaning of the Biodiversity Conservation Act 2016)?	Low adverse	No important habitat would be removed or otherwise impacted as part of the proposal. Habitat corridors would not be severed. Barriers to fauna movement and new threats to fauna would not be introduced. Mitigation measures (Section 6) will reduce risks further.
g) Cause any endangering of any species of animal, plant or other form of life, whether living on	Low adverse	The five-part test of significance, provided in Section 0 above, concludes that the proposed activity would not have a significant impact upon threatened fauna.



land, in water or in the air?		No potentially important habitat or food resources for locally occurring threatened species would be removed or otherwise impacted by the proposal.
		No hollow-bearing trees, burrows, threatened flora species, rocky outcrops, caves or water bodies would be removed or otherwise impacted. No food resources critical to the survival of a particular species would be removed.
		Fencing and associated clearing would avoid impact to <i>Solanum celatum</i> plants which were recorded at the south-west corner of the site.
h) Have any long- term effects on the environment?	Negligible	The proposed activity would not use hazardous substances or use or generate chemicals which may build up residues in the environment.
		The proposal does not involve fragmentation of vegetation or severing of habitat corridors.
i) Cause any degradation of the quality of the	Low-adverse	The environmental safeguards (Section 6) to be undertaken would minimise impacts and risks to the quality of the environment.
environment?		No significant habitat would be removed or otherwise impacted.
		Vegetated buffers would not be removed (minimal existing) and edge effects would not be introduced (clearing would occur on existing edges only).
		Erosion and sediment controls would be installed to manage potential erosion where works and disturbance would occur on slopes and in the vicinity of creeks and watercourses.
		Works would be undertaken almost entirely through previously cleared and modified land.
		The proposal would not intentionally introduce noxious weeds, vermin, or feral animals into the area or contaminate the soil.
j) Cause any risk to the safety of the environment?	Low adverse	Earthworks would occur for the new reservoir foundation, hardstand area and access road only. Cut and fill volumes and footprint shall be determined in detailed design phase with consideration to the geotechnical investigations.



		Erosion and sediment controls would be installed to manage potential erosion where works and disturbance would occur on slopes and in the vicinity of creeks and watercourses.
k) Cause any reduction in the range of beneficial uses of the environment?	Negligible	The footprint of the reservoirs would be expanded, but the site and local environment will remain relatively unchanged. The proposal would not affect the future potential use of the surrounding environment.
I) Cause any pollution of the environment?	Low adverse	The proposal would involve a temporary and local generation of noise. However, this is not anticipated to negatively affect any sensitive receivers such as schools, childcare centres and hospitals.
		Erosion and sediment controls would be installed to manage potential erosion where works and disturbance would occur on slopes and in the vicinity of creeks and watercourses.
		It is unlikely that the activity (including the environmental impact mitigation measures) would result in spillages, dust, odours, vibration or radiation.
		The proposal does not involve the use, storage or transportation of hazardous substances or the use or generation of chemicals which may build up residues in the environment.
m) Have any environmental problems	Low adverse	Any waste generated through the proposal can be recycled or re-used in accordance with resource recovery exemptions or taken to a licensed waste facility.
associated with the disposal of waste?		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> requiring off-site disposal.
n) Cause any increased demands on resources (natural or otherwise)	Low adverse	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.



which are, or are likely to become, in short supply?		
o) Have any cumulative	Low adverse	The assessed low adverse or negligible impacts of the proposal are not likely to interact.
environmental effect with other		Mitigation measures (Section 6) shall be implemented to minimise the risk of cumulative environmental effects.
future activities?		Future development associated with the URAs will involve further vegetation clearing with associated environmental assessment.
		The current proposal would not affect any habitat corridor or reduce any significant vegetation.
p) Any impact on coastal processes and coastal	Low adverse	The proposed activity would have no effect on coastal processes including those projected under climate change conditions.
hazards, including those under projected climate change conditions		The site of the proposal is not located in an identified coastal hazard area.


4. PERMISSIBILITY

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, clause 125 of the NSW *State Environmental Planning Policy (Infrastructure)* 2007 (Infrastructure SEPP) provides that:

- (1) Development for the purpose of water reticulation systems may be carried out by or on behalf of a public authority without consent on any land.
- (2) Development for the purpose of water storage facilities may be carried out without consent if it is carried out by or on behalf of—

(a) any public authority on land in Zone RU1 Primary Production, Zone RU2 Rural Landscape, Zone SP1 Special Activities, Zone SP2 Infrastructure or an equivalent land use zone,

The site of the proposal (Lot 4 DP 618527) is zoned as SP2 – Water Supply System, while the surrounding land (including Part Lot 2 DP 1146933 into which the APZ would extend) is zoned as RU1 – Primary Production. Clause 125 is therefore a relevant provision for the proposal.

