DRAFT
REVIEW OF ENVIRONMENTAL FACTORS (REF)
STORMWATER SYSTEM UPGRADE
CAMERON AND HAYWARD STREET
CONJOLA PARK

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Document control

Item	Details
Project	Review of Environmental Factors – Stormwater System Upgrade – Hayward Street Conjola Park
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Prepared By	City Services, Shoalhaven City Council

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	Reviewer	Jeff Bryant		25/11/2022

*Review and endorsement statement:

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

Assessment and approvals overview

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

1. PROPOSAL AND LOCATION

1.1 Proposed activity

The proposed activity is the upgrade of the stormwater management system within the Hayward Street road Reserve and Cameron Street, Conjola Park, between Cameron Street and Sandra Street (Figure 1 and Figure 2 below). Works are likely to be undertaken in stages determined by funding availability, however stages are likely to be:

1. Esme Street to Sandra Street
2. Cameron Steet to Esme Street

The activity would involve the following works (Refer to Figure 2 p.8 and Appendix A for details):

- Installation of approximately 260 metres of 375mm to 900mm diameter reinforced concrete pipe (RCP) along Cameron Street and Hayward Street road reserve and associated earthworks and vegetation removal (including trees).
- Installation of stormwater pits.
- Creation of grassed swale drains above the RCP within the Hayward Road road reserve.
- Installation of layback kerb at the end of Cameron Street and associated road pavement works.
- Installation of scour protection (3.5 metres length using basalt spalls) at the Sandra Street stormwater outlet.
- Reinstatement of driveways and road pavement impacted by the works.

Works would also involve the implementation of prescribed environmental impact mitigation measures and safeguards (refer to Section 7).

Shoalhaven City Council (SCC) is the proponent and the determining authority under Part 5 of the EP&A Act. The environmental assessment of the proposed activity and associated environmental impacts has been undertaken in the context of Clause 171 of the *Environmental Planning and Assessment Regulation 2021*. In doing so, this Review of Environmental Factors (REF) helps to fulfil the requirements of Section 5.5 of the Act that SCC examine and take into account to the fullest extent possible, all matters affecting or likely to affect the environment by reason of the activity.

1.2 Location

The proposal would be conducted on the southern side of Cameron Street and through the unformed Hayward Street road reserve (Figure 1 and Figure 2) to Sandra Steet. SCC is the road authority for all affected roads.

The outlet works (pipe, pit headwall and scour protection) would be undertaken on Lot 18 DP 703426 which is owned by SCC in freehold title. It is community land (as per the NSW *Local Government Act 1993)* with a Natural Area – Bushland and Wetland Category and is referred to as Windermere Drive Reserve.

1.3 Background, justification and analysis of alternatives

The Hayward Street road reserve currently consists of intermittent sections of open channels and pipes. Immediately to the west of the road reserve is the rear property boundaries of 2 to 6 Cottee Close and 4 to 9 Hayward Street. To the south and east of Hayward Street is the contributing

catchment including roads and properties from Stewart Street to Sandra Street. The adjoining roads do not have formalised drainage and all flows run overland to the channel in Hayward Street.

As a result of the topography of the area, stormwater that falls south of Cameron Street sheets overland to the north-west, where it collects in the existing open drainage channel within the unformed Hayward Street. This drain is narrow, heavily vegetated with an inconsistent profile along its length. It appears not to have been formerly designed and constructed. The capacity of the existing open drain is frequently exceeded.

At the intersection of Hayward Street road reserve and Esme Street, the channel changes to a headwall inlet and a piped network that runs under the driveways. The piped network then outlets to another open channel at the frontage of 9 Hayward Street which flows north to the end to Sandra Street. Here, the channel walls are over-steepened and significant scour is evident. An inlet headwall at the end of the channel conveys the stormwater under the driveway of 1 Sandra Street, which then outlets to Conjola Lake via a public foreshore reserve (Windermere Drive Reserve).

Stormwater that exceeds the capacity of the open drain overflows into residential properties to the west of the Hayward Street causing frequent nuisance events and reported damage to property. The purpose of the activity is to improve the drainage conveyance along Hayward Street to reduce the incidence of flooding of nearby residential properties.

Westlake Punnett were commissioned to investigate and improve the current stormwater system. They used 12D model software construct the existing surface and input the drainage network. A dynamic drainage analysis was then undertaken to estimate the runoff generated from the contributing catchment. The piped network was then analysed to determine the suitability of the existing network to cater for the 20% and 1% AEP (Annual Exceedance Probability) rainfall events. Westlake and Punnett (2022) found that due to the lack of piped drainage system, most of the stormwater conveyance is via overland flow paths and the channel. Their modelling indicates that the existing channel is undersized and is unable to contain 1% AEP flows. Although the channel can convey the 20% AEP flows, the channel does not have sufficient freeboard at several locations where the channel is constricted by vegetation and sediment build-up. The velocity of the water runoff in the channel was also assessed to be a safety risk *i.e.* greater than 2 metres / second.

Four options were investigated and assessed by Westlake Punnett (2022):

1. Upgrade and extend the piped drainage network to convey the 20% AEP and contain the 1% AEP flows in the overland flow paths
2. Upgrade and extend the piped drainage network to convey the 1% AEP within the piped network
3. Amplify the existing network of channels and pipes to convey the 1% AEP
4. Do nothing

Despite being more expensive, Option 2 was chosen as:

- stormwater flows would be safely conveyed through the site
- nuisance flooding issues would be resolved
- stormwater flows up to and including the 1% AEP would be conveyed within the piped network
- bypass flows through private properties would be eliminated for events up to the 1%AEP.

Their accepted designs for Option 2 are provided in Appendix A.

Figure 1 Location of the Proposed Activity

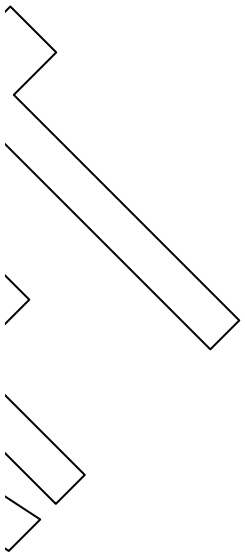
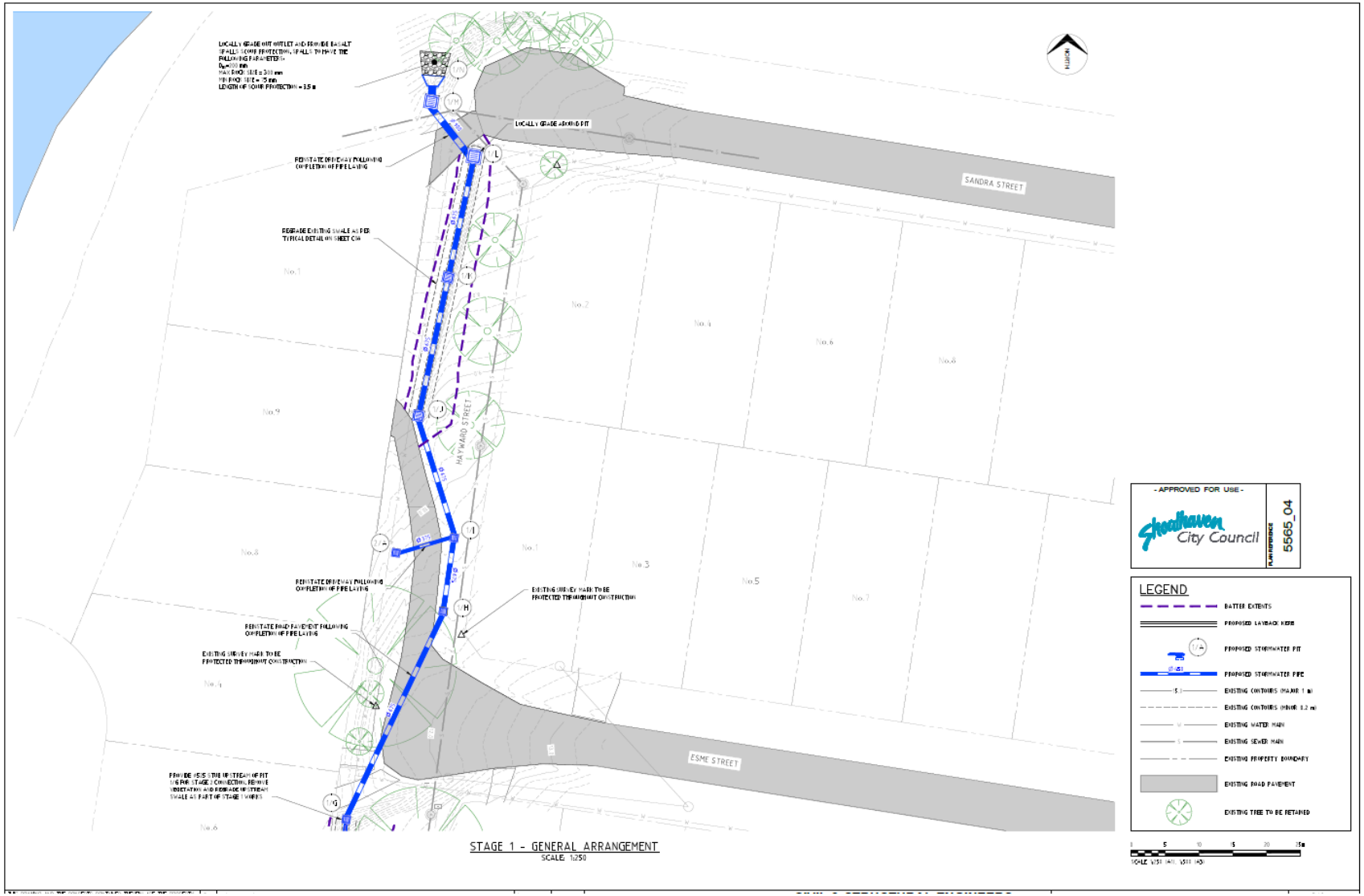


Figure 2 Extract of Plans (refer to Appendix A for full set of plans)




NOTES
1. IF ROOF DRAINAGE OUTLETS ARE DISCOVERED DURING CONSTRUCTION OF NEW KERB/DRAINAGE, CONSTRUCT NEW PROPERTY JUNCTION WITHIN VERGE AND DIRECTLY CONNECT TO THE PIPED DRAINAGE NETWORK.
ESME STREET
HAYWARD STREET
CAMERON STREET
- APPROVED FOR USE -
Shoalhaven City Council
5565_05
LEGEND
BATTER EXTENTS
PROPOSED LAYBACK KERB
PROPOSED STORMWATER PIT
PROPOSED STORMWATER PIPE
EXISTING CONTOURS (MAJOR 1 m)
EXISTING CONTOURS (MINOR 0.2 m)
EXISTING WATER MAIN
EXISTING SEWER MAIN
EXISTING PROPERTY BOUNDARY
EXISTING ROAD PAVEMENT
EXISTING TREE TO BE RETAINED
STAGE 2 - GENERAL ARRANGEMENT
SCALE 1:250

2. EXISTING ENVIRONMENT

The proposed activity would be conduct in the unformed Hayward Street road reserve, Cameron Street, and the Windermere Drive (public foreshore) Reserve.

Photographs of the site are provided in Section 2.3 below.

2.1 Habitat and vegetation assessment

Cameron Street and Sandra Street are developed and formed roads with mown grassy verges.

The Windermere Drive (public foreshore) reserve, at the site of the outlet, is a mown grassy area.

Hayward Street is unformed and contains a mix of native forest, paved driveway areas and cleared grassy areas. The native forest is a narrow strip, surrounded and isolated by residential properties. The forest is likely to comprise Turpentine – Red Bloodwood – Sydney Peppermint Shrubby Open Forest on the Foothills, southern Sydney Basin and northern South East Corner (Biometric SR658). In this location the forest is dominated by Blackbutt *Eucalyptus pilularis,* Bangalay *E. botryoides,* Turpentine *Syncarpia glomulifera,* and Red Bloodwood *Corymbia gummifera*.

Midstorey contains Sweet Pittosporum *Pittosporum undulatum,* Common Hop Bush *Dodonaea triquetra,* Cherry Ballart *Exocarpus cupressiformis,* Blueberry Ash *Elaeocarpus reticulatus,* Rice Flower *pimelea linifolia,* Black Wattle *Acacia mearnsii,* Sallow Wattle *Acacia longifolia,* Senna *Cassia sp.,* Lance Beard Heath *Leucopogon lanceolatus* and Narrow-leaved Geebung *Persoonia linearis.*

Ground cover contains a mixture of native and exotic species(*) including Asparagus fern *Asparagus sp.*,* Yorkshire Fog *Holcus lanatus*, Bromus sp.*,* Kikuyu *Cenchrus clandestinus*,* Fireweed *Senecio madagascariensis*,* False Sarsaparilla *Hardenbergia violacea,* Purpletop *Verbena bonariensis*,* Vetch *Vicia spp.*,* Twining Glycine *Glycine clandestina,* Blady Grass *Imperata cylindrica,* Swamp Dock *Rumex verticillatus*,* and Bracken *Pteridium esculentum.*

Although containing Bangalays and Blackbutts, the forest does not comprise the endangered ecological community *Bangalay Sand Forest of the Sydney Basin and South East Corner Bioregions* as the forest is not on coastal sand plains of marine or aeolian origin (refer to Section 2.2 below).

Site surveys were conducted on the 14 November between 11:00 to 13:00 (4 Hours) to:

- locate any threatened flora that have potential to occur at the site, particularly Scrub Turpentine *Rhodamnia rubescens*
- locate hollow-bearing trees, stick-nests, and other fauna habitat present in the area
- locate any signs of potential activity by threatened fauna *e.g.* Glossy Black Cockatoo (*Calyptorhynchus lathami*) feed tree species (*i.e. Allocasuarina littoralis*) or Glider feed tree species with characteristic incision marks.

No threatened flora or suitable habitat for locally occurring threated flora was identified on site during site surveys.

One large Red Bloodwood immediately adjacent to Sandra Street may contain crevices where dieback is apparent, however, no definitive hollow and entry was visible. Prior to removal the tree shall be inspected with an elevated work platform and if hollows are present, standard SCC procedures would apply. These procedures are detailed in the environmental impact mitigation

measures and safeguards prescribed in Section 7 of this REF. No other hollow bearing trees were observed.

Glossy Black Cockatoo feed tree species were located. These were approximately six Forest Oaks *Allocasuarina torulosa* which do not normally occur in the region. As they were small trees, it is assumed that they have been planted in this location or close-by. Despite being a species that the Glossy Black Cockatoo is known to feed on, there was no visible evidence of feeding on these trees in the subject site (*i.e.* chewed cones under the tree).

Whilst the site contains Yellow-bellied Glider sap feed trees (Red Bloodwood and Blackbutt) there were no incision marks, typical of this species, visible in the bark of any tree.

2.2 Geomorphological, subsurface and acid sulfate soils

The Hayward Road reserve is underlain by Snapper Point Formation Sandstone (Figure 3 below).

The western part of Lake Conjola does not have the broad and open form of the nearby St Georges Basin and Swan Lake. This is because the strata in this catchment is not downfolded into a syncline, and Conjola Creek incised into the underlying sandstone rather than the weaker siltstone at St Georges Basin and Swan Lake. When the sea drowned the lower reaches of the valley, it formed the narrow lake with a winding and branched pattern.

Top soils within the Hayward Street reserve generally comprise silty clay with high plasticity with sandstone bedrock at approximately 1.2 to 1.6 metres below existing ground level. The silty clay material is likely to have derived from the basalt / monzonite extent upslope of the site surrounding Havilland Street (Figure 3 below).

The geology and geomorphology of the site would normally indicate low risk for acid sulfate soils (ASS) and has been mapped as such (Class 5, Figure 4 p.13). A geotechnical investigation (ASCT 2022), however, indicated that potential acid sulfate soils (PASS) may be present. This was determined through a preliminary field peroxide test only. To confirm whether the soil is PASS and to determine treatment levels a full acid base account assessment would be undertaken *e.g.* Suspension Peroxide Oxidation Combined Acidity and Sulfur (SPOCAS) method.

Figure 3 Geology

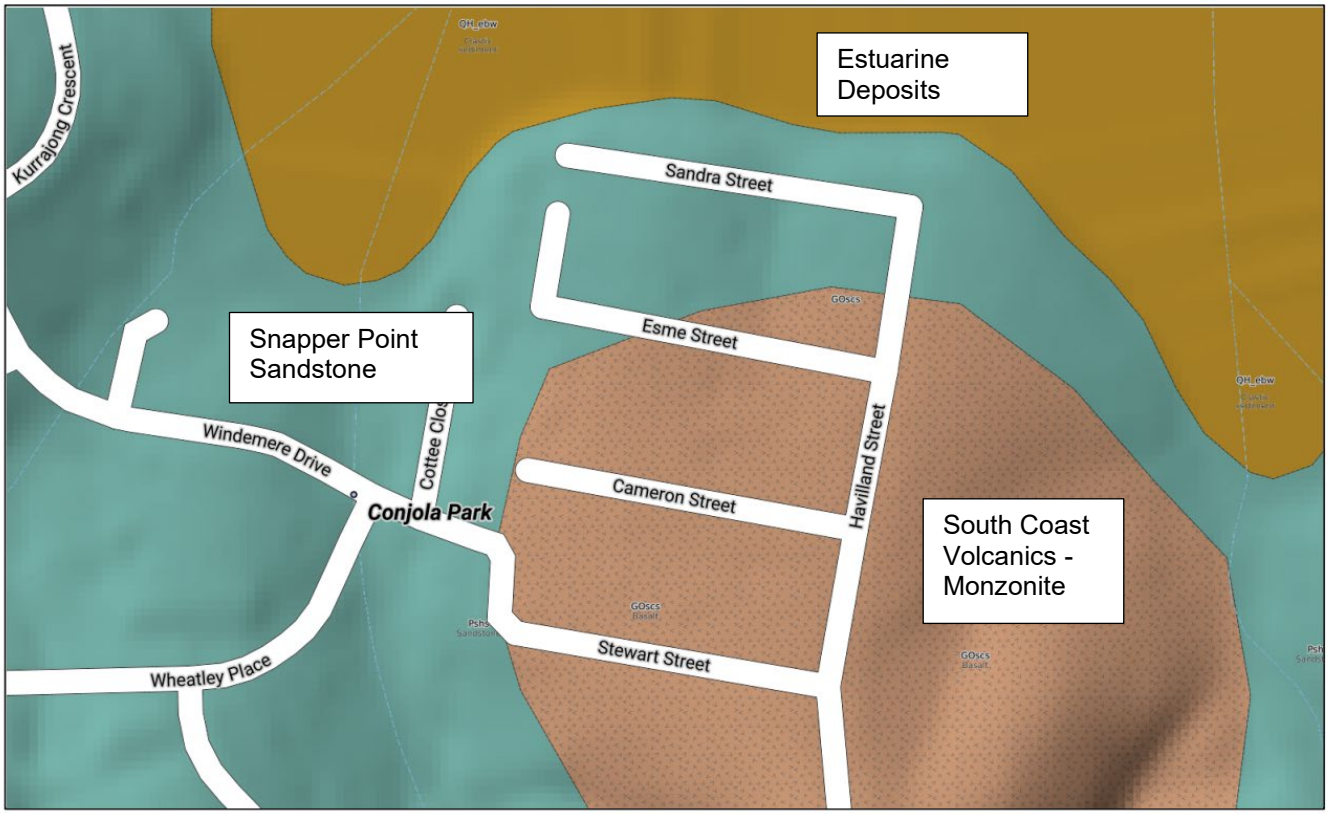
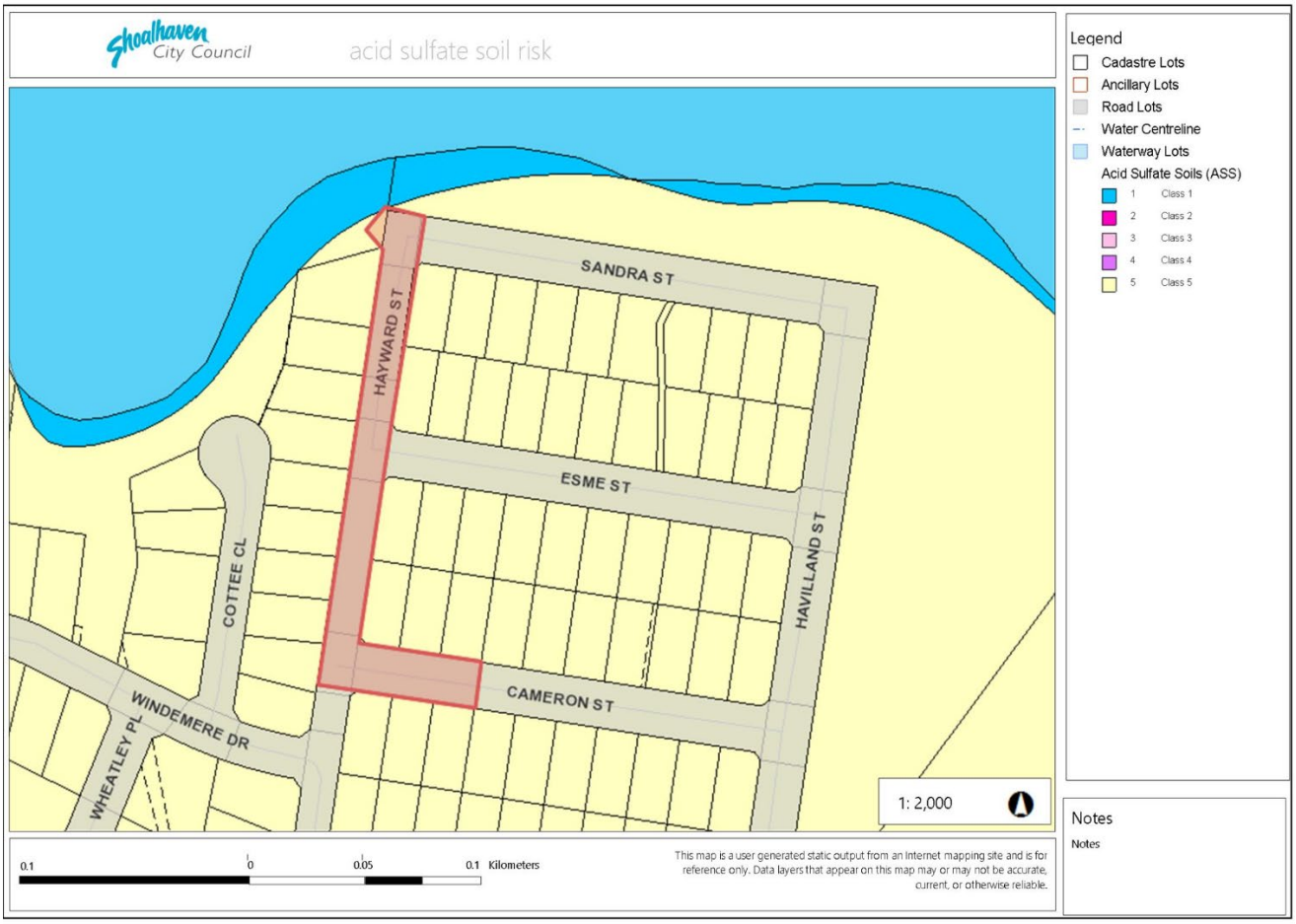


Figure 4 Acid Sulfate Soil risk map



2.3 Other

For the purposes of this REF, the site of the proposed activity:

- Is not in flood liable land
- Is not identified as being contaminated

2.4 Photos

Photo 1: Existing drainage channel – south from Sandra Street.

Photo 2: Existing outlet north of Sandra Street (Windermere Drive Reserve). New piped outlet to be provided with headwall and scour protection.

Photo 3: The Large Red Bloodwood adjacent to Sandra Street which could have a hollow / crevice

Photo 4: In Hayward Street road reserve looking north towards Sandra Street and the Lake. Photo also showing letterbox pit for the existing stormwater system and the driveway for 8 and 9 Hayward Street

Photo 5: Hayward Street reserve looking south from Esme Street. Photo showing thick vegetation that would be cleared for the proposed activity

Photo 6: Hayward Street reserve looking north from Cameron Street. Showing the extent of forest clearing proposed

Photo 7: Cameron Street taken from Hayward Street looking east. Works would be conducted on the southern side (right-hand) of the road-verge. This will include the removal of the Weeping Bottlebrush in the foreground.

3. ASSESSMENT OF LIKELY IMPACTS ON THE ENVIRONMENT

3.1 Impacts associated with the proposal

The proposal would involve the following disturbance and direct impacts:

- Removal approximately 51 trees (Table 1 and Figure 5 below) including one Red Bloodwood with potential minor hollow or crevice adjacent to Sandra Street.
- Removal of other native and non-native vegetation in an approximate 880m^2 area and replacement with grassy swale and batters.
- Excavation for the installation of the stormwater system components.
- Increase in noise during construction activities.
- Temporary impact to residential property access.
- Increased water flow onto public reserve below Sandra Street.

Other potential impacts on the environment, including indirect impacts have been considered, including:

- impact on threatened species and endangered ecological communities
- disturbance of acid sulfate soils.

