ADDENDUM
REVIEW OF ENVIRONMENTAL FACTORS (REF)
SHARED USERS PATH AND BRIDGE
PATTIMORES LAGOON ENTRANCE WATERWAY
LAKE CONJOLA ENTRANCE ROAD
LAKE CONJOLA

This Addendum REF Document updates the initial REF with updated and detailed plans and inserts proposed methodology.

Contents

Document control

Item	Details
Project	Review of Environmental Factors – Shared Users Path and Bridge over Pattimores Lagoon Entrance Waterway – Lake Conjola Entrance road – Lake Conjola
Client	City Services, Shoalhaven City Council
Prepared By	City Services, Shoalhaven City Council

Document status

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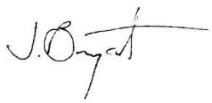
	Reviewer	Jeff Bryant		01/11/2022
V2.0	Author	Geoff Young		03/10/23

*Review and endorsement statement:

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

Assessment and approvals overview

Item	Details
Assessment type	Division 5.1 (EP&A Act) - Review of Environmental Factors (REF)
Proponent	Shoalhaven City Council
Determining authority / authorities	Shoalhaven City Council
Required approvals (consents, licences and permits)	“Fisheries Permit” – Section 200 of the NSW *Fisheries Management Act 1994*
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 construction of a shared users path (SUP) and SUP bridge over the Pattimores Lagoon entrance waterway (hereafter referred to as "the waterway"), on the northern side of Lake Conjola Entrance Road.

The activity would involve the following works (Refer to Figure 3 p.11 and Appendix A for details):

- The construction of approximately 129 metres of 2.5 metre wide concrete SUP at ground level (the path widens at Milham Street to 3.2 metres to provide for accessible kerb ramps).
- The construction of 10 metres of 2.5 metre wide raised walkway supported on screw piles.
- The installation of a 2.5 metre wide, 10 metre long single span steel truss SUP bridge with mini-mesh (or similar) supported by concrete abutments.
- Installation of signage, bollards and line-marking in accordance with relevant Austroads standards.
- Kerb and guttering along Lake Conjola Entrance Road
- Removal of approximately 25 Swamp Oaks *Casuarina glauca* and other native and non-native vegetation within area of about 370m^2.
- Removal of existing foot-bridge.

Works would also involve the implementation of prescribed safeguards and mitigation measures (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 proposed activity would be undertaken on the northern side of the Lake Conjola Entrance Road; east from Milham Street intersection to 97 Lake Entrance Road (from approx. CH5920 to CH6050) (Figure 1, Figure 2, and Figure 3). The activity would be conducted entirely within the road reserve and over the waterway that links the Lake Conjola Canal Estate and Pattimores Lagoon with the Lake Conjola waterbody.

Under the NSW *Roads Act 1993,* Shoalhaven City Council is the roads authority for Lake Conjola Entrance Road and Milham Street.

It is unclear whether the waterway is part of the Canal Estate, however for the purposes of this REF it considered to be a 'key fish habitat' for the purposes of the NSW *Fisheries Management Act 1994.*

1.3 Methodology

The proposed activity would follow the methodology below:

1. Commence side establishment and install environmental controls as per Site Establishment Plan (refer to Appendix A). This includes where applicable:
    a. Silt booms
    b. Sediment control
    c. Temporary fencing and bunting
    d. Signage
    e. Off site re-fuelling of equipment
2. Remove vegetation – prior to commencing construction works, trees will be removed by qualified arborists under guidance from Contractor.
3. Install abutments and footings either side of the waterway:
    a. A new concrete abutment on the western side would be constructed set back approximately 1 metre from the current water line.
    b. A new abutment with screw piles and drop edges would be constructed on the eastern side of the proposed bridge.
    c. Minor earthworks with a small excavator would be required to create footings for the abutments. All works would be above the water level, ad sediment booms would be positioned to limit the release of sediment into the waterway.
    d. Screw piling would be used to create a foundation for the abutments, as they are low impact and create less degradation than boring piles and filling with concrete.
    e. Concrete for the abutments would be boom pumped in from a safe location on the road. All blowdown and washout will be to plastic lined bins.
    f. Concrete to footings would be contained within a combination of formed up timber formwork and temporary formatube. Sub-contractors would be informed on the safe use of the boom pump and where possible, plastic would be laid around the surrounding areas to ensure minimal impact during concrete activities.
4. Install steel raised walkways:
    a. Raised walkways would come to site pre-assembled to minimise installation time onsite. This would include the micromesh, which would be cut and fitted within the construction compound to eliminate cuttings and sawdust from entering the waterway.
    b. Sections would be craned form the Lake Conjola Entrance Road to minimise the need for vehicles entering the waterway. Small sections of adjacent foliage on the eastern side may need to be trimmed as necessary between the road and the intended pathway to facilitate installation.
    c. Handrails would be installed following the installation of the raised sections. All handrails are bolted connections, and can be carried over the new path.
5. Supply and installation of Single-span bridge
    a. The bridge would be fabricated off-site and brought to site in one piece.
    b. The bridge would be assembled on the road, utilising a partial road closure. The micromesh and handrails would also be installed at this stage, to both eliminate

contaminants from entering the waterway, but also from a safety perspective of having pre-installed edge protection provided by the handrails.

c. A 160 tonne crane would set up on the southern side of the creek and install the bridge in one lift.

d. Placement of the bridge would be directly onto the prepared abutments.

6. Concrete path approaches to the bridge
    a. Concrete paths and balustrade would be constructed on both approaches to the bridge.
    b. A number of trees (shown in plans provided in Appendix A) would be removed to ensure the minimum 2.5 metre wide path is established.
    c. A boom spray would pump the concrete to the footpath, minimising overspray and allowing for more accurate placement.
    d. A modular balustrade will be installed to the bath approaching the bridge.
7. Stormwater
    a. A new 600mm stormwater line with pit riser would be installed on the western side of the bridge.
    b. Rip-rap would be placed adjacent to the outlet of the stormwater to act as a headwall.
    c. Appropriate back fill would be undertaken, with all treatment of acid sulfate soils in accordance with the Acid Sulfate Soil Management Plan.
8. Certification of works.
9. Decant, stabilise and dis-establish site.

1.4 Background, justification and analysis of alternatives

The purpose of the proposal is to address concerns raised by the local community regarding pedestrian and cyclists.

The existing road bridge over the waterway features a concrete pathway affixed to the bridge structure (refer photos in Section 2.6 of this REF). Although the existing pathway is in a fair condition, it is not compliant as a shared path in accordance with Austroads and AS1428 accessibility standards. As such, options for a compliant SUP solution adjacent to the existing were investigated.

Westlake Punnett and Associates (2022) identified the following key issues affecting design options:

- The existing pathway that crosses the waterway is only approximately 1.2 metres wide and is not suitable for all types of pedestrian and cyclist traffic.
- The Lake Conjola flood study indicates that the waterway can be subject to significant rises in water levels during flood events and as such there is a need to consider the minimum RL of the decking as well as the location of abutments to mitigate flood impacts and structural forces due to floodwaters, debris, and buoyancy.

- There is no kerb and gutter to the north-eastern side of the bridge for approximate length of 60 metres which is required to aid in defining the edge of the proposed shared use path.
- Existing plans (Bike Plans and the Pedestrian and Mobility Plan) that have previously been publicly exhibited and adopted, show the proposed path located on the northern side of the road.
- Operational water reticulation main and overhead powerlines run along the southern side of the road and bridge.

Other constraints or issues identified at the site include the:

- presence of protected marine vegetation (*Baumea juncea*) at the base of the road batter to the northeast of the existing bridge.
- presence of open stormwater drain and pipe system immediately north of the road where the path would be located.
- presence of utilities on the northern side of the bridge and road (telecommunications and water).

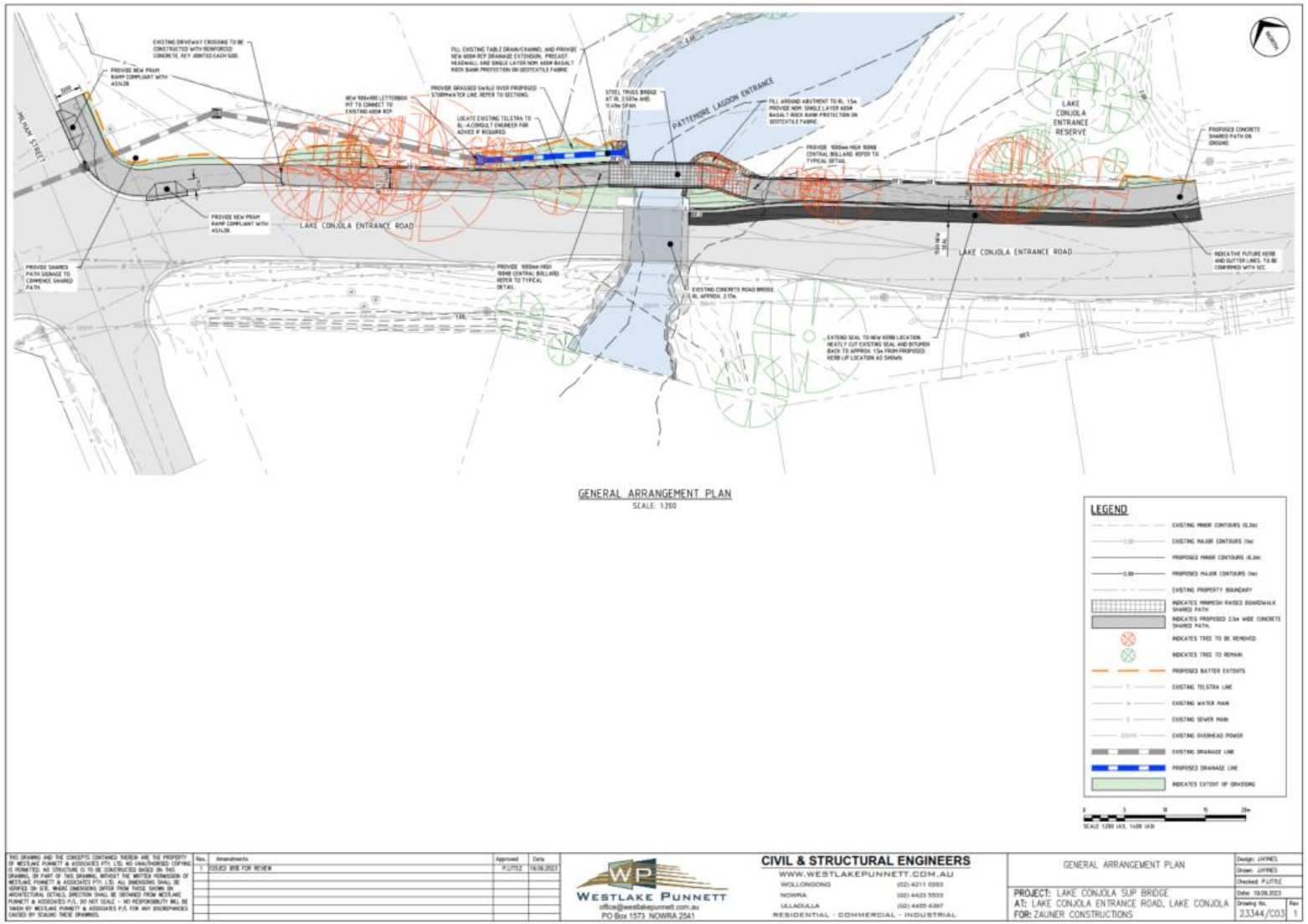
The design of the path and pedestrian bridge has considered and has addressed these constraints avoiding harm to protected marine vegetation, services and utilities, providing kerb and guttering, and mitigating any exacerbation of flooding impacts.

Because of the identified constraints there are no other suitable alternatives - other than not proceeding with the activity.

Figure 1: Location of the Proposed Activity

Figure 2: Location of the Proposed Activity

Figure 3: Extract of Plans (refer to Appendix A for full set of plans)



2. EXISTING ENVIRONMENT

The proposed activity would be conduct on the northern side of Lake Conjola Entrance Road in the vicinity of the Pattimores Lagoon entrance waterway.

Photographs of the site are provided in Section 2.5 below.

2.1 Habitat and vegetation assessment

The area affected by the proposal is on the interface of the waterway and Lake Conjola Entrance Road and is dominated by Swamp Oak *Casuarina glauca.* Other species in the area of the proposed activity include Sweet Pittosporum *Pittosporum undulatum,* Common Silkpod *Parsonia straminea* and the non-natives Kikuyu *Cenchrus clandestinus,* Asparagus Fern *Asparagus aethiopicus,* Cassia *Senna sp.,* and Date Palm *Phoenix canariensis.*

Baumea juncea, which has some protection under the NSW *Fisheries Management Act 1994,* is the dominant groundcover from the bottom of the road batter and within the tidal area of the waterway. The current extent of *Baumea juncea* is not expected to be impacted and protection measures will be employed to ensure that this vegetation is not impacted (refer to Section 7 of this REF).

The waterway would provide aquatic habitat for fish and benthic invertebrates. However, the impact would be minimal and temporary, relating only to construction of abutments, piles and associated pedestals. There would be no obstruction of fish passage.

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

Vegetation occurring on the subject land could comprise the endangered ecological community *Swamp Oak Floodplain Forest of the NSW North Coast, Sydney Basin and South East Corner Bioregions.* However, the area of impact that the proposed activity is on road-side reserve on imported road base material above the estuary and lake margin. The EEC is extent at the base of the road batters and is not expected to be impacted and protection measures will be employed to ensure that this vegetation is not impacted (refer to Section 7).

No hollow-bearing trees, stick nests, Glossy Black Cockatoo (*Calyptorhynchus lathami*) feed tree species (*i.e. Allocasuarina littoralis*) or Glider feed tree species (e.g. *Corymbia gummifera* or *Eucalyptus punctata*) occur within the site. No signs of potential threatened fauna use of the site were identified.

2.2 The Waterway

The waterway connects the Lake Conjola Canal Estate and Pattimores Lagoon to the Lake Conjola waterbody. The Lake in this location contains extensive deposits of sand swept in from the sea. Pattimores Lagoon may have been reopened during the development of the canal estate. The cadastre and the actual location of the waterway is mismatched due to previous intervention and modifications. For the purposes of this REF, it is assumed that waterway below the proposed bridge is crown land with SCC controlled land either side and above it as road reserve or community land.

The waterway is tidal when Lake Conjola is open to the sea and depth would fluctuate generally below one metre.

Despite historical intervention and modification, and potentially being part of the canal estate the waterway represents Class 1 Waterway (major key fish habitat) with Type 2 (moderately sensitive key fish habitat) as set out in NSW Department of Primary Industries' *Policy and Guidelines for*

Fish Habitat Conservation and Management (DoPI 2013). A single span bridge without obstructions in the waterway is considered appropriate for such waterway categories.

There are no seagrasses or mangroves within the waterway at the subject location. There is no saltmarsh at the edge of the waterway that would be affected by the proposed activity.

Baumea juncea (protected marine vegetation) exists on the shores of the waterway downstream of the works and below the road embankment, however this would not be impacted.

2.3 Potentially Contaminated Land

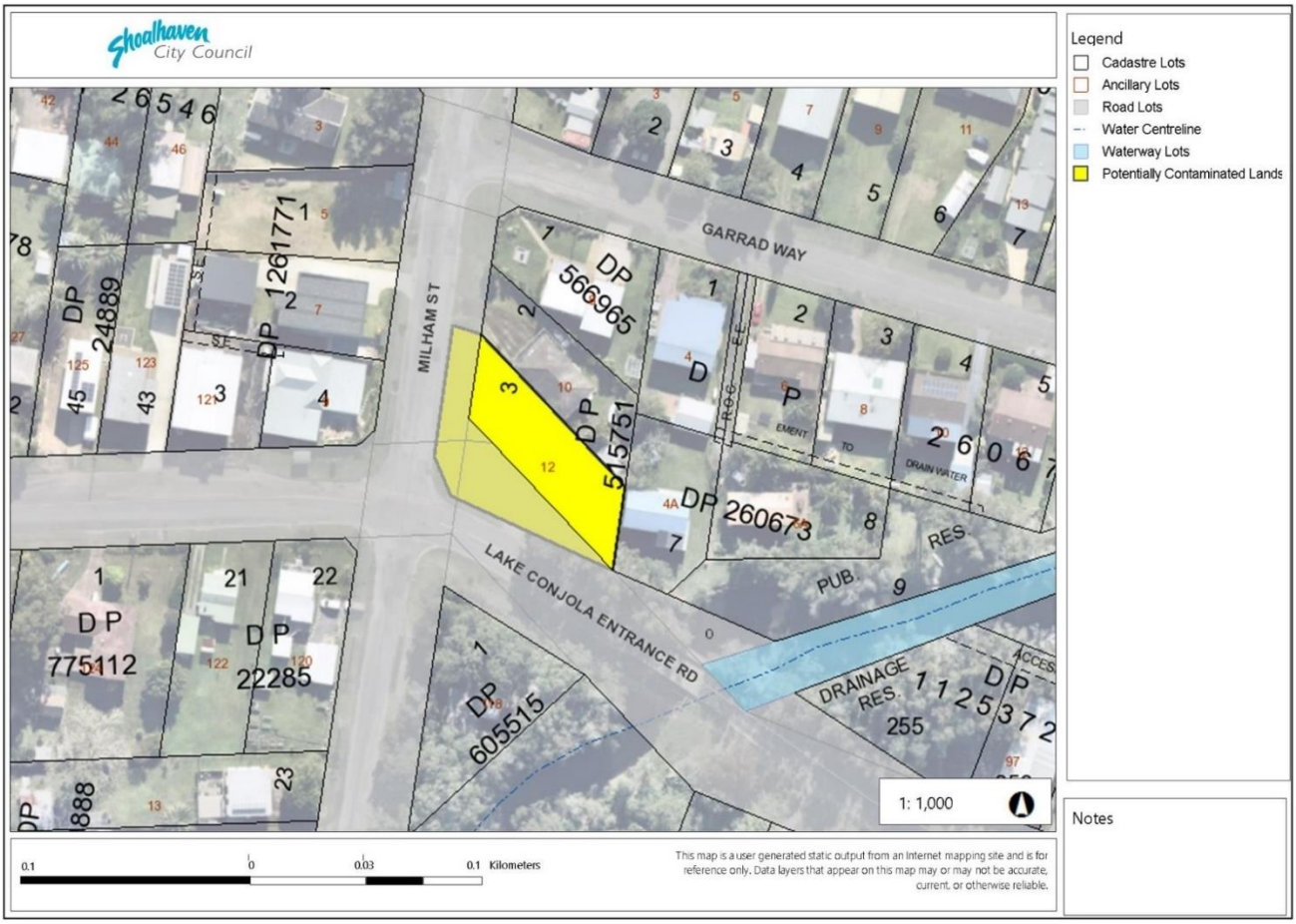
A PCL (Potentially Contaminated Land) layer, recorded by SCC, exists over the road reserve east of Milham Street intersection and over 12 Milham Street (Figure 4 below). This relates to the possible use of the land as a petrol station including the potential for an underground fuel storage tank (refer to SCC document D10/14103).

The location of tanks and whether they remain in situ is unknown. Apart from anecdotal evidence there are no planning records indicating that a petrol station with underground storage tanks was approved or existed at the site. If the site was used to supply petrol, it was likely to be supplied through drums and the potential for underground tanks is low.

Excavation works for the concrete shared path in this area would be shallow and restricted to within three metres from the edge of the roads where storage tanks would unlikely to have been installed.

Despite low potential for underground tanks, contractors will be made aware of this risk and will be advised to stop work if encountered.

Figure 4 Potential Contaminated Land record



2.4 Subsurface

The site is underlain by estuarine plains and tidal-delta flats of Holocene (recent) age comprising marine sands, silts, clays, shells and gravels. This material is visible in and on the edges of the waterway where piling and abutments for the bridge would occur. This material would have a high potential for acid sulfate soils to be present. A waste and acid sulfate soil management plan shall be developed for the management of any spoil extracted from the creek area.

The roadsides, where the concrete path would be constructed, appear to be material imported for the construction of the road and vehicle bridge approaches comprising grey sandy gravel fill with some cobbles. The risk of acid sulfate soils is much less in this area.

2.5 Flooding

The proposed activity would be within flood liable land with the soffit and finished surface level below the 2% Annual Exceedance Probability (AEP) level.