As the proposal does not require development consent, and as it constitutes an 'activity' for the purposes of Part 5 of the EP&A Act, being carried out by (or on behalf of) a public authority, environmental assessment under Part 5 of the EP&A Act is required. This REF provides this assessment.

A summary of other relevant legislation and permissibility is provided in Table 4 below.

Table 4. Summary of other relevant legislation and permissibility				
NSW STATE LEGISLATION				
Environmental Planning and Assessment Act 1979 (EP&A Act)				
Permissible $$ Not permissible				
Justification:				
The 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.				



Shoalhaven Local Environmental Plan 2014 (SLEP)					
Permissible $$ Not permissible					
Justification:					
Under the SLEP the proposed activity may have required development consent. The provisions of SEPP Infrastructure, however, prevail over the SLEP where there is an inconsistency by virtue of Section 3.28 of the EP&A Act. Consequently, development consent is not required.					
State Environmental Planning Policy (Coastal Management) 2018					
Permissible $$ Not permissible					
Justification:					
The proposed activity would be undertaken within an area which is not mapped for the purpose of the SEPP.					
State Environmental Planning Policy (Koala Habitat Protection) 2019					
Permissible $$ Not permissible					
Justification:					
Development control provisions of the SEPP apply only in relation to a development application (Part 2 of the SEPP).					
The proposal would not remove or otherwise impact habitat that Koalas are likely to rely on.					
Wilderness Act 1987					
Permissible $$ Not permissible					
Justification:					
The proposed activity is not located within a wilderness area declared under this Act.					
Protection of the Environment Operations Act 1997					
Permissible under licence $$ Not permissible					
Justification:					
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.					
Chemical storage associated with the reservoir would not exceed the scheduled activity criteria of Item 9 under Schedule 1 i.e. <i>capacity to store more than 20 tonnes</i>					



(pressurised gases), 200 tonnes (liquefied gases) or 2,000 tonnes (chemicals in any other form).
National Parks and Wildlife Act 1974 (NP&W Act)
Permissible $$ Not permissible
 Justification: The proposed activity would not encroach into National Park estate.
• The Act provides the basis for the legal protection and management of Aboriginal sites in NSW. Under Sections 86 and 90 of the Act it is an offence to disturb an Aboriginal object or knowlingly destroy or damage, or cause the destruction or damage to, an Aboriginal object or place, except in accordance with a permit of consent under section 87 and 90 of the Act. The activity is unlikely to harm an Aboriginal heritage object (refer to Section 3.4)
Fisheries Management Act 1994
Permissible $$ Not permissible
Justification:
 The proposed activity: would not affect declared aquatic reserves (Part 7, Division 2 of the Act); would not involve dredging or reclamation (Part 7, Division 3). would not involve 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 result in the blocking of the passage of fish; 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 <i>Fisheries Management (General) Regulation 2019</i>).
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:
 - a) relates to the settlement of the area that comprises New South Wales, not being Aboriginal settlement; or
 - b) 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 $\sqrt{}$ 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 6) would ensure that no *serious and irreversible impacts on biodiverstiy 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

Not permissible

Permissible $\sqrt{}$

Justification:



• Local councils are exempt from s.91E(1) of the Act in relation to all controlled activites that they carry out in, on or under waterfront land (by virtue of clause 41 of the <i>Water Management (General) Regulation 2018.</i>						
• The proposal would not interfere with the aquifer and therefore an interference licence is not required (s.91F).						
COMMONWEALTH LEGISLATION						
Commonwealth <i>Environment Protection and Biodiversity Conservation Act 1999</i> (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						
Justification:						
All affected land comprises freehold land or road reserves for which Council is the						

authority (refer to Section 1.3). Native Title has therefore been extinguished as a Previous Exclusive Possession Act – Freehold Title (Section 23B). Consultation or approval from native title claimants is therefore not required.



5. CONSULTATION

5.1 Infrastructure SEPP

Clause 13 – Development with impacts on council-related infrastructure or services

In consideration of the consultation requirements specified under Clause 13 of the Infrastructure SEPP, the proponent, Shoalhaven Water, is the also the party responsible for considering the impact of the proposal on the capacity and function of the water supply system.

No impacts to stormwater management systems, traffic generation, water use, public places, nor excavation of footpaths or road surfaces would occur.

Consultation under Section 13 is therefore not required.