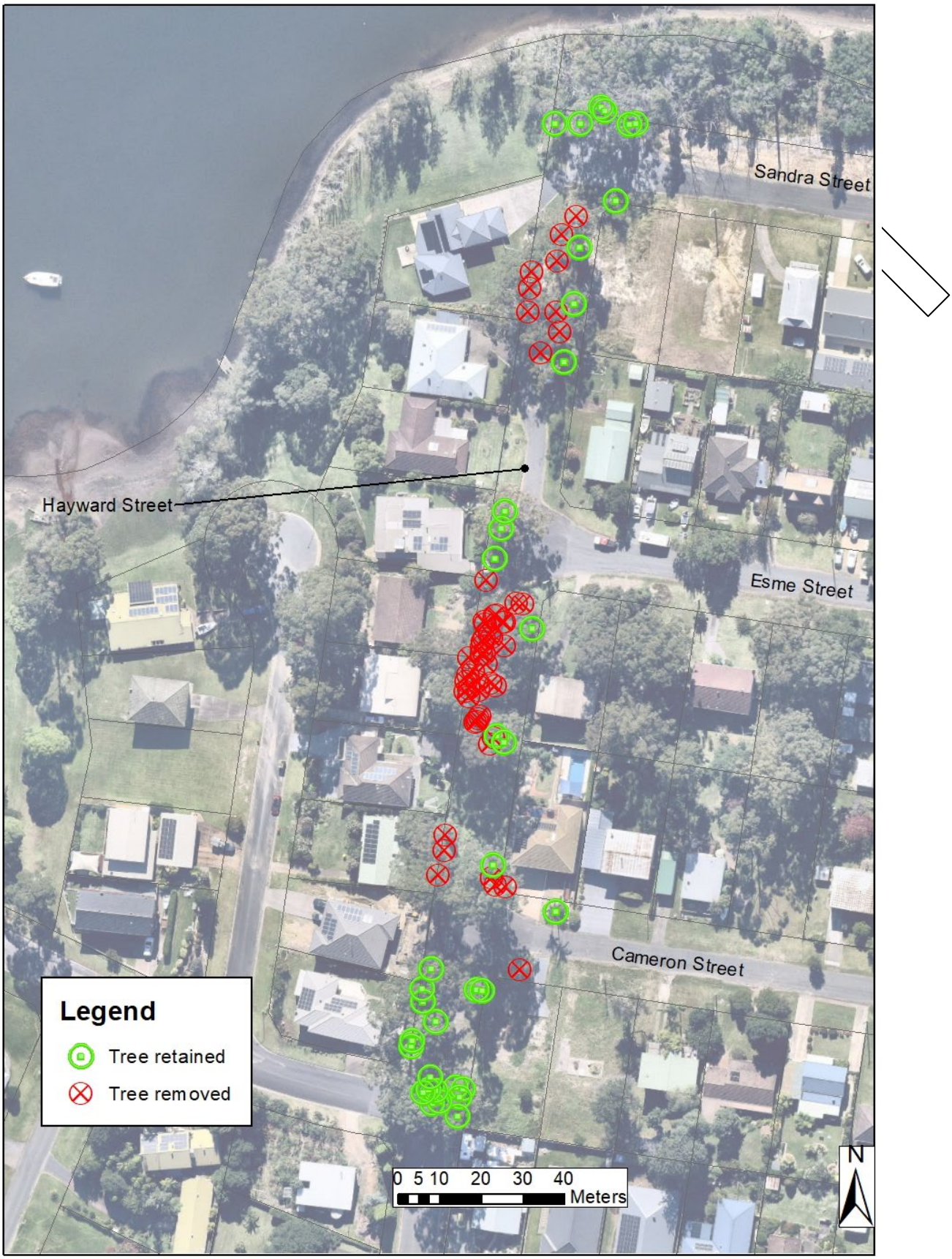
Each of these is discussed below.

Table 1 Tree removal inventory

Species	Size (DBH)	Number
Bangalay *Eucalyptus botryoides*	100 mm 150 mm 200 mm 350 mm 550 mm 600 mm 850 mm	1 3 1 1 1 2 1
Red Bloodwood *Corymbia gummifera*	150 mm 200 mm 250 mm 300 mm 950 mm	1 5 1 1 1 (with potential minor hollows)
Blackbutt *E. pilularis*	250 mm 450 mm 550 mm 600 mm 750 mm	1 1 1 2 1
Blue-leaved Stringybark *E.agglomerata*	150 mm 200 mm 250 mm 400 mm 600 mm	1 1 2 1 3
White Stringybark *E. globoidea*	350 mm 400 mm 550 mm	1 1 1

Yellow Stringybark *E.muelleriana*	450 mm	1
Turpentine *Syncarpia glomulifera*	200 mm 250 mm 300 mm 400 mm	1 1 1 1
Southern Bluegum *E. saligna x botryoides*	450 mm	1
Forest Sheoak *Allocasuarina torulosa*	150 mm 200 mm 250 mm 300 mm	4 2 1 1
Weeping Bottlebrush *Callistemon viminalis* – Street Tree (Cameron Street)	200 mm	1

Figure 5 Tree removal and retention



3.2 Tree Removal

51 trees would be removed. Refer to Table 1 above, Figure 5 below and plans provided in Appendix A.

Although the removal of these trees could be considered severe and long-term, the impact is not significant for the following reasons:

- None of the trees are listed in the threatened species schedules of the NSW *Biodiversity Conservation Act 2016* (NSW BC Act) or the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).
- Species listed in the threatened species schedules of the NSW BC Act and the EPBC Act are not likely to reside in this forest or rely on these trees and forest for food, refuge or breeding (refer to Section 3.3 of this REF).
- The trees are not in a vegetation community comprising an endangered ecological community listed under the NSW BC Act and EPBC Act.
- The trees are not within a riparian area of a natural waterway.
- The trees only exist because Hayward Street was not developed into a residential street. Section 88 (Tree Felling) of the NSW *Roads Act 1993* would allow SCC to, "*despite any Act or law to the contrary, remove or lop any tree or other vegetation this is on or overhanging a public road if, in its opinion, it is necessary to do so for the purpose of carrying out road work or removing a traffic hazard*"
- Apart from the Red Bloodwood adjacent to Sandra Street, no other tree contains a hollow or crevice that would support resident fauna.
- The trees do not appear to provide important food sources for locally occurring threatened species and do not appear to contain nests.
- The areas of Hayward Street road reserve will be planted with locally occurring species to replace those lost (refer to Section 7 of this REF).
- Although the unformed Hayward Street would have formed a narrow habitat corridor from the bushland (Conjola National Park) to the south to the Lake Conjola waterbody, this is also provided, to a greater extent, to the east across Havilland Street. The Hayward Street corridor is also restricted and disconnected by the Stewart Street, Hayward Street, Windermere Drive Link (Figure 6 below)
- With regard to environmental planning instruments, Hayward Street reserve:
  - is not mapped on Terrestrial Biodiversity Map layer in the Shoalhaven Local Environment Plan (2014) (SLEP 2014, Figure 7 below)
  - is not mapped as "Scenic Protection Area" layer in the SLEP 2014 (Figure 7 below)
  - is not mapped as "High Environmental Value" or "Biodiversity Corridor" in the Illawarra Shoalhaven Regional Plan 2041 (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) (Figure 7 below)
  - is not mapped on the Biodiversity Values Map (Figure 7 below) administered for the purposes of the NSW *Biodiversity Conservation Act 2016.*

An environmental impact statement (EIS) is therefore not considered warranted.

The impact on the amenity of adjacent residents is unknown as the plans have not yet been the subject of community engagement. This will need to occur prior to works.

Figure 6 Habitat corridor consideration

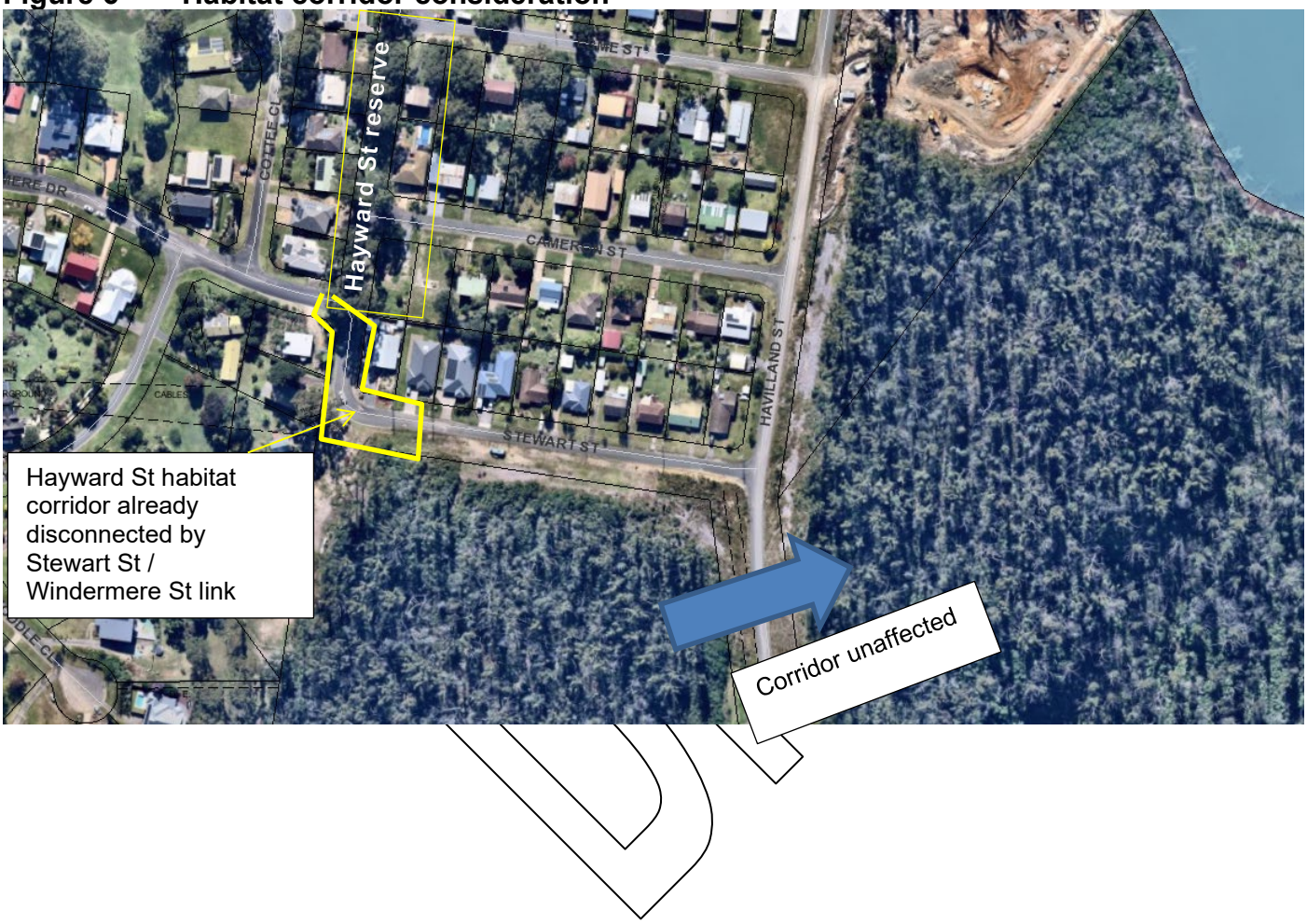
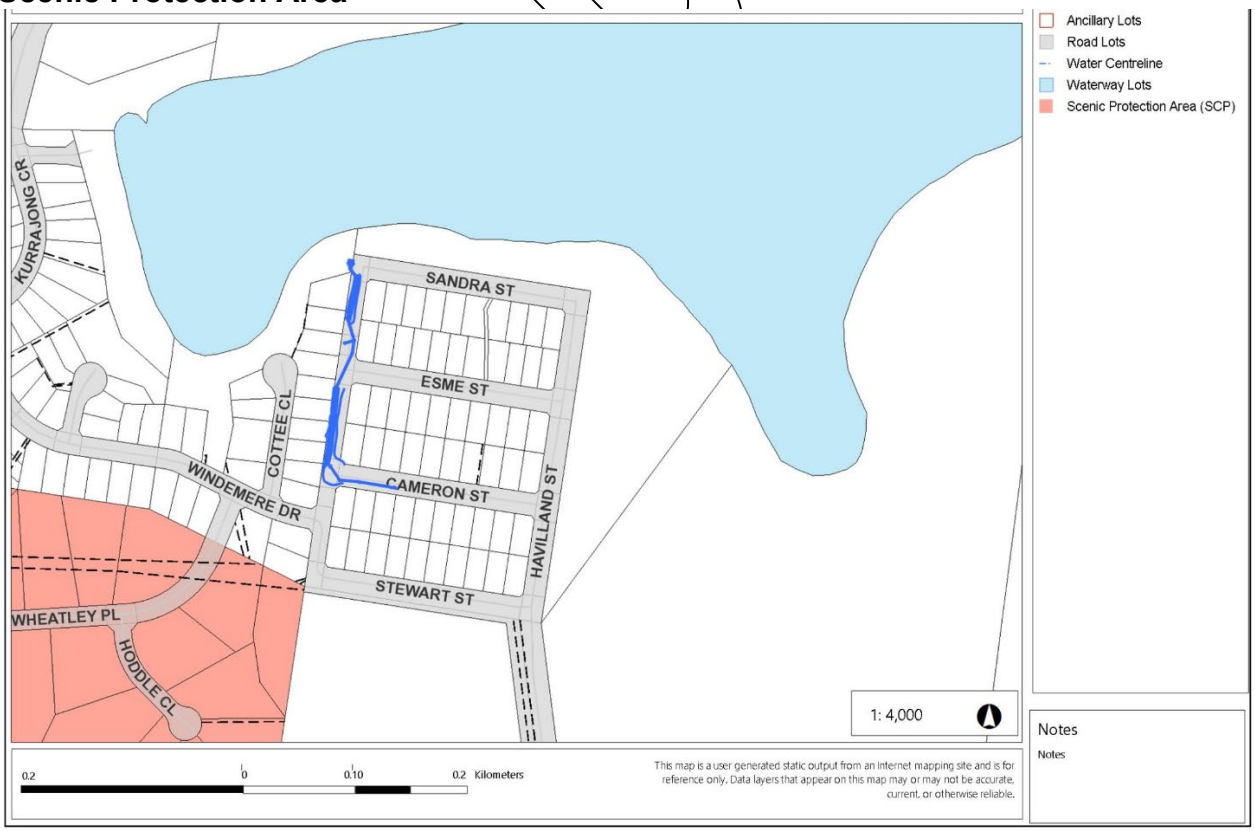


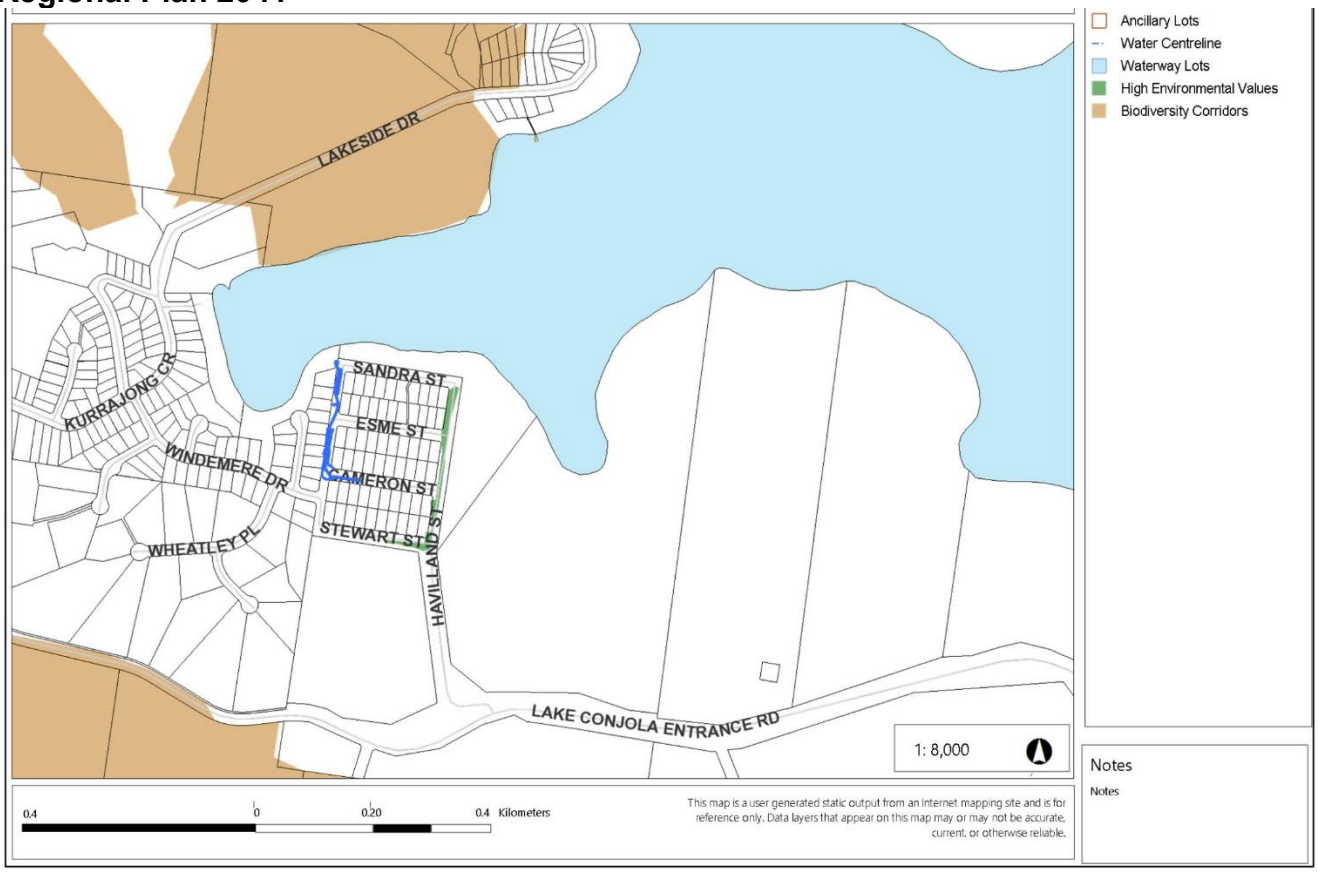
Figure 7 Hayward Street and EPIs relating to vegetation

Terrestrial Biodiversity

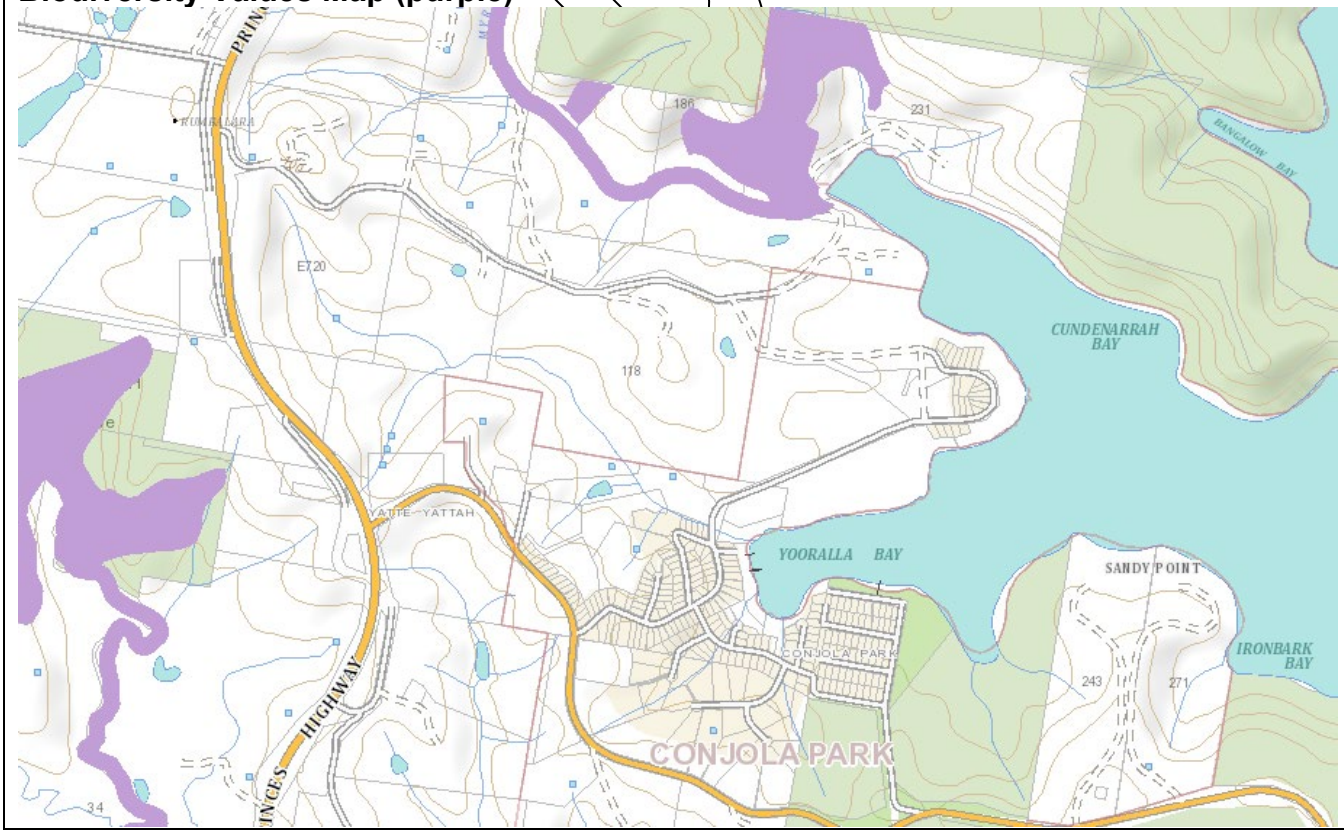
Scenic Protection Area



High Environmental Value" or "Biodiversity Corridor" in the Illawarra Shoalhaven Regional Plan 2041



Biodiversity Values Map (purple)



3.3 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.

3.3.1 Part 7A *Fisheries Management Act 1994*

Part 7A relates to threatened species conservation. As the activity is not going to occur in a marine, estuarine, tidal or aquatic environment, no further consideration of Part 7A is required.

3.3.2 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 threatened species or endangered ecological communities are considered to have some potential to occur on-site or be otherwise impacted by the proposal:

- Gang-gang Cockatoo *Callocephelon fimbriatum* – Vulnerable (V)
- Swift Parrot *Lathamus discolor* – Endangered (E)
- Brown Treecreeper *Climacteris picumnus victoriae* – V
- Varied Sittella *Daphhoenositta chrysoptera* – V
- Grey-headed Flying-fox *Pteropus poliocephalus* – V
- Eastern Coastal Free-tailed Bat *Micronomus norfolkensis* – V
- Eastern False Pipistrelle *Falsistrellus tasmaniensis* - V

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.

Gang-gang Cockatoo

The Gang-gang Cockatoo is distributed from southern Victoria through south- and central-eastern NSW. In spring and summer, the bird is generally found in tall mountain forests and woodlands, particularly in heavily timbered and mature wet sclerophyll forests. In autumn and winter, the species often moves to lower attitudes in drier more open eucalypt forests and woodlands, particularly box-gum and box-ironbark assemblages, or in dry open forest in coastal areas and often found in urban areas. Favours old grown forest and woodland attributes for nesting and roosting. Nests are located in hollows that are seven centimetres in diameter or larger in eucalypts and three metres or more above the ground (OEH 2022).

Although the species has been recorded within five kilometres, and the proposed activity site contains suitable foraging habitat, the proposed activity is not 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 placed at risk of extinction for the following reasons:

- A viable population or records for the species are not known for the site, the site provides only potential foraging habitat.
- The site does not contain trees with suitable hollows for nesting.
- The removal of 51 potential foraging trees within a clearing area of 880m^2 is insignificant in comparison to the area of potential habitat in the immediate locality including protected areas of Conjola National Park (NP) to the north and Conjola NP and Narrawallee Nature Reserve (NR) to the south and east.
- If the birds are present during works, they would be expected to fly away and not be directly harmed.

A species impact statement (SIS) or entry into the Biodiversity Offset Scheme (BOS) is therefore not required for this species for this Part.

Swift Parrot

The Swift Parrot breeds in Tasmania during spring and summer, migrating in the autumn and winter months to south-eastern Australia from Victoria and the eastern parts of South Australia to south-east Queensland. In NSW it mostly occurs on the coast and south west slopes.

On the mainland, the Swift Parrot occur in areas where eucalypts are flowering profusely or where there are abundant lerp infestations (OEH 2022b). Favoured feed trees include species present in the proposed activity *i.e.* Red Bloodwood and Blackbutt.

Although the species has been recorded within five kilometres, and the proposed activity site contains suitable foraging habitat, the proposed activity is not 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 placed at risk of extinction for the following reasons:

- A viable population or records for the species are not known for the site, the site provides only potential foraging habitat
- The site does not comprise breeding habitat as breeding occurs in Tasmania.
- The removal of 15 potential preferred foraging trees (nine Red Bloodwoods and six Blackbutts) within a clearing area of 880m^2 is insignificant relative to the area of potential habitat in the locality including protected areas of Conjola NP to the north and Conjola NP and Narrawallee NR to the south and east.
- If the birds are present during works, they would be expected to fly away and not be directly harmed.