The soffit of the proposed SUP bridge would also be located below the 10% AEP peak flood level, but still above the existing road bridge levels. Hence for smaller AEP flood events, the proposed SUP bridge is unlikely to have any adverse flood impacts.

2.6 Photos

Photo 1. The existing bridge and waterway. Photo taken from the north-eastern side of the proposed works. Also showing the Swamp Oaks that would require removal

Photo 2. On the existing bridge looking east. Conceptually showing approximate route of shared path

Photo 3. Location of proposed 2.5 metre wide concrete path east from Milham Street approaching the bridge. Also showing large Swamp Oaks that will require removal and residential driveway that will require engagement with the resident to minimise access disruptions.

Photo 4. Swamp Oak on the western side of the road which will require removal.

Photo 5. The drain on the north-western side of the bridge. The pipe will be extended, the channel filled and headwall fitted with rock scour protection at the waterway.

Photo 6. On the existing bridge looking west. Conceptually showing approximate route of shared path bridge

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 25 Swamp Oaks *Casuarina glauca* within an area of about 370m^2. This includes eight trees at or larger than 400mm diameter at breast height (dbh).
- Removal of other native and non-native vegetation in that 370m^2 area.
- Infilling of a stormwater drainage channel connecting to the waterway.
- Reclamation of the waterway with headwall and rock scour protection for the extended stormwater pipe.
- Reclamation of the waterway with concrete abutments, screw piles and associated concrete pedestals.

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

- impact on threatened species and endangered ecological communities
- impacts on protected marine vegetation
- disturbance of acid sulfate soils
- impacts on water quality, the riparian zone and key fish habitat
- exacerbation of flooding impacts

Each of these is discussed below.

3.2 Threatened species impact assessment (NSW)

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

3.2.1 Part 7A *Fisheries Management Act 1994*

Part 7A relates to threatened species conservation.

Greynurse Shark *Carcharias taurus* have been known to enter Lake Conjola from their preferred habitat around Green Island when the entrance is open to the sea.

Greynurse Sharks are typically found near the bottom (at depths of 10 to 40 metres) in deep sandy or gravel filled gutters, or in rocky caves (DoPI 2013b) this habitat is not present at the site of the proposed activity.

No other species, populations or ecological communities listed in the schedules of the Act are anticipated to occur the subject waterway connecting Pattimores Lagoon and Lake Conjola.

The proposal is therefore unlikely to result in any impact on threatened species or their habitat.

As demonstrated in Table 1 below, the proposed activity would not contribute significantly to key threatening processes, as listed under Part 7A of the Act.

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

Table 1: Key threatening processes – Fisheries Management Act 1994

Key Threatening Process (KTP)	Assessment
Degradation of native riparian vegetation along the NSW water courses	Not applicable – The subject waterway is estuarine. Estuarine and marine waters are excluded from this KTP as the degradation of riparian vegetation in these areas does not adversely affect two or more listed threatened species, populations or ecological communities (Fisheries Scientific Committee 2007).
Hook and line fishing in areas important for the survival of threatened fish species.	Not applicable – the proposed activity does not involve hook and line fishing.
Human-caused climate change.	Not applicable – the proposed activity would not contribute significantly to climate change and would not prevent implementation of the relevant Priorities Action Statement.
Installation and operation of instream structures and other mechanisms that alter natural flow regimes of rivers and streams.	Not applicable – Although concrete abutments would be installed within the waterway, these are only minor (400 mm wide) and set on the edges of the waterway. Any change in flow regime would be insignificant. Bridges and other similar structures that have minimal impact on flow are excluded from the KTP (Fisheries Scientific Committee 2006). The waterway is also unlikely to be a natural waterway being recreated through the establishment of the Canal Estates.
Introduction of fish to waters within a catchment outside their natural range.	Not applicable – the proposed activity does not involve the introduction and movement of fish.
Introduction of non-indigenous fish and marine vegetation to the coastal waters of New South Wales.	Not applicable – the proposed activity does not involve the introduction and movement of non-indigenous fish or marine vegetation.
Removal of large wood debris from New South Wales and rivers and streams.	Not applicable – Currently there is no woody debris present in the works area. The prescribed environmental safeguards (Section 7 of this REF) also require that no woody debris is to be removed from the waterway.
The current shark meshing program in New South Wales waters	Not applicable – the proposed activity does not involve shark meshing.

3.2.2 Part 7 *Biodiversity Conservation Act 2016*

An assessment of the potential for NSW threatened flora and fauna species occurring on-site or otherwise being impacted by the proposal was undertaken (refer to Appendix B). The following threatened species or endangered ecological communities are known to occur on-site or are considered to have some potential to occur on-site or be otherwise impacted by the proposal:

- Swamp oak floodplain forest of the NSW North Coast, Sydney Basin and South East Corner bioregions
- Pied Oystercatcher *Haematopus longirostris* – E
- Lesser Sand-plover *Charadrius mongolus* – V
- Eastern Hooded Dotteral (Hooded Plover) *Thinornis cucullatus cucullatus* (syn*Thinornis rubricollis*) – CE
- Southern Myotis *Myotis Macropus* – V

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

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.

Pied Oystercatcher, Lesser Sand-plover, and Eastern Hooded Dotteral *i.e.* shore-birds with potential foraging habitat on or in proximity to the site

Pied Oystercatcher

The Pied Oystercatcher is distributed around the entire Australian coastline, although it is most common in coastal Tasmania and parts of Victoria. In NSW, the species is thinly scattered along the entire coast, with fewer than 200 breeding pairs estimated to occur in the State. The bird favours intertidal flats of inlets and bays, open beaches and sandbanks. It forages on exposed sand, mud and rock at low tide, for molluscs, worms, crabs and small fish. It nests mostly on coastal or estuarine beaches although occasionally they use saltmarsh or grassy areas. Nests are shallow scrapes in sand above the high tide mark, often amongst seaweed, shells and small stones (OEH 2021a).

SAII: not applicable.

Lesser Sand-plover

The Lesser Sand-plover breeds in central and north-eastern Asia, migrating further south for winter. In Australia the species is found around the entire coast but is most common in the Gulf of Carpentaria, and along the east coast of Queensland and northern NSW. Individuals are rarely recorded south of the Shoalhaven estuary, and there are few inland records. Almost entirely coastal in NSW, favouring the beaches of sheltered bays, harbours and estuaries with large intertidal sandflats or mudflats; occasionally occurs on sandy beaches, coral reefs and rock platforms. Highly gregarious, frequently seen in flocks exceeding 100 individuals; also often seen foraging and roosting with other wader species. Roosts during high tide on sandy beaches, spits and rocky shores; forage individually or in scattered flocks on wet ground at low tide, usually away from the water's edge. Diet includes insects, crustaceans, molluscs and marine worms. Prey is usually detected visually with the birds making short, quick runs, with abrupt stops to lunge at the ground or look for prey (OEH 2021b). SAII: Not applicable

Eastern Hooded Dotteral

The Eastern Hooded Dotteral (Hooded Plover) *Thinornis cucullatus cucullatus* (syn*Thinornis rubricollis*) is endemic to southern Australia and is found mainly along the coast from south of Jervis Bay, NSW, south through Victoria and Tasmania to the western side of the Eyre Peninsula (South Australia). Presently the Hooded Plover occurs in NSW north to Sussex Inlet. Occasionally, individual birds are sighted slightly further north to the Shoalhaven River and Comerong Beach and one bird was sighted at Lake Illawarra in March 2001. 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. Hooded Plovers are seen singly, in pairs, family groups or small flocks, with 16 birds at Cudmirrah Beach being the largest group recorded in NSW in recent years. During winter, very few birds are seen in pairs. The Hooded Plover diet consists mainly of marine worms, molluscs, crustaceans, insects, water plants and seeds. 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. The nest is a scrape in the sand near debris, making it vulnerable to predators and beach disturbance. Both parents incubate 2-3 eggs for a period of 28 days and share the care of the young. Hooded Plovers display high nest site fidelity and nest solitarily. On mainland Australia, nests may be 2-5 km apart (OEH 2021c).

SAII: Breeding – Clearing in mapped areas could constitute a Serious and Irreversible Impact.

Test of significance

None of these species have been recorded in proximity to the site.

Lesser Sand-plovers do not breed in Australia, so no direct impacts to nesting or breeding activities are likely.

Breeding habitat for the Pied Oystercatcher and the Dotteral is not present at the site. The mudflats below the batter of the road represent potential foraging habitat only. The activity would have no to minimal impact on this potential foraging habitat with the majority of works being conducted on the verge of Lake Conjola Entrance Road. Measure would also be in place to prevent inadvertent harm to the mudflats including the provision of high-visibility bunting and exclusion signage (refer to Section 7 of this REF).

It is therefore considered unlikely that and significant impact on Eastern Hooded Dotteral, Lesser Sand-plover, or Pied Oystercatcher would occur as a result of the proposed activity. As species impact statement (SIS) or entry into the Biodiversity Offset Scheme is therefore not required.

Southern Myotis

The Southern Myotis is found in coastal band from the north-west of Australia, across the top-end and south to western Victoria. The species generally roosts 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. It feeds over streams and pools catching insects and small fish by raking their feet across the water surface.

Test of Significance

Although the species is likely to occur in the locality and the locality providing suitable habitat, it is considered unlikely that the Southern Myotis would be impacted by the proposed activity such that a viable local population of this species is likely to be placed at risk of extinction for the following reasons:

- No roosting habitat would be removed *i.e.* there are no hollow-bearing trees and the existing bridge structure would remain.
- Foraging habitat would not be impacted or significantly reduced.
- Prey species would not be impacted or significantly reduced.
- Removal of trees would occur during typical construction work hours and is therefore unlikely to impact nocturnal foraging activities of this species.

The proposed activity would modify some potential foraging habitat through the removal of a she-oaks along the road. The waterway, however, would retain a treed canopy and extensive treed areas would remain in the immediate vicinity. The removal of some trees would represent only a negligible reduction in the available foraging habitat in the locality. The proposal would not significantly exacerbate fragmentation of habitat or severing of movement corridors.

As species impact statement (SIS) or entry into the Biodiversity Offset Scheme is therefore not required.

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

Three endangered ecological communities are mapped as occurring in the landscape surrounding the site (refer to Figure 5 below).

- Bangalay Sand Forest of the Sydney Basin and South East Corner Bioregions ('Bangalay Sand Forest)
- Swamp Oak Floodplain Forest of the NSW North Coast, Sydney Basin and South East Corner bioregions ('Swamp Oak Floodplain Forest')
- Swamp Sclerophyll Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions ('Swamp Sclerophyll Forest').

The proposed activity lies within 115 metres to the north of mapped Swamp Oak Floodplain Forest.

Swamp Oaks dominate the subject land with approximately 25 Swamp Oaks requiring removal.

Swamp Oak Floodplain Forest is the name given to the ecological community associated with grey-black clay loams and sandy loams, where the groundwater is saline or subsaline, on waterlogged or periodically inundated flats, drainage lines, like margins and estuarine fringes

associated with coastal floodplains (OEH 2022b). The extent of Swamp Oak Floodplain Forest shown in Figure 5 below may extend north along the waterway past the proposed activity site which contains some species representative of the EEC *i.e.* Swamp Oak and *Baumea juncea.*

The proposed concrete SUP will however be constructed on the road verge comprising of imported material for the construction of the road and vehicle bridge approaches reclaimed above the banks of the waterway and as such is not on soils and is not periodically inundated. The area that would be impacted by the works also does not contain *Baumea juncea* – merely Swamp Oak and other species which are not indicative of the EEC *i.e.* Sweet Pittosporum, Common Silkpod, Kikuyu, Asparagus Fern, Cassia and Date Palm. The Swamp Oak EEC occurs from the base of the road embankment which will not be impacted by the proposed activity and protection measures would be employed to ensure that this vegetation is not impacted (refer to Section 7 of this REF).

The proposal would therefore 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.

Figure 5 EECs mapped as occurring in the surrounding locality

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 25 Swamp Oaks and other native and non-native species within an area of about 370m^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
- expansion of dryland salinity
- significant reduction of habitat for threatened species or ecological communities.

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.

3.3 Threatened species impact assessment (Commonwealth EPBC Act 1999)

A Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) Protected Matters Report was generated on 19 October 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:

- Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland ecological community - E
- Lesser Sand-plover *Charadrius mongolus* – E
- Eastern Hooded Plover *Thinornis cucullatus cucullatus* (syn*Thinornis rubricollis*) – 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 ecological communities **Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland ecological community**	
Criteria	***Assessment***
reduce the extent of an ecological community	No – the EEC extends from the base of the embankment of the road which will not be impact and would be protected to prevent inadvertent damage.
fragment or increase fragmentation of an ecological community, for example by clearing vegetation for roads or transmission lines	No – the EEC is already highly fragmented and disturbed though the construction of the Canal Estates and Lake Conjola Entrance Road.
adversely affect habitat critical to the survival of an ecological community	No - the EEC is already highly fragmented and disturbed though the construction of the Canal Estates and Lake Conjola Entrance Road. the EEC is already highly fragmented and disturbed though the construction of the Canal Estates and Lake Conjola Entrance Road.
modify or destroy abiotic (non-living) factors (such as water, nutrients, or soil) necessary for an ecological community's survival, including reduction of groundwater levels, or substantial alteration of surface water drainage patterns	No – no modification or destruction of these factors will occur. The single span truss bridge with a higher soffit than the vehicle bridge will retain drainage patterns and inundation of surrounding EEC extents.
cause a substantial change in the species composition of an occurrence of an ecological community, including a decline or loss of functionally important species, for example through regular burning or flora or fauna harvesting	No – The proposed activity predominantly affects species above the EEC extent, i.e. on the road-side.
cause a substantial reduction in the quality or integrity of an occurrence of an ecological community including, but not limited to:	No – The environmental impact mitigation measures prescribed in Section 7 will prevent this occurring

- assisting invasive species, that are harmful to the listed ecological community to become established or - causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants into the ecological community, or	
interfere with the recovery of an ecological community	No – the activity will predominantly occur outside the EEC extant and would not affect the EEC nearby.
Critically endangered and endangered species - Significant impact criteria Species to consider: **Lesser Sand-plover**	
Criteria	***Assessment***
lead to a long-term decrease in the size of a population	No. The proposed activity would not directly impact on the Lesser Sand Plover, 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	Lesser Sand Plover breeds in central and north-eastern Asia (OEH 2021b). 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. Intertidal foraging habitat along the waterway in proximity to the site would not be directly impacted.
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: **Eastern Hooded Plover**	
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 the Eastern Hooded Plover, 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 species breeds on or near beaches, with nests on flat beaches above high tide mark, on stony terraces adjacent to beaches, or on sides of sparsely vegetated dunes. The site of the proposed activity does not comprise this habitat.
modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	No 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

Additional consideration was given to the four principal threats determined by DEWHA (2009) to be most relevant to judgements on significance of impact on migratory shorebirds. These include:

- habitat loss
- habitat degradation
- disturbance, and
- direct mortality.

Degradation of shorebird habitat has a similar effect on populations as direct habitat loss. Many migratory shorebirds have specialised feeding techniques, making them susceptible to slight changes to prey sources and their foraging environments. Habitat degradation is associated with activities such as invasion of intertidal mudflats by exotic species. Other examples of activities that may cause degradation to shorebird habitats include water pollution and changes to the water regime; loss of marine or estuarine vegetation which helps stabilise mudflats and provides organic matter to support the invertebrates on which migratory shorebirds feed; expansion of mangroves; artificial changes to hydrological regimes that affect the productivity of the feeding environment; and exposure of acid sulphate soils .

The proposed activity shall not involve or contribute to habitat loss or habitat degradation.

Construction of the bridge would occur entirely outside potential breeding habitat or foraging habitat for these species.

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.

3.4 Indigenous heritage

Under Section 86 of the NSW *National Parks and Wildlife Act 1974* (NPW Act) it is an offence to disturb, damage, or destroy any Aboriginal object without an Aboriginal Heritage Impact Permit (AHIP). The Act, however, provides that if a person who exercises 'due diligence' in determining that their actions will not harm Aboriginal objects has a defence against prosecution if they later unknowingly harm an object without an AHIP (Section 87(2) of the Act). To effect this, the NSW Department of Environment, Climate Change and Water have prepared the *Due Diligence Code of*

*Practice for the Protection of Aboriginal Objects in New South Wale*s (hereafter referred to as the 'Due Diligence Guidelines) to assist individuals and organisations to exercise due diligence when carrying out activities that may harm Aboriginal objects and to determine whether they should apply for an AHIP.

Landscape features that are regarded as indicating a higher potential for Aboriginal objects, 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.

The site occurs within 200m of waters (Lake Conjola and Pattimores Lagoon).

A search on the Aboriginal Heritage Information Management System (AHIMS) on 21 September 2022 indicated that there are no recorded Aboriginal sites or places in the vicinity of the proposal (refer to AHIMS report in Figure 6 below).

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 existing bridge, road, stormwater systems, underground utilities and previous dredging for the Conjola Canal Estate. The waterway would also have been subject to ongoing, regular disturbance through natural processes of accretion and scouring. As such, it is reasonable to conclude that there is a low probability of objects occurring in area.

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.

Figure 6 Results of AHIMS Aboriginal heritage search

AHIMS Web Services (AWS)
Search Result

Your Ref/PO Number : Lake Conjola Entrance Rd
Client Service ID : 719681

Shoalhaven City Council - Nowra

Date: 21 September 2022

PO Box 42 Bridge Rd
Nowra New South Wales 2541

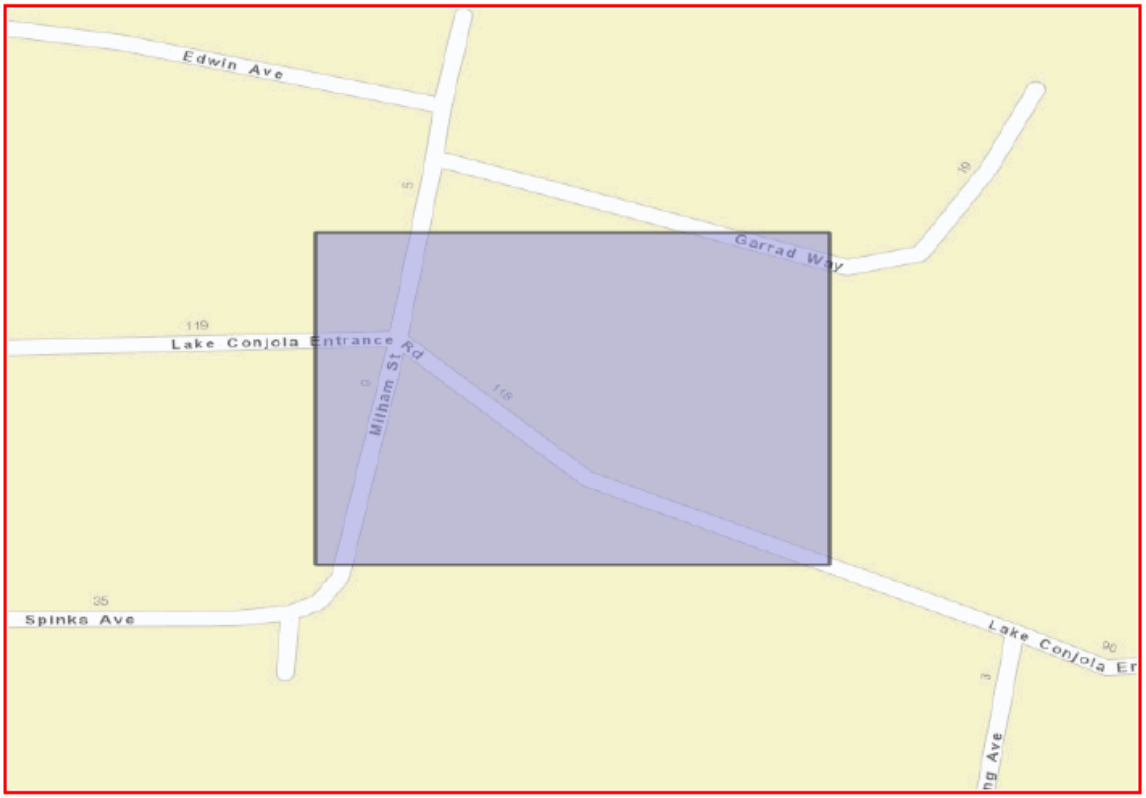
Attention: Geoffrey Young

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 : 271080.0 - 271255.0, Northings : 6094101.0 - 6094231.0 with a Buffer of 0 meters, conducted by Geoffrey Young on 21 September 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. *

3.5 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.