Clause 14 - Development with impacts on local heritage

No impacts to any local heritage item would occur. Consultation under Clause 14 is therefore not required.

Clause 15 – Development with impacts on flood liable land

The proposal would not occur on land that is flood liable. Consultation under Clause 15 is therefore not required.

<u>Clause 15AA – Consultation with State Emergency Service—development with impacts on flood</u> <u>liable land</u>

The proposal would not occur on land that is flood liable. Consultation under Clause 15AA is therefore not required.

Clause 15A – 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.

<u>Clause 16 – Consultation with public authorities other than councils</u>

In consideration of the consultation requirements specified under Clause 16 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
- would not be undertaken within or adjacent to a marine park or aquatic reserve declared under the *Marine Estate Management Act 2014*

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

- would not be undertaken in the foreshore area within the meaning of the Sydney Harbour Foreshore Authority Act 1998
- does not comprise a fixed or floating structure in or over navigable waters
- is not a development for the purposes of a health services facility, correctional centre or group home, or for residential purposes, in an area that is bush fire prone land.
- 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

The consultation requirements specified under Clause 16 of the Infrastructure SEPP therefore do not apply.

5.2 Community consultation

The proposal was publicly exhibited. Table 5 (below) provides an overview of concerns raised and responses provided.

Issue / concern Response From: Resident With regards to the items raised in your submission, we provide the following responses to assist: Regarding construction of new reservoir adjacent existing tank. We note the required destruction of a number of 1. Vegetation Impacts: Council's Environmental beautiful large, mature trees and their habitats for this Officers have undertaken a detailed assessment of the project. site and recommended a number of mitigation measures to minimise potential impacts. The proposed Please confirm that environmental matters are being works will be required to comply with the nominated adequately addressed and that the trees will be replaced, on mitigation measures to ensure any potential impacts site by at least the equivalent trees which will be maintained can be managed and mitigated in line with the strict to maturity; we are particularly interested in any proposed requirements of the Review of Environmental Factors. off-sets. The REF identified that the majority of trees being removed as part of the proposal are planted ornamental trees and not locally endemic species. Accordingly, the REF concluded that the vegetation was assessed as not being significant habitat and its removal would not fragment vegetation or sever a habitat corridor. For your awareness, one threatened plant species (Solanum celatum) was detected on site during ecological surveys and the project has been altered accordingly to avoid any impact to the threatened plant species. 2. Replacement of Trees: Whilst some vegetation removal is proposed as part of the construction of the new reservoir itself, the majority of the vegetation to be cleared is directly associated with the recommendations from the 2019 Bushfires Investigations. The recommendation being that appropriate cleared areas/Asset Protection Zones

Table 5: Summary of concerns with provided responses from public exhibition



	(APZ) be establish around all Council's critical infrastructure to assist the Community's resilience in future bushfire events by reducing the susceptibility of the water reservoirs to bushfire attack levels and damage.
	Accordingly, whilst the project will therefore be unable to replace all vegetation required to be removed in the creation of the APZ on a like for like basis, the project will incorporate amenity screening plantings (adopting lower level native species to ensure no compromise to the newly created APZ) along the eastern boundary of the site; to help minimise potential visual impacts associated with the works.
	Advice from Council's Environmental Officers is that in this particular project, there is no legislated requirement for off-set plantings; this being said Council will continue to investigate native planting opportunities throughout the wider Moss Vale Road Urban Release Areas.
From: Resident	With regards to the items raised in your submission, we provide
I have no objection per se to the proposed development, except with the notion that " There would be no destruction of important habitat". The development entails the destruction of nearly 3000 square metres of mature trees and other vegetation. Given the latest IPCC report, I would suggest that all existing naturally occurring vegetative landscapes are now more important than ever. Surely we can no longer proceed with the notion that small parcels of destroyed land are of no ecological consequence.	 Council's Environmental Officers have undertaken a detailed assessment of the site and recommended a number of mitigation measures to minimise potential impacts. The proposed works will be required to comply with the nominated mitigation measures to ensure any potential impacts can be managed and mitigated in line with the strict requirements of the Review of Environmental Factors.
So I suggest that the development be required to undertake the planting of some significant multiple of the trees removed, on Council and/or private land, in an attempt to mitigate the environmental and climatic effects of habitat destruction. Now more than ever, we need to preserve every live mature tree we have, and where tree removal is absolutely necessary, there must be appropriate ecological 'recompense' to the extent that is feasible, as a condition of project approval.	- The REF identified that the majority of trees being removed as part of the proposal are planted ornamental trees and not locally endemic species. Accordingly, the REF concluded that the vegetation was assessed as not being significant habitat and its removal would not fragment vegetation or sever a habitat corridor. For your awareness, one threatened plant species (Solanum celatum) was detected on site during ecological surveys and the project has been altered accordingly to
My point is that, especially in light of IPCC6.we need to preserve the existing vegetation base as a critical priority, whether these are ornamental species or endemic species, whether they provide critical habitat or not. I suggest that Council should as a matter of highest priority ensure that offset plantings are undertaken for all current and future projects. It is ironic that in order to protect critical infrastructure from bushfire, we increase the probability of catastrophic bushfires occurring by vegetation clearing that contributes to climate change. As I said earlier, this one project may seem negligible, but multiply this by the countless number of similar projects being undertaken across the country without offset plantings and perhaps the effects are not so negligible after all.	 avoid any impact to the threatened plant species. Whilst some vegetation removal is proposed as part of the construction of the new reservoir itself, the majority of the vegetation to be cleared is directly associated with the recommendations from the 2019 Bushfires Investigations. The recommendation being that appropriate cleared areas/Asset Protection Zones (APZ) to be established around all Council's critical infrastructure to assist the Community's resilience in future bushfire events by reducing the susceptibility of the water reservoirs to bushfire attack levels and damage.