A SIS or entry into the BOS is therefore not required for this species for this Part.

Brown Treecreeper

The Brown Treecreeper is endemic to eastern Australia and occurs in eucalypt forests and woodlands on inland plains and slopes of the Great Dividing Range. It is less commonly found on coastal plains and ranges (OEH 2022c).

The species is found in eucalypt woodlands (including Box-Gum Woodland) and dry open forest of the inland slopes and plains inland of the Great Dividing Range; mainly inhabits woodlands dominated by stringybarks or other rough-barked eucalypts, usually with an open grassy

understorey, sometimes with one or more shrub species; also found in mallee and River Red Gum (*Eucalyptus camaldulensis*) Forest bordering wetlands with an open understorey of acacias, saltbush, lignum, cumbungi and grasses; usually not found in woodlands with a dense shrub layer; fallen timber is an important habitat component for foraging. Also recorded, though less commonly, in similar woodland habitats on the coastal ranges and plains (OEH 2022c)

Hollows in standing dead or live trees and tree stumps are essential for nesting. The species breeds in pairs or co-operatively in territories which range in size from 1.1 to 10.7 ha (mean = 4.4 ha).

Although the species has been recorded within five kilometres, and the proposed activity site contains suitable foraging habitat, the proposed activity is not 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 placed at risk of extinction for the following reasons:

- A viable population or records for the species are not known for the site, the site provides only potential foraging habitat.
- The site does not comprise breeding habitat as there are no suitable hollows.
- The activity site is insufficient in area to be a viable home territory of a breeding pair.
- The removal of 51 potential foraging trees within a clearing area of 880m^2 is insignificant compared to the area of potential habitat in the locality including protected areas of Conjola National Park (NP) to the north and Conjola NP and Narrawallee Nature Reserve (NR) to the south and east.
- If the birds are present during works, they would be expected to fly away and not be directly harmed.

A SIS or entry into BOS is therefore not required for this species for this Part.

<u>Varied Sittella</u>

The Varied Sittella is sedentary and inhabits most of mainland Australia except the treeless deserts and open grasslands. 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 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 2017).

Although the species has been recorded within five kilometres, and the proposed activity site contains suitable foraging habitat, the proposed activity is not 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 placed at risk of extinction for the following reasons:

- A viable population or records for the species are not known for the site, the site provides only potential foraging habitat.
- The removal of 51 potential foraging trees within a clearing area of 880m^2 is insignificant compared to the area of potential habitat in the locality within protected areas of Conjola National Park (NP) to the north and Conjola NP and Narrawallee Nature Reserve (NR) to the south and east.
- If the birds are present during works, the would be expected to fly away and not be directly harmed.

- The environmental impact mitigation measures and safeguards prescribed in Section 7 of this REF will ensure that a pre-clearing survey is carried out to detect possible nests of this and other species. Clearing would be postponed if detected.

A SIS or entry into BOS is therefore not required for this species for this Part.

Grey-headed Flying-fox (GHFF)

The GHFF occurs in subtropical and temperate rainforest and woodlands, heath and swamps as well as urban gardens and cultivated fruit crops.

A roosting camp is located approximately two kilometres to the west of the site in Yatte Yattah Nature Reserve. Roosting camps are generally located within 20 kilometres of a regular food source and may contain thousands of animals for mating, and giving birth and rearing young (OEH 2020). The species feeds on nectar and pollen of native trees, including Eucalypts and also in cultivated urban gardens.

Although a camp exist two kilometres away, and the proposed activity site contains suitable foraging habitat, the proposed activity is not 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 placed at risk of extinction for the following reasons:

- A viable population or records for the species are not known for the site, the site provides only potential foraging habitat.
- The removal of 51 potential foraging trees within a clearing area of 880m^2 is insignificant compared to the area of potential habitat in the locality within protected areas of Conjola National Park (NP) to the north and Conjola NP and Narrawallee Nature Reserve (NR) to the south and east.
- The environmental impact mitigation measures and safeguards prescribed in Section 7 of this REF will ensure that a pre-clearing survey is carried out to detect any GHFF. Clearing would be postponed if detected.

A SIS or entry into BOS is therefore not required for this species for this Part.

Eastern Coastal Free-tailed Bat and Eastern False Pipistrelle

The Eastern Coastal Free-tailed Bat is found along the east coast from south Queensland to southern NSW. It occurs in dry sclerophyll forest, woodland, swamp forests and mangrove forests east of the Great Dividing Range. Roosts mainly in tree hollows but will also roost under bark or in man-made structures (OEH 2022d).

The Eastern False Pipistrelle is found on the south-east coast and ranges of Australia, from southern Queensland to Victoria and Tasmania. The species prefers moist habitats, with trees taller that 20 metres. Generally roosts in eucalypt hollows, but has also bee found under loose bark on trees or in buildings (OEH 2017b).

Although the species have been recorded within five kilometres, and the proposed activity site contains suitable foraging habitat, the proposed activity is not 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 placed at risk of extinction for the following reasons:

- Viable population or records for the species are not known for the site, the site provides only potential foraging habitat.

- The removal of 51 potential foraging trees within a clearing area of 880m^2 is insignificant compared to the area of potential habitat in the locality within protected areas of Conjola National Park (NP) to the north and Conjola NP and Narrawallee Nature Reserve (NR) to the south and east.
- The site does not contain quality roosting sites for the species.
- Only one tree exhibits potential small hollows. This will be examined utilising an elevated work platform prior to removal and if resident fauna is present, the fauna will be carefully removed to prevent harm (refer to environmental impact mitigation measures prescribed in Section 7 of this REF.

A SIS or entry into BOS is therefore not required for this species for this Part.

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 forest community that will be impacted by the proposed activity does not comprise an endangered ecological community.

The proposal would not result in the fragmentation or isolation of areas of any EEC and is unlikely to adversely affect the extent or composition of any EEC such that a local occurrence of the EEC would be placed at risk of extinction. As species impact statement (SIS) or entry into the Biodiversity Offset Scheme is therefore not required.

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

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

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

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

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

No EEC would 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.

The only key threatening process listed in the NSW *Biodiversity Conservation Act 2016* considered relevant to the proposed activity is *Clearing of Native Vegetation,* which is defined by the Scientific Committee's determination as "*the destruction of a sufficient proportion of one or more strata (layers) within a stand or stands of native vegetation so as to result in the loss, or long-term modification, of the structure, composition and ecological function of a stand or stands"* (OEH 2001d). 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 proposed activity would involve the removal of approximately 51 trees (Table 1 p.18 and Figure 5 p.20) and other native and non-native species within an area of about 880m^2. The impact of the proposal, however, is not considered to be significant as it is unlikely to lead to:

- exacerbation of fragmentation of vegetation
- 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 establishment and spread or exotic species which may displace native species
- significant reduction of habitat for threatened species or ecological communities.

An assessment of tree removal is also provided in Section 3.2 of this REF.

As a result, the proposal is considered not likely to result in the operation of, or significantly increase the impact of this key threatening process.

3.4 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 16 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:

- Swift Parrot - E
- Grey-headed Flying-fox – V

(V – Vulnerable, E - Endangered)

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

Table 2 EPBC Significant impact assessment

Critically endangered and endangered species - Significant impact criteria Species to consider: **Swift Parrot**	
Criteria	***Assessment***
lead to a long-term decrease in the size of a population	No. The proposed activity would not directly impact on the Swift Parrot, would not affect or disrupt breeding and would not impact on breeding or foraging habitat.
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 important habitat will be impacted.
disrupt the breeding cycle of a population	The Swift Parrot breeds in central and north-eastern Asia (OEH 2022b). Works would therefore not affect breeding habitat.
modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	No important habitat will be impacted. The removal of 15 potential preferred foraging trees (nine Red Bloodwoods and six Blackbutts) within a clearing area of 880m2 is insignificant relative to the area of potential habitat in the locality including protected areas of Conjola NP to the north and Conjola NP and Narrawallee NR to the south and east.
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: **Grey-headed Flying-fox**	
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 theGre-headed Flying-fox, will not affect or disrupt breeding and will not impact on breeding or foraging habitat.
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 will be impacted by the proposed activity
disrupt the breeding cycle of an important population	The closest camp for the species is two kilometres to the west. The species would not breed at this location
modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	No significant decrease in foraging habitat is anticipated.

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

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

3.5 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 Wales* (hereafter referred to as the 'Due Diligence Guidelines) to assist individuals and organisations to exercise due diligence when carrying out activities that may harm Aboriginal objects and to determine whether they should apply for an AHIP.

A search on the Aboriginal Heritage Information Management System (AHIMS) on 2 November 2022 indicated that there are no recorded Aboriginal sites or places in the vicinity of the proposal (refer to AHIMS report in Figure 8 below).

Landscape features that are regarded as indicating a higher potential for Aboriginal objects, as outlined in the NSW Department of Environment, Climate Change and Water's Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales (2010) 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.

As the site occurs within 200m of waters (Lake Conjola) a targeted site survey was conducted on the 3 November 2022 focussing on bare areas and in the sides of the drainage channel. No Aboriginal heritage objects were found.

The Due Diligence Guidelines define disturbed land as follows:

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

water or sewerage pipelines, stormwater drainage and other similar infrastructure) and construction of earthworks."

The site of the proposed works is highly disturbed through the construction of the nearby residential areas, roads, driveways, water main, and existing drainage channel and pipes.

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. Cautionary measures are provided in the prescribed environmental impact mitigation measures listed in Section 7.

Figure 8 Results of AHIMS Aboriginal heritage search

AHIMS Web Services (AWS)
Search Result

Your Ref/PO Number : hayward st
Client Service ID : 728864

Shoalhaven City Council - Nowra

Date: 02 November 2022

PO Box 42 Bridge Rd
Nowra New South Wales 2541

Attention: Geoffrey Young

Email: geoff.young@shoalhaven.nsw.gov.au

Dear Sir or Madam:

AHIMS Web Service search for the following area at Datum :GDA, Zone : 56, Eastings : 267163.0 - 267282.0, Northings : 6094820.0 - 6095098.0 with a Buffer of 0 meters, conducted by Geoffrey Young on 02 November 2022.

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:

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

3.6 Non-indigenous heritage

No heritage items listed on the NSW State Heritage Inventory or the *Shoalhaven Local Environment Plan 2014* occur within or in proximity to the site, such that there is any risk of impact as a result of the proposal.

3.7 Impacts to neighbouring residents

The proposed activity will be conducted in a residential area close to houses. Although community engagement has yet to be undertaken, construction noise and interruption to the use of drive-ways is anticipated.

The interruption to the use of a drive-ways located in the Hayward Street reserve may occur as a result of excavation and laying of stormwater pipes. The Construction Contractor, when engaged, shall directly consult the owners / occupants to minimise access restrictions. Once the pipes have been installed, the Contractor and SCC Project Manager shall reinstate driveways immediately.

Construction noise would be unavoidable but temporary in nature (~three to four months). Noise would originate from tree removal, excavator and truck and crane operations *etc*. Noise impact mitigation measures are to be implemented before and during construction. These include:

- Construction activities shall be limited to the hours shown in Table 3 below

Table 3 Construction hours

Construction hours	Monday to Friday	Saturday	Sunday and public holidays
Standard construction hours	7:00 am to 6:00 pm	8:00 am to 1:00 pm	No work[1]
Construction activities with impulsive or tonal noise emissions	8:00 am to 5:00 pm[2]	9:00 am to 1:00 pm[2]	No work[1]

[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 or the work the subject of this condition.*

- Owners and occupants of surrounding residential properties shall be consulted and informed of the dates of the intended works, sequencing and timing of noisy events. Where possible, this shall include an indicative noisy works schedule over a weekly period.
- Non-tonal reversing beepers (or equivalent mechanisms) shall be fitted and used on all construction vehicles and mobile plant regularly used on site.
- Stationary noise sources shall be enclosed or shielded where feasible.
- All employees, contractors and subcontractors shall receive an environmental / noise / vibration induction. The induction should at least include:
    - all project specific and relevant standard noise mitigation measures
    - permissible hours of work
    - any limitations on high noise generating activities
    - construction employee parking areas
    - designated loading / unloading areas and procedures
    - implementation of behaviour practices near dwellings, *e.g.:*

- no swearing or unnecessary shouting or loud radios next to dwellings
- no dropping of materials from height, throwing or metal items and slamming of doors.

All the above are included in the environmental impact mitigation measures prescribed in Section 7 of this REF.

3.8 Acid Sulfate Soils

Acid sulfate soils (ASS) is the common name given to naturally occurring soil and sediment containing iron sulfides. When disturbed and exposed to air, oxidation occurs and sulfuric acid is created. Sulfuric acid can then drain into waterways and cause severe short- and long-term environmental impacts.

The geology and geomorphology of the site (refer to Section 2.2 of this REF) would normally indicate low risk for acid sulfate soils (ASS) and has been mapped as such (Class 5, Figure 4 p.13). A geotechnical investigation (ASCT 2022), however, indicated that potential acid sulfate soils (PASS) may be present. This was determined through a preliminary field peroxide test only. To confirm whether the soil is PASS and to determine treatment levels a full acid base account assessment should be undertaken *e.g.* Suspension Peroxide Oxidation Combined Acidity and Sulfur (SPOCAS) method.

If PASS is indeed present, an Acid Sulfate Soil Management Plan, commensurate with the Acid Sulfate Soil Manual (ASSMAC 1998) shall be prepared and implemented.

3.9 Impact on Public Reserve

The purpose of the proposed activity is to capture overland flow currently causing flooding of residential properties and divert this water into stormwater pipes that outflow into the Windermere Drive public reserve north of Sandra Street.

The pre-existing flow from the channel above the outlet discharges is estimated as 450 litres / second in a 1%AEP rainfall event. Once constructed, flow to this location is an estimated 1400 litres / second in the 1%AEP event due to the larger amount of catchment that will now be channelled to this location (Ashe, B. *pers.comm.* 2022).

The proposed scour protection (Appendix A) has been sized using the Queensland Urban Drainage Manual (QUDM) with consideration of the volume and velocity of water in a 1%AEP event. QUDM is the recognised industry manual for engineers and stormwater designers for the planning, design and management of urban stormwater. The scour protection should dissipate the erosive energy of the water and disperse it over a wider area.

The increase in flow in the 1% AEP shouldn't materially affect the level of saturation of the area. This is more greatly affected by the duration between minor events and having sufficient time to dry (Ashe, B. *pers.comm* 2022).

Both issues (erosion and saturation) shall be monitored after construction. Remediation actions or features can be retrofitted if periods of saturation become nuisance to reserve users or maintainers, or erosion occurs. This could include installing turf reinforcement, extending the drainage line to the water, or the provision of elevated boardwalk to pedestrian facilitate access.

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. These matters are addressed in Table 4 below.

Table 4 Section 171(2) Matters of consideration

Does the proposal:	Assessment	Reason
a) Have any environmental impact on a community?	Positive	The proposed activity would benefit the community and the environment as it is anticipated to reduce the impacts of stormwater runoff affecting surrounding properties and reduce erosion of the current open channel that leads to sediment entering Lake Conjola. The owners of the properties most affected will be engaged directly by the contractor and project manager to minimise access disruptions to their driveway off Hayward Street road reserve and minimise noise impacts. The proposed activity would not have any impact on other community services and infrastructure such as water, waste management, educational, medical or social services. The local community has yet to be engaged so the impact on the local amenity value of the trees is unknown. This assessment and REF would be revised once community engagement has been undertaken. The impact to the Windermere Drive public reserve below the Sandra Street outlet and the community's use of the reserve is not fully known. Although the scour protection and energy dissipation system has been designed to industry best practice (QUDM), increased saturation of the ground and its effects are largely unknow. The site will be monitored and if erosion occurs or ground saturation becomes excessive, rectification works can be retrofitted.
b) Cause any transformation of a locality?	Medium transformation	The locality would remain road reserve, driveways and stormwater channel. The forest currently extent in the Hayward reserve would, however, be removed leaving only a few mature trees. As outlined in Section 3.2 of this REF, this impact is considered not significant. The local community has yet to be engaged so the impact on the local amenity value of the trees is unknown. This assessment and REF would be revised once community engagement has been undertaken.

Does the proposal:	Assessment	Reason
c) Have any environmental impact on the ecosystem of the locality?	Low-adverse	The five-part test of significance (Section 3.3 of this REF) concludes that the proposed activity would not have a significant impact upon threatened species or endangered ecological communities. No hollow-bearing trees or 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 prescribed in Section 7 of this REF would be employed to minimise impacts.
d) Cause a diminution of the aesthetic, recreational, scientific or other environmental quality or value of a locality?	Positive	The proposal would reduce erosion of the existing drainage channel and subsequent sedimentation into Lake Conjola. The clearing, and construction of grassy shallow swales and batters may also improve access for pedestrians by linking residential areas of Esme Street, Cameron Street, Stewart Street to the Windermere Drive (public) Reserve and the foreshore of Lake Conjola. In the context of the locality (being road and urban area), the visual impact of the proposal is minimal. The local community, however, has yet to be engaged so the impact on the local amenity value of the trees is unknown. This assessment and REF would be revised once community engagement has been undertaken.
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?	negligible	The site has no historical, social or scientific significance and does not contain, nor is associated with any heritage item listed on the NSW State Heritage Inventory, Commonwealth heritage list or in the Shoalhaven LEP 2014. 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 3.5 of this REF). The site is not within an Aboriginal Place declared under the *National Parks and Wildlife Act 1974.*
f) Have any impact on the habitat of protected fauna (within the meaning of the Biodiversity	Low adverse	Vegetation, including trees, would be removed, however: • The five-part test of significance, provided in Section 3.3 above, concludes that the

Does the proposal:	Assessment	Reason
Conservation Act 2016)?		proposed activity would not have a significant impact upon threatened fauna. • As outlined in Section 3.2 of this REF, the impact of the vegetation removal is considered not significant. The prescribed environmental safeguards and mitigation measures (Section 7) would mitigate indirect impacts to fauna and habitat including through pre-clearing surveys, control of sediment and prevention of inadvertent damage beyond what is necessary for the activity.
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	No important habitat would be removed or otherwise impacted. The five-part test of significance, provided in Section 3.3 above, concludes that the proposed activity would not have a significant impact upon threatened fauna. As outlined in Section 3.2 of this REF, the impact of the vegetation removal is considered not significant. 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. The prescribed environmental safeguards and mitigation measures (Section 7 of this REF) would minimise the risk of impact to resident fauna.
h) Have any long-term effects on the environment?	Negligible / potentially low-adverse	The proposed activity would not use hazardous substances or use or generate chemicals which may build up residues in the environment. Construction works would be relatively short term and the noise generated would occur during normal working hours. The works would be short term and would stabilise the current erosional processes occurring in the open drain. The possible impacts have been discussed in detail under Section 3. Refer also to the prescribed environmental safeguards and mitigation measures in Section 7.
i) Cause any degradation of the quality of the environment?	Negligible	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 would not intentionally introduce noxious weeds, vermin, or feral animals into the area or contaminate the soil.

Does the proposal:	Assessment	Reason
		Potential acid sulfate soils would be assessed and managed to prevent acid entering the waterway. Environmental safeguards and mitigation measures (Section 7) would be employed to minimise risk of impacts.
j) Cause any risk to the safety of the environment?	Negligible / potentially low-adverse but positive overall	The proposed activity would not involve hazardous wastes and would not lead to increased bushfire or landslip risks. The activity is not going to adversely affect flood or tidal regimes or exacerbate flooding risks. The proposal is anticipated to result in improved stormwater drainage to help alleviate current erosion and flooding issues.
k) Cause any reduction in the range of beneficial uses of the environment?	Positive	The environment is currently used as road reserve, driveway access, and stormwater drainage. The activity will enhance this use.
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. However, this is not anticipated to negatively affect any sensitive receivers such as schools, childcare centres and hospitals. The Construction Contractor will engage directly with neighbouring residents and implement measures to mitigate noise impacts (refer to Section 3.7 of this REF). 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 prescribed in Section 7 of this REF) would result in water or air pollution, spillages, dust, odours, vibration or radiation. The proposal does not involve the use, storage or transportation of hazardous substances or the generation of chemicals which may build up residues in the environment. With the implementation of the prescribed environmental safeguards and mitigation measures (Section 7), the activity is not expected to result in the oxidation of acid sulfate soils and subsequent leaching back into waterways.

Does the proposal:	Assessment	Reason
		The risk of contamination and spills from machinery including fuel and hydraulic fluids would be minimised through prescribed environmental safeguards and mitigation measures (Section 7).
m) Have any environmental problems associated with the disposal of waste?	Negligible	The waste that would be generated during construction (soil and vegetation waste) could be 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*. The soil will be assessed for potential acid sulfate soils using SPOCAS methodology and if necessary, any spoil would be managed accordingly (refer to Section 3.8 of this REF)
n) Cause any increased demands on resources (natural or otherwise) which are, or are likely to become, in short supply?	negligible	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.
o) Have any cumulative environmental effect with other existing or likely future activities?	negligible	The assessed impacts of the proposal are not likely to interact. Further clearing at or around the site would be minimal. After the proposed activity is completed, other major works are not anticipated, nor planned.
p) Any impact on coastal processes and coastal hazards, including those under projected climate change conditions	Positive	The proposed activity would have no effect on coastal processes including those projected under climate change conditions. The proposal site is not located in an identified coastal hazard area. The proposed activity would decrease the frequency and severity of flooding currently affecting adjacent residential properties.
q) Any applicable local strategic planning statement, regional strategic plan or district strategic plan made	Low-adverse	The proposed activity is consistent with the Shoalhaven 2040 planning statement particularly Planning Priority 2 – Delivering Infrastructure (https://doc.shoalhaven.nsw.gov.au/displaydoc.aspx?record=D20/437277). The proposed activity is consistent with the Illawarra Shoalhaven Regional Plan 2041

Does the proposal:	Assessment	Reason
under Division 3.1 of the Act		(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) particularly Objective 12 – *Build resilient places and communities* by improved management of stormwater decreasing flooding of properties. The proposed activity also does not impact any areas mapped in the plan as "High Environmental Value" or "Biodiversity Corridor".
r) Any other relevant environmental factors	N/A	Addressed in Section 3 of this REF.

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 2.137(1) of the NSW *State Environmental Planning Policy (Transport and Infrastructure) 2021* (Transport & Infrastructure SEPP) provides that:

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

As the proposal does not require development consent, and as it constitutes an 'activity' for the purposes of Part 5 of the EP&A Act, being carried out by (or on behalf of) a public authority, environmental assessment under Part 5 of the EP&A Act is required. This REF provides this assessment 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 NSW 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 prescribed environmental impact mitigation measures and safeguards (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. Therefore the activity is considered permissible as this REF has been prepared and determined in accordance with the EP&A Act.

4.3 NSW Local Government Act 1993

The outlet of the new stormwater system comprising pipe, pit, headwall, and scour protection would be on Lot 18 DP 703426 which is Council owned public reserve (Windermere Drive Reserve). It is community land categorised as natural area (bushland and wetland).

Under Section 35 of the Act, community land must be used and managed in accordance with the plan of management applying to the land. The plan of management (POM) applying to Windermere Drive Reserve is the *Generic Community Land Plan of Management – Natural Areas – Version 5 March 2016* (*https://doc.shoalhaven.nsw.gov.au/displaydoc.aspx?record=D16/208141*) . Section 3.2.6 of the POM discusses stormwater drains:

> "*Stormwater drains discharging into Natural Areas and streams flowing through Natural Areas often carry high levels of nutrients and fertilisers, as well as other pollutants such as herbicides and pesticides. High nutrient levels favour weed species other native species and are partially responsible for the degradation of Natural Areas. Stormwater discharge and eroded channels also carry high sediment loads that impact on water quality.*
>
> *Wherever possible, action will be taken to slow the flow of water in a watercourse rather that channelling water as quickly as possible away from an area. This applies to the length of a channel as well as the end of a piped watercourse.*
>
> *Low impact solutions to the problems of stormwater runoff and erosion and the maintenance of water quality will be given precedence over high impact engineering solutions for their aesthetic, economic and environmental rationale. However, more engineered erosion control measures may also be necessary in some circumstances. High impact solutions will be considered in circumstances where:*
>
> - *The site is within Areas of cliff/slope Instability (5.1.2) or 'other areas of potential coastal instability' (s 5.1.3) identified in Chapter G6 in the Shoalhaven DCP 2014.*
> - *The proposed development will not result in an increase in geotechnical risk;*
> - *Other option for stormwater disposal have been exhausted (e.g. charged system, use of stormwater pump); and*
> - *The proponent is able to demonstrate that the discharge of collected water from their property through the community land will not compromise the core objectives of the plan of management applying to the land"*

These provisions apply to stormwater carriage off private properties. The proposed activity is the upgrade of an existing system servicing an established residential area.

The impact to the public reserve below the Sandra Street outlet and the communities use of the reserve is unknown. Although the scour protection and energy dissipation system has been designed to industry best practice (QUDM), increased saturation of the ground and its effects are largely unknow. The site will be monitored and if erosion occurs or ground saturation becomes excessive, rectification works can be retrofitted. This is included in the environmental mitigation measures prescribed in Section 7 of this REF.

The proposed upgrade of the system is considered commensurate with the POM as it will eliminate the current channel erosion and subsequent sediment impact on water quality of Lake Conjola. The proposed scour protection would also help reduce the current levels of outlet erosion.

