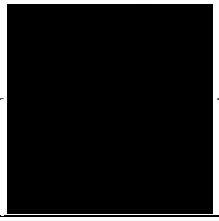
REVIEW OF ENVIRONMENTAL FACTORS (REF)
SEWER RISING MAIN SRM16 REPLACEMENT
NOWRA

Contents

Document control

Item	Details
Project	Review of Environmental Factors – Sewer Rising Main SRM16 Replacement
Client	Shoalhaven Water, Shoalhaven City Council
Prepared By	City Services, Shoalhaven City Council

Document status

Version	Author / Reviewer*	Name	Signed	Date
V1.0	Author	Jeff Bryant		02/06/2025
	Reviewer	Geoff Young		02/06/2025

*Review and endorsement statement:

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

Assessment and approvals overview

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

1. PROPOSAL AND LOCATION

1.1 Overview

This Review of Environmental Factors (REF) addresses the potential environmental impacts of – and provides mitigation measures for – a proposal to replace, reroute and extend Sewer Rising Main 16 (SRM 16).

The proposed activity is the construction of approximately 1.56km length of sewer rising main (SRM) between Sewer Pump Station 16 (SPS 16) on Hillcrest Ave and a new gravity sewer main currently under construction to the north of Carrington Park Dr.

The sewer rising main would be subsurface (depths subject to design considerations), with scour valves and inspection covers at ground level (approx.). Air valves with vents and /or odour scrubbers may be included which would protrude above-ground.

It is assumed that construction methodology could involve a combination of trenching to a width which just exceeds the pipe width (with total impact footprint from machinery access 4 to 6 metres wide); and horizontal direct-drilling or micro-tunnel under-boring (requiring entry / exit pits up to 6 metres square and clearance to feed pipes).

Figures 1 and 2 below show the site with approximate location of works.

Design drawings are included in Appendix A.

Works would involve:

- Establishment of a temporary construction compound on existing cleared land. Site to be confirmed, but would likely utilise the existing SPS site, the carpark at the netball courts and / or the open space near Carrington Park Drive.
- Vegetation removal would be minimal and limited primarily to common disturbance-successional shrubs and small trees, in addition to invasive, exotic species.
- Subsurface construction of approximately 1.56 km length of HDPE PE100 PN16 (225 mm outside diameter), with above-ground air valves and scour valves.
- Pipe installation would be via a combination of trenching and under-boring to variable depth, from 0.78 m to 5.52 m (top of pipe depth). Under-boring would be utilised wherever appropriate and possible to minimise impacts on native vegetation and roads. Non-destructive excavation methods such as vacuum excavation would be used where trenching must occur within the structural root zone of large, mature trees.
- Decommission via disconnection of the existing SRM 16.
- Establishment of a sewerage easement over private land, if required.
- The proposal would also involve the implementation of safeguards and mitigation measures (Section 7) to minimise direct and indirect impacts on the environment.

The purpose of this proposal is to redirect sewage flow from an existing gravity sewer main which is at capacity.

The proposed sewer rising main diversion would discharge into a new gravity sewer main currently under construction.

The works would reduce the likelihood of future overflows and alleviate the need to upgrade the existing gravity sewer main which would be extremely difficult and costly.

Shoalhaven City Council (SCC) is the proponent and the determining authority under Part 5 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). This Review of Environmental

Factors (REF) provides an assessment of the proposed activity and associated impacts on the environment, in the context of Division 5.1 of the Act and section 171 of the *Environmental Planning and Assessment Regulation 2021*, and in doing so, satisfies the requirement of section 5.5 of the Act, that SCC examines and takes into account to the fullest extent possible, all matters affecting or likely to affect the environment by reason of the activity.

1.2 Location

The proposed works would occur largely within public road reserves but would also encroach with Council owned community and operational land in addition to private land, over which, the establishment of an easement would be sought.

Details of affected land are provided in Table 1.

Table 1. Property affected by the proposal

Lot / DP	Description	Land owner / manager	Other pertinent information
-	John Purcell Way	Shoalhaven City Council	Public road; primary access for St John The Evangelist High School
-	Park Rd	Shoalhaven City Council	Public road; primary access for Shoalhaven High School
-	Jindalee Cr	Shoalhaven City Council	Public road
-	Carrington Park Dr	Shoalhaven City Council	Public road
Lot 46 DP 31078	Sewer Pump Station 16 (SPS16)	Shoalhaven City Council	Operational land
Lot 7 DP 1158088	31 John Purcell Way (St John The Evangelist High School)	Private	Existing SRM 16 occurs over this land; an easement shall be sought
Lot 1 DP 390432	24 John Purcell Way (Park Rd Netball Courts)	Shoalhaven City Council	Community Land – Sportsground
Lot 541 DP 1276147	-	Shoalhaven City Council	Community Land – General Community Use

Figure 1. Site location

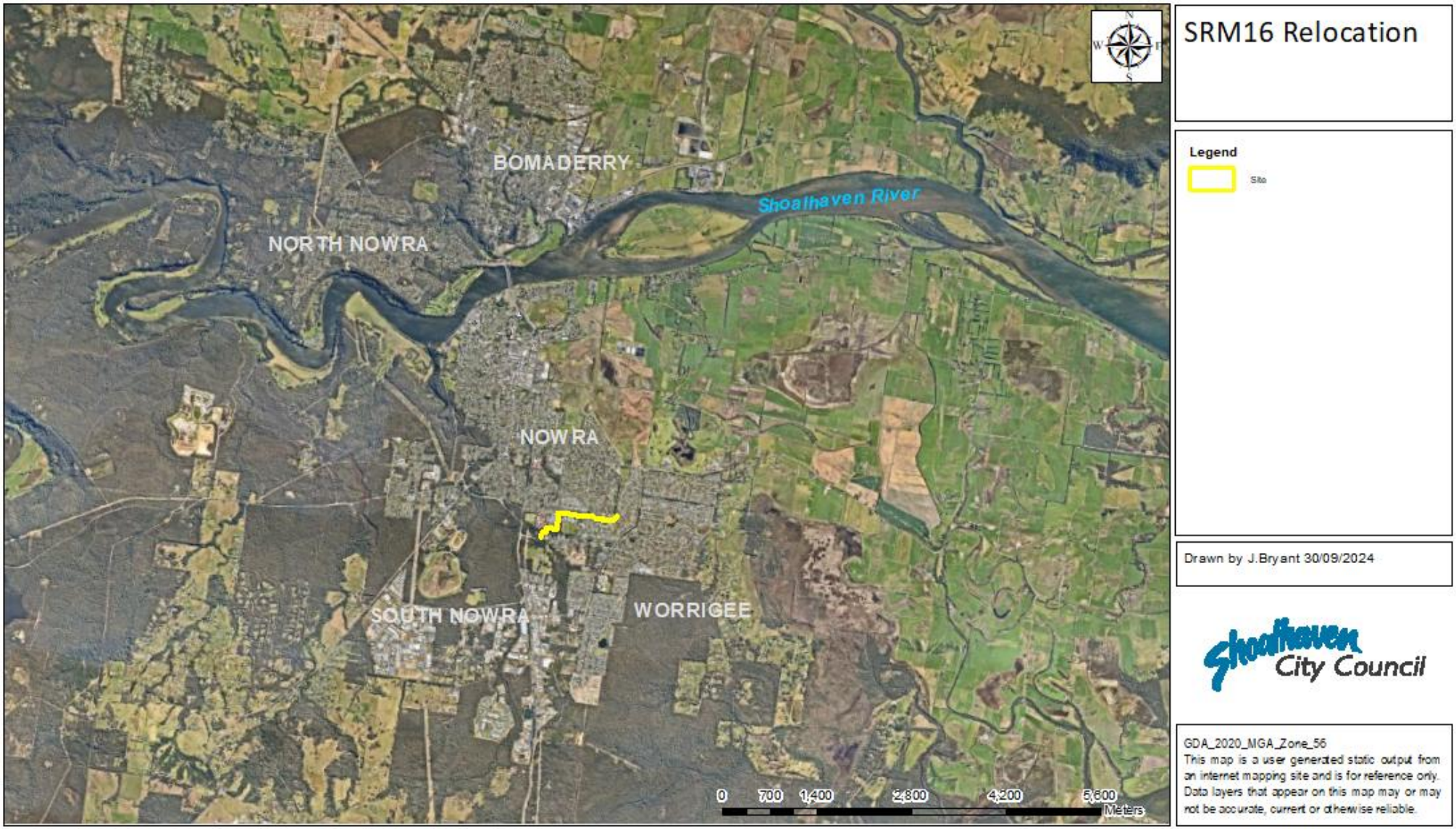


Figure 2. Site overview

2. EXISTING ENVIRONMENT

Site investigations were undertaken by a Council Environmental Officer on 18th and 30th September 2024.Investigations involved: comprehensive vegetation and habitat assessment; determination of vegetation communities; targeted survey for potentially occurring threatened flora species (including *Syzygium paniculatum* and *Triplarina nowraensis*); investigation of habitat availability on site for threatened fauna species and cryptic threatened flora species (including threatened terrestrial orchids); and investigation for potential Aboriginal and non-indigenous heritage objects.

Photos of the site are provided in section 2.4 below.

2.1 Subject site – general description

The site is narrow and linear proposed pipeline alignment, occurring within the eastern edge of Lot 46 DP 31078 (containing Sewer Pump Station 16 – SPS16), the southern edge of Lot 7 DP 1158088 (St Johns High School land), the southern and eastern edges of Lot 1 DP 390432 (Park Rd Netball Courts), the cleared and modified road reserves of John Purcell Way, Park Rd, Jindalee Cr and Carrington Park Dr, and into Lot 541 DP 1276147 (uncategorised Community Land).

Lot 46 DP 31078 (SPS16) at the south-west end of the site, is predominantly vegetated, with a cleared parking area and frontage to Hillcrest Ave, and a cleared vehicle track running through to the rear (northern) boundary.

Where the proposed alignment crosses the southern edge of Lot 7 DP 1158088 (St Johns High School land) toward John Purcell Way, vegetation is modified and managed as parkland, with scattered, mature, trees (primarily Spotted Gum) and smaller understorey trees including Wattles, and mown grass groundcover.

The southern and eastern edges of the netball courts, where the proposed alignment would occur, is moderately to highly disturbed, with mature trees (Grey Iron Bark) occurring only in the north-eastern corner.

The modified and developed road verges of Park Rd, Jindalee Cr and Carrington Park Dr, contained only scattered, small, ornamental street trees.

Lot 541 DP 1276147 at the eastern end of the site is a predominantly cleared and modified public reserve which appears to follow a disturbed, natural drainage line. This area contained some regenerated vegetation including reeds along the low point of the drainage line.

2.2 Topography, geology and soils

Much of the subject site is relatively level, with gently sloping areas occurring.

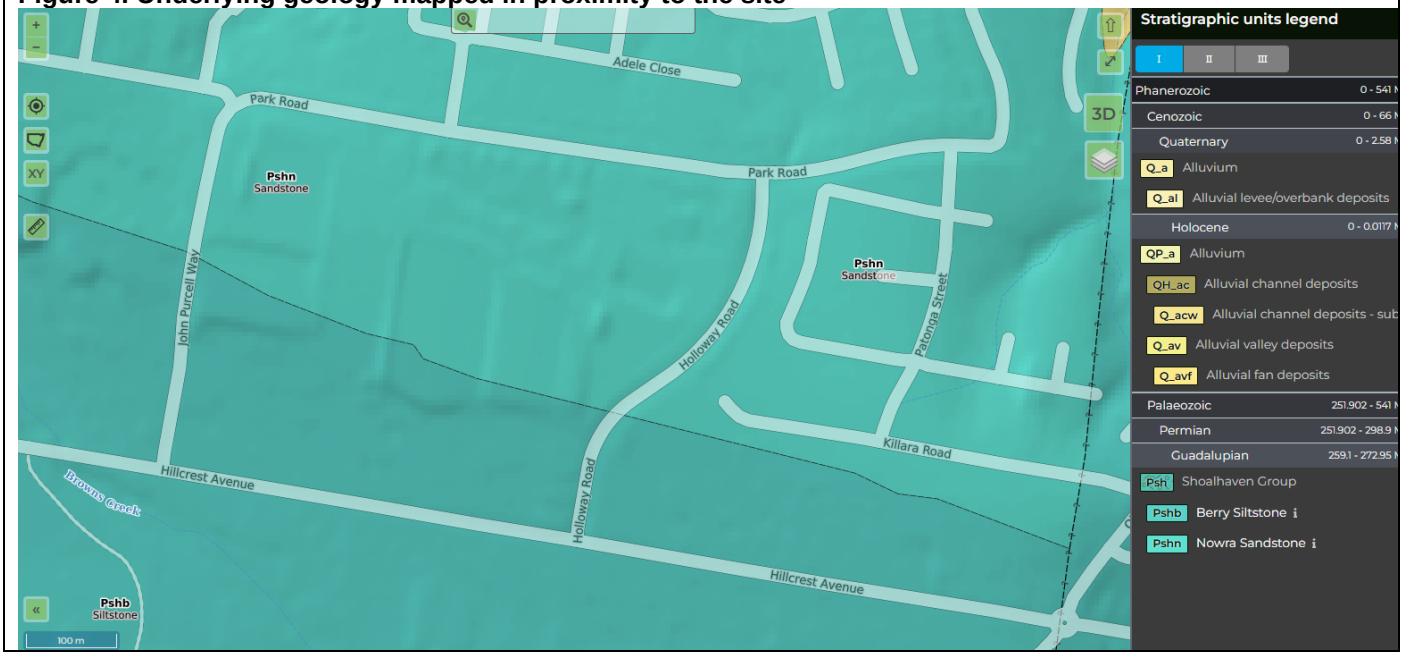
Mapped topography (Figure 3) does not reflect existing slopes, particularly toward the eastern end of the site, where the landform appears to have been modified as part of residential development. Substantial filling to level the netball courts' grounds towards the southern edge was also apparent.

No watercourses occur within the site, but Browns Creek occurs in proximity to the western end of the site.

Figure 3. Topography over and in proximity to the site

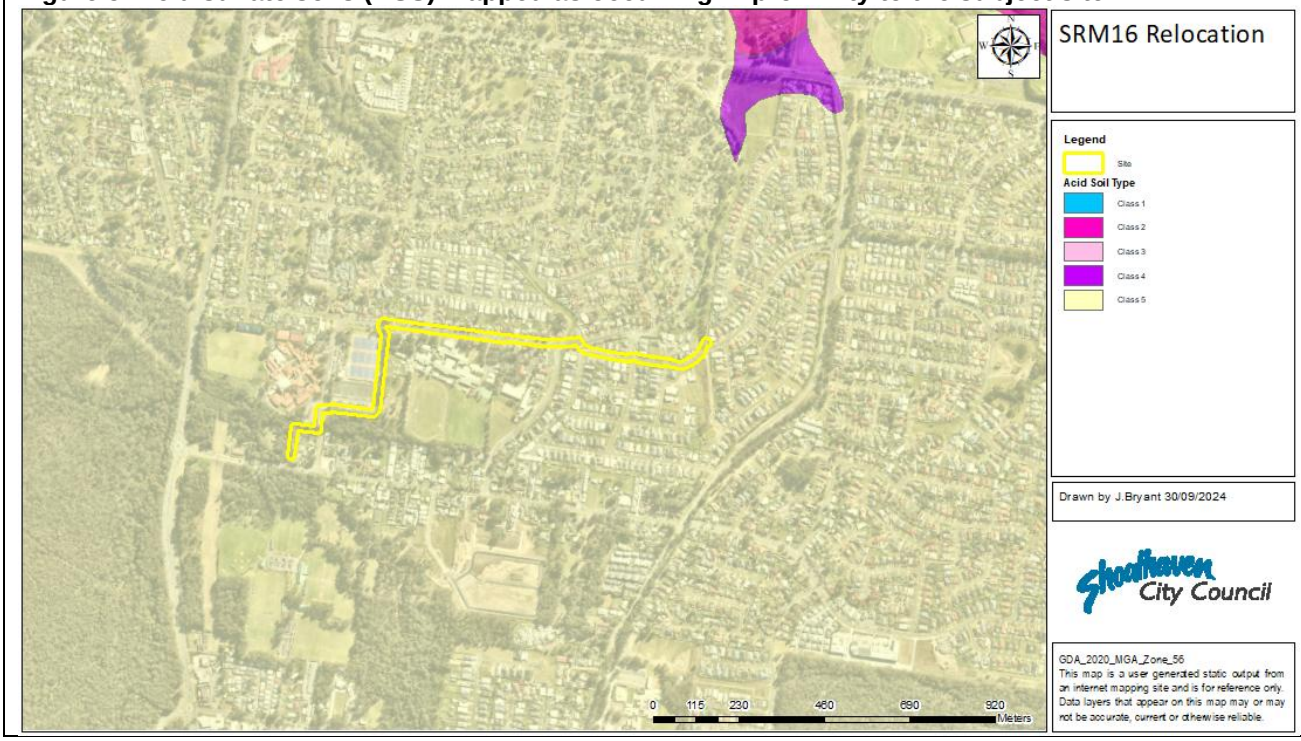
The underlying geology of the majority of the site is mapped as Nowra sandstone, with Berry siltstone occurring in the western portion of the site[1] (Figure 4).

Figure 4. Underlying geology mapped in proximity to the site[1]



The subject site and surrounds are mapped as Class 5 acid sulfate soils (ASS), with Class 4 ASS mapped as occurring approximately 480 m to the north of the eastern end of the site and Class 2 ASS occurring approximately 770 m to the north of the eastern end of the site (Figure 5).

Figure 5. Acid sulfate soils (ASS) mapped as occurring in proximity to the subject site



[1] Source: https://minview.geoscience.nsw.gov.au/

2.3 Habitat and vegetation assessment

NSW Plant Community Types (PCTs) mapped as occurring in proximity to the site (refer to Figure 6 below) include:

- PCT3330 South Coast Lowland Woollybutt Forest – this vegetation community is associated with Illawarra Lowlands Grassy Woodland threatened ecological community (TEC).
- PCT4019 Coastal Alluvial Bangalay Forest – this vegetation community is associated with River-flat Eucalypt Forest EEC and Swamp Sclerophyll Forest TEC.
- PCT3273 South Coast Lowland Shrub-Grass Forest – this vegetation community is not associated with any TEC.
- PCT3269 Shoalhaven Lowland Spotted Gum-Paperbark Forest – this vegetation community is associated with Illawarra Lowlands Grassy Woodland TEC.

Vegetation observed over the western portion of the site appeared to be PCT3330 in the south-west corner of the site, grading to PCT3269 around the Netball Courts. Both of these PCTs are associated with Illawarra Lowlands Grassy Woodland TEC.