I am sure this is way outside your sphere of influence, but i would appreciate it if you could pass my sentiments up the line for Council consideration.	 Further advice from Council's Environmental Officers is that in this particular project, there is no legislated requirement for off-set plantings; this being said Council will continue to investigate native planting opportunities throughout the wider Moss Vale Road Urban Release Areas.
 From: Resident I am a resident of Cambewarra, and a treatment psychologist providing therapy and counselling services in the local community, and receive referrals from many local GPs. I also serve as a Board Member on the Illawarra and Shoalhaven Local Health District Board and have the additional level of insight into local mental health issues. Our property boundary is close to the existing Reservoir and often appreciate the calming amenity this body of water brings to those who walk by. Professionally, I am witnessing a growing need for services and amenities that can provide a source of mental health and wellbeing, in face of the environmental, health and social isolation issues affecting every community deeply. Increasing the level of access to the proposed 'two reservoir' development to the local community would be a perfect opportunity for Council to contribute to this, at a very modest financial cost, and in an environmentally sensitive way. May I suggest or propose that Council add to the proposed plan / design of the reservoir development, by creating a public footnath / walkway around the perimeter of the whole 	 With regards to the items raised in your submission, we provide the following responses to assist: The project team has now completed our review of your submission and believe that you may be referring to the potential inclusion of a walking path around the existing Cambewarra Dam as opposed to within the Cambewarra Reservoir site which is the subject of the Review of Environmental Factors (REF). Due to the critical nature of the reservoir infrastructure, steep contours of the site and remote location along Reservoir Lane; Council is unable to incorporate a walkway around this reservoir site for water security and public safety reasons. With regards to the possible consideration of a walkway around the Cambewarra Dam site by Council, this matter will be referred to the relevant Council team members for consideration, as the Dam site itself does not form part of the project footprint being considered by the exhibited REF.
site.	



6. ENVIRONMENTAL SAFEGUARDS AND MEASURES TO MINIMISE IMPACTS

Safeg	juard / Measure	Responsibility
Plann	ning, permits and notification	
1.	A formal written agreement shall be obtained between Council and the owners of Part Lot 2 DP 1146993 for the establishment and maintenance of the proposed APZ and fence-line over this land.	Project Manager
2.	a) Notification of works affecting Part Lot 2 DP 1146993 (in accordance with agreement) shall be provided to the landowners and residents prior to commencement of works.	Project Manager / Site Manager
	b) The landowners and residents of Part Lot 2 DP 1146993 shall be informed of any proposed sediment erosion control management and soil stabilisation.	
	c) The landowners and residents of Part Lot 2 DP 1146993 shall be informed of the presence of <i>Solanum celatum</i> and made aware of its threatened status under the NSW <i>Biodiversity Conservation Act 2016</i> , and the need to protect this species during works and in the future.	
3.	Fencing design shall not include barbed-wire or razor-wire or other similar products that would increase the risk injury to native fauna.	Project Manager
Site e	establishment, works and operation	
4.	a) The population of <i>Solanum celatum</i> shall be appropriately delineated with temporary, high-visibility fencing and signage indicating "Environmental Protection Area" prior to any works commencing.	Site Manager
	b) Staff working on the site shall be informed of the presence of <i>Solanum celatum</i> and made aware of its threatened status under the NSW <i>Biodiversity Conservation Act 2016</i> , and the need to protect this species.	
5.	Construction compounds, machinery, vehicles and stockpiles shall be located within the construction footprint, or otherwise in existing cleared areas, and shall not encroach into native vegetation, including the drip zone of trees.	Site Manager