4.4 Other

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

Table 5 Summary of other relevant legislation and permissibility

NSW STATE LEGISLATION
Shoalhaven Local Environmental Plan 2014 (SLEP)
Permissible √ Not permissible ☐
Under the SLEP the proposed activity may have required development consent. The provisions of Transport and Infrastructure SEPP however, prevail over the SLEP where there is an inconsistency by virtue of Section 3.28 of the EP&A Act. Consequently, development consent is not required.
State Environmental Planning Policy (Resilience and Hazards) 2021
Permissible √ Not permissible ☐
• The site is mapped as Coastal Use Area and Coastal Environment Area for the purpose of the SEPP. The development controls relevant to these mapped areas do not apply to development that can be carried out without consent. • There are no areas mapped by this SEPP as coastal wetlands, littoral rainforest and coastal vulnerability areas in the proposed activity area.
NSW Fisheries Management Act 1994
Permissible √ Not permissible ☐
Justification: the proposed activity: • would not involve dredging for reclamation of waterland and or key fish habitat (Section 200 of the Act) • would not affect declared aquatic reserves (Part 7, Division 2 of the Act); • would not involve blocking the passage of fish (s.219); • would not impact mangroves and marine vegetation (Part 7, Division 4); • would not involve disturbance to gravel beds where salmon or trout spawn (s.208 of the Act); • does not involve the release of live fish (Part 7, Division 7); • does not involve the construction of dams and weirs (s.218); • would not result in the blocking of the passage of fish; • would not impact declared threatened species of endangered ecological communities (Part 7A); • does not constitute a declared key threatening process (Part 7A); and • would not use explosives in a watercourse (Clauses 70 and 71 of the *Fisheries Management (General) Regulation 2019).*

Aboriginal Land Rights Act 1983
Permissible √ Not permissible ☐
Justification: There are no Aboriginal Land Rights claims over the lands affected by the proposed activity.
Local Land Services Act 2013
Permissible √ Not permissible ☐
Justification: Any clearing of vegetation would be of a kind authorised under Section 60O(b)(ii) of the Local Land Services Act 2016 ("an activity carried out by a determining authority within the meaning of Part 5 of the Act after compliance with that Part."). No separate authorisation under the Act is required.
Wilderness Act 1987
Permissible √ Not permissible ☐
The proposed activity is not located within a wilderness area declared under this Act.
Roads Act 1993
Permissible √ Not permissible ☐
Justification: • Section 71 provides that a roads authority can carry out road work on any public road for which it is the roads authority. SCC is the roads authority for Cameron Street, Esme Street, Sandra Street and Hayward Street. • Cameron Street, Esme Street, Sandra Street and Hayward Street are not "classified roads" to which Section 75 (*Public authorities to notify TfNSW of proposal to carry out road work on classified roads)* applies. • Section 88 provides that a roads authority can remove or lop any tree or other vegetation that is on or overhanging a public road if, in its opinion, it is necessary to do so for the purpose of carrying out road work or removing a traffic hazard. • Section 94 allows a roads authority to carry out drainage work in or on any land in the vicinity of a road in order to drain or protect that road. • A Section 138 authority my be required for contractors to undertake works in these public roads.
Protection of the Environment Operations Act 1997
Permissible √ Not permissible ☐
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 ☐
• 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 3.5 for more information.
Heritage Act 1977
Permissible √ Not permissible ☐
The proposed activity would not disturb an item of state heritage significance. The proposal would occur in a previously disturbed area and constitutes 'minor works' under 'Relics of local heritage significance: a guide for minor works with limited impact'. The proposal would not result in any direct impacts on heritage items or values. Works can be undertaken with caution under an applicable exception under s139(1) and (2) of the Act.
Water Management Act 2000
Permissible √ Not permissible ☐
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).
COMMONWEALTH LEGISLATION
Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EP&BC Act)
Permissible √ Not permissible ☐
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 3.4 of this REF). The proposed activity is therefore not a controlled action and does not require commonwealth referral.
Commonwealth *Native Title Act 1993*
Permissible √ Not permissible ☐
Works would occur entirely within a gazetted road reserve, for which Council is the roads authority and freehold land owned by SCC. It is anticipated that Native Title has been extinguished as a Past Act (Section 228 and 229 of the Act). No procedural rights are applicable.

5. CONSULTATION WITH GOVERNMENT AGENCIES

5.1 Transport & Infrastructure SEPP

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

The SCC City Services – Works and Services is the proponent of the activity and is the asset custodian of the subject roads and road reserves as well as open drains and stormwater. No consultation is required, however, if a contractor is undertaking works on any of the public roads a s.138 permit (Roads Act 1993) may be required from the SCC Road Asset Manager.

Section 2.11 – Development with impacts on local heritage

No local heritage items are recorded as occurring in proximity to the proposal. Consultation under Section 2.11 is therefore not required.

Section 2.12 – Development with impacts on flood liable land

and

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

The proposed activity would not be undertaken on flood liable land. Consultation with the prescribed entities is not required.

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

The proposal would not occur within a coastal vulnerability area. Consultation with internal SCC staff is therefore not required.

Section 2.15 – Consultation with public authorities other than councils

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

- would not be undertaken on adjacent to land reserved under the *National Parks and Wildlife Act 1974* or in Zone E1 or in equivalent zones.
- could 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*

Consultation with the prescribed entities is not required.

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

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

5.2 Shoalhaven City Council (SCC) Asset Custodian

The SCC City Services – Works and Services is the proponent of the activity and is the asset custodian of the subject roads and road reserves as well as open drains and stormwater. No consultation is required, however, if a contractor is undertaking works on any of the public roads a s.138 permit (Roads Act 1993) may be required from the SCC Road Asset Manager.

The outlet structure (new pipe, pit, headwall, and scour protection) would occur on Lot 18 DP 703426 which is a SCC owned public reserve (Windermere Drive Reserve). The NSW *Local Government Act 1993* category is Natural Area – Bushland and Wetland. The Asset Custodian for the reserve would therefore be SCC City Development – Environmental Services. As a consequence, a notice of intention was sent to this section of SCC for comment on the 15 November 2002 (D22/480368). A response was received on the 16 November 2022 (D22/484421) which identified no issues with the proposal.

6. COMMUNITY ENGAGEMENT

Although the nearby residents know that SCC is working on resolving the stormwater issues at the location, the community has yet to be engaged and provided with details of the proposal.

The Engagement Matrix SCC's Community Engagement Policy (https://doc.shoalhaven.nsw.gov.au/displaydoc.aspx?record=POL12/31) provides that the following engagement activities should be undertaken (Local Area/Low Impact):

- Inform the community through the SCC Website (e.g. Get Involved Shoalhaven)
- Inform the Community Consultative Body (Conjola Community Association) through letters with plans or attendance at meetings
- Letters directly to neighbouring residents

These actions are included in the environmental impact mitigation measures and safeguards prescribed in Section 7 of this REF.

This REF shall also be published on the NSW Planning Portal as a matter of public interest in accordance with Clause 171(4) of the NSW *Environmental Planning and Assessment Regulation 2021.*

7. ENVIRONMENTAL SAFEGUARDS AND MEASURES TO MINIMISE IMPACTS

Note that all environmental safeguards and measures are prescribed unless otherwise stated.

Safeguard / Measure	Responsibility
Detailed Design, works planning, approvals, consultation & notification	
1. The community shall be informed of the proposal in accordance with the Community Engagement Policy including: • Inform the community through the SCC Website (e.g. Get Involved Shoalhaven) • Inform the Community Consultative Body (Conjola Community Association) through letters with plans or attendance at meetings • Letters directly to neighbouring residents	SCC Project Manager and Design Engineer
2. This REF shall be reviewed after the consultation has occurred.	SCC Environment Officer
3. The presence of potential acid sulfate soils (PASS) shall be confirmed using a full acid base account assessment (*e.g.* SPOCAS). If PASS is confirmed, a management plan shall be prepared and implemented.	SCC Project Manager and Construction Contractor
4. If contractors are to be engaged to undertake the works, a Section 138 (Roads Act 1993) consent shall be obtained from the SCC Roads Asset Manager.	SCC Project Manager
5. A dilapidation report is recommended to document pre-works condition of driveways and fences.	Construction Contractor; SCC Project Manager
6. This REF must be published on the determining authority's (Council's) website or the NSW planning portal, in accordance with clause 171(4) EP&A Regulation 2021 as a matter of "public interest".	Environmental Officer
Site Establishment	
7. Machinery access, construction compound (if required), vehicles and stockpiles shall be located within existing cleared areas of the road reserves or in the area to be impacted by the proposed works.	Site Manager; Construction Contractor
8. All employees, contractors and subcontractors shall receive an environmental / noise / vibration induction. The induction should at least include: a. all project specific and relevant standard noise and vibration mitigation measures	Site Manager; Construction Contractor

Safeguard / Measure	Responsibility
b. permissible hours of work c. any limitations on high noise generating activities d. construction employee parking areas e. designated loading / unloading areas and procedures f. implementation of behaviour practices near dwellings, e.g.: i. no swearing or unnecessary shouting or loud radios next to dwellings ii. no dropping of materials from height, throwing or metal items and slamming of doors.	
9. Owners and occupants of surrounding residential properties shall be consulted and informed of the dates of the intended works, sequencing and timing of noisy events. Where possible, this shall include an indicative noisy works schedule over a weekly period.	Site Manager; Construction Contractor
10. The owners and occupiers of 4, 8 and 9 Hayward Street shall be engaged to minimise access disruptions to their driveways.	Site Manager and Construction Contractor
11. 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
12. No major equipment maintenance works shall be undertaken on-site.	Construction contractor
13. A soil and water management plan (SWMP) shall be prepared prior to any clearing, demolition or excavation works for the oval, croquet courts, clubhouses, carparks and access. The SWMP shall be prepared in accordance with the Blue Book (Landcom 2004) and include: • Erosion controls e.g. access limitations, staging of works, no-go zones, stockpile locations, water diversion, site office and parking • Sediment controls e.g. sediment fences, and stabilised access points • Standard drawings from the Blue Book (Landcom 2004) or similar. 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.	Site Manager; Construction Contractor

<table>
<tr><th>Safeguard / Measure</th><th>Responsibility</th></tr>
<tr><td colspan="2">Construction works</td></tr>
<tr><td>14. A preclearing fauna survey shall be conducted prior to tree felling and vegetation clearing. This is to include identifying and locating any occupied bird nest and presence of grey-headed Flying-fox.
Prior to the removal of the potential hollow-bearing Red Bloodwood at Sandra Street, the tree shall be inspected by Council's Environmental Officer (or other suitable qualified ecologist) via elevated work platform prior to removal to ensure no impact to resident fauna. Resident fauna shall be removed.
Clearing shall be postponed if Grey-headed Flying-fox and nests of threatened species are detected or suspected.</td><td>Environmental Operations Officer and Construction Contractor</td></tr>
<tr><td>15. Trees shall be felled into the development footprint or existing cleared areas to minimise impact to adjacent vegetation which is to be retained.</td><td>Construction Contractor</td></tr>
<tr><td>16. Construction activities shall be limited to the hours shown below
<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 or the work the subject of this condition.</td><td>Construction Contractor</td></tr>
<tr><td>17. Non-tonal reversing beepers (or equivalent mechanisms) shall be fitted and used on all construction vehicles and mobile plant regularly used on site.</td><td>Construction Contractor</td></tr>
<tr><td>18. Stationary noise sources shall be enclosed or shielded where possible.</td><td>Construction Contractor</td></tr>
<tr><td>19. Tree protection measures in accordance with AS4970 – Protection of trees on development sites shall be implemented to minimise the risk of impact to the structural root zones of trees to be retained.</td><td>Site Manager; Construction contractor</td></tr>
</table>

Safeguard / Measure	Responsibility
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. 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	Site Manager; Construction contractor
23. 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 (http://www.epa.nsw.gov.au/waste/virgin-material.htm) b. the supplier must fill out and complete the *VENM Certificate* The completed *VENM Certificate* shall be kept for at least six years and provided to the EPA upon any request.	Site Manager; Construction contractor
24. Any waste generated on site shall be reused in accordance with relevant Resource Recovery Orders and Exemptions, or otherwise disposed of at a licenced waste facility.	Construction Contractor
25. Staff working at the site will be instructed to stop work immediately on identification of any suspected Aboriginal heritage artefact. If any objects are found, NSW Department of Planning, Industry and Environment (ph:131 555) shall be contacted.	Construction Contractor
Post construction	
26. All disturbed areas shall be stabilised with turf, seed, hydromulch or similar.	Construction Contractor
27. An asset form shall be trimmed to file 44574E on commissioning of the assets in Accordance with POL15/8 Asset Accounting Policy section 3.1.4 and POL16/79 Asset Management Policy section 3.3.	SCC Project Manager

Safeguard / Measure	Responsibility
28. To compensate for the loss of the 51 trees and other shrub in the activity area: a. Relatively open areas within the Hayward Street road reserve outside the swale shall be revegetated with locally occurring species including trees species that were removed to undertake the activity (Table 1 p.18). b. Additional trees (e.g. Swamp Oak and Bangalays) can also be planted in the Windermere Drive public reserve northern of Sandra Street if there is not sufficient area in the Hayward Street road reserve. The revegetation shall be supported and informed by a revegetation plan prepared by a suitably qualified bush regeneration practitioner.	SCC Project Manager and Environmental Operations Officer.
29. All driveways shall be reinstated to pre-construction condition.	Construction Contractor
30. The area of the Windermere Drive public reserve below the Sandra Street outlet shall be monitored for erosion or excessive saturation (duration and severity). Remedial actions are to occur if erosion occurs or saturation is excessive *e.g.* installing turf reinforcement, extending the drainage line to the water, or the provision of elevated boardwalk to pedestrian facilitate access.	SCC Project Manager, SCC Environmental Operations Officer

8. SIGNIFICANCE EVALUATION & DECISION STATEMENT

This Review of Environmental Factors has assessed the likely environmental impacts, in the context of Part 5 of the Environmental Planning and Assessment Act 1979, of a proposal by Shoalhaven City Council for an upgrade of the stormwater management system within Hayward Street road reserve, Conjola Park.

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 further 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:

Troy Punnett

District Engineer - Southern

Shoalhaven City Council Date:

9. REFERENCES

ASSMAC (Acid Sulfate Soil Management Advisory Committee) 1998 *Acid Sulfate Soil Manual.* NSW Agriculture. ISBN 0 7347 0000 8

ASCT (Australian Soil and Concrete Testing) 2022 *Lake Conjola Waste Classification.* Unpublished report for Westlake Punnett and Associates Pty Ltd. SCC reference D22/403328

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. https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Aboriginal-cultural-heritage/due-diligence-code-of-practice-aboriginal-objects-protection-100798.pdf

DoE (Department of Environment, Commonwealth of Australia). 2013. *Matters of National Environmental Significance Significant Impact Guidelines 1.1*. Available at: https://www.dcceew.gov.au/environment/epbc/publications/significant-impact-guidelines-11-matters-national-environmental-significance

OEH (NSW Office of Environment and Heritage) 2017. Varied Sittella – profile. Available at: https://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=20135

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

OEH (NSW Office of Environment and Heritage) 2020. Grey-headed Flying-fox – profile. Available at: https://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=10697

OEH (NSW Office of Environment and Heritage) 2021. Clearing of native vegetation – profile. Available at: https://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=20023

OEH (NSW Office of Environment and Heritage) 2022. Gang-gang Cockatoo – profile. Available at: https://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=10975

OEH (NSW Office of Environment and Heritage) 2022b. Swift Parrot – profile. Available at: https://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=10455

OEH (NSW Office of Environment and Heritage) 2022c. Brown Treecreeper (eastern subspecies) – profile. Available at: https://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=10171

OEH (NSW Office of Environment and Heritage) 2022d. Eastern Coastal Free-tailed Bat - profile. Available at: https://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=10544

Personal communication

Ashe, Bradley 2022 *Civil / Environmental Engineer – Westlake Punnett and Associates Pty Ltd* (SCC Reference D22/509224)

APPENDIX A – The Proposed Activity

HAYWARD STREET DRAINAGE UPGRADE

HAYWARD STREET, CONJOLA PARK, NSW

LOCALITY PLAN
SCALE: 1:2,000

DRAWING SCHEDULE			
PLAN No.	COUNCIL PLAN REFERENCE	DRAWING TITLE	REV
22222/C01	5565_01	COVER SHEET AND LOCALITY PLAN	3
22222/C02	5565_02	GENERAL NOTES	3
22222/C03	5565_03	SHEET SET ARRANGEMENT PLAN	3
22222/C04	5565_04	STAGE 1 GENERAL ARRANGEMENT	3
22222/C05	5565_05	STAGE 2 GENERAL ARRANGEMENT	3
22222/C06	5565_06	DRAINAGE LONG SECTIONS	3
22222/C07	5565_07	CATCHMENT PLAN	3
22222/C08	5565_08	DRAINAGE DETAILS	3
22222/C09	5565_09	DRAINAGE RESULTS	3
22222/C10	5565_10	CULDESAC LAYOUT AND LONG SECTION	3
22222/C11	5565_11	VEGETATION REMOVAL PLAN	3
22222/C12	5565_12	SERVICES PLAN	3
22222/C13	5565_13	SURVEY MARK AUDIT SCHEDULE	3

- APPROVED FOR USE -

Shoalhaven City Council

PLAN REFERENCE 5565_01

0 50 100 150 200m

SCALE 1:2000 (A1), 1:4000 (A3)

Rev.	Amendments	Approved	Date
1	FOR COMMENT	P.LITTLE	12.08.2022
2	FOR COMMENT	P.LITTLE	1.09.2022
A	FOR CONSTRUCTION	P.LITTLE	24.11.2022

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ULLADULLA (02) 4455 4397
RESIDENTIAL - COMMERCIAL - INDUSTRIAL

COVER SHEET AND LOCALITY PLAN

PROJECT: HAYWARD STREET DRAINAGE UPGRADE
AT: HAYWARD STREET, CONJOLA PARK
FOR: SHOALHAVEN CITY COUNCIL

Design: B.ASHE
Drawn: B.ASHE
Checked: P.LITTLE
Date: 24.11.2022
Drawing No. 22222/C01
Rev A

GENERAL NOTES

1. IN THESE NOTES THE FOLLOWING GENERIC TERMS ARE USED TO DESCRIBE PARTIES INVOLVED IN THE CONSTRUCTION. THE CONSTRUCTOR/CONTRACTOR/BUILDER EITHER OR BOTH OF THESE TERMS REFERS TO THE PARTY WITH CHARGE TO CONSTRUCT OR OTHERWISE EXECUTING THE WORKS SHOWN IN THESE DRAWINGS. THE SUPERINTENDENT/CONSTRUCTION SUPERINTENDENT EITHER OR BOTH OF THESE TERMS REFERS TO THE PARTY REPRESENTING THE PRINCIPAL FOR WHOM THE WORKS ARE BEING EXECUTED. THIS WILL GENERALLY MEAN THE COUNCIL REPRESENTATIVE OVERSEEING WORKS ON SITE.
2. IF THE CONSTRUCTOR/BUILDER REQUIRES CLARIFICATION OF ANY NOTATION ON THESE DRAWINGS OR OF THE INTENT OF A PARTICULAR DESIGN CONCEPT OR IF ANY DISCREPANCY IS NOTED ON THESE DRAWINGS, THE CONSTRUCTOR SHALL CONSULT THE CONSTRUCTION SUPERINTENDENT BEFORE PROCEEDING
3. ALL SET OUT DIMENSIONS SHOWN SHALL BE VERIFIED ON SITE PRIOR TO COMMENCEMENT OF WORKS. ENGINEERING OR DETAILED DRAWINGS SHALL NOT BE SCALED FOR DIMENSIONS
4. UNLESS NOTED OTHERWISE ALL LEVELS ARE IN METRES AHD AND ALL DIMENSIONS ARE IN MILLIMETRES
5. THE CONSTRUCTOR/BUILDER SHALL GIVE 24 HOURS NOTICE FOR ALL ENGINEERING INSPECTIONS
6. THE EXTENT AND DEPTH OF ANY EXISTING FOOTING TO STRUCTURES ON SITE SHALL BE DETERMINED BY THE CONSTRUCTOR/BUILDER. NO EXCAVATION SHOULD BE UNDERTAKEN IN THE VICINITY OF EXISTING STRUCTURES WITHOUT THE APPROVAL OF THE CONSTRUCTION SUPERINTENDENT
7. ALL CONSTRUCTION WORKS SHOULD BE CARRIED OUT SUCH THAT AT ANY TIME ADJOINING PROPERTY OWNERS ARE NOT DEPRIVED OF AN ALL-WEATHER ACCESS OR SUBJECTED TO ADDITIONAL OR POLLUTED STORMWATER RUNOFF DURING THE PERIOD OF CONSTRUCTION
8. PROVISION FOR TRAFFIC SHALL BE MADE IN ACCORDANCE WITH AS1742.3, THE RMS PUBLICATION 'TRAFFIC CONTROL AT WORK SITES' AND THE SITE SPECIFIC TRAFFIC MANAGEMENT PLAN (TO BE PREPARED BY THE CONSTRUCTOR)
9. THE CONSTRUCTOR/BUILDER SHALL MAINTAIN EXISTING STORMWATER FLOWS THROUGH THE WORKS AREA AND MAKE DUE ALLOWANCE FOR SEVERE WEATHER EVENTS.
10. THE CONSTRUCTOR SHALL ENSURE THAT ALL WORKS ARE SECURED FOR WET WEATHER AND THAT THE WORKS ARE ADEQUATELY PROTECTED AND DRAINED SO AS TO MINIMISE ANY ADVERSE EFFECTS OF STORMWATER RUNOFF.
11. ALL WORKS ARE TO BE CONSTRUCTED IN ACCORDANCE WITH SHOALHAVEN CITY COUNCIL CONSTRUCTION SPECIFICATIONS UNLESS NOTED OTHERWISE ON CONSTRUCTION DRAWINGS.
12. ALL WORKS TO BE CONSTRUCTED IN ACCORDANCE WITH THE APPROVED REVIEW OF ENVIRONMENTAL FACTORS/STATEMENT OF ENVIRONMENTAL EFFECTS/DEVELOPMENT APPROVAL DOCUMENT

QUALITY GENERAL

1. THE CONSTRUCTOR SHALL IMPLEMENT AND MAINTAIN A QA SYSTEM MEETING THE REQUIREMENTS OF AS9001:2000. THE QUALITY SYSTEM SHALL BE SUCH THAT RECORDS ARE KEPT OF ALL ASPECTS OF THE WORK.
2. DURING THE COURSE OF CONSTRUCTION, THE CONSTRUCTOR SHALL MAINTAIN ACCURATE AND UP TO DATE RECORDS AND SHALL MAKE SUCH RECORDS AVAILABLE TO THE SUPERINTENDENT IF REQUESTED. FAILURE TO MAINTAIN RECORDS AS SPECIFIED WILL RESULT IN THE CONSTRUCTOR RE-INSPECTING COMPLETED WORKS IF INSTRUCTED TO DO SO BY THE SUPERINTENDENT.
3. AT THE COMPLETION OF EACH STAGE OF THE WORKS THE CONSTRUCTOR SHALL CERTIFY THAT THOSE WORKS HAVE BEEN UNDERTAKEN AND COMPLETED IN ACCORDANCE WITH THE DRAWINGS, SPECIFICATION AND INSTRUCTIONS ISSUED DURING THE COURSE OF THE CONTRACT.

SAFETY GENERAL

1. CONSTRUCTOR TO ERECT SIGNAGE ADVISING OF CONSTRUCTION ACTIVITIES PRIOR TO COMMENCEMENT OF WORKS ON SITE. SIGNAGE SHALL BE PLACED AS NECESSARY TO ENSURE CLEAR VISIBILITY TO SIGNAGE FROM ANY ROUTE BY WHICH MOTORISTS, CYCLISTS, OR PEDESTRIANS MAY APPROACH THE WORK SITE.
2. WH&S PRECAUTIONS SHALL BE OBSERVED IN ACCORDANCE WITH THE WH&S ACT 2011 AND RELEVANT ACCOMPANYING REGULATIONS. SAFETY SYSTEMS AND DOCUMENTATION SHALL BE THE RESPONSIBILITY OF THE CONSTRUCTOR AND SHALL COMPLY WITH SPECIFIC REQUIREMENTS AS DETAILED IN RELEVANT PROJECT DOCUMENTATION.
3. SITE FACILITIES AND ACCESS TO BE MAINTAINED IN A NEAT AND TIDY CONDITION AT ALL TIMES.
4. THE CONSTRUCTOR SHALL OBTAIN AND KEEP ON SITE ALL RELEVANT MATERIAL SAFETY DATA SHEETS (MSDS) FOR ANY MATERIALS THAT ARE USED IN THE WORKS. ALL TRANSPORTATION, STORAGE AND USE OF THESE MATERIALS SHALL BE IN ACCORDANCE WITH MSDS.
5. THE CONSTRUCTOR IS TO PREPARE A SITE SPECIFIC RISK MANAGEMENT PLAN TAKING INTO ACCOUNT ALL FORSEEABLE RISKS INCLUDING MANAGEMENT OF ALL RESIDUAL RISKS IDENTIFIED IN THE SAFETY IN DESIGN REPORT.
6. STORMWATER INFRASTRUCTURE MAY BE CLASSIFIED AS A CONFINED SPACE. THE CONSTRUCTOR SHALL IDENTIFY ALL CONFINED SPACES AND IMPLEMENT ALL REQUIREMENTS NECESSARY TO CARRY OUT WORKS IN CONFINED SPACES.