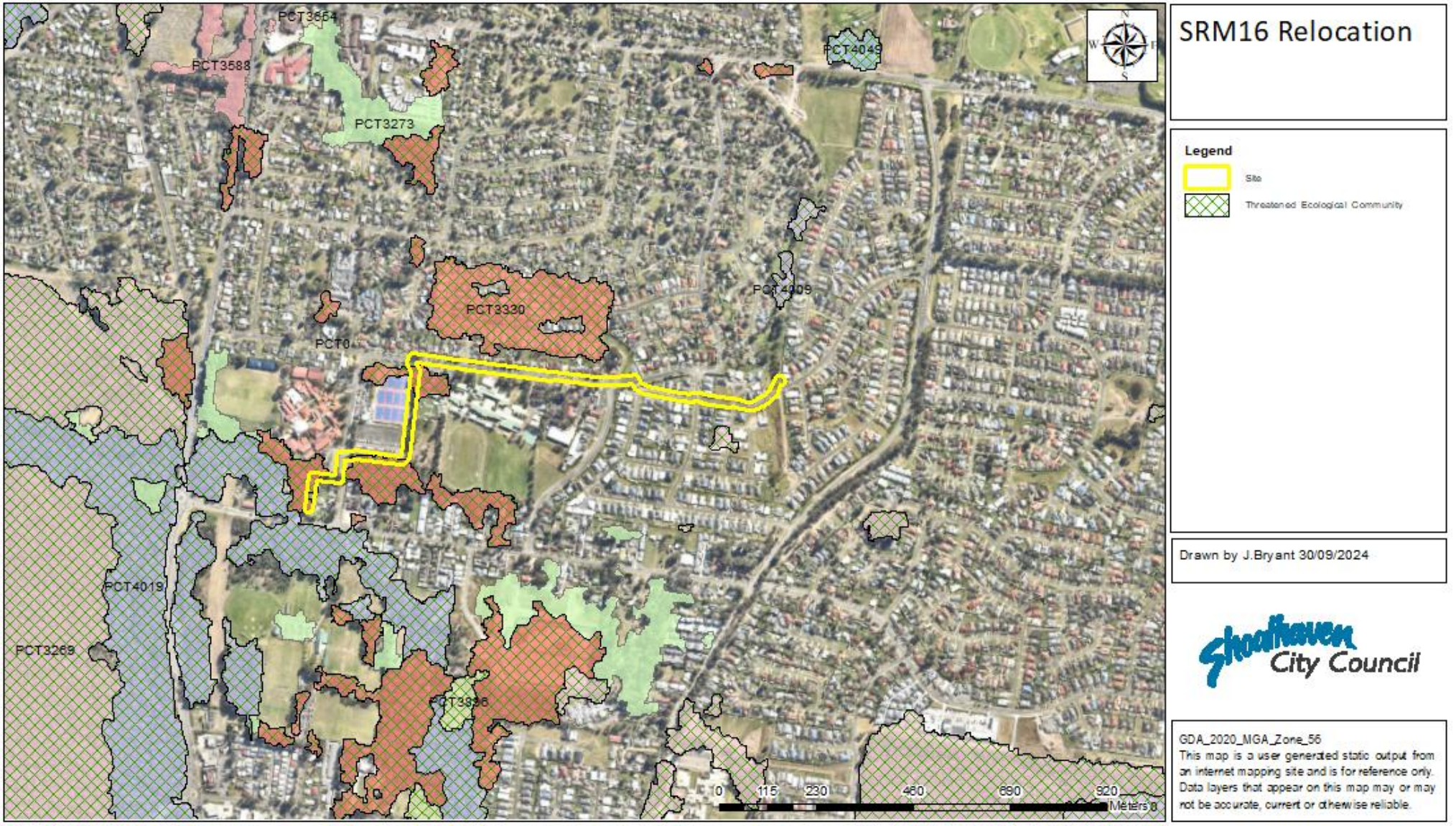
Lot 46 DP 31078 containing Sewer Pump Station 16 (SPS16) at the south-west end of the site, was mostly vegetated, with mature trees of varying age class and up to 70 cm diameter at breast height (DBH) occurred, dominated by *Eucalyptus amplifolia* (Cabbage Gum) and *Corymbia maculata* (Spotted Gum). Mid-storey vegetation included *Melaleuca linarifolia* (Flax-leaved Paperbark), *Acacia floribunda* (White Sally Wattle), *A.irrorata* (Green Wattle), *A. filicifolia* (Fern-leaved Wattle), *Parsonsia straminea* (Common Silk-pod), *Pittosporum undulatum* (Sweet Pittosporum), *Exocarpos cupressiformis* (Cherry Ballart), *Allocasuarina littoralis* (Black She-oak) and *Pultenaea villosa* (Bronze Bush-pea).

The understorey on Lot 46 DP 31078 – particularly the groundcover – was moderately disturbed and dominated by invasive exotic vegetation including *Cenchrus clandestinus* (Kikuyu), *Paspalum urvellei* (Vasey Grass), *Asparagus aethiopicus* (Asparagus Fern), *Ligustrum sinense* (Small-leaf Privet), *L.lucidum* (Large-leaf Privet), *Senna pendula* var. *glabrata* (Cassia), *Crassula multicava* subsp. *multicava* (Shade Crassula), *Bidens Pilosa* (Cobblers Pegs), *Sida rhombifolia* (Paddys Lucerne) and *Bryophyllum* (Mother of Millions).

Across the southern edge of Lot 7 DP 1158088 (St Johns High School land), vegetation was modified and managed as parkland, with scattered, mature, Spotted Gum trees and smaller understorey trees including Wattles, and mown grass groundcover.

To the south and east of the Park Rd Netball Courts, vegetation was dominated by *Eucalyptus punctata* (Grey Gum), with scattered *E.paniculata* (Grey Iron Bark) and occasional *E.amplifolia*, *Angophora floribunda* (Rough-barked Apple) and *Corymbia maculata* (Spotted Gum). The open mid-storey in this area contained occasional *Melaleuca decora* (White Feather Honeymyrtle), *Acacia filicifolia* (Fern-leaf Wattle), *Callistemon viminalis* (Weeping Bottlebrush), *Exocarpus cupressiformis* (Cherry Ballart), and groundcover of native grasses and groundcovers including *Lomandra longifolia, Aristida* spp., *Echinopogon caespitosus, Austrodanthonia* spp., *Dichelacne* spp., *Lobelia purpurascens, Schoenus apogon* and exotic *Asparagus aethiopicus* (Asparagus fern). The southern and eastern edges of the netball courts, where the proposed alignment would occur, was moderately to highly disturbed, with mature Grey Iron Bark trees occurring only in the north-eastern corner, and vegetation limited to Green Wattle, Sickle Wattle (*Acacia falcata*), Willow-leaved Hakea (*Hakea salicifolia*) and scattered Weeping Bottlebrush; and a groundcover of mostly invasive, exotic species including Kikuyu, Caterpillar Grass (*Paspalum*

Figure 6. Plant Community Types (PCTs) mapped as occurring in proximity to the proposal



spp.), *Andropogon virginicus* (Whiskey Grass), Asparagus Fern (*Asparagus aethiopicus*), and Blackberry (*Rubus fruticosus*).

The modified and developed road verges of Park Rd, Jindalee Cr and Carrington Park Dr, contained only scattered, small, ornamental street trees.

The eastern end of the site was a predominantly cleared and modified public reserve which appeared to follow a disturbed, natural drainage line. This area contained some regenerated vegetation including Spotted Gum, *Melaleuca quinquinervia* (Broad-leaved Paperbark), a groundcover of exotic Kikuyu, *Sporobolus africanus* (Parramatta Grass), *Trifolium repens* (White Clover), and *Typha orientalis* (Cumbungi) along the low point of the drainage line.

2.4 Threatened species and habitat resources on site

No threatened flora including *Syzygium paniculatum* or *Triplarina nowraensis*, nor suitable habitat for potentially occurring threatened terrestrial orchids (including *Cryptostylis hunteriana, Genoplesium baueri, Pterostylis gibbosa, and P.vernalis*) was identified on site during vegetation surveys.

No hollow-bearing trees, Glossy Black Cockatoo (*Calyptorhynchus lathami*) feed trees (i.e. *Allocasuarina littoralis* with chewed cones), or Glider feed trees (e.g. *Corymbia gummifera* or *Eucalyptus punctata* with characteristic v-shaped glider scars) were recorded as occurring within or in proximity to the site.

Vegetation in the western portion of the site was identified as PCT3330 and PCT3269, both of which are associated with Illawarra Lowlands Grassy Woodland threatened ecological community (TEC). TEC associations are discussed in Section 3.2.2 of this REF.

2.5 Site photos

Photo 1. Sewer Pump Station 16 (SPS16) facing north-east (approx.)

Photo 2. SPS16 land facing north-east (approx.) toward St Johns High School land. Trees to be underbored.

Photo 3. Indicative underboring exit pit location – some removal of shrubs and juvenile trees required

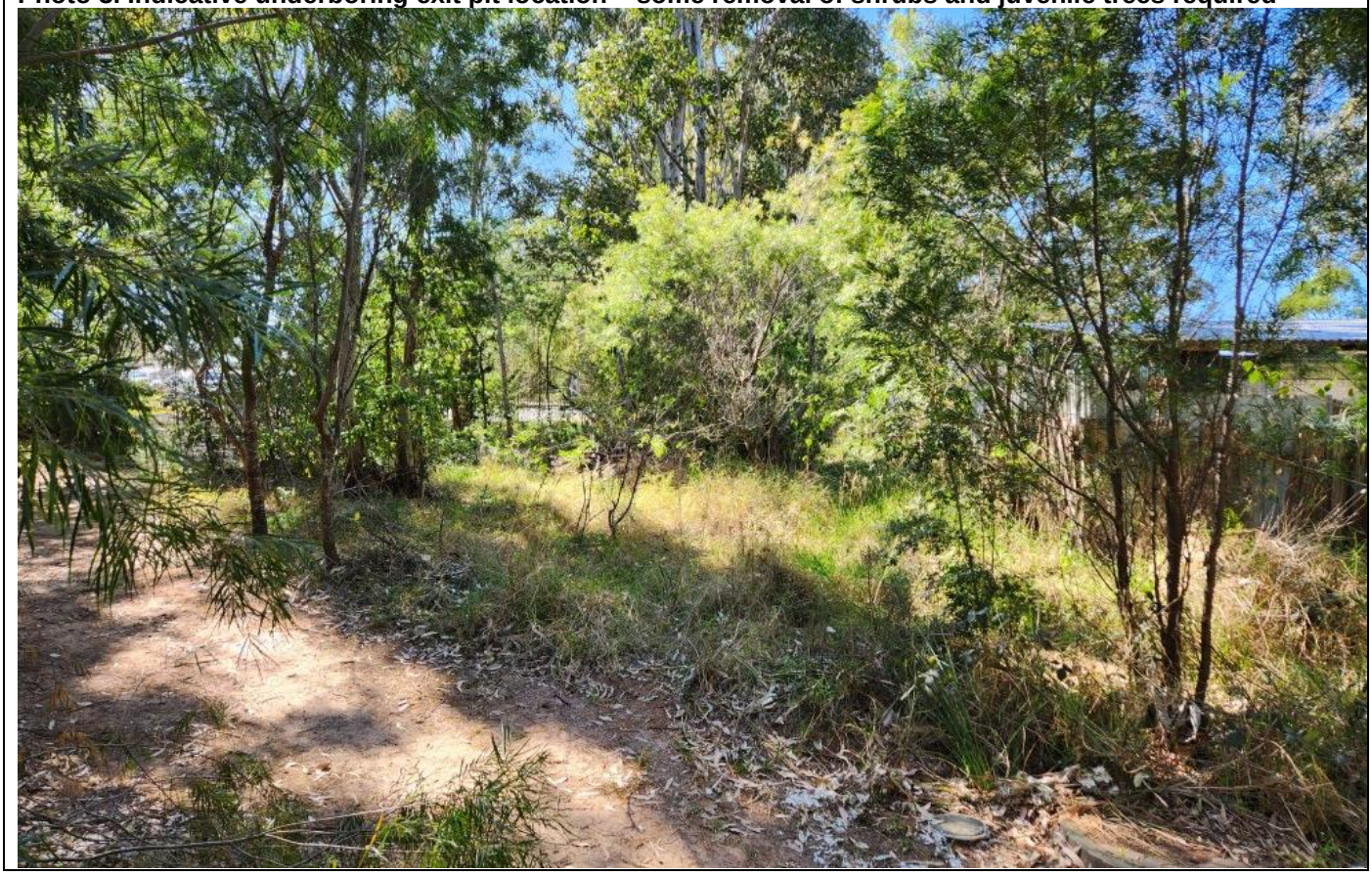


Photo 4. St Johns High School land facing east (approx.) toward John Purcell Way. Combination of underboring and non-destructive excavation would be used to minimise impacts on trees.

Photo 5. Park Rd Netball Courts facing east (approx.). Trenched – some pruning required.

Photo 6. Park Rd Netball Courts facing north (approx.). Trenched – pruning and removal of shrubs required.

Photo 7. Park Rd Netball towards Park Rd. Grey Ironbark marked for root zone protection with non-destructive excavation

Photo 8. Park Rd facing east (approx.)

Photo 9. Facing south-east (approx.) from Park Rd toward Jindalee Cr

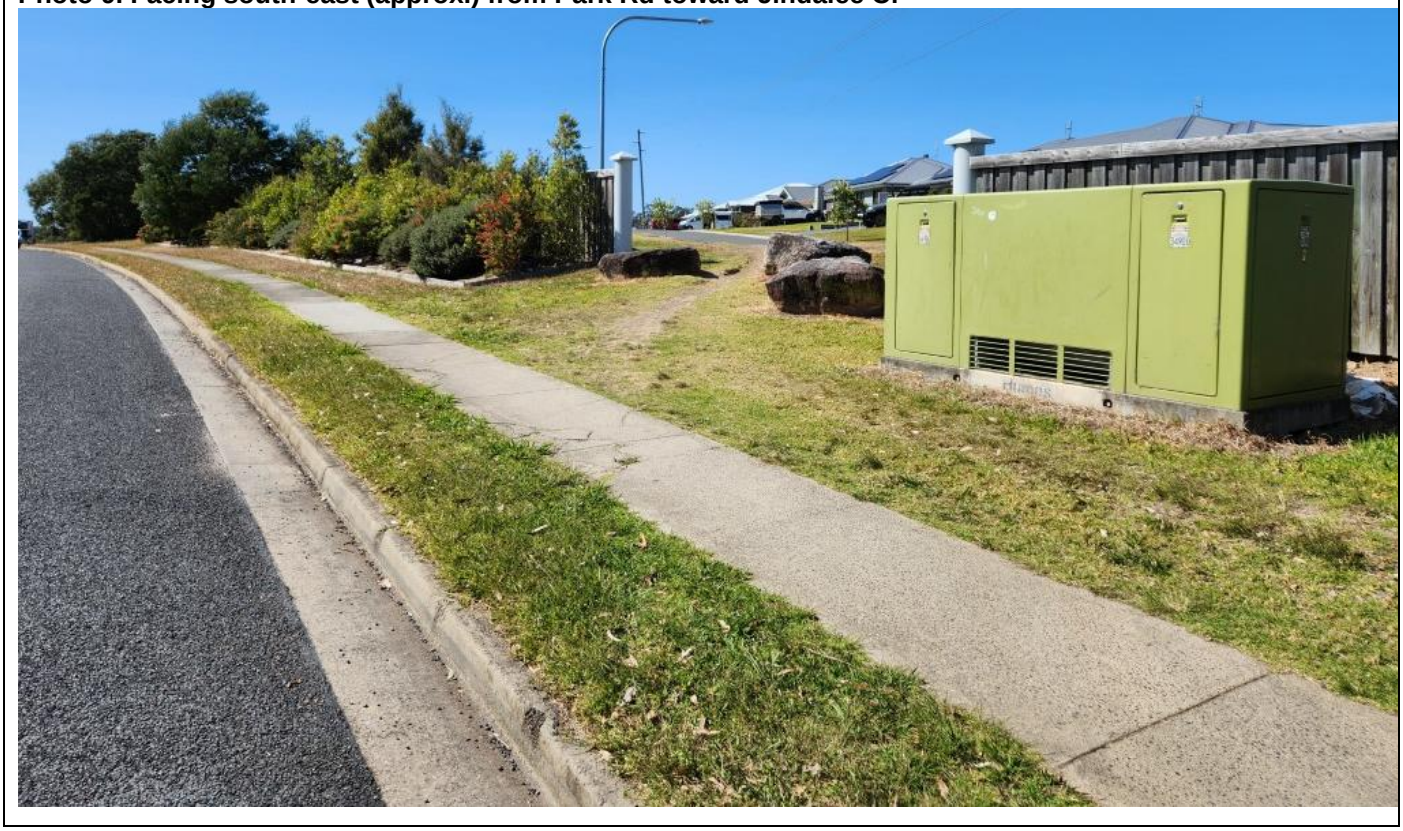


Photo 10. Eastern end of site to the north of Carrington Park Dr

3. ASSESSMENT OF LIKELY IMPACTS ON THE ENVIRONMENT

3.1 Impacts associated with the proposal

Construction impacts may occur associated with disturbance and excavation of the soil surface and the removal of vegetation and habitat features.

Under-boring would be utilised wherever appropriate and possible to minimise impacts on native vegetation, roads and driveways.

From SPS16 northward and then westward to John Purcell Way would be underbored to minimise impacts on native vegetation. An entry pit would be established on cleared land immediately north of SPS16 – requiring the removal of one juvenile Spotted Gum tree – and on the eastern side of John Purcell Way on cleared and disturbed land. An exit pit would be established at the alignment corner in Lot 7 DP 1158088, requiring the removal of a small, disturbed area of scattered shrubs and juvenile trees (refer to Photo 4).

Non-destructive excavation (e.g. vacuum) would be used within the structural root zone of a large Spotted Gum tree on the western verge of John Purcell Way where underbored and trenched construction would connect and the alignment would be directed northward along the western John Purcell Way verge. Underground infrastructure constraints prevent construction of the SRM along the eastern verge.

Up to three (3) senescing Wattle trees would be removed at the south-west corner of the Netball Courts. Pruning of trees and planted shrubs, and removal of some common disturbance-successional shrubs would occur along the southern and eastern edges of the Netball Courts.

Non-destructive excavation (e.g. vacuum) would be used within the structural root zone of two (2) large Grey Ironbark trees in the north-east corner of the Netball Courts, leading to Park Rd.

Due to constraints in the road verge caused by existing infrastructure, the alignment must coincide with the Park Rd pavement footprint. Underboring would occur along the entire alignment within Park Rd to minimise impacts on the pavement.

The remainder of the alignment footprint is on cleared and modified land containing no vegetation except for turf grass and occasional juvenile ornamental street trees.

Any native vegetation to be removed occurs on existing, disturbed edges. No fragmentation or isolation of native vegetation would occur. Vegetation to be removed contains no hollows or other important features.

No potential habitat for threatened terrestrial orchids would be impacted.

No threatened flora species or endangered ecological community would be removed or otherwise impacted.

Weeds and their propagules are present on the site and are not anticipated to spread or become more problematic as a result of the proposal.

Sediment and erosion controls shall be installed and maintained to prevent indirect associated impacts to waterways and adjacent intact native vegetation.

The risk of potential operational impacts associated with odour and pollution (e.g. the overflow of sewage into sensitive environments) would be reduced as a result of the proposal. The proposal's design and purpose is to redirect sewage flow from an existing, at-capacity, gravity sewer main and into a new rising main.

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

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

Each of these is discussed below.

3.2 Threatened species impact assessment (NSW)

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

3.2.1 Part 7A *Fisheries Management Act 1994*

Part 7A relates to threatened species conservation.

There are no threatened species listed under the Act which are mapped as occurring in proximity to the site[2], or likely to occur in proximity to the site.

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

The proposal is therefore unlikely to result in any impact on threatened entities or their habitat; and as demonstrated in Table 2 below, the proposal would not contribute significantly to key threatening processes, as listed under Part 7A of the Act.