Safeg	uard / Measure	Responsibility
6.	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.	Site Manager / Contractor
7.	Trees to be removed shall be felled into the development footprint or cleared areas, so as to avoid impact to native vegetation to be retained.	Contractor
8.	Pruning of trees where required is to be undertaken in accordance with AS 4373-1996 "Pruning of Amenity Trees".	Contractor
9.	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. Sediment fencing shall be established below areas of disturbance on all affected slopes. Additional appropriate erosion control e.g. staked haybales shall be installed within any watercourse / gully. Erosion and sediment controls shall be installed immediately after clearing works (on the same day) and 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.	Site Manager / Contractor
10	All disturbed sloped areas shall be stabilised with jute mesh and / or turf grass immediately following completion of works affecting these areas.	Site Manager / Contractor
11	Fencing shall not include barbed-wire or razor-wire or other similar products that would increase the risk injury to native fauna.	Site Manager / Contractor
12	All fill material used on site is to be free of tree stumps, roots, rubbish, large stones, building material and excessive clay or silt. Any imported fill material must be tested and classified by the site engineer as either VENM or ENM before placement.	Site Manager / Contractor
13	. 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.	Site Manager / Contractor
14	No major equipment maintenance works shall be undertaken on-site.	Site Manager / Contractor



Safeguard / Measure	Responsibility
15. 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).	Site Manager / Contractor
16. 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.	Site Manager
Post works & ongoing maintenance of site	
17. An asset form must be trimmed to file 44574E on commissioning of each facility within the proposed activity in accordance with POL15/8 Asset Accounting Policy section 3.1.4 and POL16/79 Asset Management Policy section 3.3. Asset forms are available are webpage <u>http://sccintranet/AssetsWorks/TechnicalServices/AssetStrateg</u> <u>y/AssetForms.aspx</u>	Project Manager
18. Signage shall be installed on the fence in proximity to the Solanum celatum plants advising that an "Environmentally Sensitive Area" exists, that threatened plants occur in the area, and that maintenance clearing along the fenceline in this area should not exceed 1.5m from the fence.	Site Manager
19. Amenity screen plantings utilising low native species which would not compromise the APZ, shall be considered along the eastern boundary.	Project Manager



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 the construction of an additional 3.5ML reservoir with associated infrastructure and site works at the site of an existing 2.3ML reservoir, on Reservoir Lane, Cambewarra.

Shoalhaven City Council has considered the potential environmental effects of the proposal and the effectiveness and feasibility of measures for reducing or preventing detrimental effects. It is determined that:

- 1. The proposed safeguards and mitigation measures identified in the report (Section 6) shall be adopted and implemented.
- 2. It is unlikely that there will be any significant environmental impact as a result of the proposed work and an Environmental Impact Statement is not required for the proposed works.
- 3. The proposed activity is not likely to significantly affect threatened species, populations or ecological communities, or their habitats and a Species Impact Statement / BDAR is not required.
- 4. No additional statutory approvals, licences, permits and external government consultations are required.

Robert Horner	
Executive Manager	
Shoalhaven Water	
Shoalhaven City Council	Date:

Document Review:

hoalhaven

Citv Council

	Name	Signature	Date
Author:	Jeff Bryant	J.O.J.	21/07/2021
Reviewed by:	Geoff Young	ally	23/07/2021



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APPENDIX A – Concept design plans

"Moss Vale Road Urban Release Area – Water Infrastructure – Cambewarra Reservoir"

Consultant final concept design plans by GHD

Council reference D21/281357



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	BOTTOM WATER LEVEL (B	BWL)	131.35m AHD
	TOP WATER LEVEL (TWL)		138.80m AHD
	UVERFLUW LEVEL (UL)		138.90m AHD
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Shoalhaven City Council

APPENDIX B – Likelihood of Occurrence Table (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 (<u>https://www.environment.nsw.gov.au/threatenedspeciesapp/</u>).

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).



Endangered Ecological Community name	Status	Likelihood of presence within areas impacted by the activity
Illawarra Lowlands Grassy Woodland in the Sydney	Endangered - NSW BC Act	Does not occur on-site and is not mapped as occurring in close proximity to
Basin Bioregion		the site (nearest records are approx. 3.75km to the north and south-east of
	Critically Endangered -	the site).
	Commonwealth EPBC Act	
Illawarra Subtropical Rainforest in the Sydney Basin	Endangered - NSW BC Act	Mapped as occurring approx. 500m to the north-west of the site, however,
Bioregion		site survey confirmed that the EEC does not occur within or in close
		proximity to the site. The site does not contain any indicative species of the
		EEC.