EARTHWORKS GENERAL

1. EARTHWORKS SHALL BE IN ADHERENCE TO AS3798 AND SHOALHAVEN CITY COUNCIL CONSTRUCTION SPECIFICATIONS
2. THE CONSTRUCTOR/BUILDER SHALL PROGRAM THE EARTHWORKS OPERATION SO THAT THE WORKING AREAS ARE ADEQUATELY DRAINED DURING THE PERIOD OF WORKS. THE SURFACE SHALL BE GRADED AND SEALED TO REMOVE DEPRESSIONS WHICH COULD ALLOW WATER TO POND AND PENETRATE THE UNDERLYING MATERIAL. ANY DAMAGE RESULTING FROM THE CONSTRUCTOR NOT OBSERVING THESE REQUIREMENTS SHALL BE RECTIFIED AT THE CONSTRUCTOR'S COST. THE COST ASSOCIATED WITH DEWATERING OF EXCAVATIONS FOLLOWING RAIN EVENTS IS TO BE BOURNE BY THE CONSTRUCTOR.
3. EXCAVATION SHALL BE CARRIED OUT IN LOCATIONS AND TO LEVELS SHOWN IN ENGINEERING DRAWINGS. BATTER SLOPES MUST BE APPROVED BY THE SUPERINTENDENT WHERE NOT SPECIFIED IN THE DRAWINGS. WHERE EXCAVATION TO DEPTH >1.5m IS TO OCCUR SHORING OR BENCHING MUST BE USED. (DESIGN OF SHORING SYSTEM TO BE PROVIDED BY THE CONSTRUCTOR)
4. WHERE EXCAVATED MATERIAL IS TO BE USED FOR FILLING, THE MATERIAL SHALL BE INSPECTED AND APPROVED BY THE SUPERINTENDENT
5. WHERE DIRECTED BY THE SUPERINTENDENT THE BOTTOM OF TRENCHES OR EXCAVATIONS SHALL BE COMPACTED PRIOR TO PLACEMENT OF ANY BEDDING OR CONCRETE MATERIALS. SHOULD, IN THE OPINION OF THE SUPERINTENDENT, THE MATERIAL BE UNSATISFACTORY, IT SHALL BE REMOVED AND REPLACED WITH APPROPRIATE MATERIAL

COMPACTION GENERAL

1. CONSTRUCTOR SHALL LIAISE WITH GEOTECHNICAL ENGINEER IN REGARD TO COMPACTION CONTROL, REMOVAL OF UNSUITABLE MATERIAL AND SELECTIVE STOCKPILING OF SPOIL. GEOTECHNICAL ENGINEER TO BE PROVIDED BY CONSTRUCTOR.
2. UNLESS OTHERWISE APPROVED OR SPECIFIED ALL FILL MATERIALS SHALL BE FROM A SOURCE APPROVED BY THE SUPERINTENDENT AND SHALL COMPLY WITH THE FOLLOWING
   A) FREE FROM ORGANIC AND PERISHABLE MATTER
   B) MAXIMUM PARTICLE SIZE 75MM
   C) PLASTICITY INDEX BETWEEN 2% AND 20%
   D) CBR>10
3. WHERE GEOTECHNICAL INVESTIGATIONS TO ESTABLISH SITE SOIL PARAMETERS IS BEYOND THE REASONABLE SCOPE OF INVESTIGATION ASSOCIATED WITH A PROJECT, COMPACTION SHALL BE TO THE APPROVAL OF THE CONSTRUCTION SUPERINTENDENT.
4. COMPACTION CONTROL TESTING WHERE REQUIRED BY THE SUPERINTENDENT SHALL BE CARRIED OUT AT THE COST OF THE CONSTRUCTOR/BUILDER AND TO CONFORM WITH LEVEL 1. AS DEFINED IN AS3798

EROSION & SEDIMENT CONTROL

1. ALL EROSION AND SEDIMENT CONTROL TO BE IN ACCORDANCE WITH THE NSW DEPARTMENT OF LANDS 'MANAGING URBAN STORMWATER SOILS AND CONSTRUCTION' HANDBOOK ALSO KNOWN AS 'THE BLUE BOOK'
2. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO INFORM ALL SUB-CONTRACTORS OF THEIR OBLIGATIONS UNDER THE EROSION AND SEDIMENT CONTROL PLAN IMPLEMENTED BY THE CONTRACTOR
3. THE CONTRACTOR SHALL CONSTRUCT OR INSTALL SOIL AND SEDIMENT CONTROL MEASURES TO THE SATISFACTION OF THE SUPERINTENDENT PRIOR TO ANY DISTURBANCE TO THE SITE. SOIL AND SEDIMENT CONTROL DEVICES SHALL BE AS SHOWN IN THESE DRAWINGS. IT IS THE RESPONSIBILITY OF THE CONTRACTOR/BUILDER TO ENSURE THAT TEMPORARY CONTROLS DO NOT DAMAGE EXISTING STRUCTURES
4. THE CONSTRUCTOR/BUILDER SHALL REGULARLY MAINTAIN ALL SEDIMENT AND EROSION CONTROL DEVICES AND REMOVE ACCUMULATED MATERIAL FROM SUCH DEVICES BEFORE 50% CAPACITY IS USED. ALL ACCUMULATED SEDIMENT SHALL BE RE-SPREAD OR REMOVED IN ACCORDANCE WITH THE SUPERINTENDENTS INSTRUCTIONS.
5. NO EXISTING CULVERTS OR PIPES ARE TO BE BLOCKED BY CONSTRUCTION OR SEDIMENT CONTROL MEASURES, PARTICULARLY WHERE THIS MAY CAUSE ADVERSE FLOODING IMPACTS
6. ALL SEDIMENT AND EROSION CONTROL DEVICES SHALL BE REGULARLY INSPECTED AND MAINTAINED BY THE CONTRACTOR/BUILDER UNTIL SUCH TIME AS THE DISTRUBED AREAS HAVE BEEN REHABILITATED TO A CONDITION SATISFACTORY TO THE SUPERINTENDENT. AN INSPECTION SHALL BE CONDUCTED WHEN RAIN IS FORECAST AND AFTER EACH RAIN EVENT.
7. THE CONTRACTOR/BUILDER SHALL MAINTAIN ALL REVEGETATED AREAS INCLUDING ALL WATERING AND FERTILISING UNTIL SUCH TIME AS THE VEGETATION HAS STABILISED
8. ALL TREES AND SHRUBS SHALL BE RETAINED WITHIN THE AREA OF WORKS UNLESS DIRECTED OTHERWISE BY THE SUPERINTENDENT. NO CLEARING SHALL COMMENCE PRIOR TO COUNCIL INSPECTION. ALL TREES DEEMED TO BE REMOVED SHALL BE CHIPPED AND STOCKPILED ON SITE. SELECTIVE CLEARING OF VEGETATION TO BE RESTRICTED TO THE NOMINATED AREAS WITH CLEARED VEGETATION TO BE WINDROWED ON THE CONTOURS.
9. PUBLIC ROADS SHALL BE SWEPT FREE OF DEBRIS RESULTING FROM CONSTRUCTION ACTIVITIES. SWEEPING SHALL BE UNDERTAKEN AT A MINIMUM TWICE WEEKLY. HOSING OF DEBRIS IS NOT AN ACCEPTABLE METHOD OF DEBRIS REMOVAL.
10. EXCAVATED MATERIAL WHICH IS NOT TO BE REUSED SHALL BE TAKEN OFF SITE AND DISPOSED OF AT A LICENCED FACILITY. THE COST OF DISPOSAL OF OF SURPLUS MATERIAL IS TO BE BOURNE BY THE CONSTRUCTOR. .
11. A SINGLE ENTRY AND EXIT POINT SHOULD BE USED AND CONSTRUCTED SO AS TO PREVENT SOIL REACHING THE ROAD AND TO PREVENT VEHICLES BECOMING BOGGED. ANY DEPRESSIONS LEFT BY VEHICLES TRAFFICKING THE SITE SHOULD BE REFILLED TO SURROUNDING LEVELS AS SOON AS POSSIBLE.
12. ALL TEMPORARY EARTH STRUCTURES, INCLUDING SOIL STOCKPILES, TO BE TRACK ROLLED AND SEEDED WITHIN 14 DAYS OF THEIR CONSTRUCTION. GRASS SEED MIX TO BE APPROVED BY THE SITE MANAGER PRIOR TO APPLICATION.

- APPROVED FOR USE -

Shoalhaven City Council

PLAN REFERENCE 5565_02

Rev.	Amendments	Approved	Date
1	FOR COMMENT	P.LITTLE	12.08.2022
2	FOR COMMENT	P.LITTLE	1.09.2022
A	FOR CONSTRUCTION	P.LITTLE	24.11.2022

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RESIDENTIAL - COMMERCIAL - INDUSTRIAL

GENERAL NOTES

PROJECT: HAYWARD STREET DRAINAGE UPGRADE
AT: HAYWARD STREET, CONJOLA PARK
FOR: SHOALHAVEN CITY COUNCIL

Design: B.ASHE
Drawn: B.ASHE
Checked: P.LITTLE
Date: 24.11.2022
Drawing No. 22222/C02
Rev A

SHEET - C04

SHEET - C05

SANDRA STREET

ESME STREET

HAYWARD STREET

COTTEE CLOSE

CAMERON STREET

HAVILLAND STREET

NORTH

SHEET SET ARRANGEMENT PLAN

SCALE: 1:500

- APPROVED FOR USE -

Shoalhaven City Council

PLAN REFERENCE 5565_03

LEGEND

- SHEET OUTLINE
- EXISTING PROPERTY BOUNDARY
- EXISTING LAKE

0 10 20 30 40 50m

SCALE 1:500 (A1), 1:1000 (A3)

Rev.	Amendments	Approved	Date
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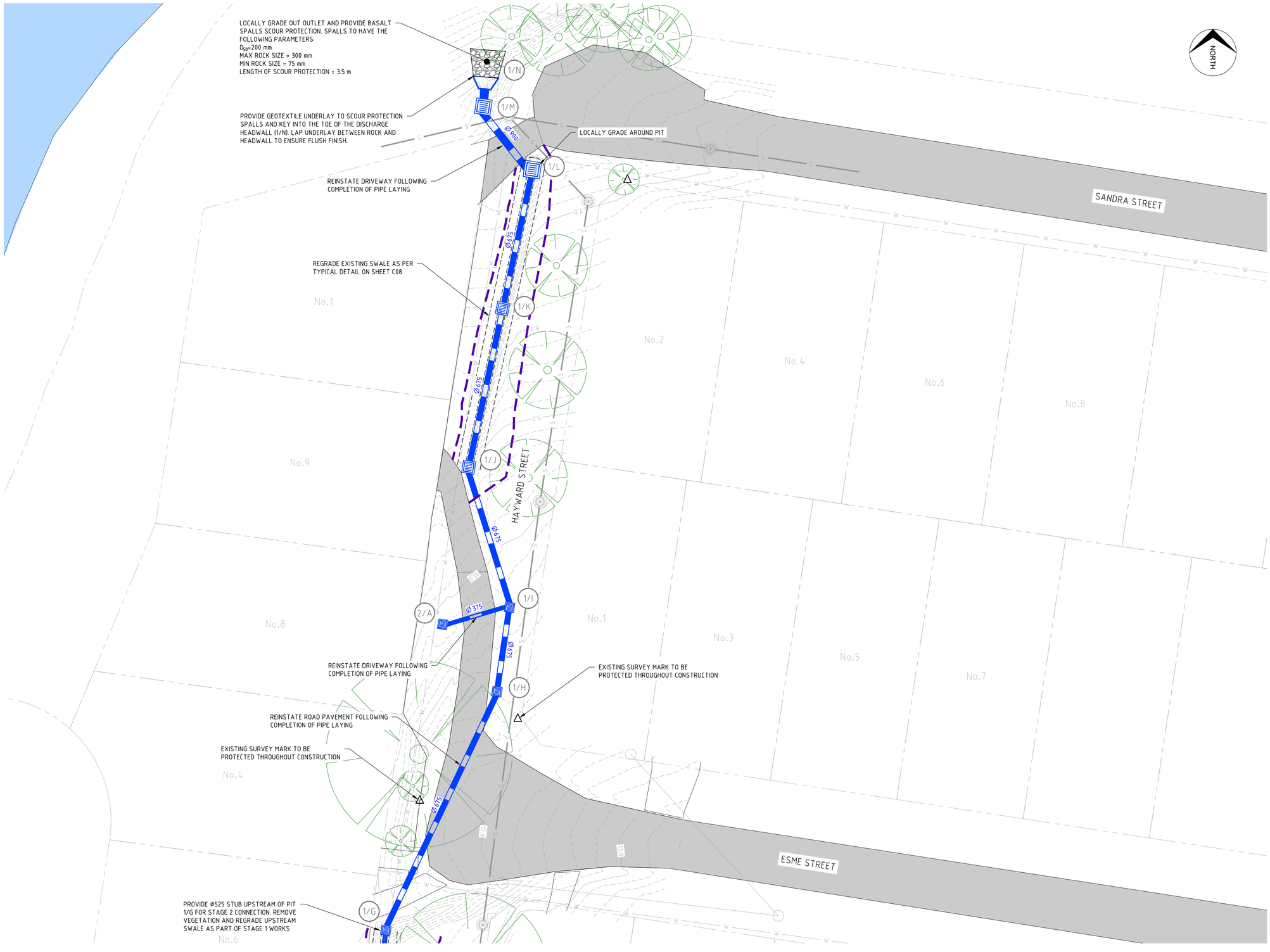
SHEET SET ARRANGEMENT PLAN

PROJECT: HAYWARD STREET DRAINAGE UPGRADE
AT: HAYWARD STREET, CONJOLA PARK
FOR: SHOALHAVEN CITY COUNCIL

Design: B.ASHE
Drawn: B.ASHE
Checked: P.LITTLE
Date: 24.11.2022
Drawing No. 22222/C03
Rev A



STAGE 1 - GENERAL ARRANGEMENT

SCALE: 1:250

- APPROVED FOR USE -

Shoalhaven City Council

PLAN REFERENCE 5565_04

LEGEND

- BATTER EXTENTS
- PROPOSED LAYBACK KERB
- PROPOSED STORMWATER PIT (1/A)
- PROPOSED STORMWATER PIPE (Ø 450)
- EXISTING CONTOURS (MAJOR 1 m) (15.0)
- EXISTING CONTOURS (MINOR 0.2 m)
- EXISTING WATER MAIN (W)
- EXISTING SEWER MAIN (S)
- EXISTING PROPERTY BOUNDARY
- EXISTING ROAD PAVEMENT
- EXISTING TREE TO BE RETAINED

0 5 10 15 20 25m

SCALE 1:250 (A1), 1:500 (A3)

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STAGE 1 GENERAL ARRANGEMENT

PROJECT: HAYWARD STREET DRAINAGE UPGRADE
AT: HAYWARD STREET, CONJOLA PARK
FOR: SHOALHAVEN CITY COUNCIL

Design: B.ASHE
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Checked: P.LITTLE
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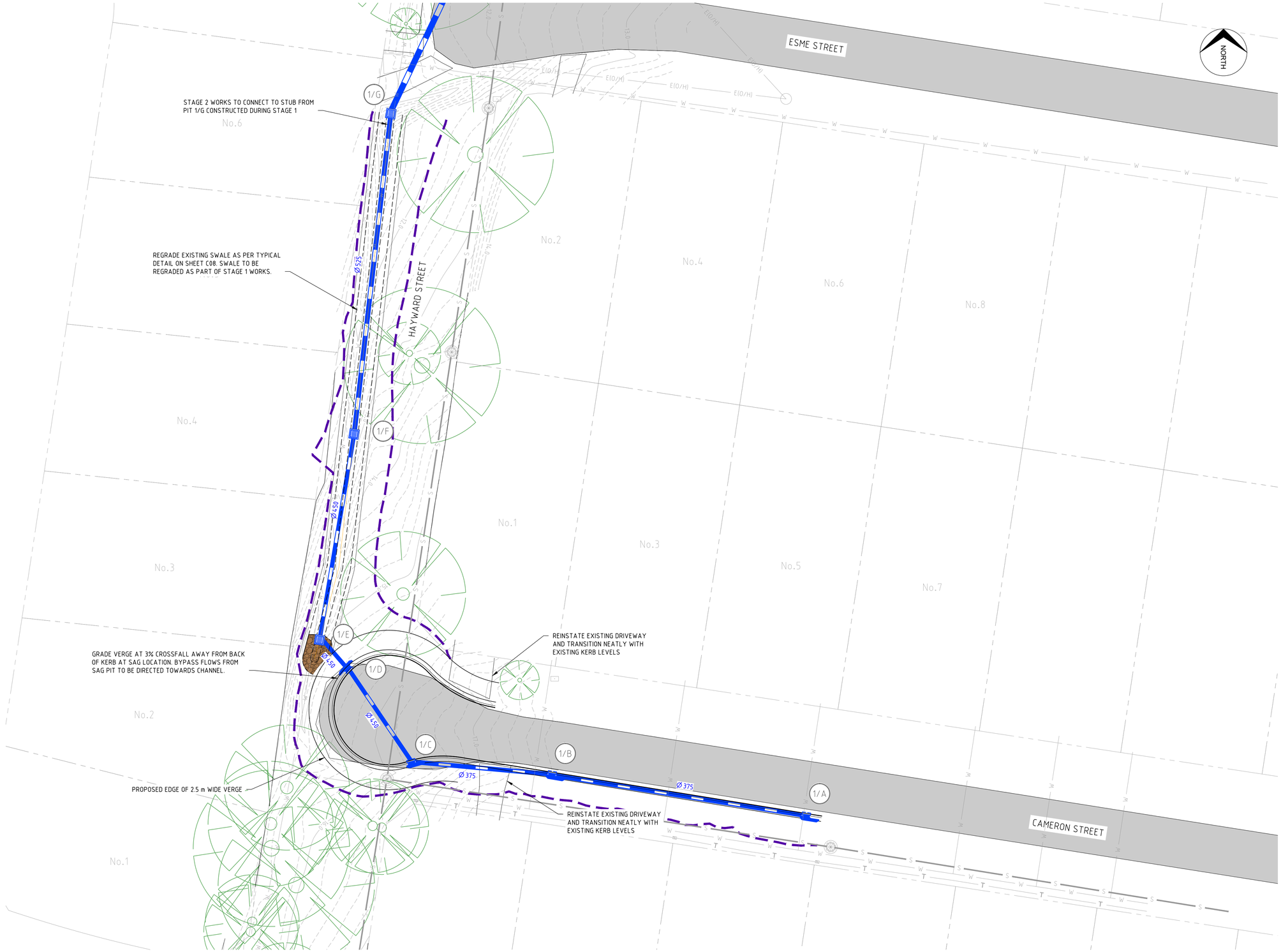
Drawing No. 22222/C04
Rev A



NOTES

1. IF ROOF DRAINAGE OUTLETS ARE DISCOVERED DURING CONSTRUCTION OF NEW KERB/DRAINAGE, CONSTRUCT NEW PROPERTY JUNCTION WITHIN VERGE AND DIRECTLY CONNECT TO THE PIPED DRAINAGE NETWORK.

- APPROVED FOR USE -

Shoalhaven City Council

PLAN REFERENCE 5565_05

LEGEND

- BATTER EXTENTS
- PROPOSED LAYBACK KERB
- 1/A — PROPOSED STORMWATER PIT
- Ø 450 — PROPOSED STORMWATER PIPE
- 15.0 — EXISTING CONTOURS (MAJOR 1 m)
- EXISTING CONTOURS (MINOR 0.2 m)
- W — EXISTING WATER MAIN
- S — EXISTING SEWER MAIN
- EXISTING PROPERTY BOUNDARY
- EXISTING ROAD PAVEMENT
- EXISTING TREE TO BE RETAINED

0 5 10 15 20 25m

SCALE 1:250 (A1), 1:500 (A3)

STAGE 2 - GENERAL ARRANGEMENT

SCALE: 1:250

Rev.	Amendments	Approved	Date
1	FOR COMMENT	P.LITTLE	12.08.2022
2	FOR COMMENT	P.LITTLE	1.09.2022
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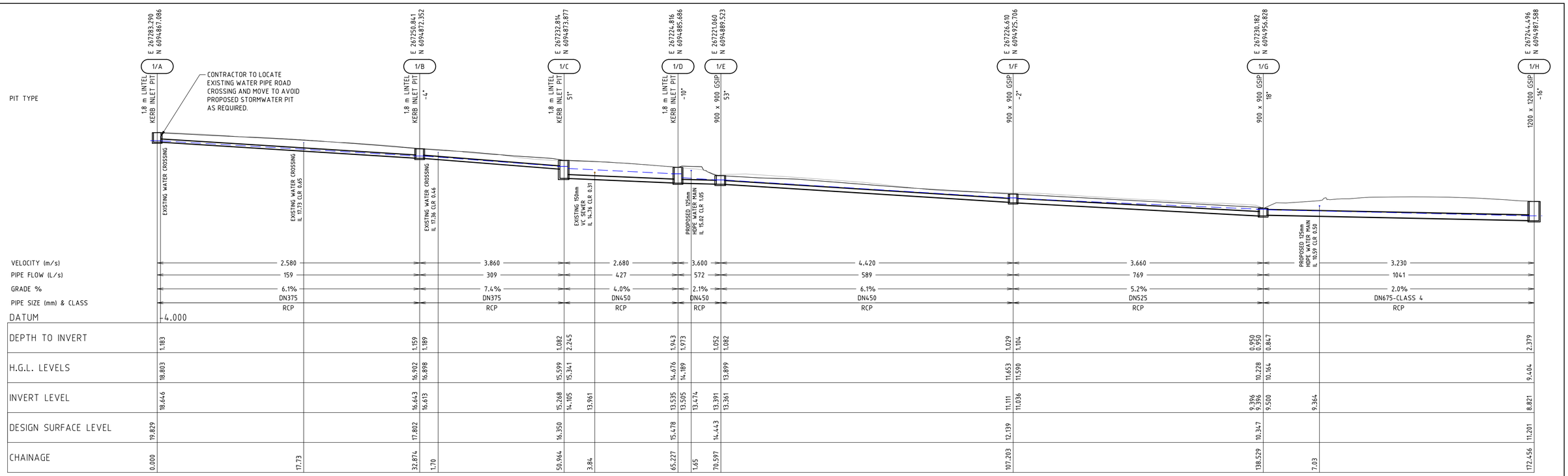
STAGE 2 GENERAL ARRANGEMENT

PROJECT: HAYWARD STREET DRAINAGE UPGRADE
AT: HAYWARD STREET, CONJOLA PARK
FOR: SHOALHAVEN CITY COUNCIL

Design: B.ASHE
Drawn: B.ASHE
Checked: P.LITTLE
Date: 24.11.2022
Drawing No. 22222/C05
Rev A



- APPROVED FOR USE -

Shoalhaven City Council

PLAN REFERENCE 5565_06

0 5 10 15 20 25m

SCALE 1:250 (A1), 1:500 (A3)

Rev.	Amendments	Approved	Date
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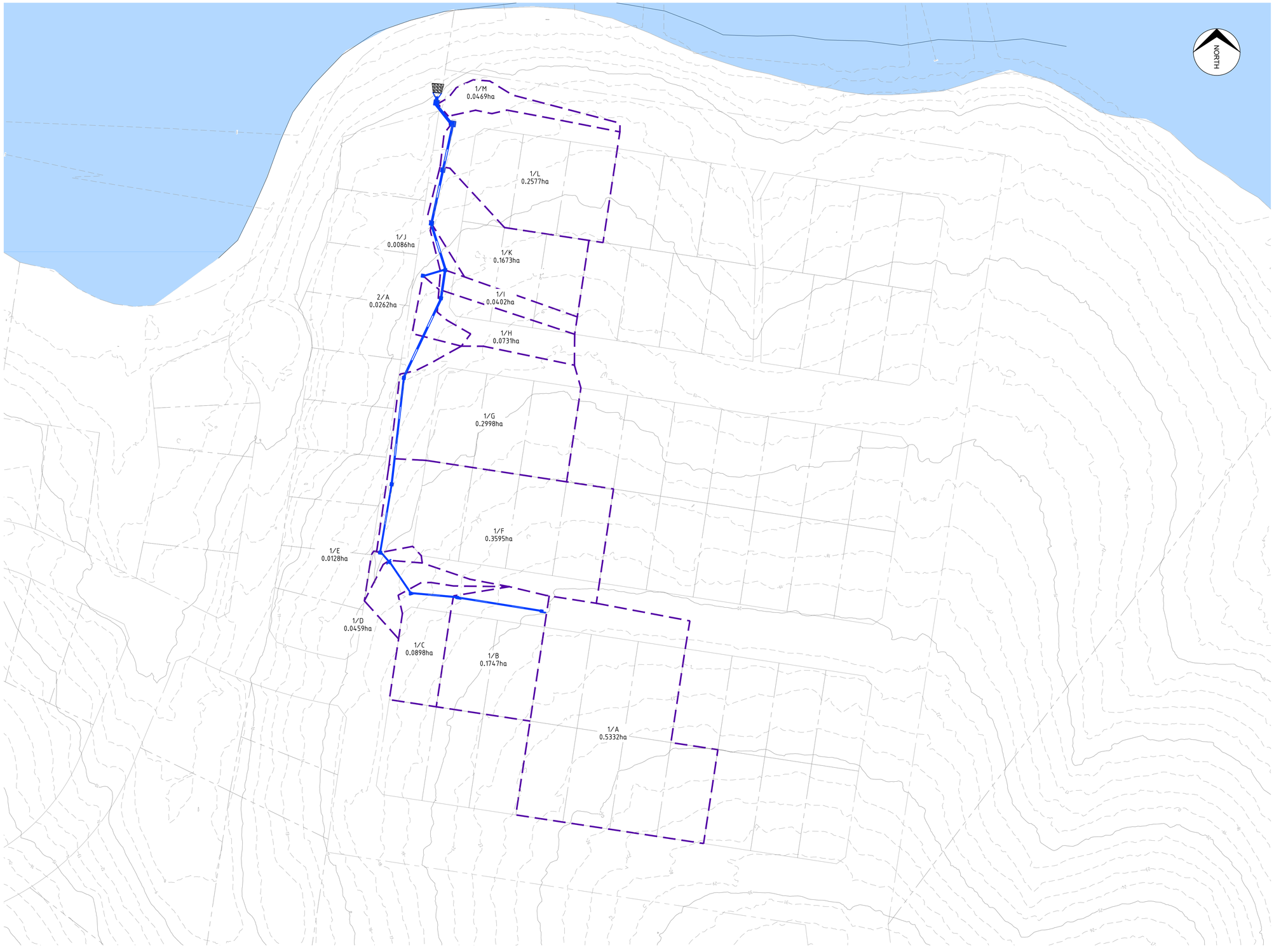
DRAINAGE LONG SECTIONS