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

Table 2: Key threatening processes – Fisheries Management Act 1994

Key Threatening Process (KTP)	Assessment
Degradation of native riparian vegetation along the NSW water courses	Negligible – The site occurs on the edge of a mapped riparian corridor associated with Browns Creek where the sewer pump station occurs. Any clearing in this location would affect only disturbed, primarily exotic understorey vegetation and juvenile trees. No mature trees would be removed. The creek embankments are not in close proximity to the works footprint (approx. 40m away). The proposal is therefore unlikely to result in degradation of the riparian vegetation.
Hook and line fishing in areas important for the survival of threatened fish species.	Not applicable – the proposed activity does not involve hook and line fishing.
Human-caused climate change.	Not applicable – the proposed activity would not contribute significantly to climate change and

[2] Fisheries NSW Spatial Data Portal https://webmap.industry.nsw.gov.au/Html5Viewer/index.html?viewer=Fisheries_Data_Portal

	would not prevent implementation of the relevant Priorities Action Statement.
Installation and operation of instream structures and other mechanisms that alter natural flow regimes of rivers and streams.	Not applicable – the proposal would not involve the installation or operation of in-stream structures or other mechanisms.
Introduction of fish to waters within a catchment outside their natural range.	Not applicable – the proposed activity does not involve the introduction and movement of fish.
Introduction of non-indigenous fish and marine vegetation to the coastal waters of New South Wales.	Not applicable – the proposed activity does not involve the introduction and movement of non-indigenous fish or marine vegetation.
Removal of large wood debris from New South Wales and rivers and streams.	Not applicable – the proposal does not involve the removal of woody debris.
The current shark meshing program in New South Wales waters	Not applicable – the proposed activity does not involve shark meshing.

3.2.2 Part 7 *Biodiversity Conservation Act 2016*

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

- *Litoria aurea* Green and Golden Bell Frog
- *Anthochaera phrygia* Regent Honeyeater
- *Artamus cyanopterus cyanopterus* Dusky Woodswallow
- *Callocephalon fimbriatum* Gang-gang Cockatoo
- *Calyptorhynchus lathami lathami* Glossy Black-cockatoo
- *Daphoenositta chrysoptera* Varied Sittella
- *Glossopsitta pusilla* Little LorikeetBird
- *Hieraaetus morphnoides* Little Eagle
- *Lophoictinia isura* Square-Tailed Kite
- *Pteropus poliocephalus* Grey-headed Flying-fox
- *Micronomus norfolkensis* Eastern Coastal Free-tailed Bat
- *Falsistrellus tasmaniensis* Eastern False Pipistrelle
- *Scoteanax rueppellii* Greater Broad-nosed Bat
- *Miniopterus orianae oceanensis* Large Bent-winged Bat
- *Chalinolobus dwyeri* Large-eared Pied Bat
- *Miniopterus australis* Little Bent-winged Bat
- *Myotis macropus* Southern Myotis
- *Saccolaimus flaviventris* Yellow-bellied Sheathtail-bat
- Illawarra Lowlands Grassy Woodland in the Sydney Basin Bioregion threatened ecological community (TEC)
- Swamp sclerophyll forest on coastal floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions threatened ecological community (TEC)

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.

Green and Golden Bell Frog (*Litoria aurea*)

Green and Golden Bell Frog (GGBF) inhabits marshes, dams and stream-sides, particularly those containing bullrushes (*Typha* spp.) or spikerushes (*Eleocharis* spp.). Optimum habitat for the species includes water-bodies that are unshaded, free of predatory fish such as Plague Minnow (*Gambusia holbrooki*), with a grassy area nearby and diurnal sheltering sites available. Some sites, particularly in the Greater Sydney region occur in highly disturbed areas. The species is active by day and usually breeds in summer when conditions are warm and wet. Males call while floating in water and females produce a raft of eggs that initially float before settling to the bottom, often amongst vegetation. Tadpoles feed on algae and other plant-matter; adults eat mainly insects, but also other frogs (OEH 2022a).

The south-western end of the site occurs within 40m of Browns Creek, for which there are historic records of GGBF occurring both upstream and downstream of the project site. Most records are from 2010-2011 during an explosive breeding event of the Brundee GGBF population. The records therefore may not reflect current likely occurrence of the species, but their close association with Browns Creek as habitat and a movement corridor is apparent, suggesting continued potential for their use of this area.

The site of the proposal does not contain any suitable habitat for GGBF. The species is known however, to disperse along and out from movement corridors during breeding events. It is therefore possible that GGBF may occur transiently within or in proximity to the site from Browns Creek during a breeding and dispersal event.

If works should coincide with the breeding period of the species (October through February, inclusive), pre-works surveys in addition to contractor site-induction shall be undertaken to determine the presence of GGBF in proximity to Browns Creek, ensure transient individuals are not impacted by the works, and to assess the need to adapt mitigation measures and monitoring of site with consideration of weather patterns and information regarding local breeding events.

The proposal would not result in direct or indirect impacts on important habitat for GGBF.

No habitat considered important for the species shall be removed or otherwise impacted. No fragmentation of important habitat or severing of habitat corridors will occur as a result of the proposal. The proposal would not impose barriers to movement of the species.

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

It is therefore considered unlikely that the proposed works will have an adverse effect on the lifecycle of the Green and Golden Bell Frog such that a local population of the species is likely to be place at risk of extinction.

Small to medium-sized forest birds: Regent Honeyeater (*Anthochaera phrygia*), Dusky Woodswallow (*Artamus cyanopterus cyanopterus*) and Varied Sittella (*Daphoenositta chrysoptera*)

The Regent Honeyeater is a striking and distinctive, medium-sized, black and yellow honeyeater with a sturdy, curved bill. The Regent Honeyeater mainly inhabits temperate woodlands and open forests of the inland slopes of south-east Australia. Birds are also found in drier coastal woodlands and forests in some years. In NSW the distribution is very patchy and mainly confined to a few remaining breeding areas (Capertee Valley, Mudgee/Wollar, Lower Hunter Valley and the Bundarra-Barraba region) and surrounding fragmented woodlands. In some years flocks converge on flowering coastal woodlands and forests. The species inhabits dry open forest and woodland, particularly Box-Ironbark woodland, and riparian forests of River She-oak. Regent Honeyeaters inhabit woodlands that support a significantly high abundance and species richness of bird species. These woodlands have significantly large numbers of mature trees, high canopy cover and abundance of mistletoes. Every few years non-breeding flocks are seen foraging in flowering coastal Swamp Mahogany and Spotted Gum forests, particularly on the central coast and occasionally on the upper north coast. Birds are occasionally seen on the south coast. The Regent Honeyeater is a generalist forager, although it feeds mainly on the nectar from a relatively small number of eucalypts that produce high volumes of nectar. Key eucalypt species include Mugga Ironbark, Yellow Box, White Box and Swamp Mahogany. Other tree species may be regionally important. For example, the Lower Hunter Spotted Gum forests have recently been demonstrated to support regular breeding events. Flowering of associated species such as Thin-leaved Stringybark *Eucalyptus eugenioides* and other Stringybark species, and Broad-leaved Ironbark *E. fibrosa* can also contribute important nectar flows at times. Nectar and fruit from the mistletoes *Amyema miquelii*, *A. pendula* and *A. cambagei* are also utilised. When nectar is scarce, lerp and honeydew can comprise a large proportion of the diet. Insects make up about 15% of the total diet and are important components of the diet of nestlings. There are three known key breeding areas, two of them in NSW - Capertee Valley and Bundarra-Barraba regions. The species breeds between July and January in Box-Ironbark and other temperate woodlands and riparian gallery forest dominated by River Sheoak. Regent Honeyeaters usually nest in horizontal branches or forks in tall mature eucalypts and Sheoaks. Also nest in mistletoe haustoria (roots). An open cup-shaped nest is constructed of bark, grass, twigs and wool by the female. (OEH 2024h)

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

infrequently horsehair, occasionally unlined. Nest sites vary greatly, but generally occur in shrubs or low trees, living or dead, horizontal or upright forks in branches, spouts, hollow stumps or logs, behind loose bark or in a hollow in the top of a wooden fence post. Nest sites may be exposed or well concealed by foliage (2017a).

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

The site contains marginal, unlikely, foraging habitat for each of these species. Regent Honeyeater does not breed in the Shoalhaven and Dusky Woodswallow and Varied Sittella are unlikely to utilise the site for nesting due to its disturbed and open condition.

Vegetation removal would be minimal and limited primarily to common disturbance-successional species, juvenile trees and invasive, exotic species. Favoured feed tree species including Grey Ironbark would be prioritised for retention.

A negligible area of potential foraging habitat would be removed along the SRM alignment. Extensive vegetation exists contiguous with the site along Browns Creek and Nowra Creek and connecting with Worrigee Nature Reserve and Comberton State Forest to the south-east, and with forested Crown Land to west.

Required vegetation removal would be minimal, occurring only in disturbed areas containing scattered shrubs and juvenile trees, and would not result in fragmentation or severing of wildlife movement corridors or creation of canopy gaps.

No barriers to movement would be introduced.

The proposal would therefore not affect breeding and would not remove habitat which is critical to the survival of these species.

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

Cockatoos and parrots: Gang-gang Cockatoo (*Callocephalon fimbriatum*), Glossy Black-cockatoo (*Calyptorhynchus lathami*) and Little Lorikeet (*Glossopsitta pusilla*)

Gang-gang Cockatoo is generally found in tall mountain forests and woodlands in spring and summer, particularly in heavily timbered and mature wet sclerophyll forests. In autumn and winter, the species often moves to lower altitudes in drier more open eucalypt forests and woodlands, particularly box-gum and box-ironbark assemblages, or in dry forest in coastal areas and often found in urban areas. May also occur in sub-alpine Snow Gum (*Eucalyptus pauciflora*) woodland and occasionally in temperate rainforests. Gang-gang Cockatoo favours old growth forest and woodland attributes for nesting and roosting. Nests are located in hollows that are 10 cm in diameter or larger and at least 9 m above the ground in eucalypts (OEH 2024c). Nesting hollows

are usually vertical or points steeply upward (Morcombe 2004). Breeding is generally from Oct-Jan.

The Glossy Black-cockatoo inhabits open forest and woodlands of the coast and the Great Dividing Range where stands of She-oak occur. Black She-oak (*Allocasuarina littoralis*) and Forest She-oak (*A. torulosa*) are important foods. Inland populations feed on a wide range of She-oaks, including Drooping She-oak, *Allocasuaraina diminuta*, and *A. gymnathera*. Belah is also utilised and may be a critical food source for some populations. In the Riverina, birds are associated with hills and rocky rises supporting Drooping She-oak, but also recorded in open woodlands dominated by Belah (*Casuarina cristat*a). The species feeds almost exclusively on the seeds of several species of she-oak (Casuarina and Allocasuarina species), shredding the cones with the massive bill. Glossy Black-cockatoo is dependent on large hollow-bearing eucalypts for nest sites. A single egg is laid between March and May (OEH 2024d).

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

The site contains marginal foraging habitat for Gang-gang Cockatoo and Little Lorikeet, including eucalypt and paperbark trees. Glossy Black Cockatoo feed species (*Allocasuarina* species) are very limited within the site and with no evidence of foraging.

No hollow-bearing trees were found to occur within or in close proximity to the site. Breeding would therefore not be at any risk of being impacted by the proposal, for any of these species.

Vegetation removal would be minimal and limited primarily to common disturbance-successional species, juvenile trees and invasive, exotic species. Preferred feed tree species including Eucalypts would be prioritised for retention.

A negligible area of potential foraging habitat would be removed along the SRM alignment. Extensive vegetation exists contiguous with the site along Browns Creek and Nowra Creek and connecting with Worrigee Nature Reserve and Comberton State Forest to the south-east, and with forested Crown Land to west.

Required vegetation removal would not result in fragmentation or severing of wildlife movement corridors or creation of canopy gaps.

No barriers to movement would be introduced.

The proposal would therefore not affect breeding and would not remove habitat which is critical to the survival of these species.

It is therefore considered unlikely that Gang-gang Cockatoo, Glossy Black-cockatoo or Little Lorikeet would be impacted by the proposed works, and the proposed activity is unlikely to have

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

Raptors: Little Eagle (*Hieraaetus morphnoides*) and Square-Tailed Kite (*Lophoictinia isura*)

The Little Eagle is a medium-sized bird of prey that occurs in two colour forms: either pale brown with an obscure underwing pattern, or dark brown on the upper parts and pale underneath, with a rusty head and a distinctive underwing pattern of rufous leading edge, pale 'M' marking and black-barred wingtips. Both forms have a black-streaked head with a slight crest, a pale shoulder band on the upperwings, a rather short and square-tipped barred tail, and feathered legs. The Little Eagle is found throughout the Australian mainland excepting the most densely forested parts of the Dividing Range escarpment. It occurs as a single population throughout NSW. This species occupies open eucalypt forest, woodland or open woodland. She-oak or Acacia woodlands and riparian woodlands of interior NSW are also used. The Little Eagle nests in tall living trees within a remnant patch, where pairs build a large stick nest in winter, laying two or three eggs during spring, with young fledging in early summer. It preys on birds, reptiles and mammals, occasionally adding large insects and carrion (OEH 2021).

The Square-tailed Kite is a reddish, medium-sized, long-winged raptor 50-56cm long and with wingspan 130-145cm. A key character in flight is the long fingered, upswept wings with a large white patch at the base of the barred 'fingers'. In NSW, scattered records of the species throughout the state indicate that the species is a regular resident in the north, north-east and along the major west-flowing river systems. It is a summer breeding migrant to the south-east, including the NSW south coast, arriving in September and leaving by March. Breeding is from July to February, with nest sites generally located along or near watercourses, in a fork or on large horizontal limbs. The Square-tailed Kite is found in a variety of timbered habitats including dry woodlands and open forests, showing a particular preference for timbered watercourses. It appears to occupy large hunting ranges of more than 100km2. In arid north-western NSW, it has been observed in stony country with a ground cover of chenopods and grasses, open acacia scrub and patches of low open eucalypt woodland. This raptor is a specialist hunter of passerines, especially honeyeaters, and most particularly nestlings, and insects in the tree canopy, picking most prey items from the outer foliage (2022c).

The site contains marginal potential foraging habitat for Little Eagle and Square-tailed Kite.

No stick nests were observed during site investigations. The site is unlikely to be used by either species for nesting due to its disturbed and open condition.

A negligible area of potential foraging habitat would be removed along the SRM alignment. Extensive vegetation exists contiguous with the site along Browns Creek and Nowra Creek and connecting with Worrigee Nature Reserve and Comberton State Forest to the south-east, and with forested Crown Land to west.

Required vegetation removal would not result in fragmentation or severing of wildlife movement corridors or creation of canopy gaps.

No barriers to movement would be introduced.

The proposal would therefore not affect breeding and would not remove habitat which is critical to the survival of these species.

It is therefore considered unlikely that Little Eagle or Square-tailed Kite would be impacted by the proposed works, and the proposed activity is unlikely to have an adverse effect on the lifecycle of

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

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

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

No GHFF camps occur in close proximity to the site. The nearest camp currently occurs at Illowra Wetlands / Bomaderry Creek, approximately 4.0 km to the north of the site[3].

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

Vegetation removal would be minimal and limited primarily to common disturbance-successional species, juvenile trees and invasive, exotic species. Favoured feed tree species including eucalypts and paperbarks would be prioritised for retention.

A negligible area of potential foraging habitat would be removed along the SRM alignment. Extensive vegetation exists contiguous with the site along Browns Creek and Nowra Creek and connecting with Worrigee Nature Reserve and Comberton State Forest to the south-east, and with forested Crown Land to west.

Required vegetation removal would not result in fragmentation or severing of wildlife movement corridors or creation of canopy gaps.

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

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

Threatened microchiropteran bats: Eastern Coastal Freetail-Bat (*Micronomus norfolkensis*), Eastern False Pipistrelle (*Falsistrellus tasmaniensis*), Greater Broad-nosed Bat (*Scoteanaux*

[3] National Flying-fox Monitoring Viewer http://www.environment.gov.au/webgis-framework/apps/ffc-wide/ffc-wide.jsf

ruepelli), Large (Eastern) Bentwing-bat (*Miniopterus orianae oceanensis*), Large-eared Pied Bat (*Chalinobolus dwyeri*), Little Bent-winged Bat (*Miniopterus australis*), Southern Myotis (Large-footed Myotis) (*Myotis Macropus*) and Yellow-bellied Sheathtail-bat (*Saccolaimus flaviventris*)

East Coast Freetail-Bat 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 2024b).

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

Greater Broad-nosed Bat 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 2024e).

Large Bentwing-bat roost primarily 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 2019).

The Little Bentwing-bat occurs in moist eucalypt forest, rainforest, vine thicket, wet and dry sclerophyll forest, Melaleuca swamps, dense coastal forests and banksia scrub. It is generally found in well-timbered areas. Little Bentwing-bats roost in caves, tunnels, tree hollows, abandoned mines, stormwater drains, culverts, bridges and sometimes buildings during the day, and at night forage for small insects beneath the canopy of densely vegetated habitats. They often share roosting sites with the Common Bentwing-bat and, in winter, the two species may form mixed clusters. In NSW the largest maternity colony is in close association with a large maternity colony of Eastern Bentwing-bats (*Miniopterus schreibersii*) and appears to depend on the large colony to provide the high temperatures needed to rear its young. Maternity colonies form in spring and birthing occurs in early summer. Males and juveniles disperse in summer. Only five nursery sites /maternity colonies are known in Australia (OEH 2020b).

The Large-eared Pied Bat 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 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 2024g).

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

Yellow-bellied Sheathtail-bat 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 2022d).

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

The site contains potential foraging habitat for microbat species over the tree canopy and along vegetated corridors.

No hollow-bearing trees were found to occur within or in close proximity to the site. No suitable maternity roosts are likely to occur in proximity to the site. Breeding would therefore not be at any risk of being impacted by the proposal, for any of these species.

Vegetation removal would be minimal and limited primarily to common disturbance-successional species, juvenile trees and invasive, exotic species. Preferred feed tree species including Eucalypts would be prioritised for retention.

A negligible area of potential foraging habitat would be removed along the SRM alignment. Extensive vegetation exists contiguous with the site along Browns Creek and Nowra Creek and connecting with Worrigee Nature Reserve and Comberton State Forest to the south-east, and with forested Crown Land to west.

Required vegetation removal would not result in fragmentation or severing of wildlife movement corridors or creation of canopy gaps.

No barriers to movement would be introduced.

The proposal would not impact on the use of Browns Creek as a habitat corridor by threatened microbats.

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

The proposal would therefore avoid impact on the breeding cycle, would avoid direct impact on individuals, and would not remove habitat which is critical to the survival of any threatened microbat species.

It is therefore considered unlikely that East Coast Freetail-Bat, Eastern False Pipistrelle, Greater Broad-nosed Bat, Large (Eastern) Bentwing-bat, Little Bentwing-bat, Large-eared Pied Bat, Southern Myotis (Large-footed 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 these species such that a viable local population of any of these species is likely to be placed at risk of extinction.

Part B - In the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:

(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or

(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction

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

- Illawarra Lowlands Grassy Woodland in the Sydney Basin Bioregion
- Swamp sclerophyll forest on coastal floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions

Illawarra Lowlands Grassy Woodland

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

PCT3330 and PCT3269 were found to occur within the site (refer to section 2.1). Both of these vegetation communities are associated with ILGW threatened ecological community (TEC).