3.6 Riparian corridors, Key Fish Habitat & Water quality

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

- Likely and potential impacts on vegetation as a result of construction activities;
- Sediment movement into waterways as a result of construction activities;
- Dredging and reclamation in proximity to key fish habitat.

The proposal would occur immediately in and adjacent to a waterway that is likely to have been created during the development of the Conjola Canal Estates. Canal Estates have generally been excluded from the provisions of the NSW Fisheries Management Act 1994 (https://www.dpi.nsw.gov.au/fishing/habitat/publications/pubs/key-fish-habitat-maps). Regardless, the constructed waterway makes a potentially important connection between Pattimores Lagoon and Lake Conjola waterway. For the REF, the waterway has been regarded as Key Fish Habitat and is mapped as so by the regulatory authority, the Department of Primary Industries (Figure 8 p.42). Refer also to Section 4.3 of this REF.

The proposed activity would predominantly occur on the road reserve immediately beside Lake Conjola Entrance Road on imported road base material. Sediment and erosion controls such as sediment fences would be installed and maintained during concrete path works to prevent movement of sediment into waterways.

The open drain to the northwest of the bridge will be filled in once pipes, headwalls and rock scour protection have been installed. Once installed and operational there would be less input of sediment into the waterway from the scouring of this open drain. During the installation of the pipe extension the waterway shall be protected with a hydrocarbon floating boom and curtain installed with consideration of the tidal fluctuations experienced at the site. Any excavation of this open drain shall be carried out in accordance with the acid sulfate soil management plan that would be prepared for the activity.

Instream works or works on the bank of the waterway would likely comprise (refer to Appendix A for plan details):

- The installation of four concrete pedestals on top of screw-piles to which piers and bracing for the elevated boardwalk would be fixed. The concrete pedestals will protrude from the ground approximately 450 mm and buried into the bed/bank about 500mm deep. Pedestals would be 450 mm in diameter.
- The installation of 2 concrete abutments, supported with screw-piles, for the steel truss bridge. The western abutment reinforced concrete formation approximately 600 mm wide, 1000 mm high and 4.225 m wide. The eastern abutment is more complex with a base pedestal of 800 mm diameter pedestal supporting an approximately 2.3 m concrete bridge high support
- Stormwater culvert headwall and scour protection.

All works would be undertaken with plant and machinery outside of the waterway on Lake Conjola Entrance Road and verge. During excavation and installation works the waterway shall be

protected with a hydrocarbon floating boom and curtain installed with consideration of the tidal fluctuations experienced at the site. Any excavation shall be carried out in accordance with the acid sulfate soil management plan that would be prepared for the activity. A Fisheries Permit would also be required for these works. Refer to Section 4.3 of this Act.

These works are not anticipated to cause obstructions to fish passage as the structures would be on the banks and edge of the waterway and be insignificant relative to the width of the waterway. Harm to benthic animals would also be considering the availability of habitat nearby (the waterway, Canal Estate, Lake Conjola, and Pattimores Lagoon).

The proposed activity is unlikely to impact threatened fish species. Refer to Section 3.2.1 of this REF).

3.7 Flood liable land

The land on which the proposal would occur is flood liable with the soffit and finished level below the 2% AEP. The soffit of the proposed SUP bridge would also be located below the 10% AEP peak flood level, but still above the existing road bridge levels.

The concept plans were sent to the State Emergency Services and SCC Senior Floodplain Engineer for comment. The following were recommendations and are reflected in the environmental impact mitigation measures and safeguards prescribed in Section 7 of this REF:

- The bridge and elevated walkway shall be built from flood compatible materials.
- The bridge shall be designed and constructed to withstand forces of floodwaters including debris and buoyancy forces of up to a 1% AEP flood event.

It was also recommended that the proposed structure is assessed in the Lake Conjola hydraulic model as part of the design to ensure that there are no adverse flood impacts on nearby properties *i.e.* afflux is kept within a +/- 10 mm limit in the 1% AEP. Details are provided in Section 5.1 of this REF.

3.8 Acid Sulfate Soil

The site is mapped as containing Class 1 and Class 3 Acid Sulfate Soils (refer to Figure 7 below). 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 Shoalhaven Local Environmental Plan 2014 (SLEP 2014) requires consideration for the management of acid sulfate soils (ASS) in class 3 risk areas if works are conducted more than one metre below the natural ground level and/or if the watertable is likely to the lowered more than one metre.

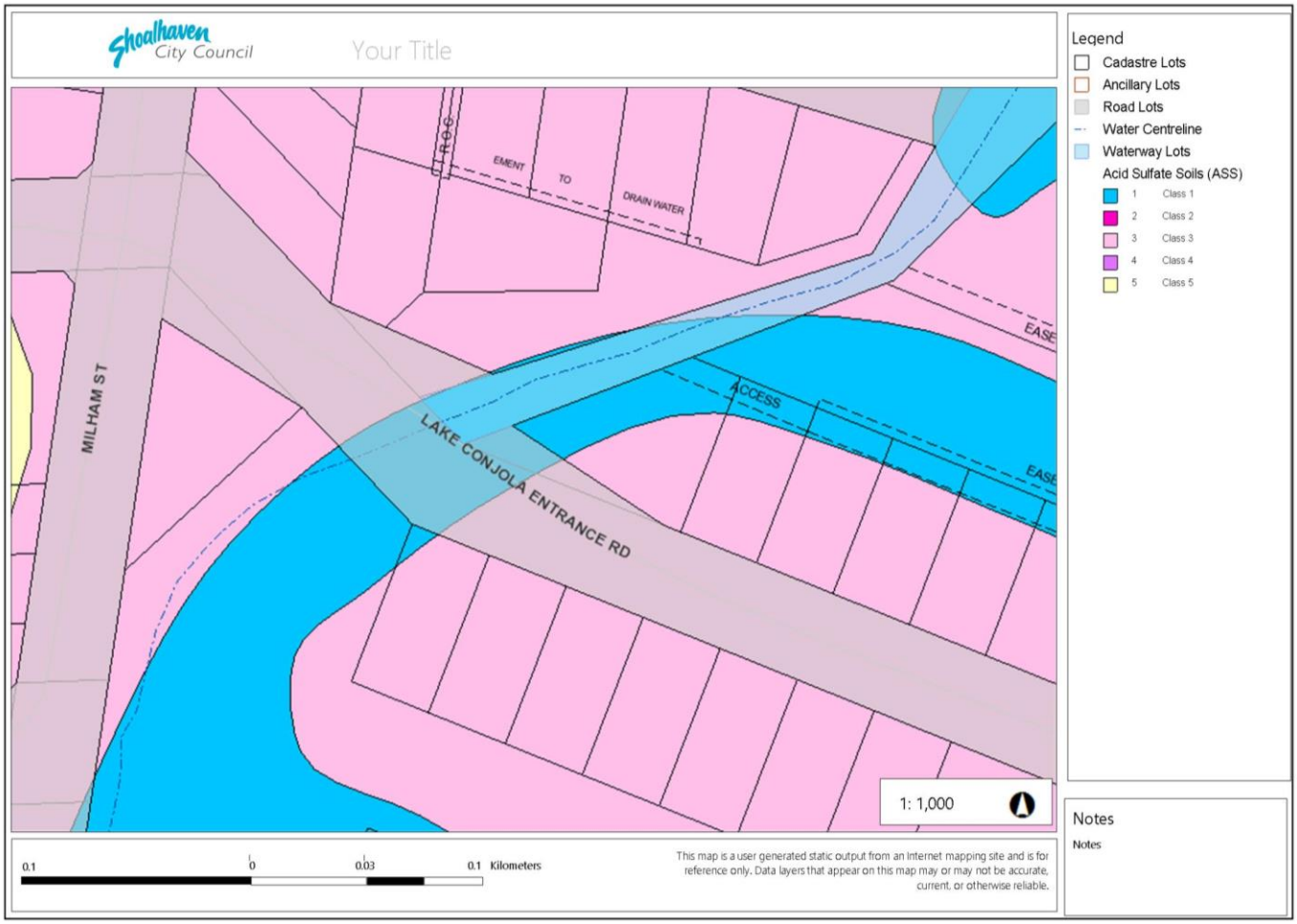
The SLEP 2014 requires consideration for the management of ASS for any works within class 1 risk areas.

Excavation for the concrete path would be on class 3 risk areas and won't require the management of ASS as excavation would be less than 1 metre below natural ground level. Excavation would also affect imported road-base material. ASS management is not required for excavation for this part of the activity.

Excavation for the stormwater pipe extension, abutments and pedestals for the elevated walkway and bridge would be conducted in class 1 risk areas. An ASS management plan would need to be prepared to treat and dispose of any excavated soils appropriately. The ASS management plan

shall be prepared commensurate with the NSW Acid Sulfate Soil Management Advisory Committee (1998) Acid Sulfate Soil Manual.

Figure 7 Acid Sulfate Soils mapped in proximity to the site



3.9 Impacts to neighbouring residents

The proposed activity will be conducted in a residential area reasonably close to houses. Construction noise, interruption to the use of a drive-way off Lake Entrance Road, and privacy impacts may occur.

The interruption to the use of a drive-way and possible privacy impacts is only applicable to one residence *i.e.* 12 Milham Street. The Construction Contractor, when engaged, shall consult directly the owners / occupants to minimise access restrictions. Once the concrete path has been installed, the Contractor and SCC Project Manager shall plant suitable trees / shrubs between the path and 12 Milham Street. The species selected should be a mutual decision with input from the resident, SCC Project Manager and SCC Environmental Officer.

Construction noise would be unavoidable but temporary in nature (~three to four months). Noise would originate from tree falling, excavator and piling operations, crane usage and concrete works. Noise impact mitigation measures are to be implemented before and during construction. These are:

- 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 and vibration 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 listed in Section 7 of this REF.

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 3.

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 have a positive impact on the community as it will improve pedestrian and cyclist (and other non-vehicular movement modes) safety by providing an alternative off-road path as opposed to the

Does the proposal:	Assessment	Reason
		current situation of travelling along a relatively busy and narrow road and bridge. The proposed activity would also be compliant with accessibility standards and Austroads. The final design will be assessed through the Lake Conjola hydraulic model to ensure there are no adverse off-site flood impacts on neighbouring properties. The owners of the property most affected (12 Milham Street) will be engaged directly by the contactor and project manager to minimise access disruptions to their driveway off Lake Conjola Entrance Road and to plant an appropriate vegetation privacy screen between the path and their property. The proposed activity would not have any impact on other community services and infrastructure such as water, waste management, educational, medical or social services.
b) Cause any transformation of a locality?	Negligible	The locality would remain road-side and waterway crossing. The proposed activity would complement the locality being an extension of the bridge and path along a public road easement.
c) Have any environmental impact on the ecosystem of the locality?	Low-adverse	The five-part test of significance (Section 3.2) 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 (refer to Sections 3.2.1 and 3.6). Refer to prescribed environmental safeguards and mitigation measures (Section 7).
d) Cause a diminution of the aesthetic, recreational, scientific or other environmental quality or value of a locality?	Positive	Recreational values will be enhanced with path and bridge that will allow travel (walking, cycling etc) off the road surface. In the context of the locality (being road and urban area), the visual impact of the proposal is minimal. Scientific and environmental qualities of the site would not be affected. The proposed activity would have no impact on these values.
e) Have any effect on a locality, place or building having	negligible	The site has no historical, social or scientific significance and does not contain, nor is associated with any heritage

Does the proposal:	Assessment	Reason
aesthetic, anthropological, archaeological, architectural, cultural, historical, scientific, or social significance or other special value for present or future generations?		item listed on the NSW State Heritage Inventory, Commonwealth heritage list or in the SLEP 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 3.4 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 Conservation Act 2016)?	Low adverse	Some vegetation, including trees, would be removed, however: • The five-part test of significance, provided in Section 3.2 above, concludes that the proposed activity would not have a significant impact upon threatened fauna. • Fauna habitat values are not considered to be limiting or important *i.e.* there are no food resources critical for particular species, rock outcrops, hollow-bearing trees, etc. The prescribed environmental safeguards and mitigation measures (Section 7) would mitigate indirect impacts to fauna and habitat including through 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?	Negligible	The five-part test of significance, provided in Section 3.2 above, concludes that the proposed activity would not have a significant impact upon threatened fauna. 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 recommendation made by SCC's Senior Floodplain Engineer will be considered during the detailed design phase to mitigate any long-term effects on flooding regimes (refer to Section 5 of this REF).

Does the proposal:	Assessment	Reason
		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 (refer to Sections 3.2.1 and 3.6). The proposal would not intentionally introduce noxious weeds, vermin, or feral animals into the area or contaminate the soil. Potential acid sulfate soils should be 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. With the implementation of the prescribed environmental safeguards and mitigation measures in Section 7 the activity would not adversely affect flood or tidal regimes or exacerbate flooding risks (refer also to Section 2.5 and Section 5 of this REF for further information). The activity would provide off-road access for pedestrian, cyclists *etc* thereby improving safety at this location.
k) Cause any reduction in the range of beneficial uses of the environment?	Positive	The environment is currently used as road, road reserve and bridge crossing. 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 residential areas, schools, childcare centres and hospitals. Sediment and erosion control in accordance with the Blue Book will be implemented to minimise movement of sediment into waterways. It is unlikely that the activity (including the environmental impact mitigation measures) would result in water or air pollution, spillages, dust, odours, vibration or radiation.

Does the proposal:	Assessment	Reason
		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. 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*.
n) Cause any increased demands on resources (natural or otherwise) which are, or are likely to become, in short supply?	Low-adverse	The amount of resources that would be used are not considered significant and would not increase demands on current resources such that they would become in short supply.
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	Potentially low-adverse	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 recommendations made by SCC's Senior Flood Engineer will be considered during the detailed design phase to mitigate any long-term effects on flooding

Does the proposal:	Assessment	Reason
		regimes. Refer also to Section 2.5 and Section 5 of this REF for further information).
q) Any applicable local strategic planning statement, regional strategic plan or district strategic plan made under Division 3.1 of the Act	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) which states "*Shoalhaven's growing and diverse communities require a wide range of infrastructure, facilities and services. These include…Transport infrastructure to connect communities, urban areas and employment hubs such as roads, pathways and cycleways…*" The proposed activity is consistent with 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) particularly Objective 28 – *Create connected and accessible walking and cycling networks.* 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	

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, clause 2.109(1) of the NSW *State Environmental Planning Policy (Transport and Infrastructure) 2021* (Transport & Infrastructure SEPP) provides that:

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

"*Road infrastructure facilities" includes "vehicle or pedestrian bridges"* (Section 2.108 of the Transport & Infrastructure SEPP).

The proposed footpath and kerb and guttering can be undertaken as 'exempt development" through the Transport and Infrastructure SEPP (Section 2.113(1)(a)(iv) and (xii)).

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 design and mitigation measures (Section 7) would ensure that no *serious and irreversible impacts on biodiversity values* (as defined by the BC Act) occur at the site of the proposed activity.
- The proposed activity is not within an area declared to be of "outstanding biodiversity value" as defined in the Act and Regulations.

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

It is also a defence to a prosecution for an offence under Part 2 of the Act (harming animals, picking plants, damaging the habitat of threatened species or ecological communities *etc*) if the work was essential for the carrying out of an activity by a determining authority within the meaning of Part 5 of the Environmental Planning and Assessment Act 1979 after compliance with that Part.

The activity will not remove vegetation that is listed under Schedule 1 Threatened Species, Schedule 2 Threatened ecological communities and Schedule 6 Protected Plants. Therefore the

activity is considered permissible as this REF has been prepared and determined in accordance with the EP&A Act. Refer to Section 3.2 for more information.

4.3 NSW *Fisheries Management Act 1994*

The objectives of *Fisheries Management Act 1994* are to conserve, develop and share the fishery resources of NSW and to conserve fish stocks and key fish habitat, threatened species, populations and ecological communities of fish and marine vegetation.

The application of this Act is uncertain as the waterway is part of the Conjola Canal Estate development. Canal estates are generally excluded from the provisions of the Act as they are excluded from the definition of "Key Fish Habitats" by the Department of Primary Industries – Fisheries (https://www.dpi.nsw.gov.au/fishing/habitat/publications/pubs/key-fish-habitat-maps).

Although likely to be anthropogenic, the waterway makes a potentially significant connection between the waterbody of Lake Conjola and Pattimores Lagoon via the canal estates. Consequently, a conservative approach has been undertaken and it is assumed that the Act would apply to the waterway regardless of it being part of the canal estate. This approach reflects the mapping of the waterway by the Department of Primary Industries as Key Fish Habitat (Figure 8 p.42).

The single-span SUP bridge over the waterway will require abutments, piling and associated concrete pedestals. The extension of the stormwater pipe will require installation of a headwall and rock scour protection. This work would comprise dredging and reclamation as defined in the Act (s.198A). Section 200 of the Act states that a "*local government authority must not carry out dredging work of reclamation work except under the authority of a permit issued by the Minister".* As a result, a Fisheries Permit will be sought and obtained prior to any work within the waterway.

Regarding other relevant provisions of the Act, the proposed activity:

- 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).*

A permit for the proposed dredging/reclamation is therefore the only permit required under this Act.

Figure 8 Key Fish Habitat Mapping (Department of Primary Industries)

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.
Aboriginal Land Rights Act 1983
Permissible √ Not permissible ☐
Justification: The waterway between the bridge and Lake Conjola is the subject the 7 February 2017 'blanket and multiple' Aboriginal land claim. It is unknown if the site of the proposed activity is "claimable land" as it is a waterway and contains the existing bridge constructed prior to the 2017 land claim. Regardless, there is nothing in the Act that precludes the proposed activity and Council accepts the risks and consequences if the Land Claim is successful which may include compensation or purchase of land/easements.
Local Land Services Act 2013
Permissible √ Not permissible ☐
Justification: Any clearing of vegetation would be of a kind authroisted 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 Lake Conjola Entrance Road and Milham Street. • Lake Conjola Entrance Road and Milham 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 authoirty to carry out drainage work in or on any land in the vicinity of a road in order to drain or protect that road.
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 3.4 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 valuesWorks can be undertaken with caution under an applicable exception from an excavation permit under s139(1) and (2) of the Heritage Act 1977.
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 3.3 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 ☐
The proposed activity would extend over the Pattimore Lagoon entrance waterway which could be subject to Native Title, although Native Title could have been extinguished when the Canal Estates were developed in the late 1980s. As there is some uncertainty, a Native Title Future Act assessment was submitted to SCC's Native Title Manager on the 08 November 2022 (D22/469674). The applicable Future Act options in provided by Subdivision K (Facilities for Services to the Public). It is assumed that any Procedural Rights (e.g. notification) would have been undertaken by the Native Title Manager prior to the construction of the SUP bridge over the waterway.

5. CONSULTATION WITH GOVERNMENT AGENCIES

5.1 Transport & Infrastructure SEPP

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

No impacts to public roads, sewerage systems, water infrastructure, nor excavation of footpaths, such as described under section 2.10(1) of the SEPP would occur.

Consultation under section 2.10 is therefore not required.

If the work is undertaken by a contractor, a Section 138 (NSW *Roads Act 1993*) may be required from the relevant section of SCC.