PROJECT: HAYWARD STREET DRAINAGE UPGRADE
AT: HAYWARD STREET, CONJOLA PARK
FOR: SHOALHAVEN CITY COUNCIL

Design: B.ASHE
Drawn: B.ASHE
Checked: P.LITTLE
Date: 24.11.2022
Drawing No. 22222/C06
Rev A



- APPROVED FOR USE -

Shoalhaven City Council

PLAN REFERENCE 5565_07

LEGEND

- CATCHMENT BOUNDARIES
- EXISTING CONTOURS (MAJOR 5 m)
- EXISTING CONTOURS (MINOR 1 m)
- EXISTING PROPERTY BOUNDARY
- EXISTING LAKE

0 15 30 45 60 75m

SCALE 1:750 (A1), 1:1500 (A3)

CATCHMENT PLAN

SCALE: 1:750

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CATCHMENT PLAN

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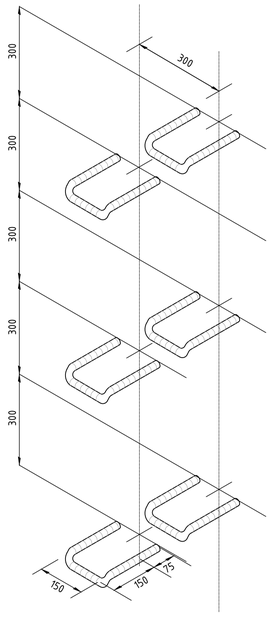
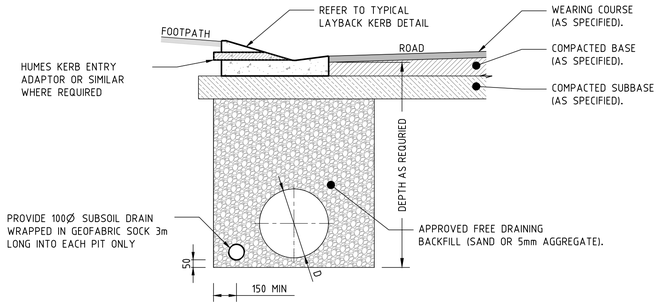
PIT SCHEDULE

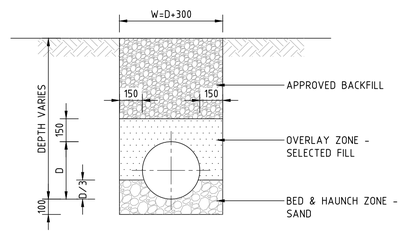
PIT NAME	PIT TYPE	EASTING	NORTHING	WIDTH (m)	LENGTH (m)	INLET PIPE DIA.	INVERT	OUTLET DIA.	INVERT	PIT SETOUT LEVEL (GRATE LEVEL)	PIT DEPTH (m)	COMMENTS
1/A	1.8 m LINTEL KERB INLET PIT	267285.301	6094866.993	0.835	0.93			375	18.782	19.959	1.177	REFER TO SCC DRAWING 2673-02
1/B	1.8 m LINTEL KERB INLET PIT	267249.169	6094872.856	0.835	0.93	375	16.459	375	16.429	17.77	1.341	REFER TO SCC DRAWING 2673-02
1/C	1.8 m LINTEL KERB INLET PIT	267227.997	6094873.088	0.835	0.93	375	14.596	450	14.521	15.86	1.338	REFER TO SCC DRAWING 2673-02
1/D	1.8 m LINTEL KERB INLET PIT	267222.330	6094886.676	0.835	0.93	450	14.131	450	14.101	15.333	1.233	REFER TO SCC DRAWING 2673-02
1/E	900 x 900 GRATED SURFACE INLET PIT	267221.060	6094889.523	0.9	0.9	450	13.362	450	13.332	14.575	1.243	REFER TO SCC DRAWING 2673-03
1/F	900 x 900 GRATED SURFACE INLET PIT	267226.610	6094925.706	0.9	0.9	450	11.041	525	10.966	12.293	1.328	REFER TO SCC DRAWING 2673-03
1/G	900 x 900 GRATED SURFACE INLET PIT	267230.182	6094956.828	0.9	0.9	525	9.48	675	9.5	10.347	0.847	REFER TO SCC DRAWING 2673-03
1/H	1200 x 1200 GRATED SURFACE INLET PIT	267245.648	6094987.485	1.2	1.2	675	8.813	675	8.738	11.126	2.388	REFER TO SCC DRAWING 2673-03
1/I	1200 x 1200 GRATED SURFACE INLET PIT	267246.113	6094998.428	1.2	1.2	675	8.519	675	8.489	10.366	1.877	REFER TO SCC DRAWING 2673-03
1/J	1200 x 1200 GRATED SURFACE INLET PIT	267240.800	6095016.293	1.2	1.2	675	7.342	675	7.312	8.4	1.088	REFER TO SCC DRAWING 2673-03
1/K	1200 x 1200 GRATED SURFACE INLET PIT	267245.589	6095038.260	1.2	1.2	675	5.963	675	5.933	7.197	1.264	REFER TO SCC DRAWING 2673-03
1/L	1200 x 1200 GRATED SURFACE INLET PIT	267249.158	6095054.628	1.2	1.2	675	4.928	900	4.703	5.738	1.035	REFER TO SCC DRAWING 2673-03
1/M	1200 x 1200 GRATED SURFACE INLET PIT	267243.257	6095062.436	1.2	1.2	900	4.507	1050	4.357	5.77	1.413	REFER TO SCC DRAWING 2673-03
1/N	HEADWALL	267242.854	6095065.254	1.5	0.2	1050	4.3			5.35	1.091	STANDARD PRECAST HEADWALL
2/A	900 X 900 GRATED SURFACE INLET PIT	267237.549	6094996.238	0.9	0.9			375	8.902	10.291	1.389	REFER TO SCC DRAWING 2673-03



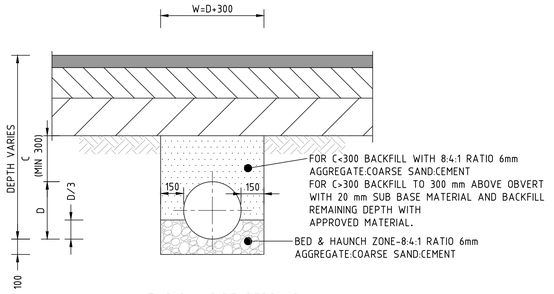
TYPICAL STEP IRON CONFIGURATION (ISOMETRIC)
SCALE 1:10



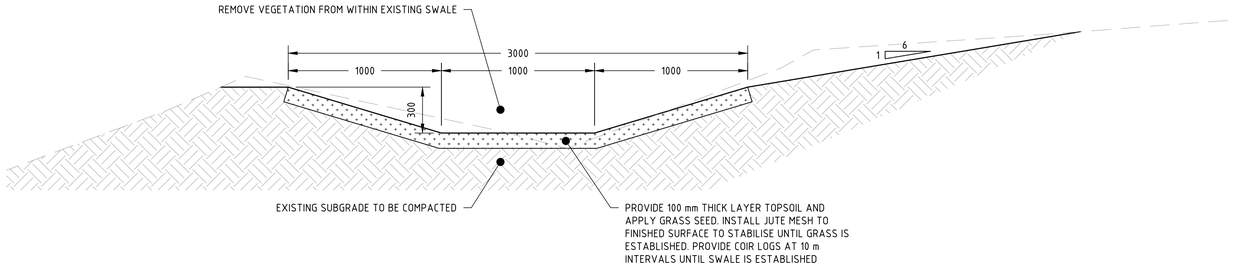
TYPICAL PIPE BEDDING - UNDER KERB
SCALE 1:20



TYPICAL PIPE BEDDING - NOT UNDER PAVEMENT
SCALE 1:20

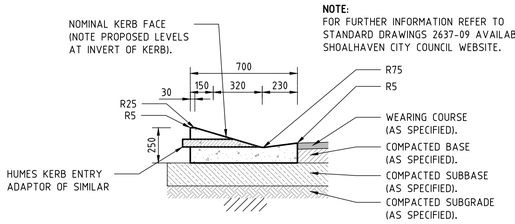


TYPICAL PIPE BEDDING - UNDER PAVEMENT
SCALE 1:20



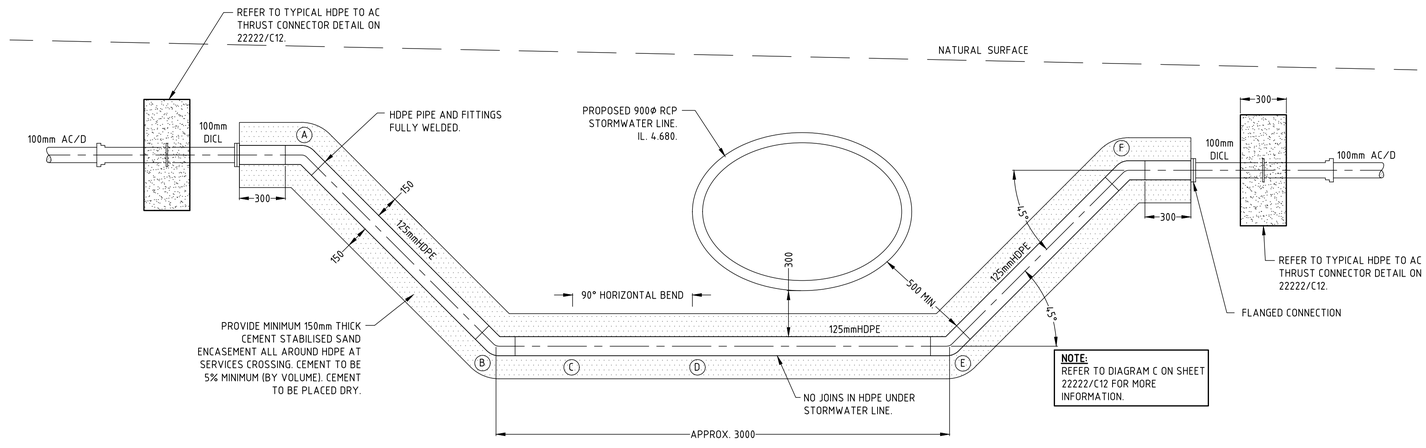
OVERLAND SWALE DETAIL
SCALE 1:20

NOTE:
ANY TRENCHING AND/OR ROAD PAVEMENT CONSTRUCTION WITHIN 1m OF THE AC WATERMAIN WILL ONLY PERMIT A LIGHT ROLLER WITHOUT VIBRATION.



NOTE:
FOR FURTHER INFORMATION REFER TO STANDARD DRAWINGS 2637-09 AVAILABLE ON SHOALHAVEN CITY COUNCIL WEBSITE.

TYPICAL LAYBACK KERB DETAIL
PROVIDE TOOL JOINTS AT MAX 3m CENTRES SCALE 1:20



NOTE:
REFER TO DIAGRAM C ON SHEET 22222/C12 FOR MORE INFORMATION.

DIAGRAM D
SECTION VIEW - SANDRA STREET PROPOSED WATERMAIN CONNECTION

- APPROVED FOR USE -
Shoalhaven City Council
PLAN REFERENCE 5565_08

0 0.2 0.4 0.6 0.8 1m
SCALE 1:10 (A1), 1:20 (A3)

0 0.5 1 1.5 2m
SCALE 1:20 (A1), 1:40 (A3)

Rev.	Amendments	Approved	Date
1	FOR COMMENT	P.LITTLE	12.08.2022
2	FOR COMMENT	P.LITTLE	1.09.2022
A	FOR CONSTRUCTION	P.LITTLE	24.11.2022

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RESIDENTIAL - COMMERCIAL - INDUSTRIAL

DRAINAGE DETAILS

PROJECT: HAYWARD STREET DRAINAGE UPGRADE
AT: HAYWARD STREET, CONJOLA PARK
FOR: SHOALHAVEN CITY COUNCIL

Design: B.ASHE
Drawn: B.ASHE
Checked: P.LITTLE
Date: 24.11.2022
Drawing No. 22222/C08
Rev A

DYNAMIC DRAINAGE RESULTS

HYDROLOGY	RETURN PERIOD (ARI)	EVENT	STORM DURATIONS RUN
ILSAX 2	100	Major	180,90,60,45,30,25,20,15,10 mins
NOTES:	ALL RESULTS ARE MAXIMUMS AND FLOWS ARE IN L/S		
	NEGATIVE FLOW VALUES INDICATE REVERSE FLOWS		

NODE		CATCHMENTS					INLETS							BYPASS							NODE			PIPES										
NODE NAME	NODE TYPE	CATCHMENT AREAS (ha)	Tc (min)			CATCHMENT FLOW	APPROACH	CAPTURED	BLOCKAGE MINOR		BLOCKAGE MAJOR		BYPASS	BYPASS NODE	D/S APPROACH FLOW	HGL	DEPTH ABOVE GRATE	MAX. VELOCITY	MAX. DxV	HGL	GRATE LEVEL	FREEBOARD LEVEL	PIPE NAME	PIPE TYPE	PIPE SIZE	LINK HGL (U/S)	LINK HGL (D/S)	Ku (MAX H/L)	Ku HEADLOSS	MAX. FLOW	CAPACITY DEPTH RATIO	VELOCITY (U/S)	VELOCITY (LINK)	VELOCITY (D/S)
		AREA 1	IMPERV 1	PERV 1	CRITICAL STORM	SET 1	FLOW	FLOW	SAG	ONGRADE	SAG	ONGRADE	FLOW																					
1/A	1.8 m LINTEL KERB INLET PIT	0.5332	5	10	Zone 1–15min–31 to 100 yr ARI/	380	380	160	100	100	50	80	221	1/B	343	20.039	0.079	1.97	0.16	18.955	19.959	1.005	1/A to 1/B	RCP	375	18.938	16.761	7	0.019	160	0.4	3.32	2.81	2.95
1/B	1.8 m LINTEL KERB INLET PIT	0.1747	5	10	Zone 1–15min–31 to 100 yr ARI/	125	343	149	100	100	50	80	194	1/C	255	17.835	0.066	2.05	0.14	16.761	17.77	1.009	1/B to 1/C	RCP	375	16.634	15.585	1.9	0.128	302	0.6	4.19	3.66	3.92
1/C	1.8 m LINTEL KERB INLET PIT	0.0898	5	10	Zone 1–15min–31 to 100 yr ARI/	64	255	123	100	100	50	80	132	1/D	163	15.927	0.067	0.65	0.05	15.585	15.86	0.275	1/C to 1/D	RCP	450	15.371	14.869	1.6	0.23	426	0.9	2.68	2.68	3.39
1/D	1.8 m LINTEL KERB INLET PIT	0.0459	5	10	Zone 1–15min–31 to 100 yr ARI/	33	163	168	100	100	50	80	0	1/E	0	15.492	0.159			14.869	15.333	0.464	1/D to 1/E	RCP	450	14.734	13.995	1.1	0.173	600	0.6	4.57	4.43	4.35
1/E	900 x 900 GSIP	0.0128	5	10	Zone 1–15min–31 to 100 yr ARI/	9	0	83	100	100	50	80	0	1/F	172	14.666	0.091	1.24	0.13	13.995	14.575	0.58	1/E to 1/F	RCP	450	13.913	11.466	0.9	0.082	688	1	4.41	4.68	5.08
1/F	900 x 900 GSIP	0.3595	5	10	Zone 1–15min–31 to 100 yr ARI/	256	172	118	100	100	50	80	54	1/G	265	12.409	0.116	1.12	0.17	11.466	12.293	0.827	1/F to 1/G	RCP	525	11.417	10.221	0.7	0.069	786	0.8	4.62	3.87	3.63
1/G	900 x 900 GSIP	0.2998	5	10	Zone 1–15min–31 to 100 yr ARI/	214	265	262	100	100	50	80	1	BP 1/A	0	10.544	0.197			10.221	10.347	0.126	1/G to 1/H	RCP	675	10.175	9.42	0.8	0.054	1031	0.9	3.14	3.27	3.44
1/H	1200 x 1200 GSIP	0.0731	5	10	Zone 1–15min–31 to 100 yr ARI/	52	52	41	100	100	50	80	11	1/I	40	11.162	0.036	1.15	0.04	9.42	11.126	1.706	1/H to 1/I	RCP	675	9.322	9.019	0.5	0.099	1067	0.9	3.04	3.32	3.76
1/I	1200 x 1200 GSIP	0.0402	5	10	Zone 1–15min–31 to 100 yr ARI/	29	40	31	100	100	50	80	9	1/J	15	10.389	0.024	0.31	0.01	8.878	10.366	1.488	1/I to 1/J	RCP	675	8.869	7.7	0.4	0.009	1107	0.5	5.33	5.54	5.79
1/J	1200 x 1200 GSIP	0.0086	5	10	Zone 1–15min–31 to 100 yr ARI/	6	15	12	100	100	50	80	3	1/K	120	8.478	0.078	1.1	0.09	7.7	8.4	0.7	1/J to 1/K	RCP	675	7.671	6.466	0.5	0.035	1118	0.5	5.43	5	5.12
1/K	1200 x 1200 GSIP	0.1673	5	10	Zone 1–15min–31 to 100 yr ARI/	119	120	91	100	100	50	80	28	1/L	211	7.29	0.093	0.75	0.13	6.466	7.197	0.731	1/K to 1/L	RCP	675	6.311	5.753	0.6	0.16	1207	0.6	4.96	3.63	3.64
1/L	1200 x 1200 GSIP	0.2577	5	10	Zone 1–15min–31 to 100 yr ARI/	184	211	156	100	100	50	80	54	1/M	88	6.572	0.834			6.572	5.738	–0.834	1/L to 1/M	RCP	900	5.733	5.681	1.6	0.081	1359	0.5	2.21	2.14	2.14
1/M	1200 x 1200 GSIP	0.0469	5	10	Zone 1–15min–31 to 100 yr ARI/	33	88	68	100	100	50	80	20	1/N	20	5.795	0.025	0.06	0.01	5.681	5.77	0.089	1/M to 1/N	RCP	1050	5.681	5.548	0.2	0.023	1425	0.4	1.65	1.65	1.65
1/N	HW OUT						20	–695	100	100	50	100	1444	LOST	1447	5.548	0.198	1.74	0.34	5.548	5.35	–0.198	1/N to 1/O			5.548	4.208	0	0	0	4.9	0	0	0
2/A	SAG FI SQR	0.0262	5	10	Zone 1–15min–31 to 100 yr ARI/	19	19	19	100	100	50	80	0	LOST	0	10.291	0	0	0	8.992	10.291	1.299	2/A to 1/I	RCP	375	8.991	8.878	7	0.005	19	0.1	0.92	1.01	1.12
1/I	1200 x 1200 GSIP	0.0402	5	10	Zone 1–15min–31 to 100 yr ARI/	29	40	31	100	100	50	80	9	1/J	15	10.389	0.024	0.31	0.01	8.878	10.366	1.488												

- APPROVED FOR USE -

Shoalhaven City Council

PLAN REFERENCE 5565_09

Rev.	Amendments	Approved	Date
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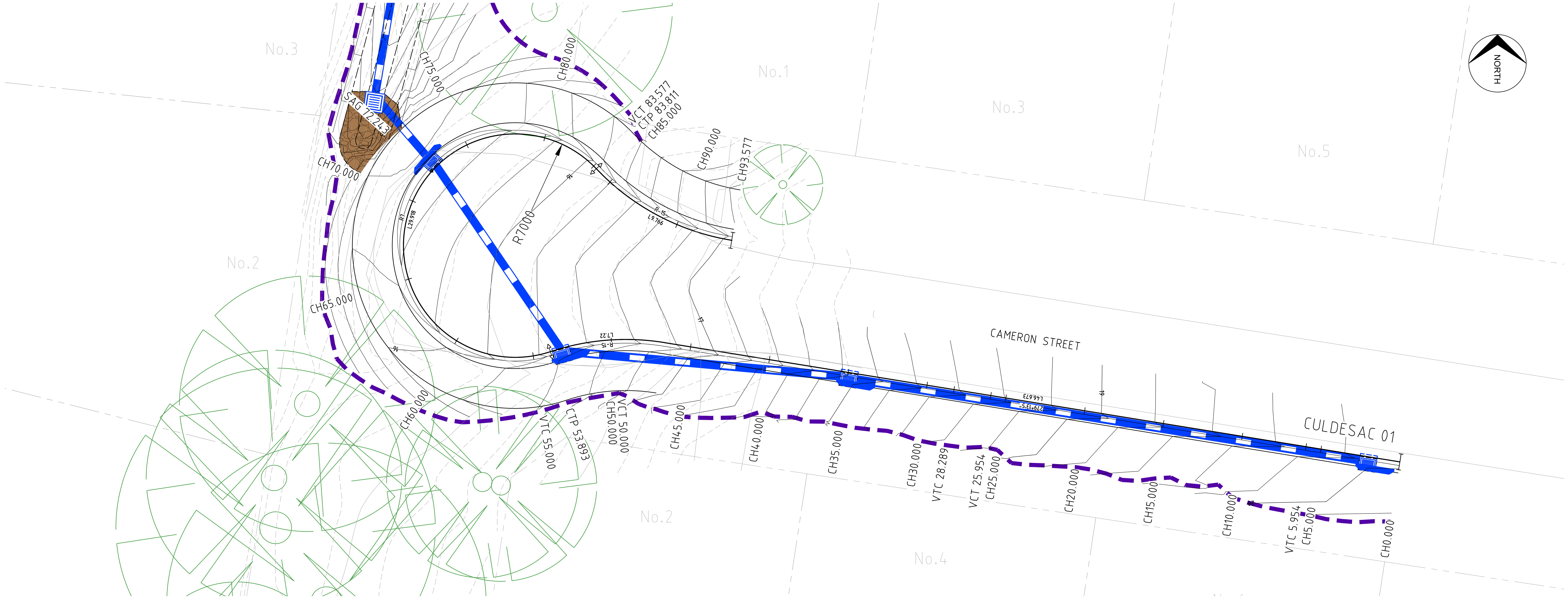
DRAINAGE RESULTS
1% AEP

PROJECT: HAYWARD STREET DRAINAGE UPGRADE
AT: HAYWARD STREET, CONJOLA PARK
FOR: SHOALHAVEN CITY COUNCIL

Design: B.ASHE
Drawn: B.ASHE
Checked: P.LITTLE
Date: 24.11.2022
Drawing No. 22222/C09
Rev A



CULDESAC LAYOUT PLAN

SCALE: 1:150

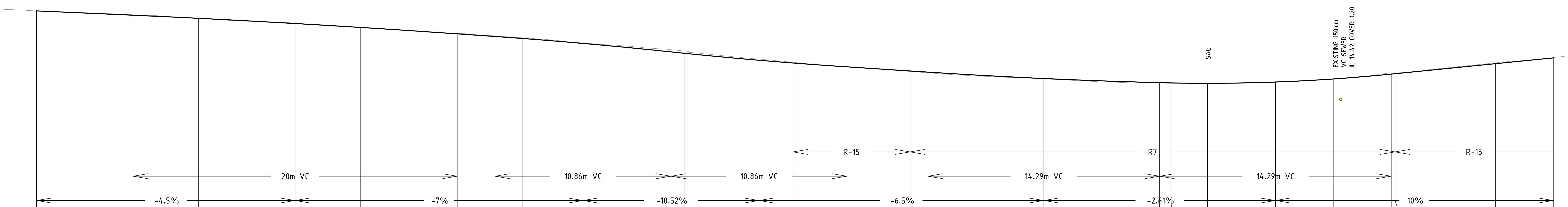
- APPROVED FOR USE -

Shoalhaven City Council

PLAN REFERENCE 5565_10

LEGEND

- BATTER EXTENTS
- PROPOSED LAYBACK KERB
- PROPOSED STORMWATER PIT (1/A)
- PROPOSED STORMWATER PIPE (Ø450)
- DESIGN CONTOURS (MAJOR 1 m) (15.0)
- DESIGN CONTOURS (MINOR 0.2 m)
- EXISTING CONTOURS (MAJOR 1 m) (15.0)
- EXISTING CONTOURS (MINOR 0.2 m)
- EXISTING TREE TO BE RETAINED



DATUM RL6

CHAINAGE	FINISHED LEVEL	EXISTING LEVEL	CUT/FILL
0	19.957	19.959	-0.002
5.95	19.689	19.724	-0.035
10	19.497	19.509	-0.012
15.95	19.177	19.205	-0.028
20	18.934	18.955	-0.021
25.95	18.539	18.577	-0.038
28.29	18.376	18.418	-0.042
30	18.251	18.294	-0.043
33.72	17.948	17.983	-0.035
39.14	17.425	17.56	-0.136
40	17.336	17.476	-0.139
44.57	16.909	16.981	-0.072
46.67	16.738	16.785	-0.048
50	16.501	16.501	0
53.89	16.248	16.211	0.037
55	16.176	16.127	0.049
60	15.885	15.844	0.041
62.14	15.781	15.754	0.027
69.29	15.526	15.487	0.038
70	15.509	15.482	0.028
72.24	15.487	15.487	-0
76.43	15.565	15.537	0.028
80	15.753	15.759	-0.006
83.58	16.054	16.127	-0.073
83.81	16.077	16.131	-0.054
90	16.696	16.75	-0.054
93.58	17.054	17.078	-0.025

LONGITUDINAL SECTION CULDESAC 01

SCALE 1:150 (HORIZONTAL)
SCALE 1:150 (VERTICAL)

0 5 10 15m
SCALE 1:150 (A1), 1:300 (A3)

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CULDESAC LAYOUT AND LONG SECTION

PROJECT: HAYWARD STREET DRAINAGE UPGRADE
AT: HAYWARD STREET, CONJOLA PARK
FOR: SHOALHAVEN CITY COUNCIL

Design: B.ASHE
Drawn: B.ASHE
Checked: P.LITTLE
Date: 24.11.2022
Drawing No. 22222/C10
Rev A

NOTES

1. A PRECLEARANCE SURVEY IS TO BE UNDERTAKEN BY A QUALIFIED BOTANIST/ECOLOGIST WITHIN 24 HOURS PRIOR TO TREE REMOVAL WORKS. REFER TO THE REVIEW OF ENVIRONMENTAL FACTORS FOR SAFEGUARDS TO PREVENT INJURY TO WILDLIFE DURING TREE REMOVAL
2. AQF LEVEL 5 ARBORIST TO BE IN ON SITE TO SUPERVISE VEGETATION REMOVAL
3. ALL TREES WITHIN THE WORKS ARE THAT ARE TO BE RETAINED ARE TO BE PROTECTED. REFER TO THE REVIE OF ENVIRONMENTAL FACTORS FOR TREE PROTECTION MEASURES.