The SRM16 alignment and proposed works methodology including use of underboring, would minimise the impact on native vegetation. To the north of the sewer pump station, vegetation removal would impact disturbed, primarily exotic, understorey vegetation, common disturbance-successional species and a small number of juvenile trees. Replacement planting of tubestock trees would be undertaken as a mitigation measure to compensate for the removal of successional canopy species.

The remainder of the alignment would occur through predominantly cleared areas, avoiding mature trees and requiring occasional removal of common plants such as Black Wattle or planted street trees only. The direct impact on ILGW would therefore be minor.

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

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

Swamp Sclerophyll Forest

Swamp Sclerophyll Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions is the name given to the ecological community associated with humic clay loams and sandy loams, on waterlogged or periodically inundated alluvial flats and drainage lines associated with coastal floodplains. This swamp community has an open to dense tree layer of eucalypts and paperbarks typically dominated by *Eucalyptus robusta* (Swamp Mahogany), *Melaleuca quinquenervia* (Paperbark) and, south from Sydney, *Eucalyptus botryoides* (Bangalay) and *Eucalyptus longifolia* (Woollybutt), with *Melaleuca ericifolia* (Swamp Paperbark), *Callistemon salignus* (Willow Bottlebrush), *Casuarina glauca* (Swamp She-oak) often occurring and a groundcover composed of abundant sedges, ferns, forbs, and grasses including *Gahnia clarkei, Pteridium esculentum, Hypolepis muelleri, Calochlaena dubia, Dianella caerulea, Viola hederacea, Lomandra longifolia, Entolasia marginata* and *Imperata cylindrica* (NSW Scientific Committee 2011c; OEH 2020d).

PCT4019 is mapped as occurring in proximity to the site, along Browns Creek and Nowra Creek, and is associated with this TEC. Indicative species for the TEC including *Melaleuca quinquenervia* (Paperbark) and *Melaleuca ericifolia* (Swamp Paperbark) occur and indicative abiotic features are present, including periodically inundated alluvial flats and drainage lines associated with coastal floodplains (along Browns Creek).

Vegetation within the site, however, aligns more closely with PCT3330 and PCT3269 and Illawarra Lowlands Grassy Woodland TEC (refer above).

Areas where Swamp Sclerophyll Forest TEC is considered to occur, i.e. along Browns Creek, would not be directly impacted on by the proposal.

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

The proposal would therefore not result in the fragmentation or isolation of areas of Swamp Sclerophyll Forest TEC, nor adversely affect the extent or composition of Swamp Sclerophyll Forest TEC such that a local occurrence of the TEC will be placed at risk of extinction.

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

(i) the extent to which habitat is likely to be removed or modified as a result of the proposed development or activity

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

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

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

No EEC would not be fragmented or isolated, nor removed or modified to an extent that would affect the long-term survival of the EEC occurring in the locality (refer to Part B).

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

Part D – Whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly).

No "*areas of outstanding biodiversity values"* have been declared in the City of Shoalhaven.

Part E – Whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process.

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

- Clearing native vegetation

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

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

Clearing of native vegetation has been shown to:

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

The proposal would avoid impacting on mature native trees and would involve the removal of only disturbed, primarily exotic, understorey vegetation, common disturbance-successional species, a small number of juvenile trees, and (possibly) planted ornamental street trees.

Replacement planting of tubestock trees would be undertaken as a mitigation measure to compensate for the removal of successional canopy species.

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

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

3.3 Threatened species impact assessment (Commonwealth EPBC Act 1999)

A Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) Protected Matters Report was generated on 21st November 2022. An EPBC Protected Matters Report provides general guidance on matters of national significance and other matters protected by the EPBC Act in the area selected. Of those threatened species and endangered ecological communities reported as likely occurring or having habitat within the area of the report, the following were considered to have potential habitat on the site and requiring of further assessment:

- Regent Honeyeater *Anthochaera Phrygia* (CE)
- Gang-gang Cockatoo *Callocephalon fimbriatum* (E)
- Large-eared Pied Bat *Chalinolobus dwyeri* (E)
- Green and Golden Bell Frog *Litoria aurea* (V)
- Glossy Black-cockatoo *Calyptorhynchus lathami lathami* (V)
- Grey-headed Flying-fox *Pteropus poliocephalus* (V)
- Illawarra and south coast lowland forest and woodland ecological community (CE)
- Coastal Swamp Sclerophyll Forest of New South Wales and South East Queensland (E)

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

Refer also to Likelihood of Occurrence Table in Appendix B.

Additional species listed under the Act, including marine species, may occur occasionally within the vicinity of the proposed activity but would not be affected by the proposal.

Table 3. EPBC Significant impact assessment

Critically endangered and endangered species - Significant impact criteria Species to consider: **Regent Honeyeater (RH)** **Gang-gang Cockatoo (GGC)** **Large-eared Pied Bat (LEPB)**	
Criteria	***Assessment***
lead to a long-term decrease in the size of a population	The proposed activity will not directly impact on a known local population of RH, GGC or LEPB, will not affect or disrupt breeding or impact on breeding habitat of RH, GGC or LEPB, and will have only a negligible impact on potential foraging habitat of RH, GGC or LEPB. Refer to Section 3.2.2 for more information.
reduce the area of occupancy of the species	No
fragment an existing population into two or more populations	No
adversely affect habitat critical to the survival of a species	No critical habitat for these species will be impacted by the proposed activity. Refer to Section 3.2.2 for more information.
disrupt the breeding cycle of a population	Works would not affect breeding habitat. Refer above and to Section 3.2.2 for more information.
modify, destroy, remove, isolate or decrease the availability or quality of habitat	No important habitat will be impacted by the proposed activity. Refer to Section 3.2.2 for more information.

to the extent that the species is likely to decline	
result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat	No invasive species will be introduced
introduce disease that may cause the species to decline	No disease will be introduced
interfere with the recovery of the species	No
Vulnerable species - Significant impact criteria Species to consider: **Green and Golden Bell Frog (GGBF)** **Glossy Black-cockatoo (GBC)** **Grey-headed Flying-fox (GHFF)**	
Criteria	***Assessment***
lead to a long-term decrease in the size of an important population of a species	The proposed activity will not directly impact on a known local population of GGBF, GBC or GHFF, will not affect or disrupt breeding, will not impact on breeding habitat, and will have only a negligible impact on foraging and refuge habitat. Refer to Section 3.2.2 for more information.
reduce the area of occupancy of an important population	No
fragment an existing important population into two or more populations	No
adversely affect habitat critical to the survival of a species	No important habitat for any of these species will be impacted by the proposed activity. No breeding, and only very minimal marginal dispersal and refuge habitat for GGBF would be impacted; no breeding or refuge habitat and only very minimal potential foraging habitat for GBC would be impacted; no breeding and only very minimal potential foraging habitat for GHFF would be impacted. Refer to Section 3.2.2 for more information.
disrupt the breeding cycle of an important population	Works would not affect breeding habitat. Refer above and to Section 3.2.2 for more information.
modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	No important habitat will be impacted by the proposed activity. Refer to Section 3.2.2 for more information.
result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	No invasive species will be introduced
introduce disease that may cause the species to decline	No disease will be introduced
interfere substantially with the recovery of the species	No
Critically endangered and endangered ecological communities - Significant impact criteria Communities to consider: **Coastal Swamp Sclerophyll Forest of New South Wales and South East Queensland (CSF)**	

Illawarra and south coast lowland forest and woodland ecological community (ISCLF&W)	
Criteria	***Assessment***
reduce the extent of an ecological community	The proposal would impact only disturbed, primarily exotic, understorey vegetation, a small number of juvenile trees and occasional common plants such as Black Wattle and planted street trees. The direct impact on ISCLF&W would be negligible. CSF would not be directly impacted. Indirect impacts are unlikely to substantially affect these EECs. The proposal would not result in reducing the extent of either EEC. Refer to Section 3.2.2 for more information.
fragment or increase fragmentation of an ecological community, for example by clearing vegetation for roads or transmission lines adversely affect habitat critical to the survival of an ecological community	No. Refer above and to Section 3.2.2 for more information.
modify or destroy abiotic (non-living) factors (such as water, nutrients, or soil) necessary for an ecological	The proposal would not result in sediment movement, changes to soil characteristics or hydrology, nor introduction of invasive species or edge effects that might impact indirectly on these EECs. Refer to Section 3.2.2 for more information.
community's survival, including reduction of groundwater levels, or substantial alteration of surface water drainage patterns	No. Refer above and to Section 3.2.2 for more information.
cause a substantial change in the species composition of an occurrence of an ecological community, including causing a decline or loss of functionally important species, for example through regular burning or flora or fauna harvesting	No. Refer above and to Section 3.2.2 for more information.
cause a substantial reduction in the quality or integrity of an occurrence of an ecological community, including, but not limited to: assisting invasive species, that are harmful to the listed ecological community, to become established, or causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants into the ecological community which kill or inhibit the growth of species in the ecological community	No. Refer above and to Section 3.2.2 for more information.
interfere with the recovery of an ecological community	No
Summary	The proposed vegetation removal would not adversely affect the extent or composition of Coastal Swamp Sclerophyll Forest of New South Wales and South East Queensland, or Illawarra and south coast lowland forest and woodland ecological community, would not fragment

	and would not affect the recovery or increase the likelihood of extinction of any EEC.

Conclusion of EPBC Significant Impact Assessment

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

No other matters of significance, i.e.:

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

would be affected as a result of the proposed activity.

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

3.4 Indigenous heritage

Under Section 86 of the NSW *National Parks and Wildlife Act 1974* (NPW Act) it is an offence to disturb, damage, or destroy any Aboriginal object without an Aboriginal Heritage Impact Permit (AHIP). The Act, however, provides that if a person who exercises 'due diligence' in determining that their actions will not harm Aboriginal objects has a defence against prosecution if they later unknowingly harm an object without an AHIP (Section 87(2) of the Act). To effect this, the NSW Department of Environment, Climate Change and Water have prepared the *Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wale*s (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 western end of the site occurs in proximity to Browns Creek. No other significant landscape features are apparent, noting that the site occurs in an area that is mostly modified and developed.

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,*

Figure 7. Results of AHIMS Aboriginal heritage search

AHIMS Web Services (AWS)
Search Result

Your Ref/PO Number : Park Rd
Client Service ID : 935273

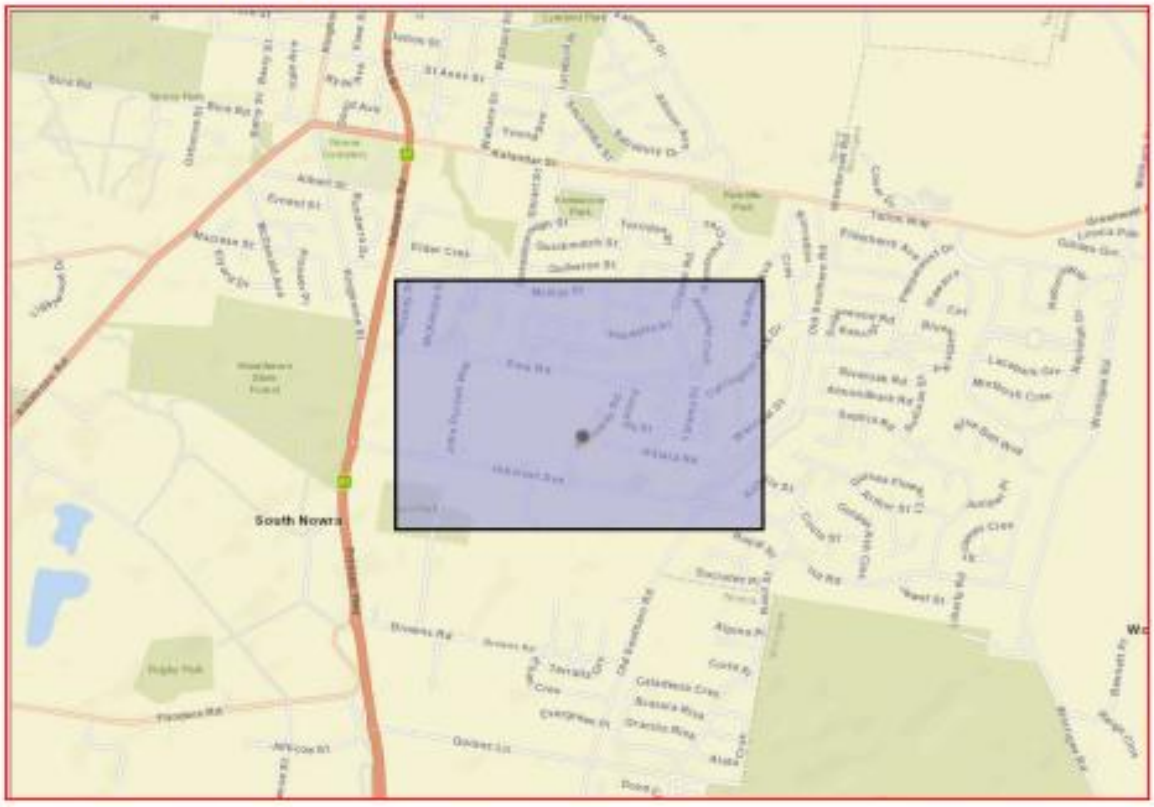
Shoalhaven City Council
42 Bridge Road
Nowra New South Wales 2541
Attention: Jeff Bryant
Email: jeff.bryant@shoalhaven.nsw.gov.au

Date: 30 September 2024

Dear Sir or Madam:

AHIMS Web Service search for the following area at Lat, Long From : -34.9014, 150.604 - Lat, Long To : -34.8926, 150.6195, conducted by Jeff Bryant on 30 September 2024.

The context area of your search is shown in the map below. Please note that the map does not accurately display the exact boundaries of the search as defined in the paragraph above. The map is to be used for general reference purposes only.



A search of Heritage NSW AHIMS Web Services (Aboriginal Heritage Information Management System) has shown that:

1	Aboriginal sites are recorded in or near the above location.
0	Aboriginal places have been declared in or near the above location. *

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 works would occur predominantly within cleared, disturbed and modified road reserves and along the edges of cleared and modified netball courts. The area to the north of the sewer pump station has not been completely cleared of trees, but the understorey has been cleared and is disturbed and modified with weed infestations. The treed area would be avoided e.g. with underboring.

A search on the Aboriginal Heritage Information Management System (AHIMS) on 30 September 2024 returned one record of an Aboriginal sites occurring in proximity to the site of the proposal (refer to Figure 7). AHIMS site 52-5-1148 refers to an isolated artefact [redacted] approximately 240 m south of the site. No works would occur in close proximity to this artefact.

As the proposal would occur on disturbed land and would not impact any recorded Aboriginal sites or places, the Due Diligence Guidelines requires no further assessment, an AHIP is not required and the activity can proceed with caution.

3.5 Non-indigenous heritage

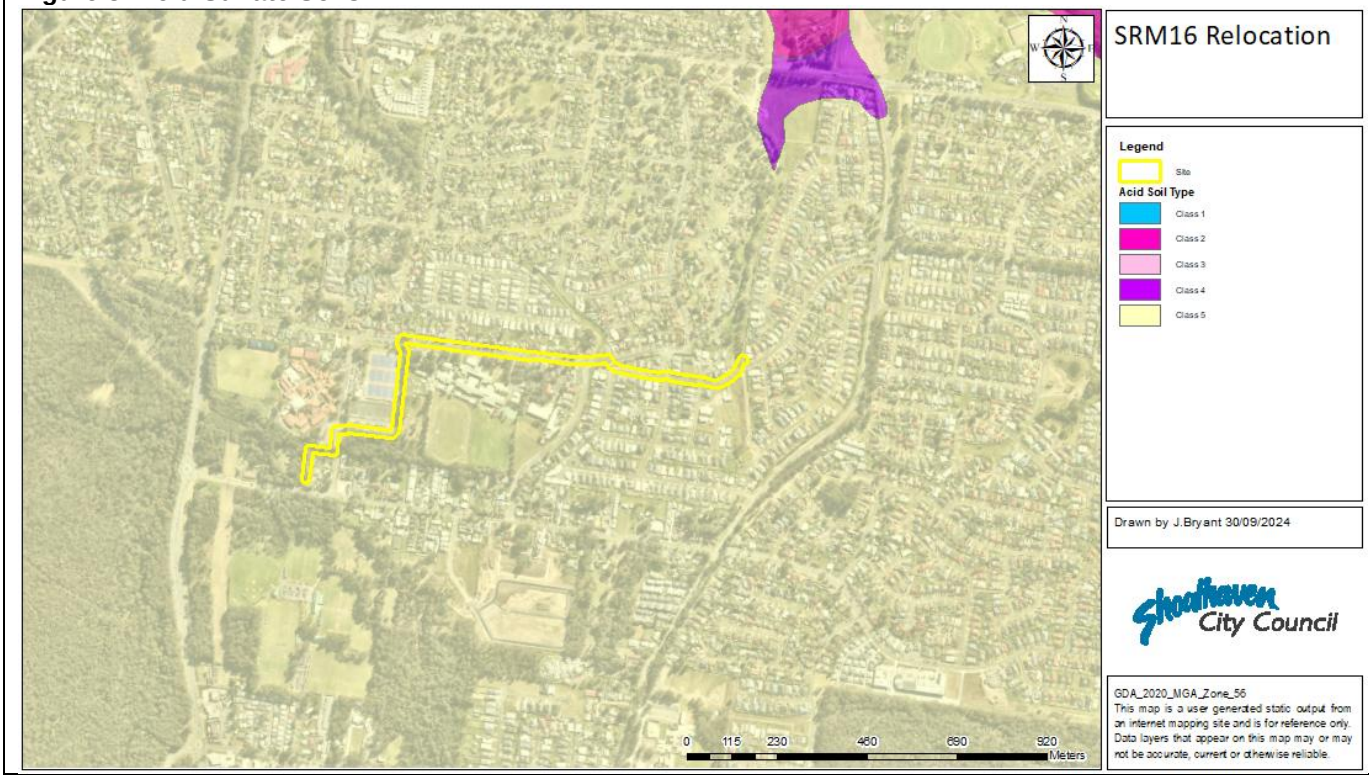
No items of local heritage significance or any items on the State Heritage Register or listed in the Shoalhaven Local Environmental Plan occur in close proximity to the site such that the proposed works might impact them.

3.6 Acid Sulfate Soils

Acid sulfate soils (A.S.S) are the common name given to sediments and soils containing iron sulfides which, when exposed to oxygen generate sulfuric acid. The majority of acid sulfate sediments were formed by natural processes in the Holocene geological period (the last 10,000 years). Formation conditions require the presence of iron-rich sediments, sulfate (usually from seawater), removal of reaction products such as bicarbonate, the presence of sulfate reducing bacteria and a plentiful supply of organic matter. These conditions tend to exist in mangroves, salt marsh vegetation or tidal areas, and at the bottom of coastal rivers and lakes. The relatively specific conditions under which acid sulfate soils are formed usually limit their occurrence to low lying parts of coastal floodplains, rivers and creeks. This includes areas with saline or brackish water such as deltas, coastal flats, backswamps and seasonal or permanent freshwater swamps that were formerly brackish. Due to flooding and stormwater erosion, these sulfidic sediments may continue to be re-distributed through the sands and sediments of the estuarine floodplain region. Sulfidic sediment may be found at any depth in suitable coastal sediments – usually beneath the watertable (ASSMAC 1998).