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

In accordance with Section 2.12, a notice of intention was submitted to SCC's Senior Floodplain Engineer. A response was received on the 18 July 2022 (D22/400248). The response states:

> "*Based on the concept design plans provided and comments in your previous emails, it seems that the existing road bridge and proposed SUP bridge have different finished surface and soffit levels. Whilst the proposed SUP has a higher finished surface and soffit level that the existing road bridge, these levels area still below the 2% AEP flood levels in this location. The SUP bridge spanning the waterway without piers is a good outcome. Based on the plans provided, the soffit of the proposed SUP would be located below the 10% AEP peak flood level, but still above the existing road bridge soffit level. Hence for smaller ARP flood events, the proposed SUP bridge is unlikely to have any adverse flood impacts. However there could potentially be minor flood impacts during larger events due to the higher SUP bridge surface level and barrier."*
>
> *Council's Engineering Design Specifications require there to be no adverse flood impacts on existing urban areas from new development in a 1% AEP. It is recommended that the proposed SUP bridge is included in the Lake Conjola hydraulic model as part of the detailed design to ensure there are no adverse flood impacts on nearby urban properties. For the purpose of this assessment, it is considered that if afflux is kept within a +/- 10mm limit in the 1% AEP event then the requirements of Council's Engineering Design Specifications will have been met. The models developed as part of the Lake Conjola Flood Study (2007) and Lake Conjola Floodplain Risk Management Study and Plan (2013) can be provided for use as no charge and only requires the consultant to sign a digital data licence agreement. Velocities can also be obtained from the hydraulic model to be used in the structural design.*
>
> *The above assessment is important to ensure Council meets its obligations under the SLEP and NSW Floodplain Development is also common for residents to blame recently constructed infrastructure in the floodplain for worsening flooding on their property. Hence it is important that Council demonstrates that the proposed SUP bridge will have no adverse flood impacts when constructed.*
>
> *The following is recommended for the design of the SUP bridge.*
>
> - *Any proportion of the bridge below the Flood Planning Level (FPL) (1% Annual Exceedance Probability (AEP) flood level plus 500mm freeboard) as documented on*

a Flood Certificate obtained from Council must be built from flood compatible materials

- *Bridge is designed to withstand forces of floodwaters including debris and buoyancy forces of up to a 1% AEP flood event."*

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

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

In accordance with Section 2.13, a notice of intention was submitted to the State Emergency Services on 10 August 2022 (D22/335275). A response was received on the 30 August 2022 (D22/400110). Of relevance the response states:

"The NSW SES has reviewed the proposed upgrade and the flood risk information (e.g. Local Flood Plan, Flood Studies etc.) available to the NSW SES. The proposed works appear to be affected by frequent flooding, approximately a 20% AEP flood (Lake Conjola Floodplain Risk Management Study and Plan 2013 and Lake Conjola Flood Study 2007). Based on this, the NSW SES provides the following advice:

- *Consider the impact of flooding on the infrastructure and the community at risk.*
- *Pursue, if relevant, site design and stormwater management that minimises any risk to the community.*
- *Ensure workers and people using the site during and after the upgrades are aware of the flood risk, for example by using signage.*

In addition, if the construction phase of the upgrades causes disruption to the operation of local roads, this may impact the ability for emergency vehicles to use these routes. The NSW requests that notification be provided where there are likely to be significant delays in the operation of the roads affected by the upgrades."

In response, the road is unlikely to be disrupted to the extent that the operation of emergency vehicles would be affected.

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 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*

As the proposed pedestrian bridge comprises a fixed structure over navigable waters, a notice of intention was sent to Transport for NSW - Maritime on the 17 October 2022 (D22/453227). A response was received on the 8 November 2022. The response states (D22/470454):

> *"In response to your correspondence dated 27 October 2022 on the subject proposal, I wish to confirm that the NSW Maritime Branch of Transport for NSW (Maritime) has no objections to this proposal, assessed on the grounds of impact to safe navigation*."

No further consultation is 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.

6. COMMUNITY ENGAGEMENT

Correspondence, which included exhibition plans, went to the Conjola Community Association, Lake Conjola Shoalhaven Bicycle User Group, Holiday Haven Lake Conjola and nearby residents of Lake Conjola Entrance Road, Garrad Way and Milham Street (refer to D22/281189 and D22/281208). Several submissions were received. These have been addressed and responded to by correspondence and/or on-site meetings as outlined in Table 6 below.

SCC will continually engage with neighbours over the course of the construction project to mitigate noise and access (refer to Section 7 of this REF).

Table 6 Summary of community engagement submissions and responses

Submission details	Response
Resident: 1. [redacted] *I am concerned about the impact on that during construction and after construction and would like more detail on this area.* 2. *The width of the path on the plan is 3.2m which seems excessive* 3. *The pathway from my driveway to the bridge will be almost level with my side fence and I have privacy issues with this, I would like to the see the width reduced and a screen installed if possible.*"	A letter response was provided by Council (D22/333866) stating: 1. *"Access to your driveway may be denied for a short period of time while the path is being constructed.* 2. *The proposed path is 2.5m, except form the 3.2 m wide section of path required at the kerb ramp locations to maintain compliance with access and mobility standards.* 3. *The path between Milham Street and the bridge will be at the same level as the top of the existing kerb and gutter, similar to the current informal access to the road bridge. The width of the path from your driveway to the bridge will be 2.5 m wide to meet shared user path standards. Consideration may be given to some type of privacy screening between the path and your property boundary."* Replacement vegetation will be planted and maintained between the path and property boundary. The species and density would be determined in consultation with property owner with assistance from SCC's Environmental Officer, noting there is no obligation to replant with the same species (Swamp Oaks).
A resident: "[redacted]	Resident was engaged directly by District Engineer and Design Engineer. Concerns were alleviated. Any existing stormwater pipes in the construction area will remain functional

[redacted] *I just want to make you aware about this pipe and ask when you do the work, you will continue to allow us to let excess water to be piped into the creek and not block it.*"	and be integrated with the new extended stormwater system.
Community Body – Conjola Community Association 1. Concerned that the removal of trees from the surrounding reserve will allow more noise from pedestrians and traffic to two properties [redacted] and loss of privacy. 2. "*we cannot see any reason why council would design a Shared User Path Bridge to address concerns raised by the community regarding pedestrian and cyclists safety when you are going to instruct them to cross over our busiest road Lake Conjola Entrance Road…Could you please make arrangements to have a staff member meet with the executive committee members of this association on the bridge and discuss this concern"*	Generic response was provided without specific address to the issues raised (D22/333869), however, it is acknowledged that many trees would be removed. 1. The number of trees has been minimised by placing the path as close to the road as possible with the inclusion of kerb and gutter. Replacement vegetation can be planted between the SUP and the adjacent properties for privacy and some noise attenuation. This will be undertaken in consultation with the property owners and SCC's Environmental Officer. 2. The District Engineer and Design Engineer met with the community group and explained the reasons for the pedestrian bridge being constructed on the northern side of the vehicle bridge. These reasons are outlined in Section 1.3 of this REF. The southern side of the vehicle bridge also constrained by the presence of powerlines and powerpoles and substantial water supply mains.
Community Body - Bicycle Users Group Representatives of the group asked for details of bollards and line-marking	Generic response was provided without specific address to the issues raised (D22/333873), however bollards and sign-marking would be as per Austroads Standards.

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 proposed structure shall be assessed in the Lake Conjola hydraulic model to ensure that there are no adverse impacts on nearby properties, *i.e.* afflux is kept within a +/- 10 mm limit in the 1% AEP flood event.	Project Manager and Design Engineer.
2. The bridge and elevated walkway shall be constructed from flood compatible materials and designed and constructed to withstand forces of floodwaters including debris and buoyancy forces of up to 1% AEP flood event.	Project Manager and Design Engineer.
3. A Fisheries Permit for dredging and reclamation shall be obtained prior to the commencement of works.	Project Manager and Environmental Officer
4. An appropriate traffic management plan shall be developed and implemented to minimise disruption and reduce risk of incident along Lake Conjola entrance Road during works.	Project Manager; Construction Contractor
5. 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.	Project Manager; Construction Contractor
6. A waste and acid sulfate soil management plan shall be developed for the management of spoil extracted from the waterway area.	Construction Contractor
7. 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	
8. Machinery access, construction compound (if required), vehicles and stockpiles shall be located within existing cleared areas of the road reserve.	Site Manager; Construction Contractor
9. 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 b. permissible hours of work c. any limitations on high noise generating activities	Construction Contractor

Safeguard / Measure	Responsibility
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.	
10. 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
11. The owners and occupiers of [redacted] shall be engaged prior to works and continually to minimise access disruptions to their driveway on Lake Conjola Entrance Road.	Site Manager and Construction Contractor
12. The extent of works shall be demarcated by high-vis bunting and signage which states “No-go zone: Environmental Protection” (or similar) to prevent inadvertent impact into protected marine vegetation and Swamp Oak Floodplain Forest.	Site Manager; Construction Contractor
13. The contractor shall be made aware of the potential (albeit low) for underground storage tanks in the road reserve on the corner of Milham Street. Contractors shall be advised to stop works if these are encountered.	Project and Site Manager.
14. 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
15. No major equipment maintenance works shall be undertaken on-site.	Construction contractor
16. To avoid the risk of pollution from machinery, refuelling shall generally be done off site, however if refuelling on site is required, due care shall be taken to avoid spilling fuel and a tray shall be used to catch any accidentally spilt fuel.	Construction contractor
17. Erosion and sediment controls in accordance with the ‘Blue Book’ (Landcom 2004) shall be installed and maintained to prevent the entry of sediment into waterways. This should include the installation of hydrocarbon Erosion and sediment controls shall be maintained in good working order for the duration of the works and	Site Manager; Construction Contractor

<table>
<tr><th>Safeguard / Measure</th><th>Responsibility</th></tr>
<tr><td>subsequently until the site has been stabilised and the risk of erosion is minimal.</td><td></td></tr>
<tr><td colspan="2">Construction works</td></tr>
<tr><td>18. A privacy screen comprising of endemic trees and shrubs shall be planted and maintained between the SUP and the boundary of 12 Milham Street. The selection of trees shall be made in consultation with the owners of 12 Milham Street and SCC’s Project Manager and Environmental Officer.</td><td>Project Manager and Construction Contractor</td></tr>
<tr><td>19. Construction activities shall be limited to the hours shown below
Table 7 Construction hours
<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>20. 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>21. Stationary noise sources shall be enclosed or shielded where possible.</td><td>Construction Contractor</td></tr>
<tr><td>22. Trees removed from the creek bank / road embankment shall be cut to ground level and stump poisoned to retain roots in-situ.</td><td>Construction Contractor</td></tr>
<tr><td>23. 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>
<tr><td>24. Pruning of trees where required is to be undertaken in accordance with AS 4373-1996 "Pruning of Amenity Trees".</td><td>Construction Contractor</td></tr>
</table>

Safeguard / Measure	Responsibility
25. All woody debris within the waterway shall remain within the waterway.	Construction Contractor
26. 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
27. 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
28. 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
29. 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
30. 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
31. Remediation of access, compound and stockpile areas shall involve removal of all stockpiled material, dressing and seeding of grassed areas, and repair to pavement and path surfaces as appropriate to return the area to its existing state prior to works.	Site Manager; Construction Contractor;

Safeguard / Measure	Responsibility
Post construction	
32. An asset form shall be trimmed to file 44574E on commissioning of the assets in Accordance with POL15/8 Asset Accounting Policy section 3.1.4 and POL16/79 Asset Management Policy section 3.3.	SCC Project Manager

8. SIGNIFICANCE EVALUATION & DECISION STATEMENT

This Review of Environmental Factors has assessed the likely environmental impacts, in the context of Part 5 of the Environmental Planning and Assessment Act 1979, of a proposal by Shoalhaven City Council for the construction of a shared users path, elevated walkway and accessible bridge over the Pattimores Lagoon entrance waterway at Lake Conjola Entrance Road, Lake .

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 - South

Shoalhaven City Council Date: 30/11/22

9. REFERENCES

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

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APPENDIX A – The Proposed Activity

LAKE CONJOLA
SHARED PATH BRIDGE

LAKE CONJOLA ENTRANCE ROAD, LAKE CONJOLA, 2539

DRAWING NO.	DRAWING DESCRIPTION	REV.
23344/C01	COVER SHEET AND LOCALITY PLAN	1
23344/C02	NOTES SHEET	1
23344/C03	GENERAL ARRANGEMENT PLAN	1
23344/C04	SUP ALIGNMENT PLAN AND LONG SECTION	1
23344/C05	SUP CROSS-SECTIONS	1
23344/C06	KERB01 ALIGNMENT PLAN AND LONG SECTION	1
23344/C07	KERB01 CROSS-SECTIONS	1
23344/C08	DRAINAGE PLAN AND LONG SECTION	1
23344/C09	BULK EARTHWORKS PLAN	1
23344/C10	STRUCTURAL PLAN AND ELEVATION	1
23344/C11	SLAB AND FOOTING DETAILS	1
23344/C12	STEELWORK DETAILS SHEET 1 OF 2	1
23344/C13	STEELWORK DETAILS SHEET 2 OF 2	1
23344/C14	SEDIMENT EROSION CONTROL PLAN	1
23344/C15	SEDIMENT EROSION CONTROL DETAILS	1
23344/C16	SGD11 PLAN AND TABLE	1

LOCALITY PLAN
1:1000

Rev.	Amendments	Approved	Date
1	ISSUED 95% FOR REVIEW	P.LITTLE	19.09.2023

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RESIDENTIAL - COMMERCIAL - INDUSTRIAL

COVER SHEET AND LOCALITY PLAN

Design: J.HYNES
Drawn: J.HYNES
Checked: P.LITTLE
Date: 19.09.2023

PROJECT: LAKE CONJOLA SUP BRIDGE
AT: LAKE CONJOLA ENTRANCE ROAD, LAKE CONJOLA
FOR: ZAUNER CONSTRUCTIONS

Drawing No. 23344/C01
Rev 1

GENERAL STRUCTURAL NOTES

GENERAL

1. THESE DRAWINGS SHALL BE READ IN CONJUNCTION WITH ALL ARCHITECTURAL AND OTHER CONSULTANTS DRAWINGS AND SPECIFICATIONS. ANY DISCREPANCY SHALL BE REFERRED TO THE ENGINEER BEFORE PROCEEDING WITH THE WORK.
2. DIMENSIONS ARE NOT TO BE SCALED FROM THESE DRAWINGS.
3. THE ENGINEER IS TO INSPECT ALL WORK PRIOR TO THE POURING OF CONCRETE. PROVIDE 48 HOURS NOTICE FOR ALL INSPECTIONS.

EARTHWORKS

5. UNLESS NOTED OTHERWISE FILL IS TO BE IN ACCORDANCE WITH CIVIL ENGINEERING NOTES.
6. **SITE DRAINAGE DURING CONSTRUCTION:** DURING CONSTRUCTION WATER RUNOFF SHALL BE COLLECTED AND CHANNELED AWAY FROM THE STRUCTURE.

CONCRETE WORKS

7. ALL WORK TO BE INSPECTED BY THE ENGINEER PRIOR TO POURING.
8. **ALL CONCRETE IS TO HAVE 100mm SLUMP AND 20mm AGGREGATE UNLESS NOTED OTHERWISE. CONCRETE STRENGTH AND COVER ARE TO BE SHOWN IN TABLE S1 UNLESS NOTED OTHERWISE.**
9. ALL CONCRETE IS TO BE COMPACTED WITH A MECHANICAL VIBRATOR IN ACCORDANCE WITH AS3600.
10. ALL CONCRETE IS TO BE CURED IN ACCORDANCE WITH AS3600.
11. ALL WORK IS TO BE PROTECTED AGAINST TERMITE ATTACK IN ACCORDANCE WITH AS3660.1 AS REVISED.

TABLE S1

ELEMENT	COVER (mm)			STRENGTH (MPa)
	TOP	BOTTOM	SIDES	
PEDESTAL FOOTINGS	65	65	65	40
STRIP FOOTINGS	65	65	65	40
CONCRETE COLUMNS	45	45	65	40
HEADSTOCKS	45	45	45	40
SHARED PATH SLAB	40	60	40	32
ABUTMENT SLABS	45	65	65	40

12. SERVICE TRENCHES MAY CAUSE DAMAGE TO FOUNDATIONS IF LOCATED CLOSE TO THE BUILDING. SEE TYPICAL DETAIL.
13. ALL REINFORCING BARS ARE TO BE D500N RADE BARS UNLESS NOTED OTHERWISE. ALL REINFORCING MESH IS TO BE D500L UNLESS NOTED OTHERWISE.
14. SPLICES IN REINFORCING BARS ARE TO LAP MIN 500mm.
15. PROVIDE 500x500 N12 'L' BARS AT ALL EXTERNAL CORNERS IN SLAB. 'L' BARS PROVIDED TOP AND BOTTOM IN PIERED AREAS. REFER TO TYPICAL DETAIL.
16. IN PIERED AREAS ENSURE TOP STEEL HAS MIN. 500mm LAP AT ALL JOINS INCLUDING STEPS IN EDGE BEAM.
17. SLABS ARE TO BE LAIN ON 30mm COMPACTED SAND BLINDING LAYER
18. PIERS ARE TO BE CLEANED OUT OF ALL LOOSE MATERIAL PRIOR TO THE INSPECTION BY THE ENGINEER. IN ADDITION THE CONTRACTOR IS TO ENSURE THAT ALL LOOSE MATERIAL IS REMOVED IMMEDIATELY PRIOR TO POURING. ALL PIERS ARE TO BE INSPECTED AND AFFIRMED BY THE ENGINEER PRIOR TO POURING. CONCRETE PIERS AND PEDESTALS SHALL BE INSTALLED WITH GALVANISED FORM TUBES.
19. THE CONTRACTOR IS TO ENSURE THAT THE FINISHED SURFACE GRADES AWAY FROM THE STRUCTURE AND THAT THE SITE STORMWATER AND DRAINAGE SYSTEMS ARE INSTALLED SO THAT WATER DOES NOT POND NEAR THE STRUCTURE DURING OR AFTER CONSTRUCTION.
20. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO CHECK FOR ANY SEWER MAINS OR OTHER SERVICES LOCATED WITHIN THE ZONE OF INFLUENCE OF THE STRUCTURE, AND ADVISE THE ENGINEER OF THEIR PRESENCE.
21. THIS DESIGN HAS BEEN BASED ON GEOTECHNICAL REPORTS BY ACT GEOTECHNICAL ENGINEERS PTY LTD REF. NO. JF/C14017 DATED 24TH MARCH 2023.

FORMWORK

1. ALL FORMWORK IS TO BE CONSTRUCTED IN ACCORDANCE WITH AS3610.
2. ALL EXPOSED FORMWORK IS TO PROVIDE A CLASS 2 FINISH.
3. PROVIDE DRIP GROOVES AS REQUIRED.
4. PROVIDE CHAMFERS TO CORNERS.
5. THE FORMWORK IS NOT TO BE DISTURBED UNTIL THE CONCRETE HAS REACHED ITS DESIGN STRENGTH. IF THE DESIGN STRENGTH IS NOT DEMONSTRATED BY TESTING THEN THE FORMWORK IS TO BE LEFT IN PLACE FOR 28 DAYS.

STRUCTURAL STEEL NOTES

1. ALL WORKMANSHIP AND MATERIAL SHALL BE IN ACCORDANCE WITH AS 4100, AS 1554 & AS/NZS 5131 EXCEPT WHERE VARIED BY THE CONTRACT DOCUMENTS.
2. CONSTRUCTION CATEGORY IN ACCORDANCE WITH AS/NZS5131 TO BE
   - IMPORTANCE LEVEL - 2
   - SERVICE CATEGORY - 1
   - FABRICATION CATEGORY - 1
   - CONSTRUCTION CATEGORY - 2
3. UNLESS NOTED OTHERWISE, ALL STEEL SHALL BE IN ACCORDANCE WITH AS 3679 GRADE 300, OR AS 1163 GRADE C350 AS APPROPRIATE.
4. UNLESS NOTED OTHERWISE ALL BOLTS SHALL BE M16 CATEGORY 8.8/S. NO CONNECTION SHALL HAVE LESS THAN 2 BOLTS. ALL BOLTS AND WASHERS SHALL BE GALVANISED.
5. FABRICATION SHALL COMPLY WITH AS/NZS 5131.
6. ERECTION SHALL COMPLY WITH AS/NZS 5131.
7. UNLESS NOTED OTHERWISE, ALL FILLET WELDS SHALL BE 6mm CONTINUOUS CATEGORY GP USING E41XX ELECTRODES. ALL BUTT WELDS SHALL BE COMPLETE PENETRATION BUTT WELDS TO AS 1554.1.
8. PROVIDE SEAL PLATES TO THE ENDS OF ALL HOLLOW SECTIONS, WITH 'BREATHER' HOLES IF MEMBERS TO BE HOT DIP GALVANISED.
9. ALL STEELWORK SHALL BE SECURELY TEMPORARILY BRACED BY THE ERECTOR AS NECESSARY TO STABILISE THE STRUCTURE DURING ERECTION.
10. IT IS THE BUILDERS RESPONSIBILITY TO PROVIDE ALL CLEATS AND HOLES AS REQUIRED FOR ALL CONNECTIONS, WHETHER OR NOT THEY ARE DETAILED ON THESE DRAWINGS.
11. ALL HOLDING DOWN BOLTS TO BE GALVANISED.
12. ALL CONNECTION DETAILS ARE TO BE IN ACCORDANCE WITH AISC STANDARDISED STRUCTURAL CONNECTIONS UNLESS NOTED OTHERWISE.