- APPROVED FOR USE -

Shoalhaven City Council

PLAN REFERENCE 5565_11

LEGEND

- EXISTING TREE TO BE RETAINED
- EXISTING TREE TO BE REMOVED
- BATTER EXTENTS
- PROPOSED LAYBACK KERB
- 1/A — PROPOSED STORMWATER PIT
- Ø 450 — PROPOSED STORMWATER PIPE
- 15.0 — EXISTING CONTOURS (MAJOR 1 m)
- EXISTING CONTOURS (MINOR 0.2 m)

VEGETATION REMOVAL PLAN - (STAGE 1)

SCALE: 1:500

0 5 10 15 20 25m

SCALE 1:250 (A1), 1:500 (A3)

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VEGETATION REMOVAL PLAN

PROJECT: HAYWARD STREET DRAINAGE UPGRADE
AT: HAYWARD STREET, CONJOLA PARK
FOR: SHOALHAVEN CITY COUNCIL

Design: B.ASHE
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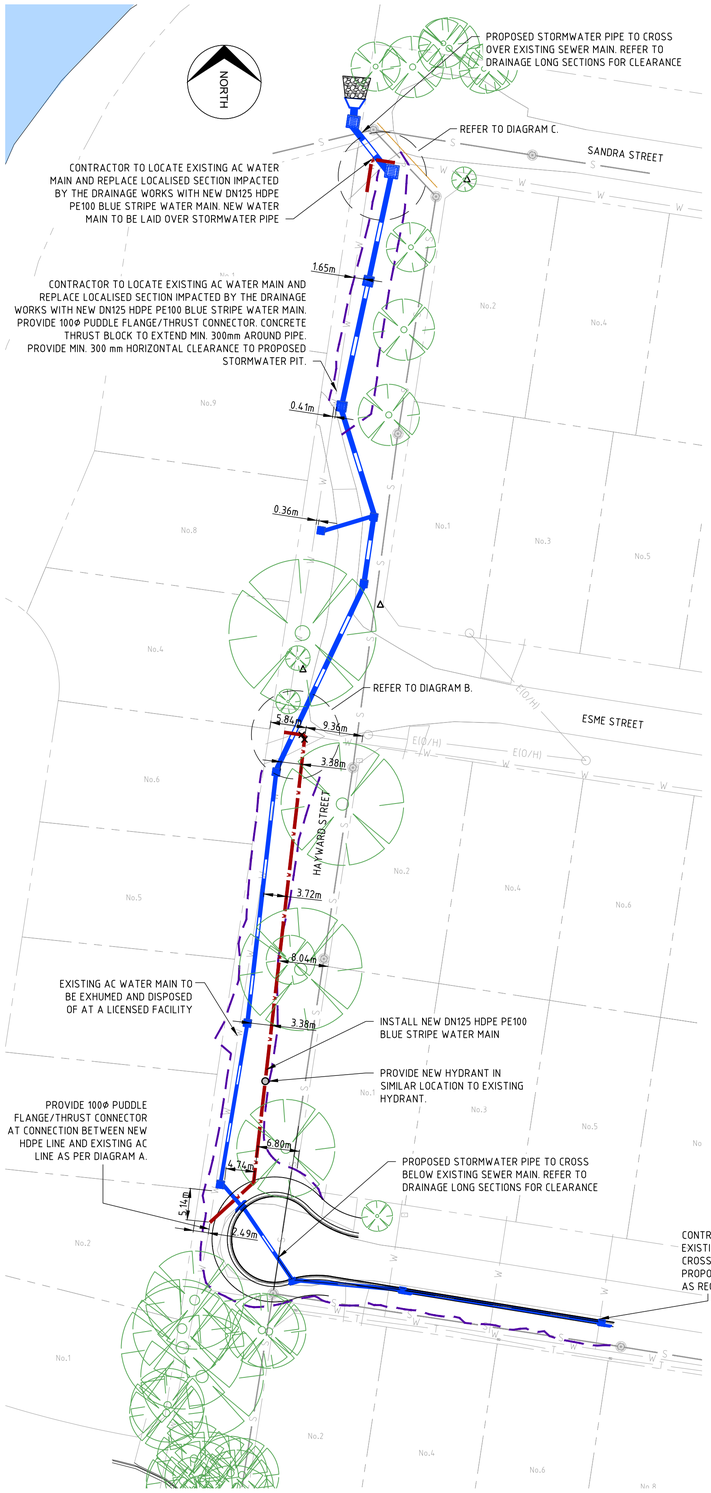


SERVICES PLAN

SCALE: 1:500

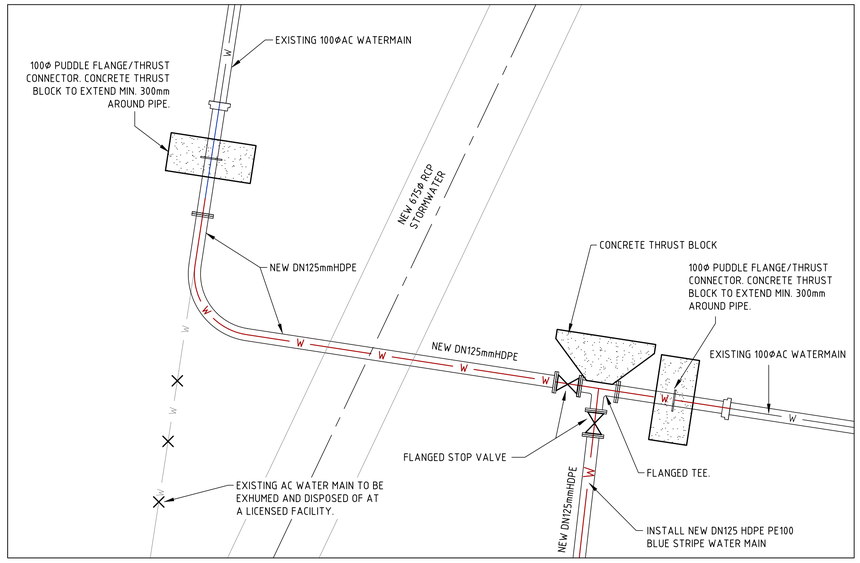
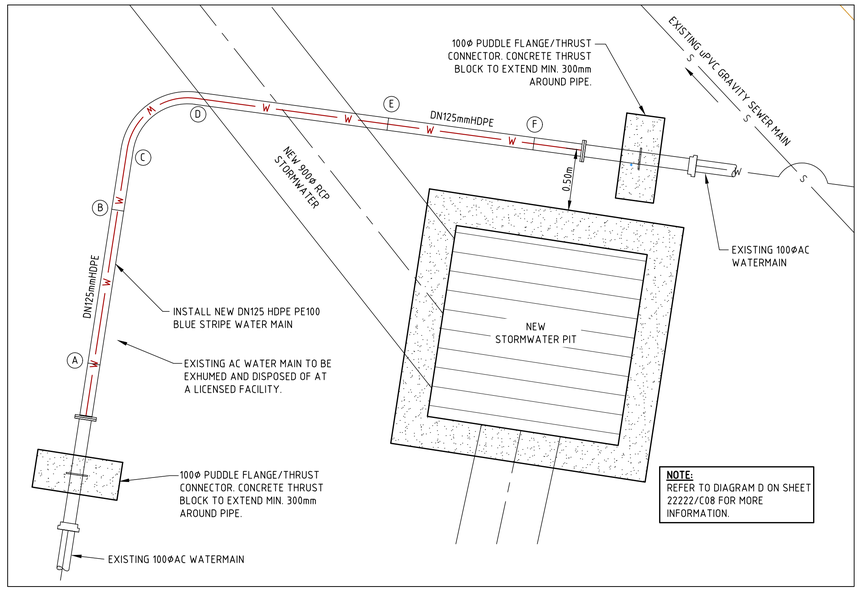


DIAGRAM B

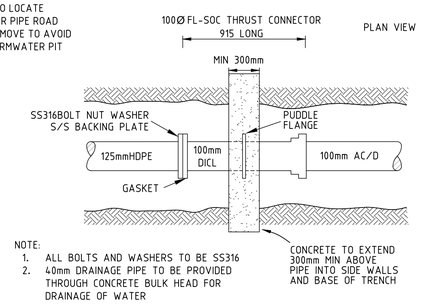
PLAN VIEW - ESME STREET PROPOSED WATERMAIN CONNECTION



NOTE:
REFER TO DIAGRAM D ON SHEET 22222/C08 FOR MORE INFORMATION.

DIAGRAM C

PLAN VIEW - SANDRA STREET PROPOSED WATERMAIN CONNECTION



NOTE:
1. ALL BOLTS AND WASHERS TO BE SS316
2. 40mm DRAINAGE PIPE TO BE PROVIDED THROUGH CONCRETE BULK HEAD FOR DRAINAGE OF WATER

DIAGRAM A

PLAN VIEW - HDPE TO AC THRUST CONNECTOR

NOTE:
ANY TRENCHING AND/OR ROAD PAVEMENT CONSTRUCTION WITHIN 1m OF THE AC WATERMAIN WILL ONLY PERMIT A LIGHT ROLLER WITHOUT VIBRATION.

NOTE:
1. THE CONTRACTOR IS TO PREPARE AN ASBESTOS MANAGEMENT PLAN BEFORE UNDERTAKING ANY WORKS ON ASBESTOS WATER MAINS.

WATER CONSTRUCTION NOTES:

1. THE CONTRACTOR SHALL COMPLY WITH THE REQUIREMENTS OF THE WORK HEALTH AND SAFETY ACT 2011, WHICH REQUIRES EMPLOYERS TO ENSURE THE HEALTH, SAFETY AND WELFARE OF EMPLOYEES.
2. THE CONTRACTOR SHALL AT ALL TIME EXERCISE ALL NECESSARY PRECAUTIONS APPROPRIATE TO ENSURE THE SAFETY OF ALL PERSONS ON THE WORK SITE OR IN THE VICINITY OF THE WORK SITE.
3. PRIOR TO COMMENCING WORK ON SITE THE CONTRACTOR SHALL GIVE ALL NECESSARY NOTIFICATIONS AS REQUIRED AND SHALL PROVIDE TO THE SUPERINTENDENT SATISFACTORY EVIDENCE TO SUCH EFFECT.
4. PRIOR TO COMMENCING WORK ON SITE THE CONTRACTOR SHALL PROVIDE TO THE SUPERINTENDENT EVIDENCE THAT THE CONTRACTOR HAS CURRENT PUBLIC RISK (LIABILITY) AND WORKERS COMPENSATION INSURANCE POLICIES.
5. THE CONTRACTOR SHALL GIVE NOT LESS THAN 4 DAYS NOTICE TO THE SUPERINTENDENT AND THE SHOALHAVEN WATER MANAGER PRIOR TO THE COMMENCEMENT OF WORK ON THE SITE.
6. NOTWITHSTANDING ANY OTHER PROVISIONS THE CONTRACTOR SHALL ARRANGE FOR THE WORK TO BE INSPECTED BY THE SUPERINTENDENT AND/OR THE SHOALHAVEN WATER INSPECTOR AT THE FOLLOWING STAGES:
   - 6.1. AFTER LAYING OF PIPES ON 100MM SAND BEDDING AND PRIOR TO COMPLETION OF SAND BACKFILL.
   - 6.2. AFTER SAND BACKFILL TO 100MM OVER PIPES AND PRIOR TO COMPLETION OF BACKFILL.
   - 6.3. PRIOR TO POURING OF THRUST BLOCKS.
   - 6.4. AFTER INSTALLATION OF UNDER-ROAD CONDUITS PRIOR TO BACKFILLING.
   - 6.5. DURING THE DISINFECTION AND PRESSURE TESTING OF WATER MAINS.
   - 6.6. AT PRACTICAL COMPLETION, AFTER SUPPLY OF WORK-AS-EXECUTED PLANS.
   - 6.7. AT THE END OF THE SIX MONTH MAINTENANCE PERIOD.
   - 6.8. AT ANY OTHER SPECIFIED STAGE OF THE WORKS AS REQUIRED BY COUNCIL'S INSPECTOR.
7. WATER MAINS TO BE CLASS 16/PN16, SERIES II, RRJ MPVC TO AS/NZS 4765 OR OPVC TO AS/NZS 4441 OR HDPE PE100 PN16 UNLESS OTHERWISE SPECIFIED ON PLAN. PIPES TO BE LIGHT BLUE IN COLOUR OR BLACK WITH BLUE STRIPE FOR HDPE.
8. WATER MAINS LOCATED WITHIN EASEMENTS ACROSS PRIVATE ALLOTMENTS TO BE CLASS K9 DUCTILE IRON CEMENT LINED (DICL) RRJ PIPES.
9. WATER MAINS ARE TO BE LOCATED IN ROAD RESERVES 2.4 METRES FROM THE PROPERTY BOUNDARY, IN EASEMENTS 1.5M FROM THE PROPERTY BOUNDARY, OR AS SHOWN OTHERWISE ON THE PLAN.
10. WATER MAIN IS TO HAVE A MINIMUM COVER OF 600MM FROM THE DESIGN FINISHED SURFACE IN TRAFFICABLE AREAS, AND 600MM IN NON-TRAFFICABLE AREAS.
11. WHERE THE WATER MAIN IS TO BE CONSTRUCTED IN AREAS OF FILL, THE CONTRACTOR IS TO ENSURE THAT THE AREA IS COMPACTED PRIOR TO CONSTRUCTION OF THE MAIN.
12. DETECTABLE TRACER TAPE TO BE PROVIDED ON TOP OF THE PIPE EMBEDMENT MATERIAL OR 1.0 METRE BELOW THE FINISHED SURFACE LEVEL, WHICHEVER IS THE HIGHER.
13. DETECTABLE TAPE IS TO BE GREEN IN COLOUR WITH THE INSCRIPTION "CAUTION - WATER MAIN BURIED BELOW", 100MM WIDE POLYTHENE TAPE WITH 316 STAINLESS STEEL WIRE INSERT.
14. ALL DUCTILE IRON VALVES, FITTINGS AND BENDS SHALL BE NYLON OR FUSION BONDED EPOXY (FBE) COATED TO AS/NZS 4158.
15. ALL VALVES ARE TO BE CLASS 16, NON RISING SPINDLE, CLOCKWISE CLOSING RESILIENT SEATED AND MANUFACTURED TO AS 2638.
16. ALL SPRING HYDRANTS TO BE AT A DEPTH OF NO GREATER THAN 200MM BELOW FINISHED GROUND SURFACE.
17. ALL HYDRANT AND STOP VALVE COVERS ARE TO BE LEFT PROTRUDING 50MM (MINIMUM) ABOVE THE FINISHED GROUND SURFACE LEVEL. THIS IS TO ALLOW FOR GRASS GROWTH AROUND THE HYDRANT AND STOP VALVE COVERS.
18. ALL FLANGED FITTINGS ARE TO BE FASTENED WITH MARINE GRADE (316) STAINLESS STEEL NUTS, BOLTS AND WASHERS.
19. CONCRETE THRUST BLOCKS ARE TO BE PROVIDED AT ALL HYDRANT BENDS, BENDS, TEES, TAPERS AND END CAPS IN ACCORDANCE WITH SHOALHAVEN WATER'S "WATER RETICULATION SPECIFICATIONS AND CONSTRUCTION STANDARDS".
20. ROAD CROSSING CONDUITS ARE TO BE LOCATED IN THE POSITION AS SHOWN ON THE PLAN TO COUNCIL'S STANDARD DRAWING (W20857-01C & W21755-29) USING 40MM DIAMETER SWV OR CLASS 12 UPVC CONDUITS (RESIDENTIAL) OR 100MM UPVC CONDUIT FOR INDUSTRIAL/COMMERCIAL SUBDIVISION, UNLESS OTHERWISE SPECIFIED ON PLAN.
21. ALL CONSTRUCTION SHALL BE PERFORMED IN ACCORDANCE WITH THE DRAWINGS, WITH WATER SERVICES ASSOCIATION OF AUSTRALIA – WATER SUPPLY CODE OF AUSTRALIA – WSA 03-2011 V3.1 AND SHOALHAVEN WATER'S SUPPLEMENT TO THE WATER SERVICES ASSOCIATION OF AUSTRALIA – WATER SUPPLY CODE OF AUSTRALIA (WSA 03-2011) VERSION 3.1, THESE NOTES AND ANY OTHER REQUIREMENTS OF SHOALHAVEN WATER AND THE SUPERINTENDENT.
22. SEDIMENT AND EROSION CONTROL MEASURES ARE TO BE IMPLEMENTED PRIOR TO CONSTRUCTION WORK COMMENCING AND MAINTAINED DURING THE CONSTRUCTION PHASE. SEDIMENT AND EROSION CONTROL MEASURES ARE TO INCORPORATE THOSE AS DETAILED ON THE SEDIMENT AND EROSION CONTROL PLAN INCLUDED IN THE ROAD AND DRAINAGE PLANS. MEASURES SHOULD ALSO INCORPORATE THOSE AS SET OUT IN COUNCIL'S STANDARD ANNEXURE "EROSION CONTROL MEASURES FOR WORK UNDERTAKEN BY CONTRACTORS DURING THE INSTALLATION OF UTILITY SERVICES".
23. INTERCONNECTIONS AND 'CUT-INS' INTO COUNCIL'S EXISTING WATER MAINS ARE TO BE UNDERTAKEN BY SHOALHAVEN WATER STAFF AT THE CONTRACTOR'S EXPENSE. THE CONTRACTOR IS TO SUPPLY ALL FITTINGS AND MATERIALS FOR THOSE WORKS (INCLUDING PLANT AND SUPPORTING LABOUR) AS DIRECTED BY SHOALHAVEN WATER.
24. INTERCONNECTION WORKS WILL NOT TAKE PLACE UNTIL SUCH TIME AS ALL PROPOSED CONSTRUCTION WORKS ARE COMPLETED, BACKFILLED AND SATISFACTORILY TESTED.
25. SAND BACKFILL COMPACTED IN 300MM LAYERS (MAXIMUM TO THE TOP OF THE TRENCH (UNDERSIDE OF ROAD BASE) IS TO BE PROVIDED FOR THE PROPOSED ROAD CROSSINGS. THIS IS TO EXTEND A MINIMUM OF 1.0 METRE PAST THE BACK OF THE KERB AND GUTTER.
26. HYDRANT COVERS ARE TO BE INSTALLED IN AN ORIENTATION WHERE THE NEAREST ONCOMING TRAFFIC WILL STRIKE THE COVERS CLOSED, OR AS DIRECTED BY SHOALHAVEN WATER'S INSPECTOR.
27. BLUE 'CATS-EYE' REFLECTIVE MARKERS TO BE FIXED IN THE CENTRE OF ROADWAYS POINTING TO THE HYDRANT LOCATION OR AS DIRECTED BY SHOALHAVEN WATER.
28. THE CONTRACTOR IS TO GAIN APPROVAL UNDER SECTION 138 OF THE ROADS ACT 1993 PRIOR TO COMMENCING CONSTRUCTION WITHIN ALL ROAD RESERVES.
29. THE CONTRACTOR SHALL WORK ONLY WITHIN THE HOURS FROM 7:00AM-5:00PM MONDAY TO FRIDAY EXCLUDING PUBLIC HOLIDAYS. ANY WORK OUTSIDE THESE HOURS BY ARRANGEMENT WITH SHOALHAVEN WATER.
30. THE CONTRACTOR SHALL ENSURE THAT THE RESIDENTS ADJACENT TO THE CONSTRUCTION ZONE ARE NOT AFFECTED BY DUST OR UNDUE NOISE DURING CONSTRUCTION AND ARE NOT DEPRIVED OF ALL-WEATHER ACCESS NOR ARE SUBJECTED TO ADDITIONAL STORMWATER RUNOFF.
31. THE CONTRACTOR SHALL NOT DISTURB ANY SURVEY CONTROL MARKS. SHOULD ANY SURVEY CONTROL MARK BE DISTURBED OR OBLITERATED, THE CONTRACTOR SHALL NOTIFY THE SUPERINTENDENT IMMEDIATELY. THE CONTRACTOR SHALL HAVE THE MARKS REPLACED AT THEIR OWN EXPENSE.
32. THE CONTRACTOR IS TO ENSURE THAT MPVC PIPES ARE NOT DEFLECTED BY MORE THAN THE MINIMUM BENDING RADIUS SPECIFIED BY THE PRODUCT MANUFACTURE.
33. THE CONTRACTOR IS TO LOCATE AND LEVEL ALL SERVICES PRIOR TO PROCEEDING. IF A CONFLICT ARISES THE CONTRACTOR IS TO IMMEDIATELY NOTIFY THE SUPERINTENDENT. RECORDS OF SERVICE LOCATION ARE TO BE SUBMITTED TO THE SUPERINTENDENT AT THE COMPLETION OF THE WORKS.
34. THE CONTRACTOR SHALL PROVIDE ALL LABOUR, MATERIALS AND EQUIPMENT NECESSARY FOR THE ACCURATE SETTING OUT OF THE ENTIRE WORKS.
35. THE CONTRACTOR SHALL ENSURE THE PIPES ARE LAID TO CORRECT INVERT LEVELS.
36. ALL FILLING THAT TAKES PLACE OVER THE SITE IS TO BE IN ACCORDANCE WITH 'ENGINEER DESIGN SPECIFICATIONS, DCP 100 SECTION D6'. THE COMPACTION TEST RESULTS SHALL BE FORWARDED TO SHOALHAVEN WATER UPON COMPLETION.