The subject site and surrounds are mapped as Class 5 Acid sulfate soils (ASS), with Class 4 ASS mapped as occurring approximately 480 m to the north of the eastern end of the site and Class 2 ASS occurring approximately 770 m to the north of the eastern end of the site (Figure 8).

Figure 8. Acid Sulfate Soils



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

The proposal would occur within 500m of Class 4 land, but this land is not below 5 m AHD and the proposal would not result in any lowering of the watertable.

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

No further consideration is warranted.

3.7 Riparian corridors Water Quality & Key Fish Habitat

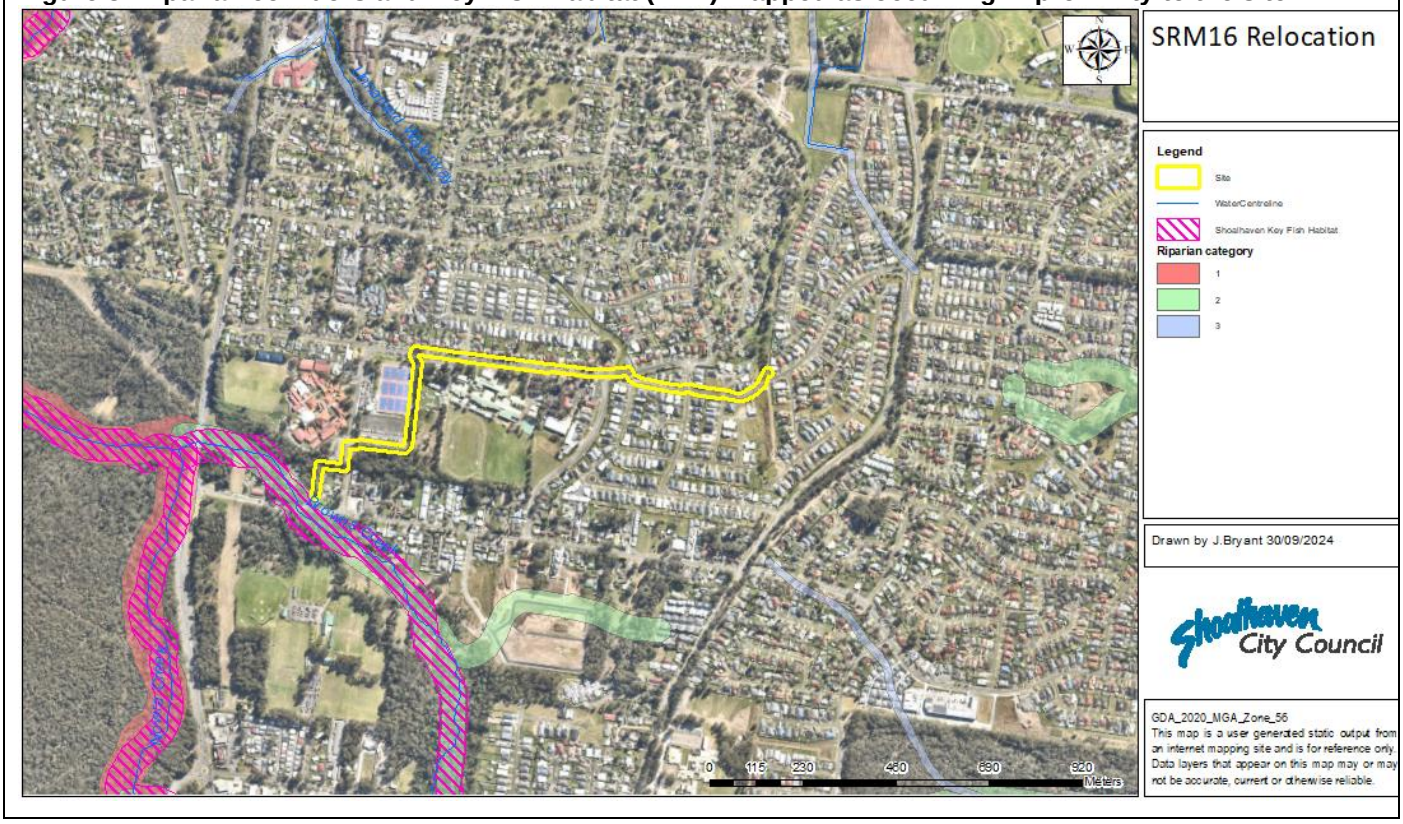
Impacts on riparian corridors, water quality and Key Fish Habitat (KFH) were considered regarding the following:

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

A Category 2 riparian corridor is associated with Browns Creek within and in the vicinity of the site (refer to Figure 8).

Key Fish Habitat is mapped as occurring within and in proximity to the site in association with Browns Creek (refer to Figure 8).

Figure 8. Riparian corridors and Key Fish Habitat (KFH) mapped as occurring in proximity to the site



No works would occur within the creek or the riparian corridor. Works in proximity to the riparian corridor would not involve the removal of any mature trees. The proposal would retain vegetated buffers to Browns Creek.

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

The proposal would therefore not impact on any riparian corridor, would not impact directly on key fish habitat and is unlikely to result in impacts on water quality, including impacts associated with sediment movement.

3.8 Flood liable land

The south-western end of the site on Lot 46 DP 31078 (where the sewer pump station exists) is mapped as flood-liable land (refer to Figure 9).

The proposal involves installation of primarily subsurface infrastructure and would result in only negligible changes to landform.

The proposal is therefore unlikely to affect flood behaviour other than to a minor extent.

Figure 9. Flood liable land mapped in proximity to the site

3.9 Other

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

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

3.10 EP&A Regulation – Section 171 matters of consideration

Section 171(2) of the *Environmental Planning and Assessment Regulation 2021* lists the factors to be taken into account when consideration is being given to the likely impact of an activity on the environment under Part 5 of the EP&A Act. The following assessment in Table 4 deals with each of the factors in relation to the proposed activity.

Table 4. Section 171 Matters of consideration

Does the proposal:	Assessment	Reason
a) Have any environmental impact on a community?	Positive	The proposal involves the construction of approximately 1.56km length of sewer rising main (SRM) between Sewer Pump Station 16 (SPS 16) on Hillcrest Ave and a new gravity sewer main currently under construction to the north of Carrington Park Dr.

		The purpose of this proposal is to redirect sewage flow from an existing gravity sewer main which is at capacity. The works would reduce the likelihood of future overflows and alleviate the need to upgrade the existing gravity sewer main which would be extremely difficult and costly. The proposal may involve temporary disruption and delays to traffic. The proposed activity would not have any impact on other community services and infrastructure such as water supply, educational, medical or social services.
b) Cause any transformation of a locality?	Negligible	The locality's current use would remain relatively unchanged.
c) Have any environmental impact on the ecosystem of the locality?	Low adverse	The five-part test of significance (Section 3.2 of this REF) concludes that the proposed activity would not have a significant impact upon threatened species or endangered ecological communities. Minimal removal of native vegetation would occur only within existing disturbed areas, with no substantial impacts on endangered ecological communities or significant habitat features and would not impact on the integrity or function of Browns Creek and riparian corridor. Refer to Sections 3.2.2 and 3.3 of this REF for more information. No significant habitat features would be removed or otherwise impacted. No food resources critical to the survival of a particular species would be removed. 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. Environmental safeguards and mitigation measures (Section 7 of this REF) would be employed to minimise risk of impacts.
d) Cause a diminution of the aesthetic, recreational, scientific or other environmental quality or value of a locality?	Negligible	The proposal would not have more than a negligible impact on aesthetic, recreational, scientific or environmental values.

e) Have any effect on a locality, place or building having aesthetic, anthropological, archaeological, architectural, cultural, historical, scientific, or social significance or other special value for present or future generations?	Positive	The site of the proposed activity has no significant aesthetic, anthropological, archaeological, architectural, cultural, historical, scientific or social values. 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. The site is not within an Aboriginal Place declared under the *National Parks and Wildlife Act 1974.* In accordance with the NSW Department of Environment, Climate Change and Water's Due Diligence Code of Practice, the proposed activity does not require an Aboriginal Heritage Impact Permit as the activity is unlikely to harm an Aboriginal artefact (refer to Section 3.4 of this REF).
f) Have any impact on the habitat of protected fauna (within the meaning of the Biodiversity Conservation Act 2016)?	Negligible	No important habitat will be removed or otherwise impacted. The five-part test of significance, provided in Section 3.2 of this REF, concludes that the proposed activity would not have a significant impact upon threatened fauna. The specified environmental mitigation measures (Section 7 of this REF) would mitigate indirect impacts to fauna and habitat including through control of sediment.
g) Cause any endangering of any species of animal, plant or other form of life, whether living on land, in water or in the air?	Low-adverse	The five-part test of significance, provided in Section 3.2 of this REF, concludes that the proposed activity would not have a significant impact upon threatened fauna. Refer to Sections 3.2.2 and 3.3 of this REF for more information. There are no species likely to rely on the site of the proposed works to the extent that modification would put them further in danger.
h) Have any long-term effects on the environment?	Low-adverse	Works would be relatively short-term and the noise generated will occur during normal working hours. The proposed activity would not use hazardous substances or use or generate chemicals which may build up residues in the environment. The possible impacts have been discussed in detail under Section 3 of this REF. Refer also to the conclusions and recommendations in Section 7 of this REF.
i) Cause any degradation of the quality of the environment?	Low-adverse	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.

		The proposal is unlikely to introduce noxious weeds, vermin, or feral animals into the area or contaminate the soil. Environmental safeguards and mitigation measures (Section 7 of this REF) would be employed to minimise risk of impacts.
j) Cause any risk to the safety of the environment?	Negligible	The proposed activity would not involve hazardous wastes and would not lead to increased bushfire or landslip risks. The proposal is not anticipated to adversely affect flood or tidal regimes, or exacerbate flooding risks.
k) Cause any reduction in the range of beneficial uses of the environment?	Negligible	The site and local environment will remain relatively unchanged. The proposal is consistent with the existing land use. The proposal is not anticipated to result in further degradation of the site or surrounding land.
l) Cause any pollution of the environment?	Low adverse	The proposal would involve a temporary and local increase in noise during the construction phase due to the use of machinery. Works shall be confined to standard construction hours. Notification shall be provided to adjacent property owners and sensitive receivers including St Johns High School and Shoalhaven High School. Minor sediment disturbance may result from works, but this is anticipated to be minimal and would be captured and managed during works and stabilised following works. Sediment and erosion control in accordance with the Blue Book will be implemented to minimise movement of sediment into waterways. It is unlikely that the activity (including the environmental impact mitigation measures) would result in water or air pollution, spillages, dust, odours, vibration or radiation. The risk of contamination and spills from machinery including fuel and hydraulic fluids would be minimised through safeguards and mitigation measures (refer to Section 7 of this REF).
m) Have any environmental problems associated with the disposal of waste?	Negligible	The waste that would be disposed off-site can be recycled or re-used in accordance with resource recovery exemptions or taken to a licensed waste facility. There would be no trackable waste, hazardous waste, liquid waste, or restricted solid waste as described in the NSW *Protection of the Environment Operations Act 1997*.
n) Cause any increased demands on resources (natural or otherwise) which are, or are	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.

likely to become, in short supply?		
o) Have any cumulative environmental effect with other existing or likely future activities?	Negligible	The assessed low adverse or negligible impacts of the proposal are not likely to interact. Mitigation measures (refer to Section 7 of this REF) shall be implemented to minimise the risk of cumulative environmental effects.
p) Any impact on coastal processes and coastal hazards, including those under projected climate change conditions	Low adverse	The proposed activity would have no effect on coastal processes including those projected under climate change conditions. The site is not located in a coastal hazard area.
q) Any applicable local strategic planning statement, regional strategic plan or district strategic plan made under Division 3.1 of the Act	Positive	The proposed activity meets Planning Priority 2 (Delivering Infrastructure) of the *Shoalhaven 2040* Strategic Land-use Planning Statement https://doc.shoalhaven.nsw.gov.au/displaydoc.aspx?record=D20/437277 The proposed activity is not inconsistent with the Illawarra Shoalhaven Regional Plan 2041 (ISRP): https://www.planning.nsw.gov.au/-/media/Files/DPE/Plans-and-policies/Plans-for-your-area/Regional-plans/Illawarra-Shoalhaven-Regional-Plan-05-21.pdf
r) Any other relevant environmental factors	N/A	

4. PERMISSIBILITY

4.1 Environmental Planning & Assessment Act 1979

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

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

In this regard, section 2.126(6) of the NSW *State Environmental Planning Policy (Transport and Infrastructure) 2021* (TISEPP) provides that (underline added for emphasis):

> *"Development for the purpose of sewage reticulation systems may be carried out without consent on any land in the prescribed circumstances."*

Development carried out by or in behalf of a public authority constitutes development carried out in the prescribed circumstances, pursuant to s2.126(1) (TISEPP).

The proposal constitutes an 'activity' for the purposes of Part 5 of the EP&A Act, and can be carried out by (or on behalf of) a public authority as development without consent. Environmental impact assessment under Part 5 of the EP&A Act is required, including consideration of matters outlined in Section 171 of the EP&A Regulation 2021. This REF provides this assessment and ensures that Council as determining authority in consideration of the activity, meets its obligation under s5.5 of the EP&A Act, to examine and take into account to the fullest extent possible, all matters affecting or likely to affect the environment by reason of the activity.

4.2 Local Government Act 1993

Under Section 35 of the Local Government Act 1993, community land is required to be used and managed in accordance with the plan of management applying to the land, any laws permitting the use of the land for a specified purpose or otherwise regulating the use of the land, and any other relevant clause in Part 2, Division 2 of the Act.

Lot 1 DP 390432 (24 John Purcell Way – Park Rd Netball Courts) is Community Land categorised as Sportsground.

The core objectives for management of the *Generic Community Land Plan of Management Sportsground* (D09/60401) are to:

- encourage, promote and facilitate recreational pursuits in the community involving organised and informal sporting activities and games, and to
- ensure that such activities are managed having regard to any adverse impacts on nearby residents.

Lot 541 DP 1276147 (off Carrington Park Dr) is Community Land categorised as General Community Use.

The core objectives for management of the *Generic Community Land Plan of Management General Community Use* (SCC reference D11/116042) are to promote, encourage and provide for the use of the land, and to provide facilities on the land, to meet the current and future needs of the local community and of the wider public:

- in relation to public recreation and the physical, cultural, social and intellectual welfare or development of individual members of the public, and

- in relation to purposes for which a lease, licence or other estate may be granted in respect of the land (other than the provision of public utilities and works associated with or ancillary to public utilities).

The proposal would not compromise or restrict the use or development of the land in accordance with the land categorisations and would not be inconsistent with the objectives of the relevant plans of management covering Lot 1 DP 390432 or Lot 541 DP 1276147.

4.3 Biodiversity Conservation Act 2016

The proposed development complies with the *Biodiversity Conservation Act 2016* for the following reasons:

- The proposed activity is unlikely to have a significant impact on threatened species and/or threatened ecological communities listed in the schedules of the Act. There is, therefore, no requirement to 'opt in' to the Biodiversity Offset Scheme.
- The design and mitigation measures (Section 7 of this REF) would ensure that no *serious and irreversible impacts on biodiversity values* (as defined by the BC Act) occur at the site of the proposed activity.
- The proposed activity is not within an area declared to be of "outstanding biodiversity value" as defined in the Act and Regulations.

Because of the above considerations, neither a species impact statement nor a biodiversity development assessment report is required for the proposed activity.

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.

Refer to Section 3.2 for more information.

4.4 Other

A summary of other relevant legislation and permissibility is provided in Table 5 below.

Table 5. Summary of other relevant legislation and permissibility

NSW STATE LEGISLATION			
***Environmental Planning and Assessment Act 1979* (EP&A Act)**			
Permissible	√	Not permissible	☐

Justification:

The Transport and Infrastructure SEPP provides for the proposed works to be undertaken without development consent (refer above). In circumstances where development consent is not required, the environmental assessment provisions outlined in Part 5 of the Act are required to be complied with. This REF fulfils this requirement.

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.

Protection of the Environment Operations Act 1997

Permissible √ 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.

***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.
- As there are no recorded sites or visible objects and as the site is on ‘disturbed land’, the Due Diligence Guidelines requires no further assessment as it is reasonable to conclude that there is a low probability of objects occurring in the area of the proposed activity and an AHIP is not required. Refer to Section 3.4 for more information.

Fisheries Management Act 1994

Permissible √ Not permissible ☐

The proposed activity:

- would not affect declared aquatic reserves (Part 7, Division 2 of the Act);
- would not involve dredging or reclamation in Key Fish Habitat (Part 7, Division 3);
- would not involve or result in the blocking the passage of fish (s.219);
- would not impact mangroves and marine vegetation (Part 7, Division 4);
- would not involve disturbance to gravel beds where salmon or trout spawn (s.208 of the Act);
- does not involve the release of live fish (Part 7, Division 7);

- does not involve the construction of dams and weirs (s.218);
- would not impact declared threatened species of endangered ecological communities (Part 7A);
- does not constitute a declared key threatening process (Part 7A); and
- would not use explosives in a watercourse (Clauses 70 and 71 of the *Fisheries Management (General) Regulation 2019).*

A Fisheries Permit would not be required.

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.

Water Management Act 2000

Permissible √ Not permissible ☐

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 *Water Management (General) Regulation 2018.*
- The proposal would not interfere with the aquifer and therefore an interference licence is not required (s.91F).

State Environmental Planning Policy (Resilience and Hazards) 2021

Permissible √ Not permissible ☐

Justification:

- The site is not mapped for the purpose of the SEPP.
- Other considerations of the RHSEPP are not relevant to the current proposal.

COMMONWEALTH LEGISLATION

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

Permissible √ Not permissible ☐

Justification:

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

Commonwealth *Native Title Act 1993*

Permissible √ Not permissible ☐

Justification:

Works would occur entirely within public road reserves for which Council is the road authority and on freehold land (refer to section 1.2 of this REF).

It is therefore assumed that Native Title has been extinguished as a Previous Exclusive Possession Act. No procedural rights are applicable.

5. CONSULTATION WITH GOVERNMENT AGENCIES

5.1 Transport & Infrastructure SEPP

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

Consultation occurred with SCC Works and Services including the District Engineer – Central as custodian of the roads and stormwater infrastructure in this location. Preference was expressed for the sewage infrastructure to not occur within the footprint of the road pavement. This option was explored, but deemed not possible, due to the proximity of existing services in the road verges. Trenchless construction beneath the pavement was selected to minimise impact on the road structure and function.

Shoalhaven Water, the proponent of proposed works, is also the custodian of sewer and water infrastructure.

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

Further consultation under clause 2.10 is therefore not required.

Clause 2.11 – Development with impacts on local heritage

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

Consultation under Clause 2.11 is therefore not required.

Clause 2.12 – Development with impacts on flood liable land

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

The proposal involves installation of primarily subsurface infrastructure and would result in only negligible changes to landform.

The proposal is therefore unlikely to affect flood behaviour other than to a minor extent.

Refer to Section 3.8 of this REF for more information.

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

The proposal would occur on land which is mapped as being flood-liable but would not be carried out under a relevant provision for Clause 2.13.

Furthermore, the proposal is unlikely to affect flood behaviour other than to a minor extent (refer to Section 3.8).