SURFACE FINISH

13. ALL EXPOSED STEELWORK TO BE HOT DIP GALVANISED UNLESS NOTED OTHERWISE.
14. FINISH COAT TO BUILDERS DETAIL.

DESIGN LOADS

SUPERIMPOSED LOADS ARE GENERALLY IN ACCORDANCE WITH AS1170.1, AND AS NOTED BELOW UNLESS MORE STRINGENT REQUIREMENTS ARE SPECIFIED ELSEWHERE IN THE DOCUMENTATION.

TABLE L1

LOCATION	SUPERIMPOSED DEAD LOAD (kPa)	LIVE LOAD (kPa)	FLOOD VELOCITY (m/s)
PATHWAY	0	5	-
BRIDGE	0	5	2
ELEVATED WALKWAY	0	5	2

TREE NOTE 1

ANY SOFT SPOTS CAUSED BY THE TREE REMOVAL, WHICH OCCUR UNDER THE STRUCTURE, ARE TO BE BACK FILLED AS FOLLOWS; REMOVE ALL LOOSE MATERIAL AND BACK FILL WITH CLEAN FILL IN 150mm LAYERS COMPACTED TO 95% STANDARD USING A MECHANICAL ROLLER.

TREE NOTE 2

THE PRESENCE OF LARGE TREES NEAR THE STRUCTURE MAY CAUSE DAMAGE. IF TREES ARE NOT REMOVED IN ACCORDANCE WITH ARBORIST RECOMMENDATION THEN DAMAGE MAY OCCUR TO THE HOUSE.

SITE DRAINAGE NOTE

THE BUILDER IS TO ENSURE THAT THE FINISHED SURFACE GRADES AWAY FROM THE STRUCTURE AND THAT SITE STORMWATER AND DRAINAGE SYSTEMS ARE INSTALLED SO THAT WATER DOES NOT POND NEAR THE BUILDING DURING OR AFTER CONSTRUCTION.

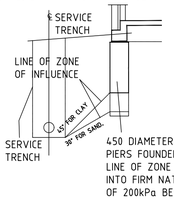
SEWER NOTE

IT IS THE BUILDERS RESPONSIBILITY TO CHECK FOR ANY SEWER MAINS OR OTHER SERVICES LOCATED WITHIN THE ZONE OF INFLUENCE OF THE STRUCTURE, AND ADVISE THE ENGINEER OF THEIR PRESENCE.

ROCK NOTE

IF ROCK IS ENCOUNTERED UNDER ANY FOOTING THEN ALL FOOTINGS ARE TO BE FOUNDED ON ROCK. REFER TO THE ENGINEER FOR ADVICE.

IF ANY FOOTING OR EDGE BEAM IS POSITIONED SO THAT THE ZONE OF INFLUENCE OF THE FOOTING INTERSECTS A SERVICE TRENCH THEN PIERS ARE REQUIRED. REFER TO THE ENGINEER IF THIS IS THE CASE. THE ZONE OF INFLUENCE IS DEFINED BY A 45 DEG. LINE (FOR CLAY) OR 30 DEG. LINE (FOR SAND) DRAWN FROM THE BASE OF THE FOOTING. SEE DETAIL BELOW.



TYPICAL SERVICE TRENCH DETAIL

NOT TO SCALE

PILING NOTES

1. PILES ARE DESIGNED IN ACCORDANCE WITH AS2159-2009 - PILING - DESIGN AND INSTALLATION FOR THE LOADS SPECIFIED IN THE PILING SCHEDULE ON DRAWING 22038/C04. PILING INSTALLATION TO FOLLOW THE REQUIREMENTS PROVIDED BY THE GEOTECHNICAL REPORT PREPARED BY ACT GEOTECHNICAL ENGINEERS PTY LTD REF NO. JF/C14017. AT THE COMPLETION OF THE WORK DEEMED SATISFACTORY BY THE ENGINEER, AN INSPECTION/PILE CERTIFICATE SHALL BE PROVIDED.
2. THE CONTRACTOR SHALL UTILISE A 'PILING INSTALLATION LOG-BOOK' DURING PILE INSTALLATION. THIS SHALL INCLUDE, BUT NOT BE LIMITED TO;
   - PILE FOUNDING DEPTH
   - FINAL TORQUE READING
   - NUMBER OF PILE EXTENSIONS
   - INNER PILE VOLUME (WHEN COREFILLING IS REQUIRED)
3. THE CONTRACTOR IS TO ENSURE THE INSTALLATION EQUIPMENT AND TORQUE MEASURING DEVICE IS CALIBRATED REGULARLY AT NO GREATER THAN SIX (6) MONTH INTERVALS.
4. CUT-OFF LEVELS PERFORMED BY THE CONTRACTOR MUST BE TRIMMED TO A TOLERANCE OF 25mm FROM THE DESIGNED CUT-OFF LEVEL.
5. WHERE VARIATION IN THE PILE DEPTH OR INCONSISTENCIES WITH THE DESIGN DEPTH OCCURS, REASSESSING OF THE FOUNDING DEPTH, STRENGTH, SERVICEABILITY, AND DURABILITY MUST BE CONSIDERED BY THE ENGINEER. FURTHER GEOTECHNICAL ASSESSMENT MAY BE DEEMED NECESSARY SUBJECT TO THE ENGINEERS RECOMMENDATION.
6. PILE SHAFTS MUST BE DRIVEN WITH A VARIATION OF NOT MORE THAN 10mm PER METER OF PILE FROM THE VERTICAL OR FROM THE BATTER SHOWN ON THE DRAWINGS.
7. PILES SHALL BE INSTALLED WITH A MAXIMUM OUT-OF-PLAN LOCATION TOLERANCE OF 50mm. PILES SHALL BE ACCURATELY SET OUT BY THE SITE SURVEYOR.
8. THE PILING CONTRACTOR SHALL BE RESPONSIBLE FOR THE CONSTRUCTION AND INSTALLATION OF THE SCREW PILES IN ACCORDANCE WITH THE CONSTRUCTION DRAWINGS.

PILE TESTING

1. THE REQUIREMENT OF PILE TESTING SHALL BE SUBJECT TO THE CLIENTS REQUEST OR DEEMED NECESSARY BY THE CONTRACTOR AND/OR PROJECT ENGINEER.
2. PILE TESTING SHALL FOLLOW THE REQUIREMENTS OF AS2159-2009 SECTION 8.
3. WHERE TEST PILES ARE NOMINATED AS THE REPRESENTATIVE PILES IN ADVANCE OF CONSTRUCTION, THESE PILES SHALL BE CONSTRUCTED IN THE SAME MANNER AND TO THE SAME STANDARD OF CONSTRUCTION USED FOR THE PILES THEY REPRESENT.
4. WHERE A TEST LOAD IS REQUIRED TO BE HIGHER THAN THE SPECIFIED DESIGN ACTION EFFECT, A STRONGER HELIX MAY BE REQUIRED, SUBJECT TO THE ENGINEERS RECOMMENDATION.
5. TEST PILES SHALL BE LOCATED NEAR TO GEOTECHNICAL BOREHOLE LOCATIONS.

DURABILITY OF PILES

1. PILES SHALL BE DESIGNED CONSIDERING A MILD CORROSION RATE IN ACCORDANCE WITH AS2159-2009.
2. PILES SHELL BE DESIGNED FOR A DESIGN LIFE OF 50 YEARS.

SITE WORKS:

1. ALL WORKS TO BE IN ACCORDANCE WITH SPECIFICATIONS AND AUSTRALIAN STANDARDS. CONFLICTS SHALL BE REFERRED TO THE SUPERINTENDENT FOR DIRECTION.
2. THE CONTRACTOR IS TO DESIGN, OBTAIN APPROVALS AND CARRY OUT REQUIRED TEMPORARY TRAFFIC CONTROL PROCEDURES DURING CONSTRUCTION IN ACCORDANCE WITH RMS & SHOALHAVEN CITY COUNCIL REGULATIONS AND REQUIREMENTS.
3. THE CONTRACTOR IS TO OBTAIN ALL AUTHORITY APPROVALS AS REQUIRED.
4. RESTORE ALL PAVED, COVERED, GRASSED AND LANDSCAPED AREAS TO THEIR ORIGINAL CONDITION ON COMPLETION OF WORKS.
5. ON COMPLETION OF ANY TRENCHING WORKS, ALL DISTURBED AREAS SHALL BE RESTORED TO THEIR ORIGINAL CONDITION, INCLUDING KERBS, FOOTPATHS, CONCRETE AREAS, GRAVEL, GRASSED AREAS AND ROAD PAVEMENTS.
6. THE CONTRACTOR SHALL ARRANGE ALL SURVEY SETOUT TO BE CARRIED OUT BY A REGISTERED SURVEYOR.
7. THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND EXISTING LEVELS ON SITE PRIOR TO LODGMENT OF TENDER AND PRIOR TO CONSTRUCTION.
8. THIS PLAN IS TO BE READ IN CONJUNCTION WITH THE ENGINEERING PLANS, AND ANY OTHER PLANS OR WRITTEN INSTRUCTIONS THAT MAY BE ISSUED RELATING TO DEVELOPMENT OF THE SUBJECT SITE.
9. ANY EXISTING TREES WHICH ARE NOT SPECIFICALLY NOTED TO BE REMOVED SHALL BE PROTECTED FROM CONSTRUCTION ACTIVITIES BY:
   (A) PROTECTING THEM WITH BARRIER FENCING OR SIMILAR MATERIALS INSTALLED OUTSIDE THE DRIP LINE,
   (B) ENSURING THAT NOTHING IS NAILED TO THEM,
   (C) PROHIBITING PAVING, GRADING, SEDIMENT WASH OR PLACING OF STOCKPILES WITHIN THE DRIP LINE EXCEPT UNDER THE FOLLOWING CONDITIONS.
   (i) ENCROACHMENT ONLY OCCURS ON ONE SIDE AND NO CLOSER TO THE TRUNK THAN EITHER 1.5 METRES OR HALF THE DISTANCE BETWEEN THE OUTER EDGE OF THE DRIP LINE AND THE TRUNK, WHICH EVER IS GREATER.
   (II) A DRAINAGE SYSTEM THAT ALLOWS AIR AND WATER TO CIRCULATE THROUGH THE ROOT ZONE (E.G. A GRAVEL BED) IS PLACED UNDER ALL FILL LAYERS OF MORE THAN 300 MILLIMETRES DEPTH.
   (III) CARE IS TAKEN NOT TO CUT ROOTS UNNECESSARILY NOR TO COMPACT THE SOIL AROUND THEM.
10. DO NOT OBTAIN DIMENSIONS BY SCALING THE DRAWINGS.
11. IN CASE OF DOUBT OR DISCREPANCY REFER TO SUPERINTENDENT FOR CLARIFICATION OR CONFIRMATION PRIOR TO THE COMMENCEMENT OF CONSTRUCTION.
12. WHERE NEW WORKS ABUT EXISTING THE CONTRACTOR SHALL ENSURE THAT A SMOOTH EVEN PROFILE, FREE FROM ABRUPT CHANGES IS OBTAINED.
13. MAKE SMOOTH TRANSITION TO EXISTING FEATURES AND CONSTRUCTION.
14. THESE PLANS SHALL BE READ IN CONJUNCTION WITH ALL APPROVED DRAWINGS AND SPECIFICATIONS PREPARED BY OTHER PROJECT CONSULTANTS.
15. TRENCHES THROUGH EXISTING ROAD AND CONCRETE PAVEMENTS SHALL BE SAWCUT TO FULL DEPTH OF CONCRETE AND A MIN 50mm IN BITUMINOUS PAVING.
16. ALL CONSTRUCTION WORK IS TO BE CARRIED OUT SO THAT AT ANY TIME ADJOINING PROPERTY OWNERS ARE NOT DEPRIVED OF AN ALL-WEATHER ACCESS OR SUBJECTED TO ADDITIONAL STORM WATER RUN-OFF DURING THE PERIOD OF CONSTRUCTION.
17. ALL GREEN WASTE IS EITHER TO BE REMOVED FROM SITE OR MULCHED ON SITE AND SPREAD OVER DISTURBED AREAS. NO GREEN WASTE IS TO BE BURNT ON SITE.

EXISTING SERVICES:

1. CARE TO BE TAKEN WHEN EXCAVATING NEAR EXISTING SERVICES. NO MECHANICAL EXCAVATIONS ARE TO BE UNDERTAKEN OVER COMMUNICATION, GAS OR ELECTRICAL SERVICES. HAND EXCAVATION ONLY IN THESE AREAS.
2. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO DETERMINE AND CONFIRM THE LOCATION AND LEVEL OF ALL EXISTING SERVICES PRIOR TO THE COMMENCEMENT OF ANY WORK. ANY DISCREPANCIES SHALL BE REPORTED TO THE SUPERINTENDENT. CLEARANCES SHALL BE DISCUSSED WITH THE RELEVANT SERVICE AUTHORITIES.
3. THE CONTRACTOR SHALL PROTECT AND MAINTAIN ALL EXISTING SERVICES THAT ARE TO BE RETAINED IN THE VICINITY OF THE PROPOSED WORKS. ANY AND ALL DAMAGE TO THESE SERVICES AS A RESULT OF THESE WORKS SHALL BE REPAIRED BY THE CONTRACTOR UNDER THE DIRECTION OF THE SUPERINTENDENT, AND AT NO EXTRA COST.
4. THE CONTRACTOR SHALL ALLOW FOR ADJUSTMENT (IF REQUIRED) OF EXISTING SERVICES IN AREAS AFFECTED BY WORKS.
5. THE CONTRACTOR SHALL ALLOW FOR THE CAPPING OFF, EXCAVATION AND REMOVAL (IF REQUIRED) OF EXISTING SERVICES IN AREA AFFECTED BY WORKS UNLESS DIRECTED OTHERWISE ON THE DRAWINGS OR BY THE SUPERINTENDENT.
6. THE CONTRACTOR SHALL ENSURE THAT AT ALL TIMES SERVICES TO ALL BUILDINGS NOT AFFFECTED BY THE WORKS ARE NOT DISRUPTED.
7. PRIOR TO COMMENCEMENT OF ANY WORKS THE CONTRACTOR SHALL GAIN APPROVAL FOR THE RELOCATION AND/OR CONSTRUCTION OF TEMPORARY SERVICES AND FOR ANY ASSOCIATED INTERRUPTION OF SUPPLY.
8. THE CONTRACTOR SHALL CONSTRUCT TEMPORARY SERVICES TO MAINTAIN EXISTING SUPPLY TO BUILDINGS REMAINING IN OPERATION DURING WORKS TO THE SATISFACTION AND APPROVAL OF THE SUPERINTENDENT. ONCE DIVERSION IS COMPLETE AND COMMISSIONED THE CONTRACTOR SHALL REMOVE ALL SUCH TEMPORARY SERVICES AND MAKE GOOD TO THE SATISFACTION OF THE SUPERINTENDENT.
9. PRIOR TO COMMENCEMENT OF EXCAVATION, THE CONTRACTOR SHALL DETERMINE THE LOCATION OF ALL SERVICES AND WILL BE RESPONSIBLE FOR ADJUSTMENT AND REPAIR OF SERVICES.
10. ADJUST ALL UTILITY SERVICE COVERS TO SUIT NEW GRADES & LEVELS TO SERVICE PROVIDERS SATISFACTION.

EARTHWORKS:

1. EARTHWORKS ARE TO BE CARRIED OUT IN ACCORDANCE WITH GEOTECHNICAL ENGINEERS RECOMMENDATIONS. REFER TO INFORMATION PROVIDED BY DEVELOPER.
2. STRIP TOPSOIL, VEGETABLE MATTER AND RUBBLE TO EXPOSE NATURALLY OCCURRING MATERIAL AND STOCKPILE ON SITE AS DIRECTED BY THE SUPERINTENDENT.
3. WHERE FILLING IS REQUIRED TO ACHIEVE DESIGN SUBGRADE, PROOF ROLL EXPOSED NATURAL SURFACE WITH A MINIMUM OF TEN PASSES OF A VIBRATING ROLLER (MINIMUM STATIC WEIGHT OF 10 TONNES) IN THE PRESENCE OF THE SUPERINTENDENT.
4. ALL SOFT, WET OR UNSUITABLE MATERIAL IS TO BE REMOVED AS DIRECTED BY THE SUPERINTENDENT AND REPLACED WITH APPROVED MATERIAL SATISFYING THE REQUIREMENTS LISTED BELOW.
5. THE CONTRACTOR SHALL PROGRAM THE EARTHWORKS OPERATION SO THAT THE WORKING AREAS ARE ADEQUATELY DRAINED DURING THE PERIOD OF CONSTRUCTION. THE SURFACE SHALL BE GRADED AND SEALED OFF TO REMOVE DEPRESSIONS, ROLLER MARKS AND SIMILAR WHICH WOULD ALLOW WATER TO POND AND PENETRATE THE UNDERLYING MATERIAL. ANY DAMAGE RESULTING FROM THE CONTRACTOR NOT OBSERVING THESE REQUIREMENTS SHALL BE RECTIFIED AT THE CONTRACTORS COST.
6. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO ENSURE AND MAINTAIN THE INTEGRITY OF ALL SERVICES, CONDUITS AND PIPES DURING CONSTRUCTION, SPECIFICALLY DURING THE BACKFILLING AND COMPACTION PROCEDURE. ANY AND ALL DAMAGE TO NEW OR EXISTING SERVICES AS A RESULT OF THESE WORKS SHALL BE REPAIRED BY THE CONTRACTOR AT NO EXTRA COST.
7. USE OF VIBRATING ROLLERS ARE TO BE LIMITED DUE TO THE CLOSENESS OF EXISTING STRUCTURES. SAFE DISTANCE = 1.5 x DRUM WEIGHT (DMW)

SUBGRADE NOTES:

1. FOLLOWING SITE ESTABLISHMENT THE CONTRACTOR IS TO PROOF ROLL EXPOSED SUBGRADE IN THE PRESENCE OF THE GEOTECHNICAL ENGINEER TO CONFIRM SUITABILITY OF SUBGRADE.
2. THE SUBGRADE IS TO BE COMPACTED TO ACHIEVE 100% STANDARD MAXIMUM DRY DENSITY, (AS1289E1.1), AT A MOISTURE CONTENT WITHIN 2% OF STANDARD OPTIMUM, OR ALTERNATIVE INSTRUCTION IS TO BE OBTAINED FROM A GEOTECHNICAL ENGINEER.
3. REMOVE ANY SOFT, HEAVING, WET OR UNSTABLE AREAS IDENTIFIED DURING PROOF ROLLING AND REPLACE USING SELECT IMPORTED FILL COMPACTED IN LAYERS NOT EXCEEDING 200MM MEASURED LOOSE TO ACHIEVE 100% STANDARD COMPACTION AS SPECIFIED ABOVE. OBTAIN WRITTEN APPROVAL FROM CLIENT PRIOR TO PROCEEDING WITH THE ABOVE WORK.
4. ANY FILL REQUIRED TO RAISE LEVELS TO UNDERSIDE OF PROPOSED SLAB OR PAVEMENT FORMATION TO BE APPROVED GRANULAR MATERIAL COMPACTED IN LAYERS NOT EXCEEDING 200MM MEASURED LOOSE TO ACHIEVE A MINIMUM 98% STANDARD MAXIMUM DRY DENSITY AT A MOISTURE CONTENT WITHIN 2% OF STANDARD OPTIMUM.
5. IMPORTED FILL IS TO CONSIST OF IMPORTED WELL-GRADED MATERIAL WITH A MAXIMUM PARTICLE SIZE OF 75mm, WITH 80% LESS THAN 20MM, AND A SOAKED C.B.R. GREATER THAN 15% AND PLASTICITY INDEX LESS THAN 12%.
6. BACKFILLING FOR SERVICE TRENCHES UNDER SLABS AND PAVEMENTS SHALL BE APPROVED WELL-GRADED GRANULAR MATERIAL. EITHER SELECT INSITU OR IMPORTED FILL COMPACTED AS SPECIFIED ABOVE.
7. DO NOT PROCEED WITH ANY EARTHWORKS WHICH WILL BE SUBJECT TO A VARIATION CLAIM WITHOUT PRIOR APPROVAL FROM CLIENT. VARIATIONS FOR EARTHWORKS WILL NOT BE APPROVED UNLESS FORMAL INSTRUCTION, INCLUDING VARIATION VOLUMES, IS OBTAINED FROM ENGINEER.