POLYETHYLENE WATERMAIN CONSTRUCTION NOTES:

1. ALL POLYETHYLENE (PE) WATERMAINS SHALL BE DESIGNED AND INSTALLED IN ACCORDANCE WITH THE WATER SERVICES ASSOCIATION OF AUSTRALIA POLYETHYLENE PIPELINE CODE (WSA01-2001).
2. PE PIPE SHALL COMPLY WITH AS/NZS 4130.
3. FITTINGS USED ON PE PIPE SHALL COMPLY WITH AS 2129.
4. THE PE COMPOUND SHALL BE PE100 AND SHALL COMPLY WITH AS/NZS 4131.
5. PIPE SIZES HAVE BEEN SELECTED IN ACCORDANCE WITH TABLE A2 OF WSA01-2001 TO BE EQUIVALENT TO SERIES 2 CLASS 16 PVC PRESSURE PIPE TO AS/NZS 1477.
6. PE MAY BE COLD BENT TO A MINIMUM RADIUS AS SPECIFIED BY THE SUPPLIER.
7. ALLOWANCE SHALL BE MADE DURING CONSTRUCTION FOR EXPANSION AND CONTRACTION OF PE PIPE DUE TO TEMPERATURE CHANGES.
8. THE PRESSURE RATING OF PE PIPES AND FITTINGS HAVE BEEN DETERMINED IN ACCORDANCE WITH SECTION 2.10 OF WSA01-2001 AND AS/NZS 4130. PE PIPE SHALL BE BLACK PIPE WITH BLUE STRIPES.
9. PE PIPE AND FITTINGS SHALL BE STORED ON SITE IN ACCORDANCE WITH SECTION 2.4 OF WSA01-2001.
10. INSTALLATION OF PE PIPE SHALL BE IN ACCORDANCE WITH AS/NZS 2566.2.
11. DETECTABLE TRACER TAPE SHALL BE PROVIDED ON TOP OF THE PIPE EMBEDMENT MATERIAL OR 1.0 METRE BELOW THE FINISHED SURFACE LEVEL, WHICHEVER IS HIGHER.
12. DETECTABLE TAPE SHALL BE GREEN IN COLOUR WITH THE INSCRIPTION "CAUTION - WATER MAIN BELOW", 100MM WIDE PE TAPE WITH 316 STAINLESS STEEL WIRE INSERT.
13. JOINTING SHALL BE BY BUTT-FUSION WELDING METHOD UNLESS NOTED OTHERWISE.
14. BUTT-FUSION WELDING SHALL BE CERTIFIED AND ACCREDITED IN ACCORDANCE WITH SECTION 6 OF WSA01-2001. PRE-QUALIFICATION OF THE BUTT-FUSION WELDING TECHNIQUE SHALL BE OBTAINED FROM SHOALHAVEN WATER, PRIOR TO COMMENCEMENT OF WORKS. REFER TO SECTION 2.12.2 OF WSA01-2001.
15. TESTING OF WORKS SHALL BE UNDERTAKEN IN ACCORDANCE WITH SECTION 2.13 OF WSA01-2001.
16. ALL FLANGE BACKING PLATES, NUTS & BOLTS ARE TO BE 316 STAINLESS STEEL.
17. ALL PE CONNECTIONS TO HAVE 316 STAINLESS STEEL BACKING PLATE AND PE STUB FLANGE WELDED TO THE MAIN.

- APPROVED FOR USE -

Shoalhaven City Council

PLAN REFERENCE 5565_12

LEGEND

- S — EXISTING SEWER MAIN
- W — EXISTING WATER MAIN
- T — EXISTING TELECOMMS LINE
- E(O/H) — EXISTING ELECTRICAL (OVERHEAD)
- EXISTING PROPERTY BOUNDARY
- PROPOSED 125mmHDPE WATERMAIN
- PROPOSED BATTER EXTENTS
- PROPOSED LAYBACK KERB
- PROPOSED STORMWATER PIPE
- EXISTING TREE TO BE RETAINED

0 10 20 30 40 50m

SCALE 1:500 (A1), 1:1000 (A3)

Rev.	Amendments	Approved	Date
1	FOR COMMENT	P.LITTLE	12.08.2022
2	FOR COMMENT	P.LITTLE	1.09.2022
A	FOR CONSTRUCTION	P.LITTLE	24.11.2022

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RESIDENTIAL - COMMERCIAL - INDUSTRIAL

SERVICES PLAN

PROJECT: HAYWARD STREET DRAINAGE UPGRADE
AT: HAYWARD STREET, CONJOLA PARK
FOR: SHOALHAVEN CITY COUNCIL

Design: B.ASHE	
Drawn: B.ASHE	
Checked: P.LITTLE	
Date: 24.11.2022	
Drawing No. 22222/C12	Rev A

- APPROVED FOR USE -

Shoalhaven City Council

PLAN REFERENCE 5565_13

Project Mark ID	SCIMS Mark ID	Type	Origin	Phase 1 - Investigation									Field Audit		Phase 2 - Proposed Impact		
				Coordinates					GDA			AHD					
				Datum	Easting	Northing	Zone	Coord Source	Class	PU	LU	RL	Class	PU	LU	Mark Status	Search Date	Pre-Construction Audit		
																		Mark Status	Project Impact	Inspection Date
3	**PM106066**	**PM**	**SCIMS**	**GDA94**	**267234.55**	**6094973.685**	**56**	**SCIMS**	**B**			**11.544**	**B**			**Found**	**12/10/2021**	**Found Intact**	**Safe**	
100	**PMFD/106065**	**PM**	**SCIMS**	**GDA94**	**267443.195**	**6094947.882**	**56**	**Traverse**	**B**			**13.598**	**B**			**Found**	**12/10/2021**	**Found Intact**	**Safe**	
129	**SSMFD/112488**	**SSM**	**SCIMS**	**GDA94**	**267229.967**	**6094788.763**	**56**	**Traverse**	**B**			**18.563**	**B**			**Found**	**12/10/2021**	**Found Intact**	**Safe**	
122		**GIP**	**DP703426**	**GDA94**	**267247.18**	**6094984.231**	**56**	**Traverse**								**Found**	**12/10/2021**	**Found Intact**	**Safe**	
126		DHW	DP802244	GDA94	267203.583	6094835.073	56	Calculated								Destroyed	12/10/2021	Destroyed	Already Gone	
127		DHW	DP802244	GDA94	267200.982	6094845.117	56	Calculated								Destroyed	12/10/2021	Destroyed	Already Gone	
128		**DHW**	**DP1119827**	**GDA94**	**267173.898**	**6094860.83**	**56**	**Traverse**								**Found**	**12/10/2021**	**Found Intact**	**Safe**	
633		**GIP**	**DP703426**	**GDA94**	**267261.31**	**6095053.49**	**56**	**Traverse**								**Found**	**12/10/2021**	**Found Intact**	**Safe**	
13		GIP	CP4253-2013	GDA94	267247.223	6094961.233	56	Calculated								Destroyed	12/10/2021	Destroyed	Already Gone	
11		GIP	CP4253-2013	GDA94	267233.17	6094868.999	56	Calculated								Destroyed	12/10/2021	Destroyed	Already Gone	
12		GIP	CP4253-2013	GDA94	267233.135	6094891.984	56	Calculated								Destroyed	12/10/2021	Destroyed	Already Gone	
10		**GIP**	**CP4253-2013**	**GDA94**	**267222.01**	**6094795.757**	**56**	**Calculated**								**Not Found**	**12/10/2021**	**Not Searched**		

SURVEY MARK AUDIT SCHEDULE

SCALE: 1:500

Rev.	Amendments	Approved	Date
1	FOR COMMENT	P.LITTLE	12.08.2022
2	FOR COMMENT	P.LITTLE	1.09.2022
A	FOR CONSTRUCTION	P.LITTLE	24.11.2022

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SURVEY MARK AUDIT SCHEDULE

PROJECT: HAYWARD STREET DRAINAGE UPGRADE
AT: HAYWARD STREET, CONJOLA PARK
FOR: SHOALHAVEN CITY COUNCIL

Design: B.ASHE
Drawn: B.ASHE
Checked: P.LITTLE
Date: 24.11.2022
Drawing No. 22222/C13
Rev A

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 searched on the 18 October 2022. 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).

Endangered Ecological Community name	***Status***	***Likelihood of presence within areas impacted by the activity***
Bangalay Sand Forest of the Sydney Basin and South East Corner Bioregions	Endangered - *NSW* BC *Act*	Does not occur on-site and is not mapped as occurring in close proximity to the site.
Coastal Saltmarsh in the NSW North Coast, Sydney Basin and South East Corner Bioregions	Endangered - *NSW* BC *Act* Vulnerable - Commonwealth *EPBC Act*	Does not occur on-site and is not mapped as occurring in close proximity to the site.
Freshwater wetlands on coastal floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions	Endangered - *NSW* BC *Act*	Does not occur on-site and is not mapped as occurring in close proximity to the site.
Illawarra Lowlands Grassy Woodland in the Sydney Basin Bioregion	Endangered - NSW BC Act Critically Endangered - Commonwealth EPBC Act	Does not occur on-site and is not mapped as occurring in close proximity to the site.
Illawarra Subtropical Rainforest in the Sydney Basin Bioregion	Endangered - *NSW* BC *Act* Critically Endangered - Commonwealth *EPBC Act*	Does not occur on-site and is not mapped as occurring in close proximity to the site.
Littoral Rainforest in the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	Endangered - NSW BC Act Critically Endangered - Commonwealth EPBC Act	Does not occur on-site and is not mapped as occurring in close proximity to the site.

Swamp oak floodplain forest of the NSW North Coast, Sydney Basin and South East Corner bioregions	Endangered - *NSW* BC *Act* Endangered - Commonwealth *EPBC Act*	Does not occur on-site and is not mapped as occurring in close proximity to the site.
Swamp sclerophyll forest on coastal floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions	Endangered - NSW BC Act	Does not occur on-site and is not mapped as occurring in close proximity to the site.

Species name	***Status***	***Habitat requirements (www.environment.nsw.gov.au)***	***Likelihood of presence within areas impacted by the activity***
FLORA			
Scrub Turpentine *Rhodamnia rubescens*	Endangered NSW BC Act and Critically Endangered EPBC Act	Species is found in littoral, warm temperate and subtropical and wet sclerophyll forest usually on volcanic and sedimentary soils.	Unlikely to occur. No suitable habitat present within the site. Not observed during site inspections.
AMPHIBIANS			
Green and Golden Bell Frog *Litoria aurea*	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).	Unlikely to occur. No suitable habitat present within the site.
BIRDS			
White-throated Needletail *Hirundapus caudacutus*	Vulnerable and 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	Possibly occurring over or in proximity to the site, but unlikely to utilise or rely on available habitat within the site.

		exhibited by the species. Although they occur over most types of habitat, they are probably recorded most often above wooded areas, including open forest and rainforest, and may also fly between trees or in clearings, below the canopy, but they are less commonly recorded flying above woodland. They also commonly occur over heathland, but less often over treeless areas, such as grassland or swamps. When flying above farmland, they are more often recorded above partly cleared pasture, plantations or remnant vegetation at the edge of paddocks. In coastal areas, they are sometimes seen flying over sandy beaches or mudflats, and often around coastal cliffs and other areas with prominent updraughts, such as ridges and sand-dunes. They are sometimes recorded above islands well out to sea.	
Black Bittern *Ixobrychus flavicollis*	Vulnerable NSW BC Act	The Black Bittern inhabits both terrestrial and estuarine wetlands, generally in areas of permanent water and dense vegetation. Where permanent water is present, the species may occur in flooded grassland, forest, woodland, rainforest and mangroves. Roosts in trees or on ground amongst dense reeds, nests in branches overhanging water	Unlikely to occur within the site. No suitable breeding or foraging habitat present.
White-bellied Sea-Eagle *Haliaeetus leucogaster*	*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.	Possibly occurring over or in proximity to the site, but unlikely to utilise available habitat within the site. No breeding habitat.

Little Eagle *Hieraaetus morphnoides*	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 over or in proximity to the site, but unlikely to utilise available habitat within the site. No stick nests in proposed works site.
Square-Tailed Kite *Lophoictinia isura*	*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 within 200m of riparian areas, near watercourses, in a fork or on large horizontal limbs.	Possibly occurring over or in proximity to the site, but unlikely to utilise available habitat within the site.
Eastern Osprey *Pandion cristatus*	Vulnerable NSW BC *Act*	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.	Possibly occurring over or in proximity to the site, but unlikely to utilise available habitat within the site. No stick nests in proposed works site.
Sooty Oystercatcher *Haematopus fuliginosus*	Vulnerable NSW BC *Act*	Shore bird. Found around the entire Australian coast, including offshore islands, being most common in Bass Strait. Small numbers of the species are evenly distributed along the NSW coast. The availability of suitable nesting sites may limit populations. Favours rocky headlands, rocky shelves, exposed reefs with rock pools, beaches and muddy estuaries. Forages on exposed rock or coral at low tide for foods such as limpets and mussels. Breeds in spring and summer, almost exclusively on offshore islands, and occasionally on isolated promontories. The nest is a shallow scrape on the ground, or small mounds of pebbles, shells or seaweed when nesting among rocks.	Unlikely to occur. No suitable habitat present within the site.
Pied Oystercatcher *Haematopus longirostris*	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	Unlikely to occur. No suitable habitat present within the site.

		saltmarsh or grassy areas. Nests are shallow scrapes in sand above the high tide mark, often amongst seaweed, shells and small stones.	
Eastern Hooded Dotteral (Hooded Plover) *Thinornis cucullatus cucullatus*	*NSW* BC *Act:* Critically Endangered *EPBC Act:* Vulnerable	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 rain. At night they favour the upper zones of beaches for roosting. When on rocks they forage in crevices in the wave-wash or spray zone, avoiding elevated rocky areas and boulder fields. In coastal lagoons they forage in damp or dry substrates and in shallow water, depending on the season and water levels. In eastern Australia, Hooded Plovers usually breed from August to March on sandy ocean beaches strewn with beachcast seaweed, in a narrow strip between the high-water mark and the base of the fore-dunes. They often nest within 6 m of the fore-dune, mostly within 5 m of the high-water mark, but occasionally among or behind dunes.	Unlikely to occur. No suitable habitat present within the site.
Eastern Curlew *Numenius madagascariensis*	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. The birds are also found in saltworks and sewage farms (Marchant &	Unlikely to occur within the site. No suitable habitat present.

		Higgins 1993). The numbers of Eastern Curlew recorded during one study were correlated with wetland areas. Mainly forages on soft sheltered intertidal sandflats or mudflats, open and without vegetation or covered with seagrass, often near mangroves, on saltflats and in saltmarsh, rockpools and among rubble on coral reefs, and on ocean beaches near the tideline. The birds are rarely seen on near-coastal lakes and in grassy areas. Roosts on sandy spits and islets, especially on dry beach sand near the high-water mark, and among coastal vegetation including low saltmarsh or mangroves. It occasionally roosts on reef-flats, in the shallow water of lagoons and other near-coastal wetlands. Eastern Curlews are also recorded roosting in trees and on the upright stakes of oyster-racks.	
Little Tern *Sternula albifrons*	Endangered NSW BC Act Migratory EPBC Act	Mostly exclusively coastal, preferring sheltered environments; however may occur several kilometres from the sea in harbours, inlets and rivers (with occasional offshore islands or coral cay records). Nests in small, scattered colonies in low dunes or on sandy beaches just above the high tide mark near estuary mouths or adjacent to coastal lakes and islands. Nests in a scrape in the sand, which may be lined with shell grit, seaweed or small pebbles.	Unlikely to occur within the site. No suitable habitat present.
Gang-gang Cockatoo *Callocephalon fimbriatum*	Vulnerable NSW BC Act	Tall mountain forests and woodlands, particularly in heavily timbered and mature wet sclerophyll forests. In winter, may occur at lower altitudes in drier more open eucalypt forests and woodlands, and often found in urban areas. preferring more open eucalypt forests and woodlands, particularly in box-ironbark assemblages, or in dry forest in coastal areas. Favours old growth attributes for nesting and roosting	Suitable foraging habitat present. Species has potential to occur in the activity area. Impact assessment is provided in Section 3.3.2
Glossy Black-cockatoo *Calyptorhynchus lathami*	Vulnerable NSW BC Act	The species inhabits open forest and woodlands of the coast where stands of she-oak occur. In the locality the species feed almost exclusively on the seeds of the black she-oak *Allocasuarina littoralis* shredding the cones with their bill.	Unlikely to occur within the site. No suitable habitat present. No breeding or foraging habitat present.

Little Lorikeet *Glossopsitta discolor*	Vulnerable NSW BC Act	The Little Lorikeet is distributed widely across the coastal and Great Divide regions of eastern Australia from Cape York to South Australia. NSW provides a large portion of the species' core habitat. Forages primarily in the canopy of open *Eucalyptus* forest and woodland, yet also finds food in *Angophora, Melaleuca* and other nectar and fruit bearing trees. Riparian habitats are particularly used, due to higher soil fertility and hence greater productivity.	Unlikely to occur within the site. No suitable habitat present. No breeding or foraging habitat present.
Swift Parrot *Lathamus discolour*	Endangered EPBC Act Endangered NSW BC Act	Migrates to the Australian south-east mainland between March and October. On the mainland they occur in areas where eucalypts are flowering profusely or where there are abundant lerp (from sap-sucking bugs) infestations. Favoured feed trees include winter flowering species such as Swamp Mahogany *Eucalyptus robusta*, Spotted Gum *Corymbia maculata*, Red Bloodwood *C. gummifera*, Mugga Ironbark *E. sideroxylon*, and White Box E. albens. Commonly used lerp infested trees include Inland Grey Box E. microcarpa, Grey Box E. moluccana and Blackbutt E. pilularis. Return to some foraging sites on a cyclic basis depending on food availability. Following winter they return to Tasmania where they breed from September to January, nesting in old trees with hollows and feeding in forests dominated by Tasmanian Blue Gum Eucalyptus globulus.	Suitable foraging habitat present. Species has potential to occur in the activity area. Impact assessment is provided in Section 3.3.2.
Barking Owl *Ninox connivens*	Vulnerable NSW BC Act	The Barking Owl inhabits woodland and open forest, including fragmented remnants and partly cleared farmland. It is flexible in tis habitat use, and hunting can extend in to closed forest and more open areas. Sometimes able to successfully breed along timbered watercourses in heavily cleared habitats (*e.g.* western NSW) due to the higher density of prey found on these fertile riparian soils. Roosts in shaded portions of tree canopies, including tall midstorey trees with dense foliage such as *Acacia* and *Casuarina* species. Breeds in hollows of large, old trees	Possibly occurring over or in proximity to the site, but unlikely to utilise available habitat within the site. No breeding habitat (hollow-bearing trees).
Powerful Owl *Ninox strenua*	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	Possibly occurring over or in proximity to the site, but unlikely to utilise available habitat within

		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	the site. No breeding habitat (hollow-bearing trees).
Sooty owl *Tyto tenebricosa*	Vulnerable NSW BC Act	Occurs in rainforest, including dry rainforest, subtropical and warm temperate rainforest, as well as moist eucalypt forest.	Unlikely to occur within the site. No suitable habitat present.
Brown Treecreeper *Climacteris picumnus victoriae*	Vulnerable NSW BC Act	The Brown Treecreeper is found in eucalypt woodlands (including Box-Gum Woodland) and dry open forest of the inland slopes and plains inland of the Great Dividing Range; mainly inhabits woodlands dominated by stringybarks or other rough-barked eucalypts, usually with an open grassy understorey, sometimes with one or more shrub species; also found in mallee and River Red Gum Forest bordering wetlands.	Suitable foraging habitat present. Species has potential to occur in the activity area. Impact assessment is provided in Section 3.3.2.
Varied Sittella *Daphoenositta chrysoptera*	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	Suitable foraging habitat present. Species has potential to occur in the activity area. Impact assessment is provided in Section 3.3.2.
Scarlet Robin *Petroica boodang*	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. Scarlet Robin habitat usually contains abundant logs and fallen timber: these are important components of its habitat.	Unlikely to occur within the site. No suitable habitat present.
Pink Robin *Petroica rodinogaster*	Vulnerable NSW BC Act	The Pink Robin inhabits rainforest and tall, open eucalypt forest, particularly in densely vegetated gullies.	Unlikely to occur within the site. No suitable habitat present.
MAMMALS			

Spotted-tailed Quoll *Dasyurus maculatus*	Vulnerable NSW BC Act and Endangered EPBC Act	The species has been 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. Quolls use hollow-bearing trees, fallen logs, other animal burrows, small caves and rock outcrops as den sites.	Unlikely to occur within the site. No suitable habitat present.
Grey-headed Flying-fox *Pteropus poliocephalus*	Vulnerable NSW BC Act and EPBC Act	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 kilometres of a regular food source and are commonly found in gullies, close to water, in vegetation with a dense canopy. The species feeds on the nectar and pollen of native trees, in particular *Eucalyptus, Melaleuca* and *Banksia,* and fruits of rainforest trees and vines	Suitable foraging habitat present. Species has potential to occur in the activity area. Impact assessment is provided in Section 3.3.2
Eastern Coastal Free-tailed Bat *Micronomus norfolkensis*	Vulnerable NSW BC Act	Occur in dry sclerophyll forest, woodland, swamp forests and mangrove forests east of the Great Dividing Range. Roosts mainly in tree hollows but will also roost under bark on in man-made structures.	Suitable foraging habitat present. Species has potential to occur in the activity area. Impact assessment is provided in Section 3.3.2
Eastern False Pipistrelle *Falsistrellus tasmaniensis*	Vulnerable NSW BC Act	Prefers moist habitats, with trees taller than 20m. Generally roosts in eucalypt hollows, but has also been found under loose bark on trees or in buildings.	Suitable foraging habitat present. Species has potential to occur in the activity area. Impact assessment is provided in Section 3.3.2
Southern Myotis *Myotis macropus*	Vulnerable NSW BC Act	Generally roost in groups of 10 to 15 close to water in caves, mine shafts, hollow-bearing trees, storm water channels, buildings, under bridges and in dense foliage.	Possibly occurring over or in proximity to the site, but unlikely to utilise available habitat within the site. No roosting habitat or food resources affected.
Greater Broad-nosed Bat *Scoteanax rueppellii*	Vulnerable NSW BC Act	The Greater Broad-nosed Bat is found mainly in the gullies and river systems that drain the Great Dividing Range. The species utilises a variety of habitats from woodland to moist and dry eucalypt forest and rainforest, though it is most commonly found in tall wet forests. Although this species usually roosts in tree hollows, it has been found in buildings.	Possibly occurring over or in proximity to the site, but unlikely to utilise available habitat within the site. No roosting habitat or food resources affected.

Large Bent-winged Bat *Miniopterus orianae oceanensis*	Vulnerable NSW BC Act	Caves are the primary roosting habitat, but also use derelict mines, stormwater tunnels, buildings and other man-made structures. The species form discrete populations centred on a maternity cave that is used annually. At other times of the year, populations disperse within about 300 km range of maternity caves.	Possibly occurring over or in proximity to the site, but unlikely to utilise available habitat within the site. No roosting habitat or food resources affected.
Southern Brown Bandicoot (eastern) *Isoodon obesulus obesulus*	Endangered NSW BC Act and EPBC Act	They are generally only found in heath or open forest with a heathy understorey on sandy or friable soils.	Unlikely to occur within the site. No suitable habitat present.
Koala *Phascolarctos cinereus*	Endangered NSW BC Act and EPBC Act	The koala inhabits eucalypt woodland and forests.	Unlikely to occur within the site. No suitable habitat present. Insufficient area of habitat disjunct from other areas of potential habitat.
Eastern Pygmy-possum *Cercartetus nanus*	Vulnerable NSW BC Act	Found in a broad range of habitats from rainforest through sclerophyll (including Box-Ironbark) forest and woodland to heath, but in most areas woodlands and heath appear to be preferred.	Unlikely to occur within the site. No suitable habitat present.
Yellow-bellied Glider *Petaurus australis*	Vulnerable NSW BC Act and EPBC Act.	Occurs in tall mature eucalypt forest generally in areas with high rainfall and nutrient rich soils. Feeds primarily on plant and insect exudates, including nectar, sap, honeydew and mana with pollen and insects providing protein	Unlikely to occur within the site. No suitable habitat present. No hollows suitable for the species is present in the activity area and no signs of feeding is apparent.
Squirrel Glider *Petaurus norfolkensis*	Vulnerable NSW BC Act	The Squirrel Gliders 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. Require abundant tree hollows for refuge and nest sites.	Unlikely to occur within the site. No suitable habitat present.
Greater Glider *Petauroides Volans*	Endangered EPBC Act	The greater glider is an arboreal nocturnal marsupial, predominantly solitary and largely restricted to eucalypt forests and woodlands of eastern Australia. It is typically found in highest abundance in taller, montane eucalypt forests of fertile soils with relatively old trees and abundant hollows.	Unlikely to occur within the site. No suitable habitat present.

Long-nosed Potoroo *Potorous tridactylus*	Vulnerable NSW BC Act and EPBC Act	The species inhabits coastal heaths and dry and wet sclerophyll forests. Dense understorey with occasional open areas is an essential part of habitat, and may consist of grass-trees, sedges, ferns or heath, or of low shrubs of tea-trees or melaleucas. A sandy loam soil is also a common feature.	Unlikely to occur within the site. No suitable habitat present.
Australian Fur-seal *Arctocephalus pusillus doriferus*	Vulnerable NSW BC Act	Prefers rocky parts of islands with flat open terrain.	Unlikely to occur within the site. No suitable habitat present.
Southern Right Whale *Eubalaena australis*	Endangered NSW BC Act and EPBC Act	Temperate and subpolar oceanic waters of the Southern Hemisphere, with a circumpolar distribution between about 20°S and 55°S with some records further south to 63°S.	Unlikely to occur within the site. No suitable habitat present.