Notification to NSW State Emergency Service Risk Reduction is therefore not required.

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

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

Clause 2.15 – Consultation with public authorities other than councils

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

- would not be undertaken on or adjacent to land reserved under the *National Parks and Wildlife Act 1974* or in Zone C1 or in equivalent zones;
- does not comprise a fixed or floating structure in or over navigable waters;
- would not increase the amount of artificial light in the night sky and located on land within the dark sky region as identified on the dark sky region map;
- would not be undertaken within Defence communications facility buffer (only relevant to the defence communications facility near Morundah);
- would not be undertaken on land in a mine subsidence district within the meaning of the *Mine Subsidence Compensation Act 1961*;
- would not be development on, or reasonably likely to have an impact on, a part of the Willandra Lakes Region World Heritage Property;
- would not be development within a Western City operational area specified in Schedule 2 of the *Western Parkland City Authority Act 2018*.

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

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

Summary

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

6. COMMUNITY ENGAGEMENT

In accordance with Council's Community Engagement Policy, the proposal constitutes a *Local Area – Low Impact* activity. Formal community engagement is not required.

Consultation with affected residents, property owners and sensitive receivers shall be undertaken, including:

- St Johns High School
- Shoalhaven High School
- Asset custodian and user groups of Park Rd Netball Courts
- Owners and residents of affected properties, including those for which access may be disrupted (e.g. by underboring activities).

It is recommended that general notification of the proposal be provided to surrounding property owners within 200 m of the proposal, outlining the purpose of the project, anticipated timeframes, potential noise impacts and traffic disruptions.

Where disruption to traffic would occur, notification via variable message boards shall inform users of the road of proposed works and potential delays for eight weeks prior to commencement (four weeks minimum) and during works.

7. ENVIRONMENTAL SAFEGUARDS AND MEASURES TO MINIMISE IMPACTS

Note that safeguards are prescribed unless stated otherwise.

Safeguard / Measure	Responsibility
Works planning, approvals, consultation & notification	
1. An easement for sewerage infrastructure shall be sought over Lot 7 DP 1158088 (31 John Purcell Way – St John The Evangelist High School) to accommodate Shoalhaven Water's proposed and existing sewage infrastructure.	Project Manager;
2. Works shall, to every practical extent, be scheduled to occur during school holidays to minimise disruption to school activities and related traffic.	Project Manager; Construction Contractor
3. Consultation with affected residents, property owners and sensitive receivers shall be undertaken, including: • St Johns High School • Shoalhaven High School • Asset custodian and user groups of Park Rd Netball Courts • Owners and residents of affected properties, including those for which access may be disrupted (e.g. by underboring activities).	Project Manager;
4. It is recommended that general notification of the proposal be provided to surrounding property owners within 200 m of the proposal, outlining the purpose of the project, anticipated timeframes, potential noise impacts and traffic disruptions.	Project Manager;
5. Where disruption to traffic would occur, notification via variable message boards shall inform users of the road of proposed works and potential delays for eight weeks prior to commencement (four weeks minimum) and during works.	Construction Contractor
Site Establishment	
6. An appropriate traffic management plan shall be developed and implemented to minimise disruption and reduce risk of incident along John Purcell Way, Park Rd, Jindalee Cr and Carrington Park Dr during works.	Construction Contractor
7. Construction compounds, machinery, vehicles and stockpiles shall be located within the construction footprint, or otherwise in nearby existing cleared areas for which	Project Manager; Construction Contractor

<table>
<tr><th>Safeguard / Measure</th><th>Responsibility</th></tr>
<tr><td>Council is the land manager (such as the SPS16 site, the carpark at Park Rd Netball Courts and / or the reserve at the eastern end of the alignment near Carrington Park Drive), and shall not encroach into native vegetation, including the drip zone of trees.</td><td></td></tr>
<tr><td>8. Erosion and sediment controls in accordance with the ‘Blue Book’ (Landcom 2004) shall be installed and maintained appropriately to prevent the entry of sediment into waterways. Erosion and sediment controls shall be maintained in good working order for the duration of the works and subsequently until the site has been stabilised and the risk of erosion is minimal.</td><td>Construction Contractor</td></tr>
<tr><td colspan="2">Construction works</td></tr>
<tr><td>9. Construction works shall be within the times shown below with works generating high noise and/or vibration levels scheduled during less sensitive time periods.
<table>
<tr><th>Construction hours</th><th>Monday to Friday</th><th>Saturday</th><th>Sunday and public holidays</th></tr>
<tr><td>Standard construction hours</td><td>7:00 am to 6:00 pm</td><td>8:00 am to 1:00 pm</td><td>No work[1]</td></tr>
<tr><td>Construction activities with impulsive or tonal noise emissions</td><td>8:00 am to 5:00 pm[2]</td><td>9:00 am to 1:00 pm[2]</td><td>No work[1]</td></tr>
</table>
[1] Emergency works to protect persons, property and the environment permitted

[2] Works may be carried out in continuous blocks not exceeding three hours each with a minimum respite from those activities and works of not less than one hour between each block. ‘Continuous’ includes any period during which there is less than a one hour respite between ceasing and recommencing any of the work the subject of this condition.</td><td>Construction contractor</td></tr>
<tr><td>10. If works should occur during the months October through February (inclusive), pre-works surveys shall be undertaken to determine the presence of Green & Golden Bell Frogs in proximity to Browns Creek, ensure transient individuals are not impacted by the works, and to assess the need to adapt mitigation measures and monitoring of site with consideration of weather patterns and information regarding local breeding events.</td><td>SCC Environmental Officer;
Construction contractor</td></tr>
<tr><td>11. All machinery to be used shall be cleaned, degreased and in good working order prior to entering the site.</td><td>Construction Contractor</td></tr>
</table>

Safeguard / Measure	Responsibility
12. The contractor shall keep an emergency spill kit on-site at all times with procedures to contain and collect any leakage or spillage of fuels, oils and greases from plant and equipment.	Construction Contractor
13. No major equipment maintenance works shall be undertaken on-site.	Construction Contractor
14. To avoid the risk of pollution from machinery, refuelling shall generally be done off site, however if refuelling on site is required, due care shall be taken to avoid spilling fuel and a tray shall be used to catch any accidentally spilt fuel.	Construction Contractor
15. If engineering fill is imported to the site, all conditions prescribed in the applicable Resource Recovery Exemptions shall be complied with, including: • ensuring the producer of the waste has complied with the applicable Order such as testing and validation • ensuring the material has met all chemical and other material requirements specified in the applicable Order • keeping a written record of the following for a period of six years: o the quantity of material received o the name and address of the supplier	Construction Contractor
16. If Virgin Excavated Natural Material (VENM) is taken to the site (*i.e.* without chemical testing and validation): a. the material must meet the definition of VENM (refer to Section **Error! Reference source not found.**) b. the supplier must fill out and complete the *VENM Certificate* (http://www.epa.nsw.gov.au/waste/virgin-material.htm) c. The completed *VENM Certificate* shall be kept for at least six years and provided to the EPA upon any request.	Construction Contractor
17. Native vegetation removal and pruning shall be undertaken only to the extent required to construct and maintain the proposed infrastructure.	Construction Contractor
18. Impact to the structural root zones of trees to be retained shall be avoided to every practical extent.	Construction Contractor;
19. Non-destructive excavation methods such as vacuum excavation shall be used where trenching must occur within the structural root zone of large, mature trees, including: • large Spotted Gum tree on the western verge of John Purcell Way where underbored and trenched construction would connect;	Construction Contractor;

Safeguard / Measure	Responsibility
• two (2) large Grey Ironbark trees in the north-east corner of the Netball Courts, leading to Park Rd.	
20. Pruning of trees where required is to be undertaken in accordance with AS 4373-1996 "Pruning of Amenity Trees".	Construction Contractor;
21. In the event that any wildlife be significantly disturbed or injured during works, Council's Environmental Officers are to be contacted on 4429 3405, or if unavailable, Wildlife Rescue – South Coast should be contacted on 0418 427 214, to rescue and relocate the animal(s).	Construction Contractor;
22. Staff working at the site will be instructed to stop work immediately on identification of any suspected Aboriginal heritage artefact. If any objects are found, NSW Department of Planning, Industry and Environment (ph:131 555) shall be contacted.	Construction Contractor;
23. Compensatory tree planting shall be undertaken within the SPS 16 site. Tree replacement shall involve the planting of endemic tree tube-stock (or larger) at a ratio of at least 3 replacement plants for every 1 tree of 100 mm diameter at breast height (DBH) or greater, which is removed. Species selection shall be consistent with endemic vegetation at planting location(s) – to be approved by Council's Environmental Officer. Suitable species include *Eucalyptus amplifolia, E.longifolia* and *Corymbia maculata.* Tubestock planting shall be undertaken by a suitably qualified and experienced Bush Regeneration or Horticultural Landscaping contractor.	Project Manager; SCC Environmental Officer
24. Any disturbed table drains and road batters shall be stabilised following construction with jute mesh, turf, hydromulch or similar.	Construction Contractor;
Post construction	
25. An asset form shall be trimmed to file 44574E on commissioning of the assets in Accordance with POL15/8 Asset Accounting Policy section 3.1.4 and POL16/79 Asset Management Policy section 3.3.	Council Project Manager

8. SIGNIFICANCE EVALUATION & DECISION STATEMENT

This Review of Environmental Factors has assessed the likely environmental impacts, in the context of Part 5 of the Environmental Planning and Assessment Act 1979, of a proposal by Shoalhaven Water for the construction of approximately 1.56km length of Sewer Rising Main 16 (SRM 16) between Sewer Pump Station 16 (SPS 16) on Hillcrest Ave and a new gravity sewer main currently under construction to the north of Carrington Park Dr, Nowra.

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

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

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

Determined by:

Andrew McVey
Director – Shoalhaven Water (Acting)
Shoalhaven City Council Date: 10/06/2025

9. REFERENCES

DAWE (Department of Agriculture, Water and the Environment, Australian Government). 2021. *Species Profiles and Threats Database* (online database). Available at https://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl

DECCW (Department of Environment, Climate Change and Water, NSW) 2010 Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales.

DoE (Department of Environment, Commonwealth of Australia). 2013. *Matters of National Environmental Significance Significant Impact Guidelines 1.1*. Available at: http://155.187.2.69/epbc/guidelines-policies.html

EES (Environment, Energy and Science – NSW Department of Planning, Industry and the Environment). 2020. *Surveying threatened plants and their habitats*.

Morcombe, M. 2004. *Field Guide to Australian Birds*. Steve Parish Publishing, Australia.

NSW Government. 2021. *Threatened Biodiversity Data Collection* (online database). Available at: https://www.environment.nsw.gov.au/AtlasApp/UI_Modules/TSM_/Default.aspx

NSW Scientific Committee. 2011a. *Illawarra Lowlands Grassy Woodland in the Sydney Basin Bioregion - Determination to make a minor amendment to Part 3 of Schedule 1 of the Threatened Species Conservation Act.* Available from: https://www.environment.nsw.gov.au/Topics/Animals-and-plants/Threatened-species/NSW-Threatened-Species-Scientific-Committee/Determinations/Final-determinations/2011-2012/Illawarra-Lowlands-Grassy-Woodland-in-the-Sydney-Basin-Bioregion-minor-amendment-Determination

NSW Scientific Committee. 2011b. *River-Flat Eucalypt Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions - Determination to make a minor amendment to Part 3 of Schedule 1 of the Threatened Species Conservation Act*. Available at: https://www.environment.nsw.gov.au/Topics/Animals-and-plants/Threatened-species/NSW-Threatened-Species-Scientific-Committee/Determinations/Final-determinations/2011-2012/River-Flat-Eucalypt-Forest-on-Coastal-floodplains-minor-amendment-Determination

NSW Scientific Committee. 2011c. *Swamp Sclerophyll Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions - Determination to make a minor amendment to Part 3 of Schedule 1 of the Threatened Species Conservation Act*. Available at: https://www.environment.nsw.gov.au/Topics/Animals-and-plants/Threatened-species/NSW-Threatened-Species-Scientific-Committee/Determinations/Final-determinations/2011-2012/Swamp-Sclerophyll-Forest-on-Coastal-Floodplains-of-the-NSW-North-Coast-minor-amendment-Determination

OEH (NSW Office of Environment and Heritage). 2017a. *Dusky Woodswallow – profile*. Available at: https://threatenedspecies.bionet.nsw.gov.au/profile.aspx?id=20303

OEH (NSW Office of Environment and Heritage). 2017b. *Eastern False Pipistrelle – profile*. Available at: https://threatenedspecies.bionet.nsw.gov.au/profile?id=10331

OEH (NSW Office of Environment and Heritage). 2017c. Varied Sittella – Profile. Available at: https://threatenedspecies.bionet.nsw.gov.au/profile?id=20135

OEH (NSW Office of Environment and Heritage). 2019. *Large Bent-winged Bat – profile*. Available at: https://threatenedspecies.bionet.nsw.gov.au/profile?id=10534

OEH (NSW Office of Environment and Heritage). 2020a. *Grey-headed Flying-fox - profile*. Available from: https://threatenedspecies.bionet.nsw.gov.au/profile?id=10697

OEH (NSW Office of Environment and Heritage). 2020b. *Little Bent-wing Bat – profile*. Available at: https://threatenedspecies.bionet.nsw.gov.au/profile?id=10533

OEH (NSW Office of Environment and Heritage). 2020c. *Southern Myotis – profile*. Available at: https://threatenedspecies.bionet.nsw.gov.au/profile?id=10549

OEH (NSW Office of Environment and Heritage). 2020d. *Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions – profile*. Available at: https://threatenedspecies.bionet.nsw.gov.au/profile?id=10786

OEH (NSW Office of Environment and Heritage). 2021. *Little Eagle – profile.* Available from: https://threatenedspecies.bionet.nsw.gov.au/profile?id=20131

OEH (NSW Office of Environment and Heritage). 2022a. *Green and Golden Bell Frog - profile*. Available from: https://threatenedspecies.bionet.nsw.gov.au/profile?id=10483

OEH (NSW Office of Environment and Heritage). 2022b. *Little Lorikeet – profile.* Available from: https://threatenedspecies.bionet.nsw.gov.au/profile?id=20111

OEH (NSW Office of Environment and Heritage). 2022c. *Square-tailed Kite - profile*. Available at: https://threatenedspecies.bionet.nsw.gov.au/profile?id=10495

OEH (NSW Office of Environment and Heritage). 2022d. *Yellow-bellied Sheathtail-bat – profile*. Available at: https://threatenedspecies.bionet.nsw.gov.au/profile?id=10741

OEH (NSW Office of Environment and Heritage). 2024a. *Clearing of native vegetation- profile*. Available at: https://threatenedspecies.bionet.nsw.gov.au/profile?id=20023

OEH (NSW Office of Environment and Heritage). 2024b. *Eastern Coastal Free-tailed Bat – profile*. Available at: https://threatenedspecies.bionet.nsw.gov.au/profile?id=10544

OEH (NSW Office of Environment and Heritage). 2024c. *Gang-gang Cockatoo – profile.* Available from: https://threatenedspecies.bionet.nsw.gov.au/profile?id=10975

OEH (NSW Office of Environment and Heritage). 2024d. *Glossy Black-Cockatoo – profile.* Available from: https://threatenedspecies.bionet.nsw.gov.au/profile?id=10140

OEH (NSW Office of Environment and Heritage). 2024e. *Greater Broad-nosed Bat – profile*. Available at: https://threatenedspecies.bionet.nsw.gov.au/profile?id=10748

OEH (NSW Office of Environment and Heritage). 2024f. *Illawarra Lowlands Grassy Woodland in the Sydney Basin Bioregion - Sydney Basin - profile*. Available at: https://threatenedspecies.bionet.nsw.gov.au/profile?id=10426

OEH (NSW Office of Environment and Heritage). 2024g. *Large-eared Pied Bat – profile*. Available at: https://threatenedspecies.bionet.nsw.gov.au/profile?id=10157

OEH (NSW Office of Environment and Heritage). 2024h. *Regent Honeyeater – profile.* Available from: https://threatenedspecies.bionet.nsw.gov.au/profile?id=10841

Richards, G.C. & Hall, L.S. 2012. *A natural history of Australian bats: Working the night shift*. CSIRO Publishing: Collingwood, Victoria.

APPENDIX A – Design plans

“SEWER RISING MAIN 16 RELOCATION PROJECT – SPS 16 (HILLCREST AVE) TO SNSM”

Shoalhaven Water

26/05/2025

(SCC Reference D25/240656)

APPENDIX B – Threatened Species Likelihood of Occurrence

NSW Threatened Species Likelihood of Occurrence Table

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

Likelihood of occurrence in study area

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

Possibility of impact

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

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

Threatened Ecological Community (TEC) name	***Status***	***Likelihood of presence within areas impacted by the activity***
Bangalay Sand Forest of the Sydney Basin and South East Corner Bioregions (BC Act)	Endangered - NSW BC Act	Not mapped as occurring nor associated with any mapped plant community types in proximity to the site. No indicative species present.
Coastal Saltmarsh in the NSW North Coast, Sydney Basin and South East Corner Bioregions (BC Act) *Subtropical and Temperate Coastal Saltmarsh* (EPBC Act)	Endangered - NSW BC Act Vulnerable - Commonwealth EPBC Act	Not mapped as occurring nor associated with any mapped plant community types in proximity to the site. No indicative species present.
Freshwater wetlands on coastal floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions (BC Act)	Endangered - NSW BC Act	Not mapped as occurring nor associated with any mapped plant community types in proximity to the site. No indicative species present.
Illawarra Lowlands Grassy Woodland in the Sydney Basin Bioregion (BC Act) *Illawarra and south coast lowland forest and woodland ecological community* (EPBC Act)	Endangered - NSW BC Act Critically Endangered - Commonwealth EPBC Act	PCT3330 is mapped and was confirmed as occurring within and in proximity to the site and is associated with this TEC. Indicative species and abiotic features for the TEC are present. Further assessment has been undertaken in s3.2.2 and s3.3 of this REF.
Illawarra Subtropical Rainforest in the Sydney Basin Bioregion (BC Act) *Illawarra– Shoalhaven subtropical rainforest of the Sydney Basin Bioregion* (EPBC Act)	Endangered - NSW BC Act Critically Endangered - Commonwealth EPBC Act	Not mapped as occurring nor associated with any mapped plant community types in proximity to the site. No indicative species present.
Littoral Rainforest in the New South Wales North Coast, Sydney Basin and South East Corner Bioregions (BC Act) *Littoral Rainforest and Coastal Vine Thickets of Eastern Australia* (EPBC Act)	Endangered - NSW BC Act Critically Endangered - Commonwealth EPBC Act	Not mapped as occurring nor associated with any mapped plant community types in proximity to the site. No indicative species present.
Milton Ulladulla Subtropical Rainforest in the Sydney Basin Bioregion (BC Act) *Illawarra– Shoalhaven subtropical rainforest of the Sydney Basin Bioregion* (EPBC Act)	Endangered - NSW BC Act Critically Endangered - Commonwealth EPBC Act	Not mapped as occurring nor associated with any mapped plant community types in proximity to the site. No indicative species present.