SIGNAGE AND LINEMARKING:

1. LINE MARKING AND PAINT SHALL BE IN ACCORDANCE WITH THE FOLLOWING STANDARDS. AS 2700 AND AS 2709
2. PAINT SHALL BE TYPE 3, CLASS A AND THE COLOUR SHALL BE WHITE AND NOT SUBJECT TO DISCOLOURATION. ALL PAINT SHALL BE APPLIED BY MECHANICAL SPRAYER.
3. LINE MARKING SHALL BE SPOTTED OUT AND APPROVED PRIOR TO SPRAYING.
4. PAINT SHALL BE APPLIED AT A WET THICKNESS OF BETWEEN 0.35mm TO 0.40mm.
5. ALL SIGNAGE TO BE INSTALLED IN ACCORDANCE WITH AUSTRALIAN STANDARDS.

ACCESS AND SAFETY:

1. THE CONTRACTOR SHALL COMPLY WITH ALL STATUTORY AND INDUSTRIAL REQUIREMENTS FOR PROVISION OF A SAFE WORKING ENVIRONMENT INCLUDING TRAFFIC CONTROL.
2. THE CONTRACTOR SHALL ENSURE THAT AT ALL TIMES ACCESS TO ALL BUILDINGS ADJACENT THE WORKS IS NOT DISRUPTED.
3. WHERE NECESSARY THE CONTRACTOR SHALL PROVIDE SAFE PASSAGE OF VEHICLES AND/OR PEDESTRIANS THROUGH OR BY THE SITE.
4. TRAFFIC CONTROL MEASURES IN ACCORDANCE WITH AS1742.3 ARE TO BE IN PLACE AND MAINTAINED AT ALL TIMES. (TRAFFIC CONTROL PLANS TO BE SUBMITTED PRIOR TO COMMENCEMENT OF WORK.)

TRAFFIC MANAGEMENT:

1. PARKING OF VEHICLES OR LOADING/UNLOADING OF VEHICLES ON ROADWAYS MAY CAUSE A TRAFFIC HAZARD. DURING CONSTRUCTION, MAINTENANCE OR DEMOLITION DESIGNATED PARKING FOR WORKERS AND LOADING AREAS SHOULD BE PROVIDED. TRAINED TRAFFIC MANAGEMENT PERSONNEL SHOULD BE RESPONSIBLE FOR THE SUPERVISION OF THESE AREAS. DELIVERY OF CONSTRUCTION MATERIALS SHOULD BE WELL PLANNED TO AVOID CONGESTION OF TRAFFIC AREAS AND TRAINED TRAFFIC MANAGEMENT PERSONNEL SHOULD BE USED TO SUPERVISE LOADING/UNLOADING AREAS.

2. BUSY CONSTRUCTION AND DEMOLITION SITES PRESENT A RISK OF COLLISION WHERE DELIVERIES AND OTHER TRAFFIC ARE MOVING WITHIN THE SITE. A TRAFFIC CONTROL PLAN SUPERVISED BY TRAINED TRAFFIC MANAGEMENT PERSONNEL SHOULD BE ADOPTED FOR THE WORK SITE.

SURVEY NOTE:

1. THE LOCATION OF UNDERGROUND SERVICES SHOWN ON THESE PLANS IS INDICATIVE ONLY.

2. IT IS THE CONTRACTORS RESPONSIBILITY TO LOCATE UNDERGROUND SERVICES BY CAREFUL HAND POT-HOLING PRIOR TO ANY EXCAVATION AND EXERCISE DUE CARE DURING THAT EXCAVATION.

Rev.	Amendments	Approved	Date
1	ISSUED 95% FOR REVIEW	P.LITTLE	19.09.2023

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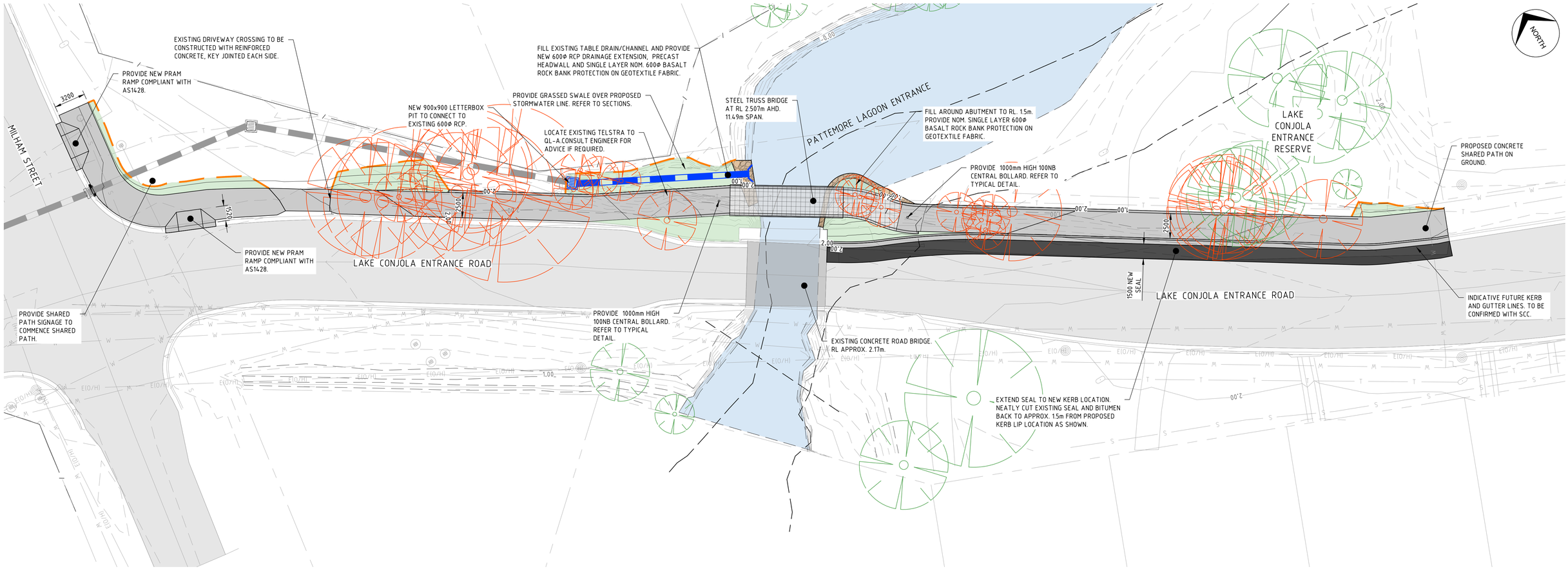
RESIDENTIAL - COMMERCIAL - INDUSTRIAL

NOTES SHEET

Design: J.HYNES
Drawn: J.HYNES
Checked: P.LITTLE
Date: 19.09.2023

PROJECT: LAKE CONJOLA SUP BRIDGE
AT: LAKE CONJOLA ENTRANCE ROAD, LAKE CONJOLA
FOR: ZAUNER CONSTRUCTIONS

Drawing No. 23344/C02
Rev 1



GENERAL ARRANGEMENT PLAN

SCALE: 1:200

LEGEND

- EXISTING MINOR CONTOURS (0.2m)
- EXISTING MAJOR CONTOURS (1m)
- PROPOSED MINOR CONTOURS (0.2m)
- PROPOSED MAJOR CONTOURS (1m)
- EXISTING PROPERTY BOUNDARY
- INDICATES MINIMESH RAISED BOARDWALK SHARED PATH
- INDICATES PROPOSED 2.5m WIDE CONCRETE SHARED PATH.
- INDICATES TREE TO BE REMOVED
- INDICATES TREE TO REMAIN
- PROPOSED BATTER EXTENTS
- EXISTING TELSTRA LINE
- EXISTING WATER MAIN
- EXISTING SEWER MAIN
- EXISTING OVERHEAD POWER
- EXISTING DRAINAGE LINE
- PROPOSED DRAINAGE LINE
- INDICATES EXTENT OF GRASSING

0 5 10 15 20m

SCALE 1:200 (A1), 1:400 (A3)

Rev.	Amendments	Approved	Date
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GENERAL ARRANGEMENT PLAN

PROJECT: LAKE CONJOLA SUP BRIDGE
AT: LAKE CONJOLA ENTRANCE ROAD, LAKE CONJOLA
FOR: ZAUNER CONSTRUCTIONS

Design: J.HYNES
Drawn: J.HYNES
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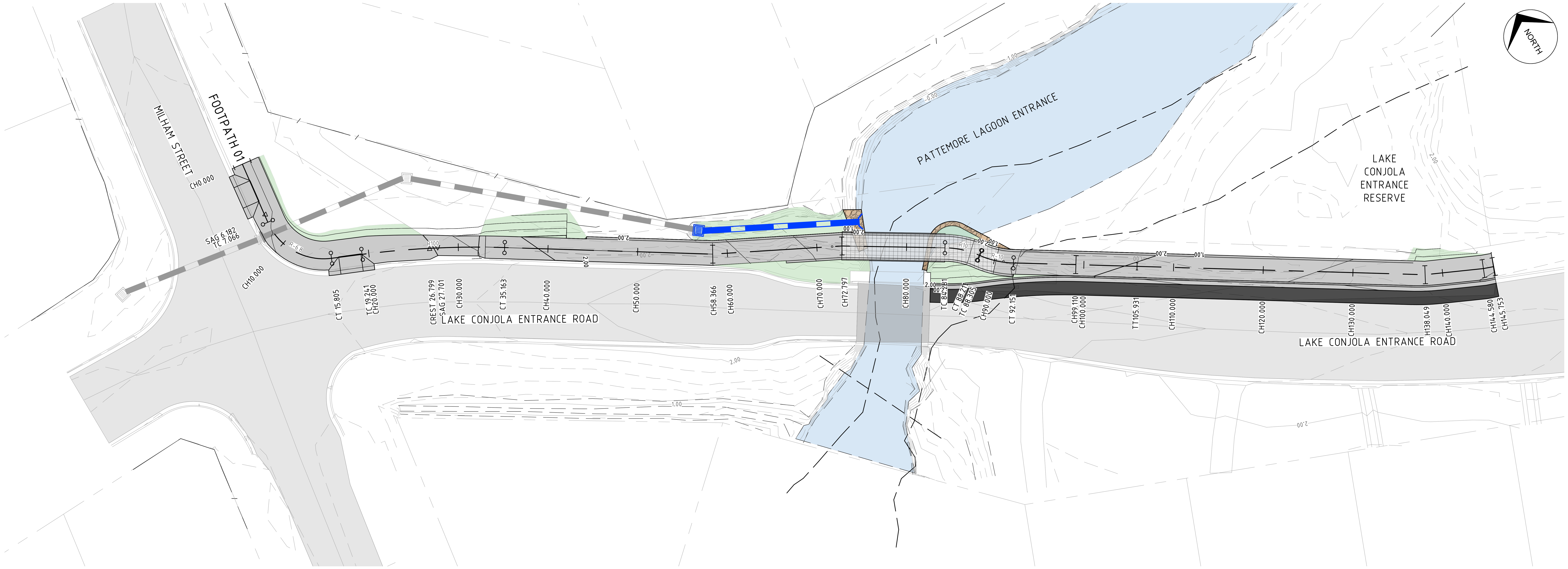
Date: 19.09.2023
Drawing No. 23344/C03
Rev 1



FOOTPATH 01 ALIGNMENT PLAN

SCALE: 1:250

EX. DRIVEWAY CROSSING

SAG — CREST SAG — SHARED USE CONCRETE FOOTPATH — STEEL TRUSS BRIDGE — ELEVATED BOARDWALK — SHARED USE CONCRETE FOOTPATH

HORIZONTAL CURVE: R-6.8 | R100 | R10 | R-10

VERTICAL CURVE

GRADE: -0.01% | 1.42% | 0.29% | -1.6% | 1.65% | 9.19% | 2.27% | 1.61% | 0.41% | 2.67% | 0% | -3.68% | -0.9% | -0.94%

DATUM RL-14

FINISHED LEVEL	1.577	1.577	1.589	1.702	1.714	1.725	1.733	1.754	1.74	1.778	1.815	1.885	1.934	1.953	2.086	2.089	2.144	2.148	2.165
EXISTING LEVEL	1.52	1.531	1.529	1.638	1.648	1.63	1.603	1.627	1.627	1.678	1.707	1.724	1.853	1.85	1.841	1.839	1.957	1.914	1.795
CUT/FILL	0.057	0.046	0.06	0.064	0.065	0.095	0.129	0.128	0.113	0.1	0.107	0.161	0.081	0.103	0.246	0.25	0.187	0.233	0.37
CHAINAGE	0	6.18	7.07	15	15.81	16.6	19.24	26.8	27.7	30	32.22	32.99	35.16	35.97	44.26	45	58.37	59.34	60

FINISHED LEVEL	2.507	2.507	2.507	2.507	2.507	2.362	2.359	2.296	2.217	2.078	2.049	1.996	1.943	1.857	1.716	1.687	1.626	1.615
EXISTING LEVEL	0.743	0.74	0.118	0.656	0.656	1.543	1.557	1.414	1.534	1.409	1.239	1.328	1.178	1.15	1.552	1.515	1.57	1.629
CUT/FILL	1.764	1.767	2.389	1.851	1.851	0.819	0.802	0.882	0.684	0.668	0.81	0.668	0.766	0.707	0.163	0.172	0.055	-0.014
CHAINAGE	72.79	72.8	75	84.28	84.28	88.21	88.31	90	92.15	95.94	99.11	105	110.88	120	135	138.05	144.58	145.75

LONGITUDINAL SECTION FOOTPATH 01

SCALE 1:250 (HORIZONTAL)
SCALE 1:250 (VERTICAL)

0 5 10 15 20 25m
SCALE 1:250 (A1), 1:500 (A3)

Rev.	Amendments	Approved	Date
1	ISSUED 95% FOR REVIEW	P.LITTLE	19.09.2023

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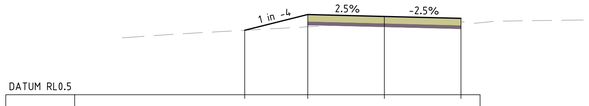
SUP ALIGNMENT PLAN AND LONG SECTION

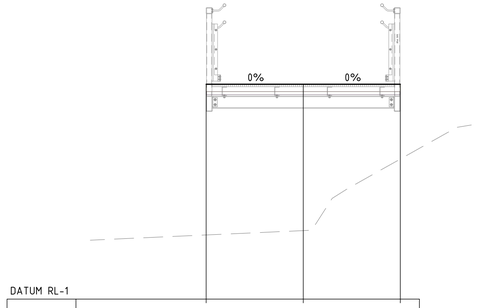
PROJECT: LAKE CONJOLA SUP BRIDGE
AT: LAKE CONJOLA ENTRANCE ROAD, LAKE CONJOLA
FOR: ZAUNER CONSTRUCTIONS

Design: J.HYNES
Drawn: J.HYNES
Checked: P.LITTLE
Date: 19.09.2023
Drawing No. 23344/C04
Rev 1



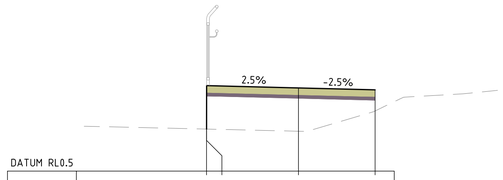
DATUM RL0.5				
FINISHED LEVEL	1.552	1.809	1.778	1.747
EXISTING LEVEL	1.552	1.609	1.678	1.692
OFFSET	-2.279	-1.25	0	1.25

CH 30



DATUM RL-1			
FINISHED LEVEL	2.507	2.507	2.507
EXISTING LEVEL	0.047	0.118	1.286
OFFSET	-1.585	0	1.585

CH 75

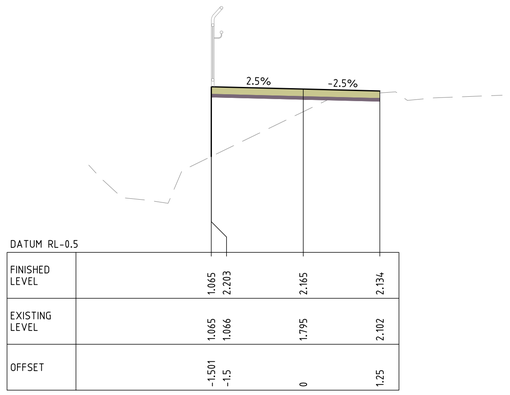


DATUM RL0.5				
FINISHED LEVEL	1.185	1.895	1.857	1.826
EXISTING LEVEL	1.185	1.185	1.15	1.482
OFFSET	-1.501	-1.5	0	1.25

CH 120

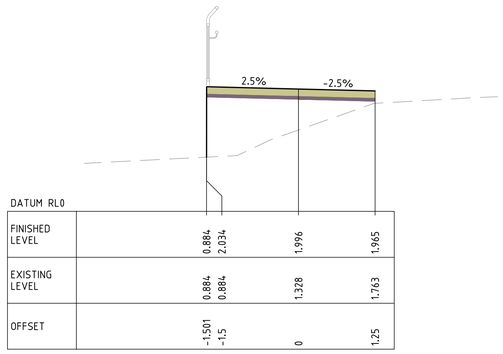
DATUM RL0.5				
FINISHED LEVEL	1.506	1.751	1.702	1.671
EXISTING LEVEL	1.506	1.56	1.638	1.541
OFFSET	-2.93	-1.95	0	1.25

CH 15



DATUM RL-0.5				
FINISHED LEVEL	1.865	2.203	2.165	2.134
EXISTING LEVEL	1.065	1.066	1.795	2.102
OFFSET	-1.501	-1.5	0	1.25

CH 60



DATUM RL0				
FINISHED LEVEL	0.884	2.034	1.996	1.965
EXISTING LEVEL	0.884	0.884	1.328	1.763
OFFSET	-1.501	-1.5	0	1.25

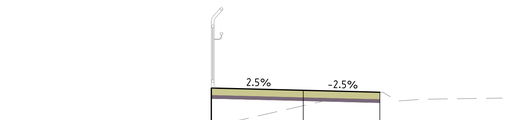
CH 105

DATUM RL0.5				
FINISHED LEVEL	1.672	1.652	1.615	1.583
EXISTING LEVEL	1.672	1.67	1.629	1.58
OFFSET	-1.581	-1.5	0	1.25

CH 145.75

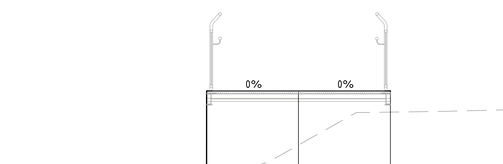
DATUM RL0.5				
FINISHED LEVEL	1.465	1.626	1.577	1.546
EXISTING LEVEL	1.465	1.479	1.52	1.546
OFFSET	-2.595	-1.95	0	1.25

CH 0



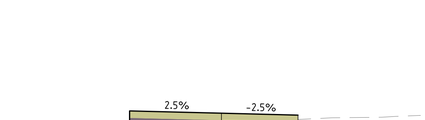
DATUM RL0.5				
FINISHED LEVEL	1.496	2.127	2.089	2.058
EXISTING LEVEL	1.496	1.496	1.839	2.054
OFFSET	-1.501	-1.5	0	1.25

CH 45



DATUM RL0				
FINISHED LEVEL	0.653	2.296	2.296	2.296
EXISTING LEVEL	0.653	0.654	1.414	1.952
OFFSET	-1.502	-1.5	0	1.5

CH 90



DATUM RL0.5				
FINISHED LEVEL	1.457	1.753	1.716	1.685
EXISTING LEVEL	1.457	1.457	1.552	1.614
OFFSET	-1.5	-1.5	0	1.25

CH 135

0 1 2 3 4 5m

SCALE 1:50 (A1), 1:100 (A3)