Species name	Species name Status Habitat requirements (www.environment.nsw.gov.au)		Likelihood of presence within areas impacted by the activity
FLORA			
<i>Cryptostylis hunteriana</i> Leafless tongue Orchid	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 (Eucalyptus sclerophylla), Silvertop Ash (E. sieberi), Red Bloodwood (Corymbia gummifera) and Black Sheoak (Allocasuarina	Unlikely to occur. No suitable habitat present within or in vicinity of site.



		littoralis); appears to prefer open areas in the understorey of this community and is often found in association with the Large Tongue Orchid (C. subulata) and the Tartan Tongue Orchid (C. erecta).	
<i>Eucalyptus langleyi</i> Albatross Mallee	NSW BC Act Vulnerable EPBC Act Vulnerable	Found in Mallee shrub land on poorly drained, shallow, sandy soils on sandstone.	No suitable habitat. Does not occur. A conspicuous species, not detected during site surveys
<i>Genoplesium baueri</i> Bauer's Midge Orchid	Endangered <i>EPBC Act</i> Endangered <i>NSW</i> BC <i>Act</i>	Grows in dry sclerophyll forest and moss gardens over sandstone.	Unlikely to occur. No suitable habitat present within or in vicinity of site.
Hibbertia stricta subsp. furcatula	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. 	No suitable habitat. Does not occur. Not detected during site surveys



<i>Pterostylis pulchella</i> Waterfall Greenhood	NSW BC ACT Vulnerable EPBC Act Vulnerable	The Waterfall Greenhood is found on cliff faces close to waterfalls and creek banks and mossy rocks alongside running water. Flowers appear from February to May	Unlikely to occur. No suitable habitat present within or in vicinity of site.
Pterostylis ventricosa	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 moderatley 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 to occur. No suitable habitat present within or in vicinity of site. Open areas are highly disturbed.
<i>Rhodamnia rubescens</i> Scrub Turpentine	Critically Endangered NSW BC Act	Found in littoral, warm temperate and subtropical rainforest and wet sclerophyll forest usually on volcanic and sedimentary soils.	Does not occur. A conspicuous species, not detected during site surveys



Solanum celatum	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.	A small patch of the species was found to occur on the south-west corner of the site. Further assessment is required.
<i>Zieria baeuerlenii</i> Bomaderry Zieria	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.	Does not occur. A conspicuous species, not detected during site surveys
<i>Zieria tuberculata</i> Warty Zieria	NSW BC Act Vulnerable EPBC Act Vulnerable	Grows in heath amongst rocky outcrops on rain forest edges and in tall forest and shrubland.	Does not occur. A conspicuous species, not detected during site surveys
AMPHIBIANS			
Giant Burrowing Frog Heleioporus australiacus	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.	Unlikely to occur. No suitable habitat within the site.
		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). 	
MICRO-CHIROPTERAN	BATS		
Eastern Bentwing-bat <i>Miniopterus orianae</i> <i>oceanensis</i>	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 within the site. May utilise foraging habitat within the site. No roosting habitat occurs. Further assessment required.
Eastern False Pipistrelle <i>Falsistrellus</i> <i>tasmaniensis</i>	NSW BC Act Vulnerable	 Prefers moist habitat that contains trees greater than 20 m high with a dense undertstorey. 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 	Possibly occurring within the site. May utilise foraging habitat within the site. No roosting habitat occurs. Further assessment required.



		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).	
Eastern Freetail-Bat <i>Micronomus norfolkensis</i>	<i>Vulnerable NSW</i> BC <i>Act</i> Vulnerable <i>EPBC Act</i>	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. May utilise foraging habitat within the site. No roosting habitat occurs. Further assessment required.
Greater Broad-nosed Bat <i>Scoteanaux ruepelli</i>	Vulnerable <i>NSW</i> BC <i>Act</i>	 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. May utilise foraging habitat within the site. No roosting habitat occurs. Further assessment required.
Large-eared Pied Bat Chalinobolus dwyeri	Vulnerable <i>NSW</i> BC <i>Act</i> Vulnerable <i>EPBC Act</i>	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-	Possibly occurring within the site. May utilise foraging habitat within the site. No roosting habitat occurs. Further assessment required.



		elevation dry open forest and woodland close to these features	
Little Bent-wing Bat <i>Miniopterus australis</i>	Vulnerable <i>NSW</i> BC <i>Act</i>	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. May utilise foraging habitat within the site. No roosting habitat occurs. Further assessment required.
Southern Myotis (Large- footed Myotis) <i>Myotis macropus</i>	Vulnerable <i>NSW</i> BC <i>Act</i>	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 an aerial insects flying over water. They use their large feet to capture prey items (Churchill 2008).	Possibly occurring within the site. May utilise foraging habitat within the site. No roosting habitat occurs. Further assessment required.