Threatened Ecological Community (TEC) name	***Status***	***Likelihood of presence within areas impacted by the activity***
River-flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions (BC Act) *River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria* (EPBC Act)	Endangered - NSW BC Act Critically Endangered - Commonwealth EPBC Act	PCT4019 is mapped as occurring in proximity to the site and is associated with Riverflat Eucalypt Forest TEC as well as Swamp Sclerophyll Forest TEC. Indicative species and abiotic features suggest that PCT4019 present in proximity to the site is more closely representative of Swamp Sclerophyll Forest TEC. Riverflat Eucalypt Forest TEC is not considered to occur. Refer to s3.2.2 of this REF for more information.
Robertson Basalt Tall Open-forest in the Sydney Basin and South Eastern Highlands Bioregions (BC Act)	Critically Endangered – NSW BC Act	Not mapped as occurring nor associated with any mapped plant community types in proximity to the site. No indicative species present.
Swamp oak floodplain forest of the NSW North Coast, Sydney Basin and South East Corner bioregions (BC Act) *Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland ecological community* (EPBC Act)	Endangered - NSW BC Act Endangered - Commonwealth EPBC Act	Not mapped as occurring nor associated with any mapped plant community types in proximity to the site. No indicative species present.
Swamp sclerophyll forest on coastal floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions (BC Act) *Coastal Swamp Sclerophyll Forest of New South Wales and South East Queensland* (EPBC Act)	Endangered - NSW BC Act Endangered - Commonwealth EPBC Act	PCT4019 is mapped as occurring in proximity to the site and is associated with this TEC. Indicative species and abiotic features for the TEC are present. Further assessment has been undertaken in s3.2.2 and s3.3 of this REF.

Species name	**Common name**	**Type**	**Status**	**Species information & habitat requirements**	**Likelihood of presence within areas impacted by the activity**
Acacia pubescens	Downy Wattle	Flora	Vulnerable EPBC Act Vulnerable NSW BC Act	Occurs on alluviums, shales and at the intergrade between shales and sandstones. The soils are characteristically gravely soils, often with ironstone. Occurs in open woodland and forest, in a variety of plant communities, including Cooks River/Castlereagh Ironbark Forest, Shale/Gravel Transition Forest and Cumberland Plain Woodland. Longevity is unknown, but clonal species have been known to survive for many	Does not occur on site. A conspicuous species not observed during flora surveys.

Species name	Common name	Type	Status	Species information & habitat requirements	Likelihood of presence within areas impacted by the activity
				decades. Flowers from August to October. Pollination of Acacia flowers is usually by insects and birds. The pods mature in October to December. Recruitment is more commonly from vegetative reproduction than from seedlings. The percentage of pod production and seed fall for this species appears to be low. Acacia species generally have high seed dormancy and long-lived persistent soil seedbanks. It is thought that the species needs a minimum fire free period of 5 - 7 years to allow an adequate seedbank to develop.	
Cryptostylis hunteriana	Leafless tongue Orchid	Flora	Vulnerable EPBC Act Vulnerable NSW BC Act	Occurs in a wide variety of habitats from moist sandy soil to dense heathland, sedgeland and verges of fire trails. The larger populations typically occur in woodland dominated by Scribbly Gum (Eucalyptus sclerophylla), Silvertop Ash (E. sieberi), Red Bloodwood (Corymbia gummifera) and Black Sheoak (Allocasuarina 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).	Unlikely to occur. No suitable habitat. Understorey is moderately to highly disturbed and dominated by dense infestations of exotic invasive species.
Eucalyptus langleyi	Albatross Mallee	Flora	NSW BC Act Vulnerable EPBC Act Vulnerable	Found in Mallee shrub land on poorly drained, shallow, sandy soils on sandstone.	Does not occur on site. No suitable habitat. A conspicuous species not observed during flora surveys.
Genoplesium baueri	Bauer's Midge Orchid	Flora	Endangered EPBC Act Endangered NSW BC Act	Grows in dry sclerophyll forest and moss gardens over sandstone.	Unlikely to occur. No suitable habitat. Understorey is moderately to highly disturbed and dominated by dense infestations of exotic invasive species.
Hibbertia stricta subsp. furcatula	0	Flora	Endangered NSW BC Act	Habitat of the Southern Sydney population is broadly dry eucalypt forest and woodland. This population appears to occur mainly on upper slopes and above the Woronora River gorge escarpment, at or near the interface between the Lucas Heights soil landscape and Hawkesbury sandstone. Toelken & Miller (2012) note that the species usually grows in 'gravelly loam or clay soil in heath under open woodland'. Habitat of the South	

Species name	Common name	Type	Status	Species information & habitat requirements	Likelihood of presence within areas impacted by the activity
				Coast population is poorly recorded, but appears to be dry sclerophyll forest or woodland associations in sandy soils over sandstone.	
Pterostylis gibbosa	Illawarra Greenhood	Flora	Endangered EPBC Act Endangered NSW BC Act	All known populations grow in open forest or woodland, on flat or gently sloping land with poor drainage. In the Illawarra region, the species grows in woodland dominated by Forest Red Gum Eucalyptus tereticornis, Woollybutt E. longifolia and White Feather Honey-myrtle Melaleuca decora. Near Nowra, the species grows in an open forest of Spotted Gum Corymbia maculata, Forest Red Gum and Grey Ironbark E. paniculata. In the Hunter region, the species grows in open woodland dominated by Narrow-leaved Ironbark E. crebra, Forest Red Gum and Black Cypress Pine Callitris endlicheri. The Illawarra Greenhood is a deciduous orchid that is only visible above the ground between late summer and spring, and only when soil moisture levels can sustain its growth. The leaf rosette grows from an underground tuber in late summer, followed by the flower stem in winter. After a spring flowering, the plant begins to die back and seed capsules form (if pollination has taken place). As with many other greenhoods, male fungus gnats are believed to be the pollinator. The Illawarra Greenhood can survive occasional burning and grazing because of its capacity to reshoot from an underground tuber.	Unlikely to occur. No suitable habitat. Understorey is moderately to highly disturbed and dominated by dense infestations of exotic invasive species.
Pterostylis vernalis	0	Flora	Critically Endangered EPBC Act Critically Endangered NSW BC Act	Pterostylis vernalis grows in open sites in shallow soil over sandstone sheets, in heath and heathy forest.	Unlikely to occur. No suitable habitat. Understorey is moderately to highly disturbed and dominated by dense infestations of exotic invasive species.
Rhodamnia rubescens	Scrub Turpentine	Flora	Critically Endangered NSW BC Act	Found in littoral, warm temperate and subtropical rainforest and wet sclerophyll forest usually on volcanic and sedimentary soils.	Does not occur on site. No suitable habitat. A conspicuous species not observed during flora surveys.

Species name	Common name	Type	Status	Species information & habitat requirements	Likelihood of presence within areas impacted by the activity
Solanum celatum	0	Flora	NSW BC Act Endangered	Grows in rainforest clearings or in wet sclerophyll forests. Flowers August to October and produces fruit between December and January. Normally recorded in disturbed margins and clearings.	Does not occur on site. No suitable habitat. A conspicuous species not observed during flora surveys.
Syzygium paniculatum	Magenta Lilly Pilly	Flora	Vulnerable EPBC Act Endangered NSW BC Act	On the south coast the Magenta Lilly Pilly occurs on grey soils over sandstone, restricted mainly to remnant stands of littoral (coastal) rainforest.	Does not occur on site. A conspicuous species not observed during flora surveys.
Triplarina nowraensis	Nowra Heath Myrtle	Flora	NSW BC Act Endangered EPBC Act Endangered	Nowra Heath Myrtle occurs on poorly drained, gently sloping sandstone shelves or along creek lines underlain by Nowra Sandstone. The sites are often treeless or have a very open tree canopy due to the impeded drainage.	Does not occur on site. No suitable habitat. A conspicuous species not observed during flora surveys.
Heleioporus australiacus	Giant Burrowing Frog	Amphibian	Vulnerable EPBC Act Vulnerable NSW BC Act	Found in heath, woodland and open dry sclerophyll forest on a variety of soil types except those that are clay based. Spends more than 95% of its time in non-breeding habitat in areas up to 300 m from breeding sites. While in these areas, individuals burrow below the soil surface or in the leaf litter. Individual frogs occupy a series of burrow sites, some of which are used repeatedly. Breeding habitat of this species is generally soaks or pools within first or second order streams. They are also commonly recorded from 'hanging swamp' seepage lines and where small pools form from the collected water. Frogs breed after heavy rain mainly in late summer and Autumn from February to April. Eggs usually laid out of water in a moist burrow in sandy clay banks of smaller creeks, dams or ephemeral pools in forest (Anstis 2017).	Unlikely to occur. No suitable habitat.

Species name	Common name	Type	Status	Species information & habitat requirements	Likelihood of presence within areas impacted by the activity
Litoria aurea	Green and Golden Bell Frog	Amphibian	Vulnerable EPBC Act Endangered NSW BC Act	Marshes, dams and stream-sides, particularly those containing bullrushes (Typha spp.) or spikerushes (Eleocharis spp.). Optimum habitat for the species includes water-bodies that are unshaded, free of predatory fish such as Plague Minnow (Gambusia holbrooki), with a grassy area nearby and diurnal sheltering sites available. Some sites, particularly in the Greater Sydney region occur in highly disturbed areas (OEH 2017).	Possibly occurring in close proximity to the south-west end of the site, associated with Brown's Creek. Further assessment has been undertaken in s3.2.2 and s3.3.
Anthochaera phrygia	Regent Honeyeater	Bird	Critically endangered EPBC Act Critically endangered NSW BC Act	Temperate woodlands and open forests- and drier coastal woodlands in some years (flowering coastal woodlands and forests including box-ironbark woodland, and riparian forests- that exhibit large numbers of mature trees, high canopy cover and abundance of mistletoes) Key eucalypt species include Mugga Ironbark, Yellow Box, Blakely's Red Gum, White Box and Swamp Mahogany. Also utilises: Eucalyptus microcarpa, E. punctata, E. polyanthemos, E. moluccana, Corymbia robusta, E. crebra, E. caleyi, C. maculata, E.mckieana, E. macrorhyncha, E. laevopinea, and Angophora floribunda. Nectar and fruit from the mistletoes Amyema miquelii, A. pendula and A. cambagei are also eaten during the breeding season.	Possibly occurring within the site. Suitable habitat occurs including Ironbark trees. Further assessment has been undertaken in s3.2.2 and s3.3.
Apus pacificus	Fork-tailed Swift	Bird	Migratory EPBC Act	Occurring over inland plains but sometimes above foothills or in coastal areas. They often occur over cliffs and beaches and also over islands and sometimes well out to sea. They also occur over settled areas, including towns, urban areas and cities. They mostly occur over dry or open habitats, including riparian woodland and tea-tree swamps, low scrub, heathland or saltmarsh. They are also found at treeless grassland and sandplains covered with spinifex, open farmland and inland and coastal sand dunes.	Unlikely to occur. No suitable habitat.

Species name	Common name	Type	Status	Species information & habitat requirements	Likelihood of presence within areas impacted by the activity
Ardenna pacifica	Wedge-tailed Shearwater	Bird	Migratory EPBC Act	A pelagic, marine bird known from tropical and subtropical waters. The species tolerates a range of surface-temperatures and salinities, but is most abundant where temperatures are greater than 21 °C and salinity is greater than 34.6 %. In tropical zones the species may feed over cool nutrient-rich waters. The species has been recorded in offshore waters of eastern Victoria and southern NSW, mostly over continental slope with sea-surface temperatures of 13.9–24.4 °C and usually off the continental shelf in north-west Australia.	Unlikely to occur. No suitable habitat.
Ardenna tenuirostris	Short-tailed Shearwater	Bird	Migratory EPBC Act	Coastal, oceanic.	Unlikely to occur. No suitable habitat.
Artamus cyanopterus cyanopterus	Dusky Woodswallow	Bird	Vulnerable NSW BC Act	The Dusky Woodswallow is often reported in woodlands is eastern, southern and southwestern Australia. In New South Wales it is widespread from coast to inland, including the western slopes of the great Diving Range and farther west. It is often reported in woodlands and dry open sclerophyll forests, usually dominated by eucalyptus, including mallee associations. It has also been recorded in shrublands and heathlands and various modified habitats including regenerating forests; very occasionally in moist forests of rainforests. At sites where Dusky Woodswallows are recorded the understorey is typically open with sparse eucalypt saplings, acacias and other shrubs, including heath. The ground cover may consist of grasses, sedges or open ground, often with 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.	Possibly occurring within the site. Further assessment has been undertaken in s3.2.2 and s3.3.

Species name	Common name	Type	Status	Species information & habitat requirements	Likelihood of presence within areas impacted by the activity
Botaurus poiciloptilus	Australasian Bittern	Bird	NSW BC Act Endangered EPBC Act Endangered	Occurs in terrestrial freshwater wetlands and, rarely, estuarine habitats. It favours wetlands with tall, dense vegetation, where it forages in still, shallow water up to 0.3 m deep, often at the edges of pools or waterways, or from platforms or mats of vegetation over deep water. The species favours permanent and seasonal freshwater habitats, particularly those dominated by sedges, rushes and/or reeds (e.g. Phragmites, Cyperus, Eleocharis, Juncus, Typha, Baumea, Bolboschoenus) or cutting grass (Gahnia) growing over muddy or peaty substrate. Knowledge of the breeding ecology of the Australasian Bittern is relatively poor. Available data indicate that the Australasian Bittern breeds in relatively deep, densely vegetated freshwater swamps and pools, building its nests in deep cover over shallow water. The species requires shallow water, less than 30 cm deep with medium to low density reeds, grasses or shrubs for foraging and needs deeper water, with medium to high density reeds, rushes or sedges for nesting.	Unlikely to occur. No suitable habitat.
Burhinus grallarius	Bush Stone-curlew	Bird	NSW BC Act Endangered	Inhabits open forests and woodlands with a sparse grassy ground layer and fallen timber. Largely nocturnal, being especially active on moonlit nights. Nest on the ground in a scrape or small bare patch.	Unlikely to occur. No suitable habitat.
Calidris melanotos	Pectoral Sandpiper	Bird	Migratory EPBC Act	In Australasia, the Pectoral Sandpiper prefers shallow fresh to saline wetlands. The species is found at coastal lagoons, estuaries, bays, swamps, lakes, inundated grasslands, saltmarshes, river pools, creeks, floodplains and artificial wetlands.The species is usually found in coastal or near coastal habitat but occasionally found further inland. It prefers wetlands that have open fringing mudflats and low, emergent or fringing vegetation, such as grass or samphire. The species has also been recorded in swamp overgrown with lignum. They forage in shallow water or soft mud at the edge of wetlands (Higgins & Davies 1996).	Unlikely to occur. No suitable habitat.

Species name	Common name	Type	Status	Species information & habitat requirements	Likelihood of presence within areas impacted by the activity
Callocephalon fimbriatum	Gang-gang Cockatoo	Bird	Endangered *NSW* BC *Act* Endangered EPBC Act	Tall mountain forests and woodlands, particularly in heavily timbered and mature wet sclerophyll forests. In winter, may occur at lower altitudes in drier more open eucalypt forests and woodlands, and often found in urban areas. preferring more open eucalypt forests and woodlands, particularly in box-ironbark assemblages, or in dry forest in coastal areas. Favours old growth attributes for nesting and roosting	Possibly occurring within the site. Further assessment has been undertaken in s3.2.2 and s3.3.
Calyptorhynchus lathami lathami	Glossy Black-cockatoo	Bird	Vulnerable *NSW* BC *Act* Vulnerable EPBC Act	The GBC inhabits open forest and woodlands of the coast where stands of she-oak occur. In the Jervis Bay region they feed almost exclusively on the seeds of the black she-oak Allocasuarina littoralis, shredding the cones with their bill	Possibly occurring within the site. Further assessment has been undertaken in s3.2.2 and s3.3.
Daphoenositta chrysoptera	Varied Sittella	Bird	Vulnerable NSW BC Act	Inhabits eucalypt forests and woodlands, especially those containing rough-barked species and mature smooth-barked gums with dead branches, mallee and Acacia woodland	Possibly occurring within the site. Further assessment has been undertaken in s3.2.2.
Dasyornis brachypterus	Eastern Bristlebird	Bird	Endangered EPBC Act Endangered NSW BC Act	Sedgeland/heathland/dry sclerophyll and woodlands- / requires thick shrub/heath layer for shelter, nesting and foraging	Unlikely to occur. No suitable habitat.
Epthianura albifrons	White-fronted Chat	Bird	Vulnerable NSW BC Act	Commonly occurring in the saltmarshes of southern Australia, the White-fronted Chat is often seen foraging for insects and their larvae among the succulent leaves and stems of stunted saltmarsh plants.	Unlikely to occur. No suitable habitat.
Falco subniger	Black Falcon	Bird	Vulnerable NSW BC Act	The Black Falcon is widely, but sparsely, distributed in New South Wales, mostly occurring in inland regions. Some reports of 'Black Falcons' on the tablelands and coast of New South Wales are likely to be referable to the Brown Falcon. In New South Wales there is assumed to be a single population that is continuous with a broader continental population, given that falcons are highly mobile, commonly travelling hundreds of kilometres (Marchant & Higgins 1993)	Possibly occurring transiently over or in proximity to the site, but would not utilise habitat within the site.
Gallinago hardwickii	Latham's Snipe	Bird	EPBC Act: Migratory	In Australia, Latham's Snipe occurs in permanent and ephemeral wetlands up to 2000 m above sea-level. They	Unlikely to occur. No suitable habitat.

Species name	Common name	Type	Status	Species information & habitat requirements	Likelihood of presence within areas impacted by the activity
				usually inhabit open, freshwater wetlands with low, dense vegetation (e.g. swamps, flooded grasslands or heathlands, around bogs and other water bodies). However, they can also occur in habitats with saline or brackish water, in modified or artificial habitats, and in habitats located close to humans or human activity. In Australia, Latham's Snipe occurs in a wide variety of permanent and ephemeral wetlands. They usually occur in open, freshwater wetlands that have some form of shelter (usually low and dense vegetation) nearby. They generally occupy flooded meadows, seasonal or semi-permanent swamps, or open waters, but various other freshwater habitats can be used including bogs, waterholes, billabongs, lagoons, lakes, creek or river margins, river pools and floodplains.	
Glossopsitta pusilla	Little Lorikeet	Bird	Vulnerable NSW BC ACT	Forages primarily in the canopy of open Eucalyptus forest and woodland, yet also finds food in Angophora, Melaleuca and other tree species. Riparian habitats are particularly used, due to higher soil fertility and hence greater productivity. Isolated flowering trees in open country, e.g. paddocks, roadside remnants and urban trees also help sustain viable populations of the species. Roosts in treetops, often distant from feeding areas. Nests in proximity to feeding areas if possible, most typically selecting hollows in the limb or trunk of smooth-barked Eucalypts. Entrance is small (3 cm) and usually high above the ground (2–15 m). These nest sites are often used repeatedly for decades, suggesting that preferred sites are limited. Riparian trees often chosen, including species like Allocasuarina	Possibly occurring within the site. Further assessment has been undertaken in s3.2.2.
Haematopus longirostris	Pied Oystercatcher	Bird	Endangered NSW BC Act	Favours intertidal flats of inlets and bays, open beaches and sandbanks. Forages on exposed sand, mud and rock at low tide, for molluscs, worms, crabs and small fish. Nests mostly on coastal or estuarine beaches although occasionally they use saltmarsh or grassy areas. Nests are shallow scrapes in sand above the high tide mark, often amongst seaweed, shells and small stones.	Unlikely to occur. No suitable habitat.