Rev.	Amendments	Approved	Date
1	ISSUED 95% FOR REVIEW	P.LITTLE	19.09.2023

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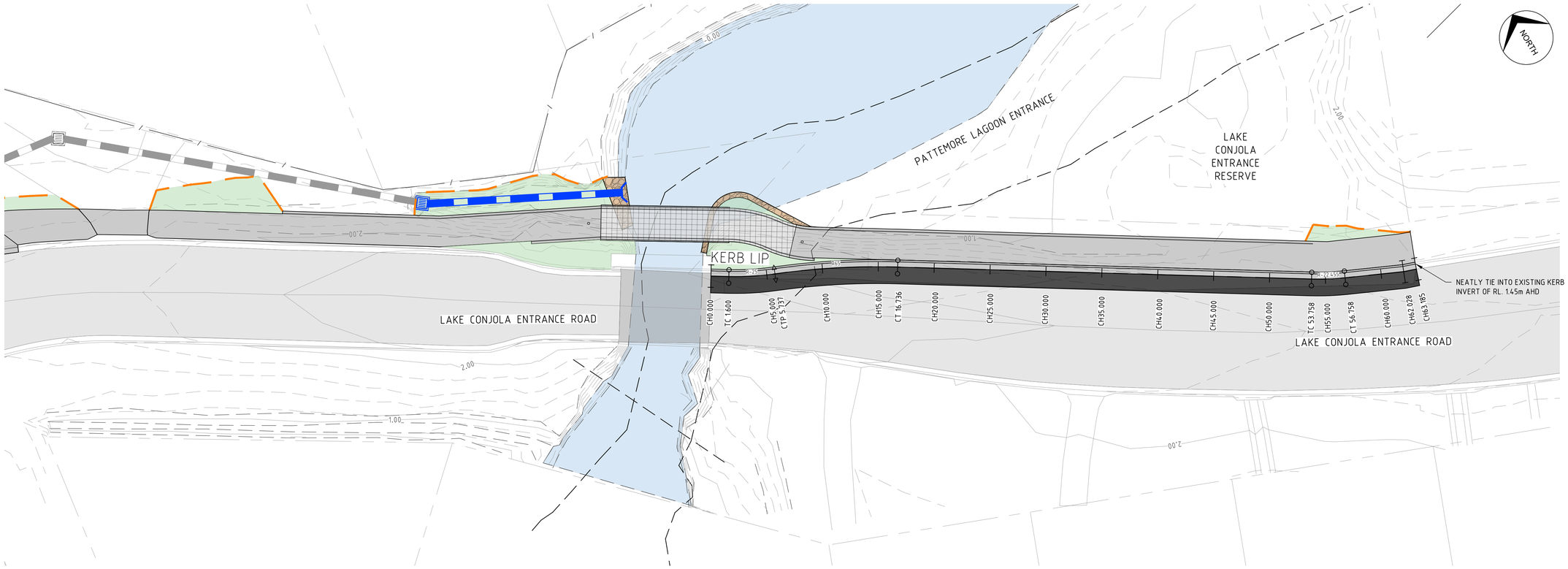
RESIDENTIAL - COMMERCIAL - INDUSTRIAL

SUP CROSS-SECTIONS

PROJECT: LAKE CONJOLA SUP BRIDGE
AT: LAKE CONJOLA ENTRANCE ROAD, LAKE CONJOLA
FOR: ZAUNER CONSTRUCTIONS

Design: J.HYNES
Drawn: J.HYNES
Checked: P.LITTLE
Date: 19.09.2023
Drawing No. 23344/C05
Rev 1



KERB LIP ALIGNMENT PLAN

SCALE: 1:200

HORIZONTAL CURVE			R-25			R65																R-22.455			
VERTICAL CURVE							5m VC										6.88m VC			6.88m VC					
GRADE			-0.55%						-0.9%									-1.08%					-0.9%		
DATUM RL-10																									
FINISHED LEVEL	2.005	1.996	1.974	1.94	1.924	1.919	1.905	1.904	1.785	1.65	1.618	1.582	1.562	1.547	1.533	1.514	1.503	1.485	1.472						
EXISTING LEVEL	2.294	2.158	1.991	1.934	1.912	1.902	1.857	1.856	1.738	1.705	1.684	1.644	1.622	1.602	1.577	1.539	1.516	1.483	1.472						
CUT/FILL	-0.289	-0.162	-0.017	0.006	0.012	0.017	0.048	0.048	0.048	-0.054	-0.066	-0.062	-0.06	-0.055	-0.044	-0.025	-0.013	0.002	0.000						
CHAINAGE	0	1.6	5.74	11.85	14.35	15	16.74	16.85	30	45	48.44	51.88	53.76	55.32	56.76	58.76	60	62.03	63.18						

LONGITUDINAL SECTION KERB LIP

SCALE 1:200 (HORIZONTAL)
SCALE 1:200 (VERTICAL)

0 5 10 15 20m

SCALE 1:200 (A1), 1:400 (A3)

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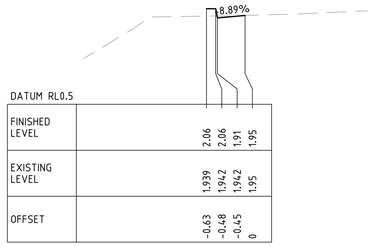
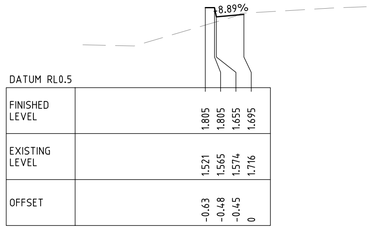
KERB01 ALIGNMENT PLAN AND LONG SECTION

PROJECT: LAKE CONJOLA SUP BRIDGE
AT: LAKE CONJOLA ENTRANCE ROAD, LAKE CONJOLA
FOR: ZAUNER CONSTRUCTIONS

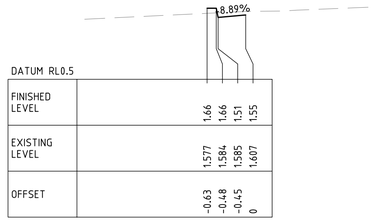
Design: J.HYNES
Drawn: J.HYNES
Checked: P.LITTLE
Date: 19.09.2023
Drawing No. 23344/C06
Rev 1



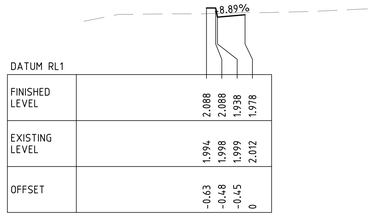
CH 10



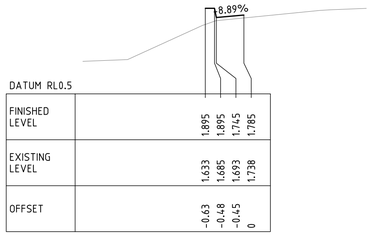
CH 40



CH 55



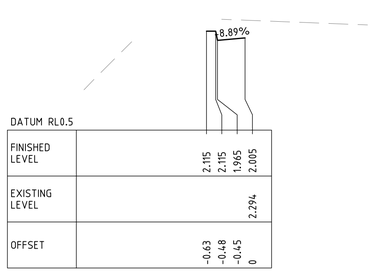
CH 5



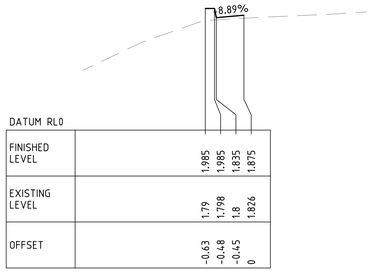
CH 30

CH 50

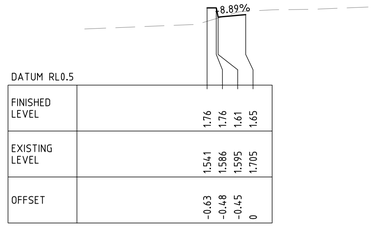
CH 63.19



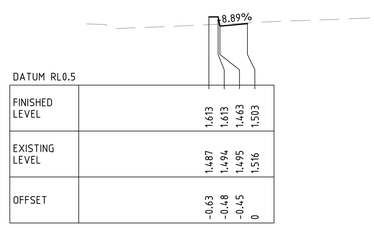
CH 0



CH 20



CH 45



CH 60

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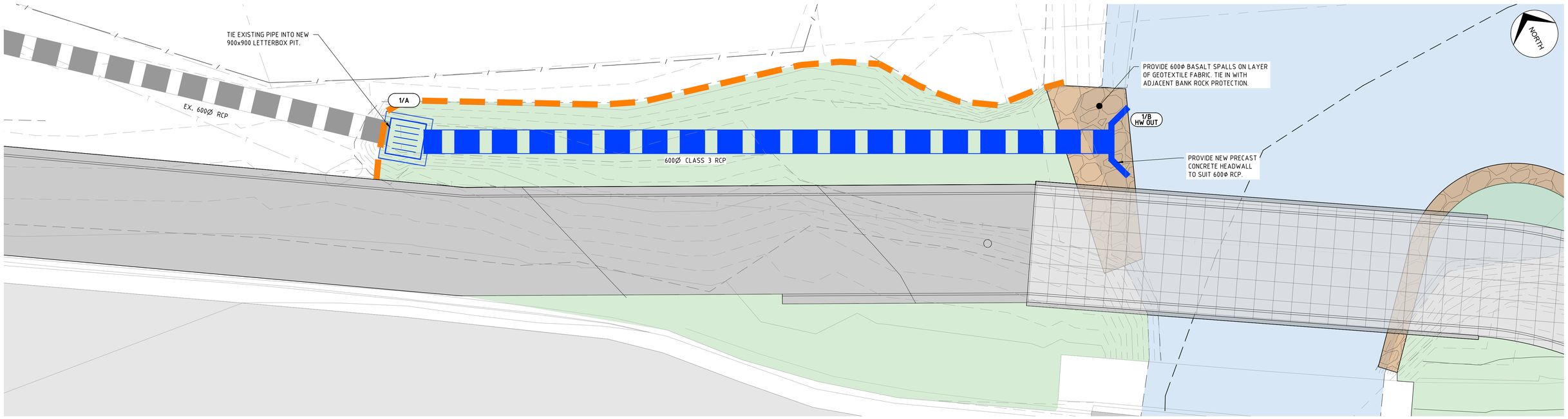
KERB01 CROSS-SECTIONS

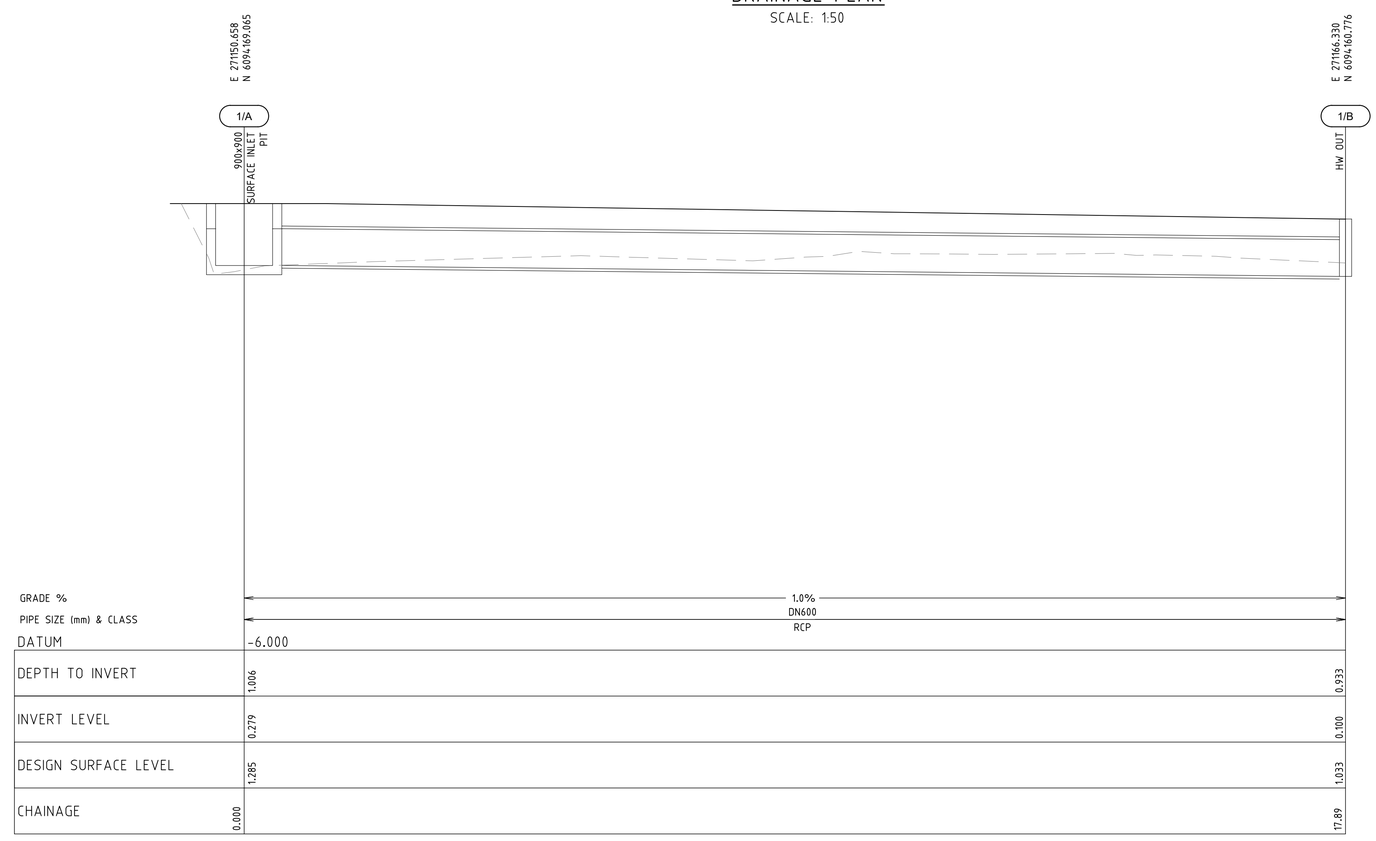
PROJECT: LAKE CONJOLA SUP BRIDGE
AT: LAKE CONJOLA ENTRANCE ROAD, LAKE CONJOLA
FOR: ZAUNER CONSTRUCTIONS

Design: J.HYNES
Drawn: J.HYNES
Checked: P.LITTLE
Date: 19.09.2023
Drawing No. 23344/C07
Rev 1



DRAINAGE PLAN

SCALE: 1:50



LINE 1

0 1 2 3 4 5m

SCALE 1:50 (A1), 1:100 (A3)

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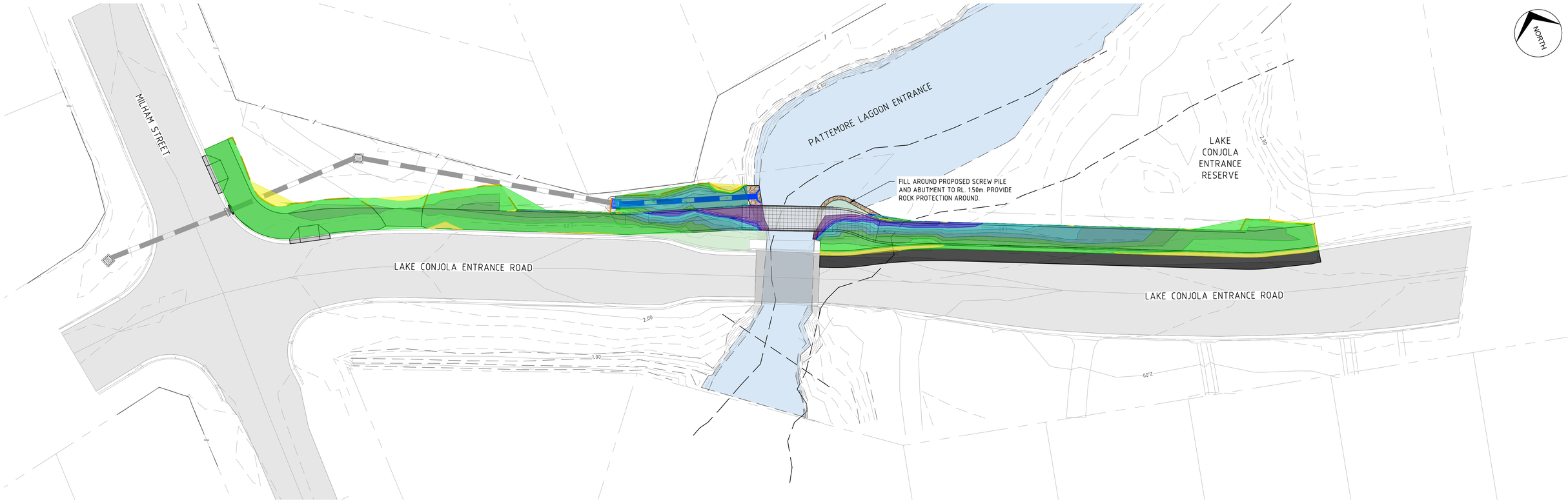
DRAINAGE PLAN AND LONG SECTION

PROJECT: LAKE CONJOLA SUP BRIDGE
AT: LAKE CONJOLA ENTRANCE ROAD, LAKE CONJOLA
FOR: ZAUNER CONSTRUCTIONS

Design: J.HYNES
Drawn: J.HYNES
Checked: P.LITTLE
Date: 19.09.2023
Drawing No. 23344/C08
Rev 1



BULK EARTHWORKS PLAN

SCALE: 1:250

CUT/FILL LEGEND 0.2m

	-10.0m TO -1.8m
	-1.8m TO -1.6m
	-1.6m TO -1.4m
	-1.4m TO -1.2m
	-1.2m TO -1.0m
	-1.0m TO -0.8m
	-0.8m TO -0.6m
	-0.6m TO -0.4m
	-0.4m TO -0.2m
	-0.2m TO 0.0m
	0.0m TO 0.2m
	0.2m TO 0.4m
	0.4m TO 0.6m
	0.6m TO 0.8m
	0.8m TO 1.0m
	1.0m TO 1.2m
	1.2m TO 1.4m
	1.4m TO 1.6m
	1.6m TO 1.8m
	1.8m TO 10m

CUT/FILL VOLUMES:

CUT AND FILL VOLUMES PROVIDED ARE BASED ON THE SUBTRACTION OF EXISTING SURFACES (EXISTING SURVEY) FROM TRIANGULATED DESIGN SURFACES. VOLUMES DO NOT ALLOW FOR BULKING FACTORS OR COMPACTION FACTORS DERIVING FROM THE POROSITY OR COMPACTNESS OF THE EXISTING OR PLACED MATERIAL.

CUT MATERIAL IS TO BE STOCKPILED AND IF DEEMED ADEQUATE BY THE GEOTECHNICAL ENGINEER MAY BE USED IN THE FILLING OF MATERIAL AROUND THE INSTALLED CULVERTS TO NEW DESIGN LEVELS.