Yellow-bellied Sheathtail- bat <i>Saccolaimus flaviventris</i>	Vulnerable <i>NSW</i> BC <i>Act</i>	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	Possibly occurring within the site. May utilise foraging habitat within the site. No roosting habitat occurs. Further assessment required.
		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	
BIRDS	l		
Barking Owl Ninox connivens	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	Possibly occurring transiently within or over the site. No nesting habitat occurs. Would not rely on habitat within the site.



		repeatedly over years by a pair, but they may switch sites if disturbed by predators (e.g. goannas).	
Bush Stone-curlew	NSW BC Act	Inhabits open forests and woodlands with a	Unlikely to occur. No suitable habitat occurs
Burhinus grallarius		sparse grassy ground layer and fallen timber.	within the site.
	Endangered	Largely nocturnal, being especially active on	
		moonlit nights. Nest on the ground in a scrape or	
		small bare patch.	
Dusky Woodswallow	Vulnerable NSW BC Act	The Dusky Woodswallow is often reported in	Possibly occurring transiently within the site.
Artamus cyanopterus		woodlands is eastern, southern and	Unlikely to rely on habitat within the site. No
cyanopterus		southwestern Australia. In New South Wales it is	important habitat would be removed.
		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	
		have also been recorded in shrublands and	
		heathlands and carious 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 course 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.	



Eastern Bristlebird-	Endangered EPBC	Sedgeland/heathland/dry sclerophyll and	Unlikely to occur. No suitable habitat occurs
Dasyornis brachypterus	Act	woodlands- / requires thick shrub/heath layer	within the site.
	Endangered NSW BC	for shelter, nesting and foraging	
	Act		
Flame Robin <i>Petroica phoenicea</i>	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 sedgelands 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	Possibly occurring transiently within the site. Unlikely to rely on habitat within the site. No important habitat would be removed.
Gang-gang Cockatoo	Vulnerable NSW BC	Tall mountain forests and woodlands,	Possibly occurring transiently within the site.
Callocephalon	Act	particularly in heavily timbered and mature wet	Unlikely to rely on habitat within the site. No
fimbriatum		sclerophyll forests. In winter, may occur at	important habitat would be removed. No
		lower altitudes in drier more open eucalypt	hollow-bearing trees occur.
		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	
Glossy Black-cockatoo	Vulnerable NSW BC	The GBC inhabits open forest and woodlands	Possibly occurring transiently within the site.
Calyptorhynchus	Act	of the coast where stands of she-oak occur. In	Unlikely to rely on habitat within the site. No
lathami		the Jervis Bay region they feed almost	important habitat would be removed. No

Review of Environmental Factors Shoalhaven water – Moss Vale Rd URAs Part 3: Cambewarra Reservoir D21/302103



		exclusively on the seeds of the black she-oak	hollow-bearing trees occur. No feed trees
		with their bill	
Little Lorikeet Glossopsitta pusilla	Vulnerable NSW BC ACT	 with their bill 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 transiently within the site. Unlikely to rely on habitat within the site. No important habitat would be removed. No hollow- bearing trees occur.
		preferred sites are limited. Riparian trees often chosen, including species like Allocasuarina	