Species name	Common name	Type	Status	Species information & habitat requirements	Likelihood of presence within areas impacted by the activity
Haliaeetus leucogaster	White-bellied Sea-Eagle	Bird	NSW BC Act Vulnerable Migratory EPBC Act	Found in coastal habitats (especially those close to the sea-shore) and around terrestrial wetlands in tropical and temperate regions of mainland Australia and its offshore islands. The habitats occupied by the sea-eagle are characterized by the presence of large areas of open water (larger rivers, swamps, lakes, the sea). Birds have been recorded in (or flying over) a variety of terrestrial habitats. The species is mostly recorded in coastal lowlands, but can occupy habitats up to 1400 m above sea level on the Northern Tablelands of NSW and up to 800 m above sea level in Tasmania and South Australia. Birds have been recorded at or in the vicinity of freshwater swamps, lakes, reservoirs, billabongs, saltmarsh and sewage ponds. They also occur at sites near the sea or sea-shore, such as around bays and inlets, beaches, reefs, lagoons, estuaries and mangroves. Terrestrial habitats include coastal dunes, tidal flats, grassland, heathland, woodland, forest (including rainforest) and even urban areas.	Unlikely to occur. No suitable habitat.
Hieraaetus morphnoides	Little Eagle	Bird	Vulnerable NSW BC Act	Occupies open eucalypt forest, woodland or open woodland. She-oak or acacia woodlands and riparian woodlands of interior NSW are also used. Nests in tall living trees within a remnant patch, where pairs build a large stick nest in winter	Possibly occurring within the site. Further assessment has been undertaken in s3.2.2.
Hirundapus caudacutus	White-throated Needletail	Bird	Migratory EPBC Act	Almost exclusively aerial, from heights of less than 1 m up to more than 1000 m above the ground. Because they are aerial, it has been stated that conventional habitat descriptions are inapplicable, but there are, nevertheless, certain preferences exhibited by the species. Although they occur over most types of habitat, they are probably recorded most often above wooded areas, including open forest and rainforest, and may also fly between trees or in clearings, below the canopy, but they are less commonly recorded flying above woodland. They also commonly occur over heathland, but less often over treeless areas, such as grassland or swamps.	Unlikely to occur. No suitable habitat.

Species name	Common name	Type	Status	Species information & habitat requirements	Likelihood of presence within areas impacted by the activity
Hydroprogne caspia	Caspian Tern	Bird	Migratory EPBC Act	Occur along the Australian coastline, and also occur inland along major rivers, especially in the Murray-Darling and Lake Eyre drainage basins, preferring wetlands with clear water to allow easy prey detection.	Unlikely to occur. No suitable habitat.
Ixobrychus flavicollis	Black Bittern	Bird	Vulnerable NSW BC Act	Terrestrial and estuarine wetlands generally in areas of permanent water and dense vegetation that may comprise grassland, woodland forest rainforest and mangroves. Roosts in trees or on ground amongst dense reeds, nests in branches overhanging water	Unlikely to occur. No suitable habitat.
Limosa lapponica	Bar-tailed Godwit	Bird	Migratory EPBC Act	The Bar-tailed Godwit is found mainly in coastal habitats such as large intertidal sandflats, banks, mudflats, estuaries, inlets, harbours, coastal lagoons and bays. It is found often around beds of seagrass and, sometimes, in nearby saltmarsh. It has been sighted in coastal sewage farms and saltworks, saltlakes and brackish wetlands near coasts, sandy ocean beaches, rock platforms, and coral reef-flats. It is rarely found on inland wetlands or in areas of short grass, such as farmland, paddocks and airstrips, although it is commonly recorded in paddocks at some locations overseas. Forages near the edge of water or in shallow water, mainly in tidal estuaries and harbours.	Unlikely to occur. No suitable habitat.
Lophoictinia isura	Square-Tailed Kite	Bird	Vulnerable NSW BC Act	Summer breeding migrant to the south-east, including the NSW south coast, arriving in September and leaving by March. Found in a variety of timbered habitats including dry woodlands and open forests. Shows a particular preference for timbered watercourses large hunting ranges of more than 100km2. Breeding is from July to February, with nest sites generally located along or near watercourses, in a fork or on large horizontal limbs.	Possibly occurring within the site. Further assessment has been undertaken in s3.2.2.
Neophema pulchella	Turquoise Parrot	Bird	Vulnerable NSW BC Act	Lives on the edges of eucalypt woodland adjoining clearings, timbered ridges and creeks in farmland. Prefers to feed in the shade of a tree and spends most of the day on the ground searching for the seeds or grasses and herbaceous plants, or browsing on vegetable matter. Nests in tree hollows, logs or	Possibly occurring transiently over or in proximity to the site, but would not utilise habitat within the site.

Species name	Common name	Type	Status	Species information & habitat requirements	Likelihood of presence within areas impacted by the activity
				posts, from August to December. It lays four or five white, rounded eggs on a nest of decayed wood dust.	
Ninox strenua	Powerful Owl	Bird	Vulnerable NSW BC Act	Coastal Woodland, Dry Sclerophyll Forest, wet sclerophyll forest and rainforest- Can occur in fragmented landscapes Roosts in dense vegetation comprising species such as Turpentine Syncarpia glomulifera, Black She-oak Allocasuarina littoralis, Blackwood Acacia melanoxylon, Rough-barked Apple Angophora floribunda, Cherry Ballart Exocarpus cupressiformis and a number of eucalypt species. requires old growth elements-hollow bearing tree resources for nesting and prey resource. Nests in large tree hollows in large eucalypts that are at least 150yrs old. Often in riparian areas. Large home range	Possibly occurring transiently over or in proximity to the site, but would not utilise habitat within the site.
Numenius madagascariensis	Eastern Curlew	Bird	Critically Endangered EPBC Act	Most commonly associated with sheltered coasts, especially estuaries, bays, harbours, inlets and coastal lagoons, with large intertidal mudflats or sandflats, often with beds of seagrass. Occasionally, the species occurs on ocean beaches (often near estuaries), and coral reefs, rock platforms, or rocky islets. The birds are often recorded among saltmarsh and on mudflats fringed by mangroves, and sometimes use the mangroves.	Unlikely to occur. No suitable habitat.
Pandion cristatus	Eastern Osprey	Bird	NSW BC Act Vulnerable	Favour coastal areas, especially the mouths of large rivers, lagoons and lakes. Feed on fish over clear, open water. Breed from July to September in NSW. Nests are made high up in dead trees or in dead crowns of live trees, usually within one kilometre of the sea.	Unlikely to occur. No suitable habitat.
Petroica boodang	Scarlet Robin	Bird	Vulnerable NSW BC Act	The Scarlet Robin is primarily a resident in dry forests and woodlands, but some adults and young birds disperse to more open habitats after breeding.	Unlikely to occur. No suitable habitat.

Species name	Common name	Type	Status	Species information & habitat requirements	Likelihood of presence within areas impacted by the activity
Petroica phoenicea	Flame Robin	Bird	Vulnerable NSW BC ACT	Breeds in upland tall moist eucalypt forests and woodlands, often on ridges and slopes. Prefers clearings or areas with open understoreys. The ground layer of the breeding habitat is dominated by native grasses and the shrub layer may be wither sparse or dense. Occasionally occurs in temperate rainforest, and also in herbfields, heathlands, shrublands and 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 scrublands in coastal areas.	Unlikely to occur. No suitable habitat.
Pluvialis squatarola	Grey Plover	Bird	EPBC Act: Migratory	Grey Plovers usually forage on large areas of exposed mudflats and beaches of sheltered coastal shores such as inlets, estuaries and lagoons. They also occasionally feed in pasture and at the muddy margins of inland wetlands such as lakes, swamps and bores. They usually roost in sandy areas, such as on unvegetated sandbanks or sand-spits on sheltered beaches or other sheltered environments such as estuaries or lagoons. In Port Phillip Bay, they roost on artificial sand islands created by dredge spoil. They less often roost on the muddy edges of estuaries or water storages such as reservoirs and salt-lakes. The species has also been recorded roosting in claypans 2 km from the sea.	Unlikely to occur. No suitable habitat.

Species name	Common name	Type	Status	Species information & habitat requirements	Likelihood of presence within areas impacted by the activity
Pycnoptilus floccosus	Pilotbird	Bird	Vulnerable EPBC Act	Pilotbirds are small, plump, ground-dwelling birds, about 18 cm long and endemic to south-east Australia. Upland Pilotbirds occur above 600 m in the Brindabella Ranges in the Australian Capital Territory, and in the Snowy Mountains in New South Wales and north-east Victoria. Lowland Pilotbirds occur in forests from the Blue Mountains west of Newcastle, around the wetter forests of eastern Australia, to Dandenong near Melbourne. Pilotbirds are strictly terrestrial, living on the ground in dense forests with heavy undergrowth. Largely sedentary, they are typically seen hopping briskly over the forest floor and foraging on damp ground or among leaf-litter. Flight is described as fairly weak, though, if disturbed, birds can sometimes ascend into shrubs (but no more than 1–2 m from the ground). They are typically seen in pairs or occasionally in family parties, occupying small territories all year round. Birds forage mostly in pairs for insects, and occasionally eat seeds and fruits.	Unlikely to occur. No suitable habitat.
Rostratula australis	Australian Painted Snipe	Bird	NSW BC Act Endangered EPBC Act Endangered	Prefers fringes of swamps, dams and nearby marshy areas where there is a cover of grasses, lignum, low scrub or open timber. Nests on the ground amongst tall vegetation, such as grasses, tussocks or reeds. The nest consists of a scrape in the ground, lined with grasses and leaves. Breeding is often in response to local conditions; generally occurs from September to December. Incubation and care of young is all undertaken by the male only. Forages nocturnally on mud-flats and in shallow water. Feeds on worms, molluscs, insects and some plant-matter.	Unlikely to occur. No suitable habitat.

Species name	Common name	Type	Status	Species information & habitat requirements	Likelihood of presence within areas impacted by the activity
Stictonetta naevosa	Freckled Duck	Bird	Vulnerable NSW BC Act	Found primarily in south-eastern and south-western Australia, occurring as a vagrant elsewhere. It breeds in large temporary swamps created by floods in the Bulloo and Lake Eyre basins and the Murray-Darling system, particularly along the Paroo and Lachlan Rivers, and other rivers within the Riverina. The duck is forced to disperse during extensive inland droughts when wetlands in the Murray River basin provide important habitat. The species may also occur as far as coastal NSW and Victoria during such times. Prefer permanent freshwater swamps and creeks with heavy growth of Cumbungi, Lignum or Tea-tree. During drier times they move from ephemeral breeding swamps to more permanent waters such as lakes, reservoirs, farm dams and sewage ponds. Breeding usually Aug-Dec, nesting in the fork of a branch over-hanging flood debris usually within 1m of surface (Morcombe 2011).	Unlikely to occur. No suitable habitat.
Thalasseus bergii	Crested Tern	Bird	Migratory EPBC Act	Crested Terns inhabit coastal areas, offshore waters, beaches, bays, inlets, tidal rivers, salt swamps, lakes and larger rivers. The species breeds during Sep-Jan in the south and Mar-Jun in the north in large, dense colonies on small islands. Nesting occurs on sand or shingle among low vegetation behind the beaches (Pizzey & Knight 2012; Morcombe 2011)	Unlikely to occur. No suitable habitat.
Thinornis cucullatus cucullatus	Eastern Hooded Dotteral (Hooded Plover)	Bird	NSW BC Act: Critically Endangered EPBC Act: Vulnerable	Eastern Hooded Dotteral (Hooded Plover) Thinornis cucullatus cucullatus (synThinornis rubricollis). In south-eastern Australia Hooded Plovers prefer sandy ocean beaches, especially those that are broad and flat, with a wide wave-wash zone for feeding, much beachcast seaweed, and backed by sparsely vegetated sand-dunes for shelter and nesting. Occasionally Hooded Plovers are found on tidal bays and estuaries, rock platforms and rocky or sand-covered reefs near sandy beaches, and small beaches in lines of cliffs. They regularly use near-coastal saline and freshwater lakes and lagoons, often with saltmarsh. Hooded Plovers forage in sand at all levels of the zone of wave wash during low and mid-tide or among seaweed at high-tide, and occasionally in dune blowouts after	Unlikely to occur. No suitable habitat.

Species name	Common name	Type	Status	Species information & habitat requirements	Likelihood of presence within areas impacted by the activity
				rain. At night they favour the upper zones of beaches for roosting.	
Tyto novaehollandiae	Masked Owl	Bird	Vulnerable NSW BC Act	Dry eucalypt forests and woodlands from sea level to 1100 m. Inhabits forest but often hunts along the edges of forests, including roadsides. The typical diet consists of tree-dwelling and ground mammals, especially rats. Pairs have a large home-range of 500 to 1000 hectares. Roosts and breeds in moist eucalypt forested gullies, using large tree hollows or sometimes caves for nesting. Requires old growth elements-hollow bearing tree resources for nesting and prey source.	Unlikely to occur. No suitable habitat.
Tyto tenebricosa	Sooty Owl	Bird	Vulnerable NSW BC Act	Occurs in rainforest, including dry rainforest, subtropical and warm temperate rainforest, as well as moist eucalypt forests	Unlikely to occur. No suitable habitat.
Cercartetus nanus	Eastern Pygmy-possum	Mammal	Vulnerable NSW BC Act	Rainforest, sclerophyl forest & woodland to heath – but heath & woodland preferred. Forages on banksias, eucalypts & bottlebrushes.	Unlikely to occur. No suitable habitat.

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

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

Species name	Common name	Type	Status	Species information & habitat requirements	Likelihood of presence within areas impacted by the activity
Phascolarctos cinereus	Koala	Mammal	Vulnerable NSW BC Act	Eucalypt woodland and forest Home range sizes vary with quality of habitat ranging from less than two ha to several hundred ha. Preferred tree species on the south coast are Eucalyptus amplifolia, E.viminalis, & E.tereticornis but numerous other species also known food trees.	Unlikely to occur. Preferred feed tree species are available, but no populations of the species occur in the locality, connectivity is poor.
Pteropus poliocephalus	Grey-headed Flying-fox	Mammal	Vulnerable EPBC Act Vulnerable NSW BC Act	Occur in subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps as well as urban gardens and cultivated fruit crops. Roosting camps are generally located within 20km of a regular food source and are commonly found in gullies, close to water, in vegetation with a dense canopy.	Possibly occurring within the site. Further assessment has been undertaken in s3.2.2 and s3.3.
Micronomus norfolkensis	Eastern Coastal Free-tailed Bat	Microchiropteran bat	*Vulnerable NSW* BC *Act*, Vulnerable *EPBC Act*	Small tree hollows/fissures in bark for roosting in dry sclerophyll forest, woodland, swamp forests and mangrove forests east of the Great Dividing Range.	Possibly occurring within the site. Further assessment has been undertaken in s3.2.2 and s3.3.
Falsistrellus tasmaniensis	Eastern False Pipistrelle	Microchiropteran bat	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 to avoid the thick understorey. They prefer continuous forest and avoid remnant vegetation. However, they have been recorded in open forests (Churchill, S 2008, Australian Bats, Jacana Books, Crows Nest, NSW).	Possibly occurring within the site. Further assessment has been undertaken in s3.2.2.
Scoteanax rueppellii	Greater Broad-nosed Bat	Microchiropteran bat	Vulnerable *NSW* BC *Act*	Found mainly in gullies and river systems that drain the Great Dividing Range, it utilises a variety of habitats from woodland through to moist and dry eucalypt forest and rainforest, below 500m, though it is most commonly found in tall wet forest. Although this species usually roosts in tree hollows, it has also	Possibly occurring within the site. Further assessment has been undertaken in s3.2.2.

Species name	Common name	Type	Status	Species information & habitat requirements	Likelihood of presence within areas impacted by the activity
				been found in buildings. Forages after sunset, flying slowly and directly along creek and river corridors at an altitude of 3 - 6 m	
Miniopterus orianae oceanensis	Large Bent-winged Bat	Microchiropteran bat	NSW BC Act Vulnerable	Specific caves are known maternity sites with other caves being primary roosting habitat outside breeding period. Also uses derelict mines, storm-water tunnels, buildings and other man-made structures. Hunts in forested areas, catching moths and other flying insects above the tree tops.	Possibly occurring within the site. Further assessment has been undertaken in s3.2.2.
Chalinolobus dwyeri	Large-eared Pied Bat	Microchiropteran bat	Vulnerable *NSW* BC *Act* Vulnerable *EPBC Act*	Found mainly in areas with extensive cliffs and caves, from Rockhampton in Queensland south to Bungonia in the NSW Southern Highlands. It is generally rare with a very patchy distribution in NSW. There are scattered records from the New England Tablelands and North West Slopes. Roosts in caves (near their entrances), crevices in cliffs, old mine workings and in the disused, bottle-shaped mud nests of the Fairy Martin (*Petrochelidon ariel*), frequenting low to mid-elevation dry open forest and woodland close to these features	Possibly occurring within the site. Further assessment has been undertaken in s3.2.2 and s3.3.
Miniopterus australis	Little Bent-winged Bat	Microchiropteran bat	Vulnerable *NSW* BC *Act*	Found in moist eucalypt forest, rainforest, vine thicket, wet and dry sclerophyll forest, Melaleuca swamps, dense coastal forests and banksia scrub. Generally found in well-timbered areas. Little Bentwing-bats roost in caves, tunnels, tree hollows, abandoned mines, stormwater drains, culverts, bridges and sometimes buildings during the day, and at night forage for small insects beneath the canopy of densely vegetated habitats. They often share roosting sites with the Common Bentwing-bat and, in winter, the two species may form mixed clusters.	Possibly occurring within the site. Further assessment has been undertaken in s3.2.2.
Myotis macropus	Southern Myotis	Microchiropteran bat	Vulnerable *NSW* BC *Act*	This species is predominantly roosts in caves, however, is known to roost in trees and man- made structures close to water. Roosts are generally located close to water, where the bats forage in small groups of three or four. They have a strong association with streams and permanent waterways in areas that are vegetated rather than cleared (Churchill, S 2008, Australian Bats, Jacana Books, Crows Nest, NSW They feed	Possibly occurring within the site. Further assessment has been undertaken in s3.2.2.

Species name	Common name	Type	Status	Species information & habitat requirements	Likelihood of presence within areas impacted by the activity
				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).	
Saccolaimus flaviventris	Yellow-bellied Sheathtail-bat	Microchiropteran bat	Vulnerable *NSW* BC *Act*	Roosts singly or in groups of up to six, in tree hollows and buildings; in treeless areas they are known to utilise mammal burrows. When foraging for insects, flies high and fast over the forest canopy, but lower in more open country. Forages in most habitats across its very wide range, with and without trees; appears to defend an aerial territory. Breeding has been recorded from December to mid-March, when a single young is born. Seasonal movements are unknown; there is speculation about a migration to southern Australia in late summer and autumn	
Varanus rosenbergi	Rosenberg's Goanna	Reptile	NSW BC Act Vulnerable	Found in heath, open forest and woodland. Associated with termites, the mounds of which this species nests in; termite mounds are a critical habitat component. Individuals require large areas of habitat. Feeds on carrion, birds, eggs, reptiles and small mammals. Shelters in hollow logs, rock crevices and in burrows, which they may dig for themselves, or they may use other species' burrows, such as rabbit warrens.	Unlikely to occur. No suitable habitat.