Masked Owl – <i>Tyto</i>	Vulnerable NSW BC	Dry eucalypt forests and woodlands from sea	Possibly occurring transiently within or over the
novaehollandiae	Act	level to 1100 m. Inhabits forest but often hunts	site. No nesting habitat occurs. Would not rely
		along the edges of forests, including	on habitat within the site.
		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.	
Olive Whistler	Vulnerable NSW BC Act	The Olive Whistler inhabits the wet forests on the	Possibly occurring transiently within the site.
Pachycephala olivacea		ranges of the east coast. It has a disjunct	Unlikely to rely on habitat within the site. No
		distribution in NSW chiefly occupying the beech	important habitat would be removed.
		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.	
Powerful Owl	Vulnerable NSW BC	Coastal Woodland, Dry Sclerophyll Forest, wet	Possibly occurring transiently within or over the
Ninox strenua	Act	sclerophyll forest and rainforest- Can occur in	site. No nesting habitat occurs. Would not rely
		fragmented landscapes Roosts in dense	on habitat within the site.
		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	
Scarlet Robin	Vulnerable NSW BC Act	The Scarlet Robin is primarily a resident in dry	Possibly occurring transiently within the site.
Petroica boodang		forests and woodlands, but some adults and	Unlikely to rely on habitat within the site. No
		young birds disperse to more open habitats after	important habitat would be removed.
		breeding.	
Sooty Owl	Vulnerable	Occurs in rainforest, including dry rainforest,	Possibly occurring transiently within or over the
Tyto tenebricosa	NSW BC Act	subtropical and warm temperate rainforest, as	site. No nesting habitat occurs. Would not rely
		well as moist eucalypt forests	on habitat within the site.
Square-Tailed Kite	Vulnerable NSW BC	Summer breeding migrant to the south-east	Possibly occurring transiently within or over
Lophoictinia isura	Act	including the NSW south coast arriving in	the site. No suitable nesting habitat occurs
		September and leaving by March, Found in a	Would not rely on habitat within the site.
		variety of timbered habitats including dry	
		woodlands and open forests. Shows a particular	
		preference for timbered watercourses large	
		hunting ranges of more than 100km2 Nest	
		within large hollow bearing trees generally	
		within 200m of riparian areas.	
Varied Sittella	Vulnerable	Inhabits eucalypt forests and woodlands.	Possibly occurring transiently within the site.
Daphoenositta	NSW BC Act	especially those containing rough-barked species	Unlikely to rely on habitat within the site. No
chrysoptera		and mature smooth-barked gums with dead	important habitat would be removed.
		branches, mallee and Acacia woodland	
White-bellied Sea-Eagle	NSW BC Act	Found in coastal habitats (especially those close	Unlikely to occur. No suitable habitat occurs.
Haliaeetus leucogaster	Vulnerable	to the sea-shore) and around terrestrial wetlands	
_		in tropical and temperate regions of mainland	
	Migratory	Australia and its offshore islands. The habitats	



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EPBC Act	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.	
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White-throated Needletail <i>Hirundapus caudacutus</i>	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	Possibly occurring transiently within the site. Unlikely to rely on habitat within the site. No important habitat would be removed.
		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.	
MAMMALS			
Brush-tailed Rock- wallaby <i>Petrogale</i> <i>penicillata</i>	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 occurs within the site.



Eastern Pygmy-possum <i>Cercatetus nanus</i>	Vulnerable NSW BC Act	Rainforest, sclerophylla forest & woodland to heath – but heath & woodland preferred. Forages on banksias, eucalypts & bottlebrushes.	Unlikely to occur. No suitable habitat occurs within the site.
Greater Glider <i>Petauroides Volans</i>	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 occurs within the site.
Grey-headed Flying-fox <i>Pteropus poliocephalus</i>	Vulnerable <i>EPBC Act</i> Vulnerable <i>NSW</i> BC <i>Act</i>	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. May utilise foraging habitat within the site. Further assessment required.
Koala Phascolarctos cinereus	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 <i>Eucalyptus</i> <i>amplifolia, E.viminalis, & E.tereticornis</i> but numerous other species also known food trees.	Unlikely to occur. No suitable habitat occurs within the site.



Long-nosed Potoroo Potorous tridactylus	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-fruiting) 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 occurs within the site.
Southern Brown	Endangered EPBC Act	Southern Brown Bandicoots are largely	Possibly occurring within the site. May utilise
Bandicoot (eastern)	Endangered NSW BC	crepuscular (active mainly after dusk and/or	foraging habitat within the site. Further
Isoodon obesulus	Act	before dawn). They are generally only found in	assessment required.
obesulus		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 Xanthorrhoea 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.	
Spotted-tailed Quoll	Endangered	Recorded across a range of habitat types,	Possibly occurring transiently within the site.
Dasyurus maculatus	EPBC Act	including rainforest, open forest, woodland,	Unlikely to rely on habitat within the site. No
	Vulnerable	coastal heath and inland riparian forest, from the	important habitat would be removed.
	NSW BC Act	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. Such sites may be visited by multiple	
		individuals and can be recognised by the	
		accumulation of the sometimes characteristic	
		'twisty-shaped' faeces deposited by animals.	
		Females occupy home ranges up to about 750	
		hectares and males up to 3500 hectares. Are	
		known to traverse their home ranges along	
		densely vegetated creeklines.	
Yellow-bellied Glider -	Vulnerable NSW BC	Forest with old growth elements. Large	Unlikely to occur. No suitable habitat occurs
Petaurus Australis	Act	Eucalypt Hollows for denning- Inhabits mature	within the site.
		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.	