FILL TO FINAL DESIGN	
TOTAL CUT	1.83 m^3
TOTAL FILL	232.57 m^3

0 5 10 15 20 25m

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

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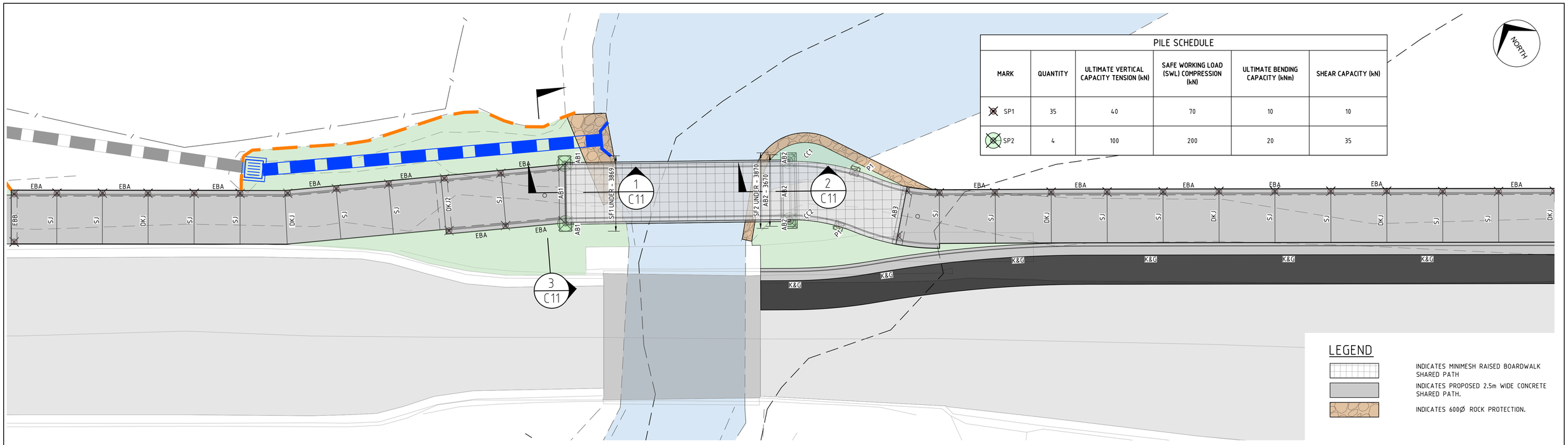
BULK EARTHWORKS PLAN

PROJECT: LAKE CONJOLA SUP BRIDGE
AT: LAKE CONJOLA ENTRANCE ROAD, LAKE CONJOLA
FOR: ZAUNER CONSTRUCTIONS

Design: J.HYNES
Drawn: J.HYNES
Checked: P.LITTLE
Date: 19.09.2023
Drawing No. 23344/C09
Rev 1

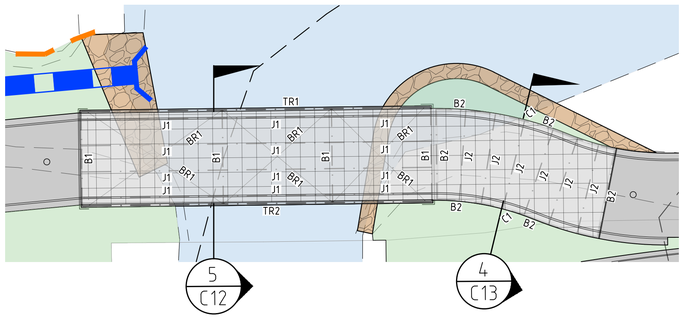
PILE SCHEDULE					
MARK	QUANTITY	ULTIMATE VERTICAL CAPACITY TENSION (kN)	SAFE WORKING LOAD (SWL) COMPRESSION (kN)	ULTIMATE BENDING CAPACITY (kNm)	SHEAR CAPACITY (kN)
SP1	35	40	70	10	10
SP2	4	100	200	20	35



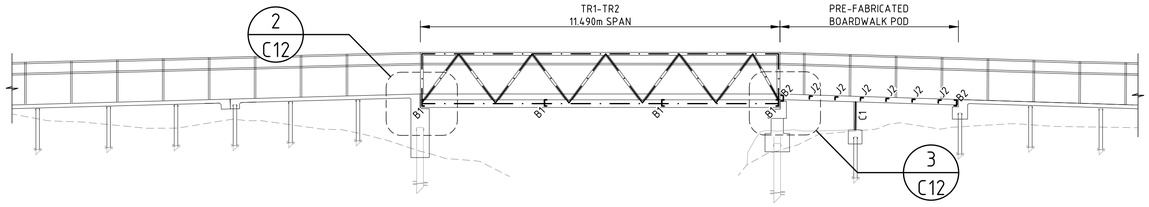
SLAB AND FOOTING PLAN
SCALE: 1:100

MEMBER LIST:
B1 = 200PFC BRIDGE BEARERS.
B2 = 180PFC BEAMS.
J1 = 150PFC JOISTS AT 850 CTRS.
J2 = 90x10EA JOISTS AT MAX. 750 CTRS.
C1 = 89x6SHS COLUMNS.
TR1-TR2 = FABRICATED BRIDGE TRUSS. REFER TO DETAILS.
BR1 = 16Ø ROD CROSS-BRACE WITH TURNBUCKLE TO BRIDGE DECK.
BR2 = 12Ø ROD CROSS-BRACE WITH TURNBUCKLE BETWEEN C1 COLUMNS, REFER TO SECTION 4.

MESH SPECIFICATION: GRATEX MICROMESH GTX-381313M2 (38mm THICK).



STEELWORK PLAN
SCALE: 1:100



STEELWORK ELEVATION
SCALE: 1:100

0 1 2 4 6 8 10m
SCALE 1:100 (A1), 1:200 (A3)

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STRUCTURAL PLAN AND ELEVATION

PROJECT: LAKE CONJOLA SUP BRIDGE
AT: LAKE CONJOLA ENTRANCE ROAD, LAKE CONJOLA
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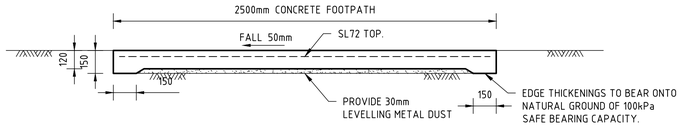
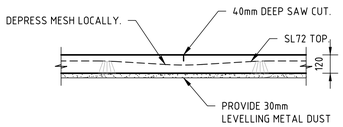
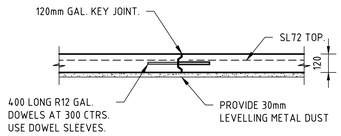


TYPICAL 2500mm CONCRETE FOOTPATH SECTION

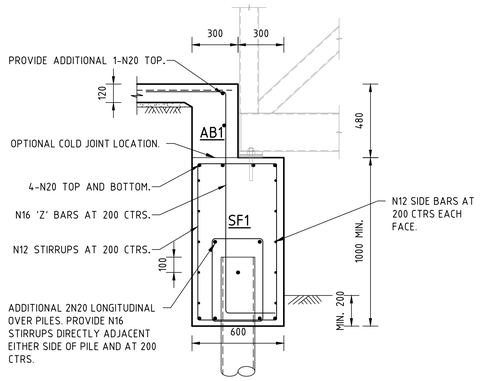


SJ
TYPICAL SAWN JOINT
120 THICK SLAB ALTERNATIVE

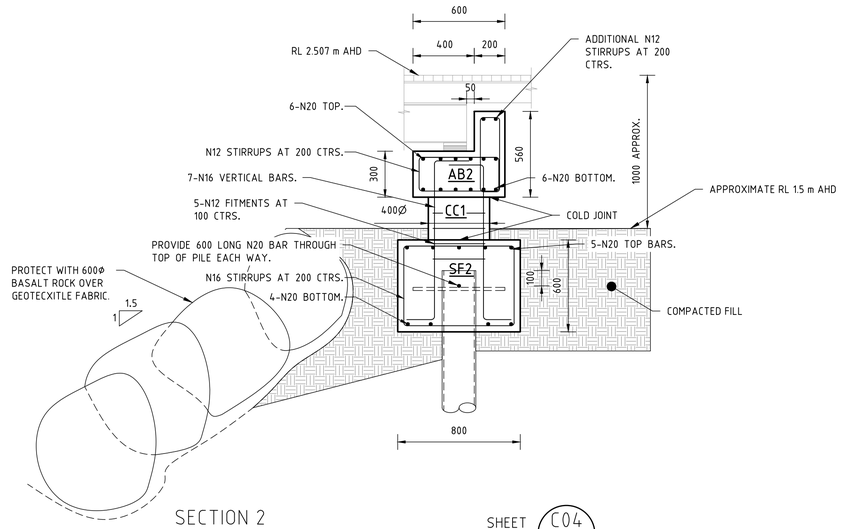
SAW JOINT NOTE:
JOINT TO BE SAWN AS EARLY AS POSSIBLE. IT IS TO BE CARRIED OUT BEFORE RANDOM CRACKING CAN OCCUR, BUT AFTER THE CONCRETE HAS HARDENED SUFFICIENTLY TO PREVENT RAVELLING OR TEARING OF THE SURFACE. CUT 1 OUT OF 2 REINFORCING BARS. DEPRESS MESH LOCALLY AT JOINT



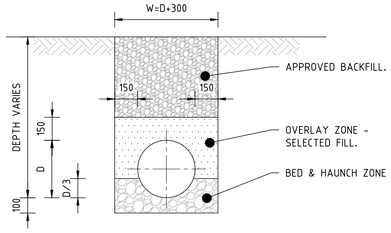
DKJ
TYPICAL DOWELLED KEY JOINT
120 THICK SLAB ALTERNATIVE



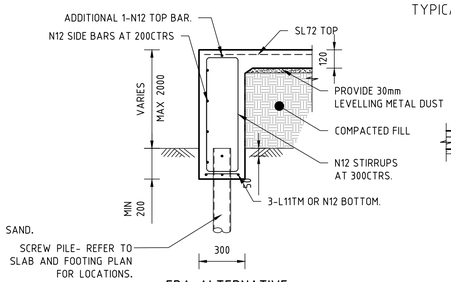
SECTION 1
ABUTMENT DETAIL (AB1)
SHEET C04
SCALE 1:20



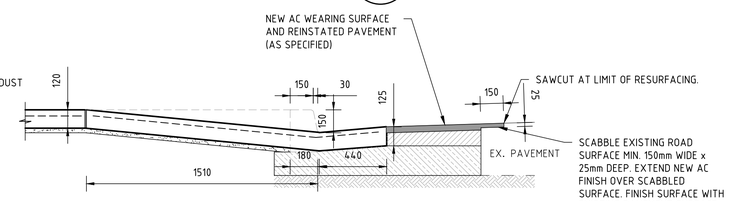
SECTION 2
TYPICAL ABUTMENT 2 (AB2)
SHEET C04
SCALE 1:20



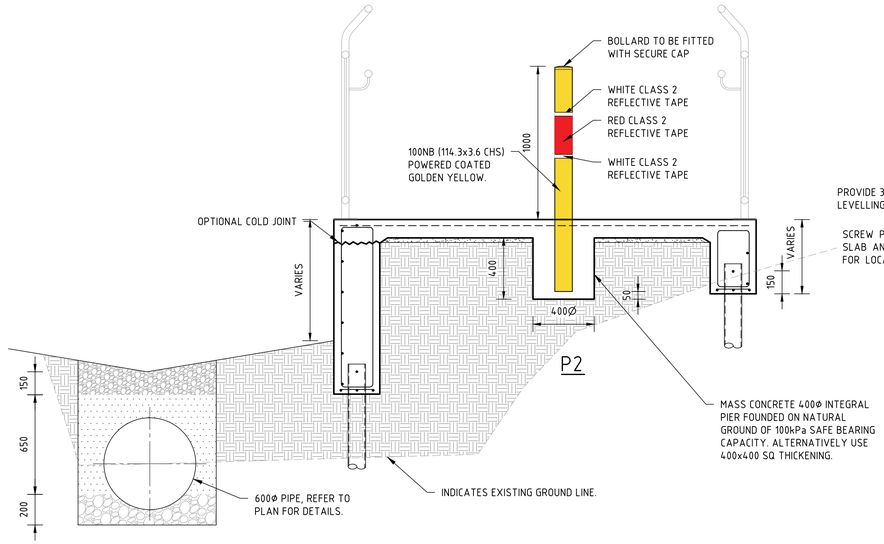
TYPICAL STORMWATER PIPE BEDDING
SCALE 1:20



EBA ALTERNATIVE
DEEPENED EDGE BEAM TYPE A
SCALE 1:20

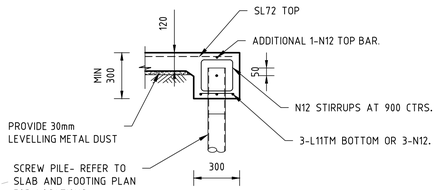


TYPICAL KERB RAMP DETAIL TO AS1428.1
SCALE 1:20

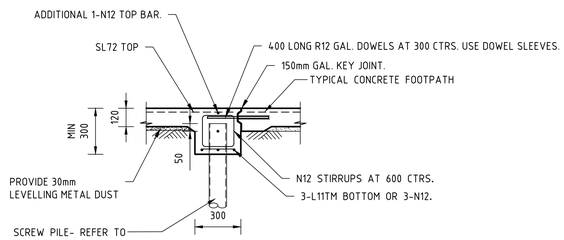


SECTION 3
BOLLARD AND STORMWATER SECTION
SHEET C10
SCALE 1:20

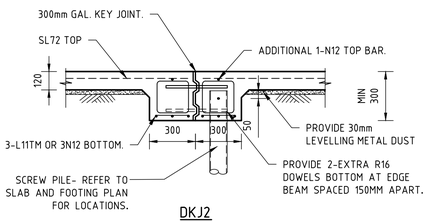
NOTE: ALTERNATE POST-INSTALLED CENTRE BOLLARD IS ALSO ACCEPTABLE.



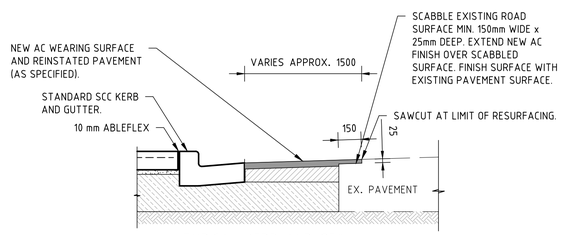
EBA
EDGE BEAM TYPE A
SCALE 1:20



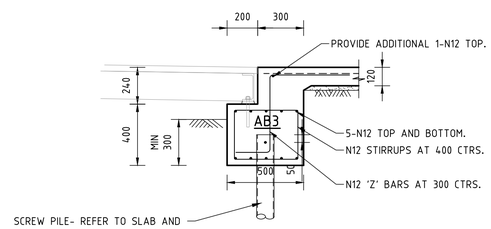
EBB
EDGE BEAM TYPE B
SCALE 1:20



DKJ2
DOWELLED KEY JOINT
SCALE 1:20



TYPICAL KERB AND SEAL EXTENSION DETAIL
SCALE 1:20



ABUTMENT 3 (AB3)
SCALE 1:20

0 500 1000 1500 2000mm
SCALE 1:20 (A1), 1:40 (A3)

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SLAB AND FOOTING DETAILS

PROJECT: LAKE CONJOLA SUP BRIDGE
AT: LAKE CONJOLA ENTRANCE ROAD, LAKE CONJOLA
FOR: ZAUNER CONSTRUCTIONS

Design: J.HYNES
Drawn: J.HYNES
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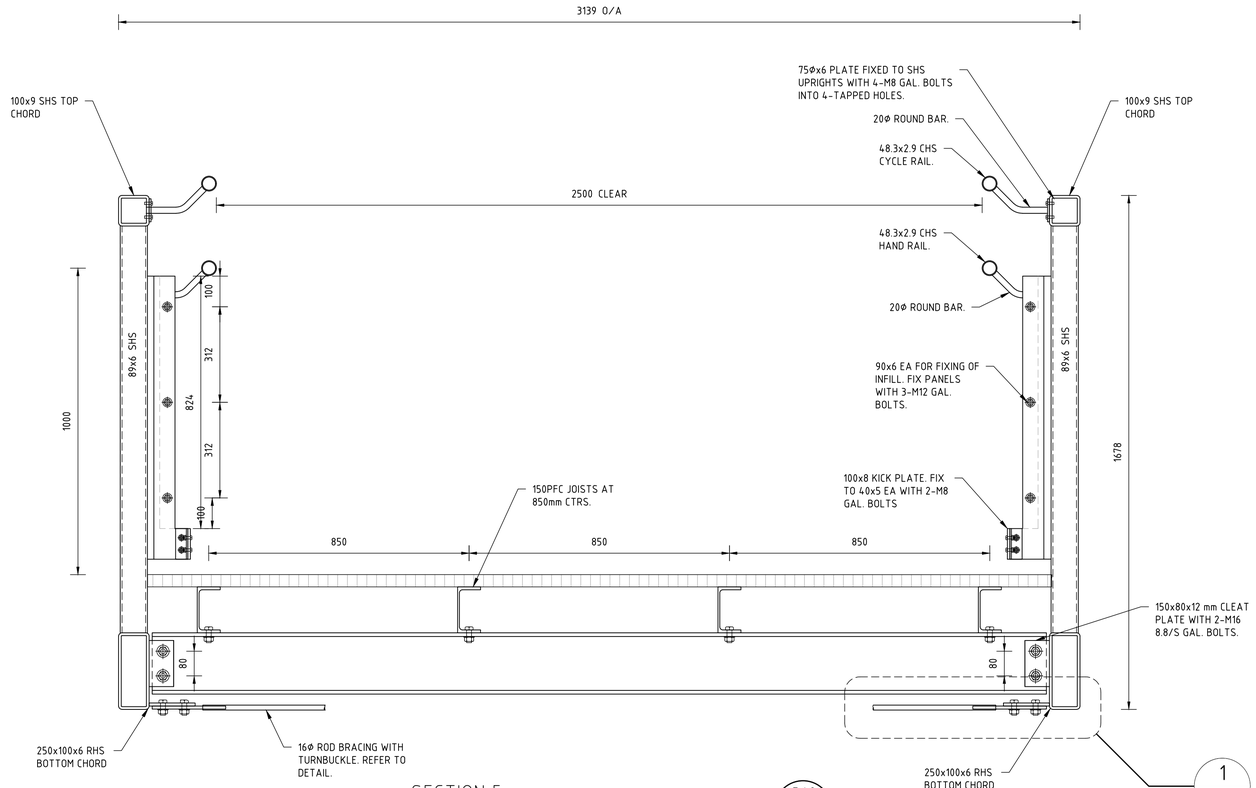
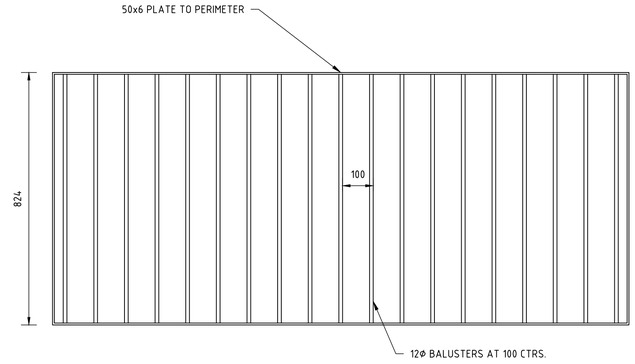
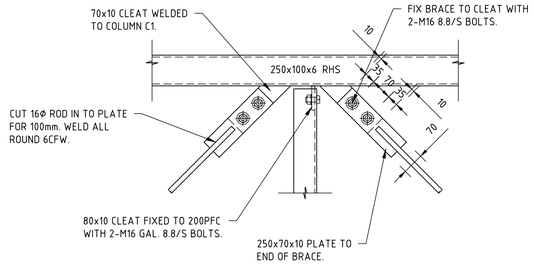


SECTION 5
TYPICAL SECTION THROUGH BRIDGE

SHEET C10
SCALE 1:10

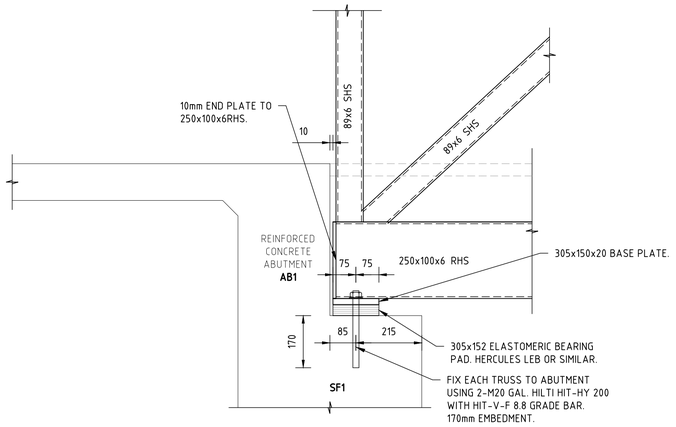


TYPICAL INFILL PANEL



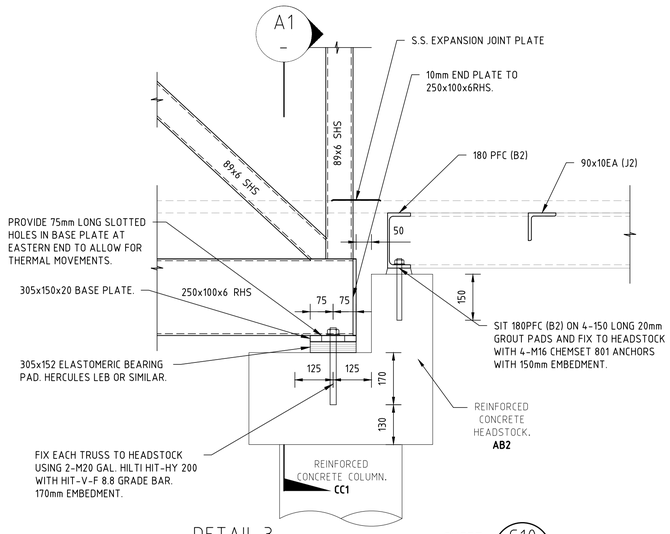
DETAIL 1
TYPICAL BRACE DETAIL FOR BRIDGE

SHEET -
SCALE 1:10



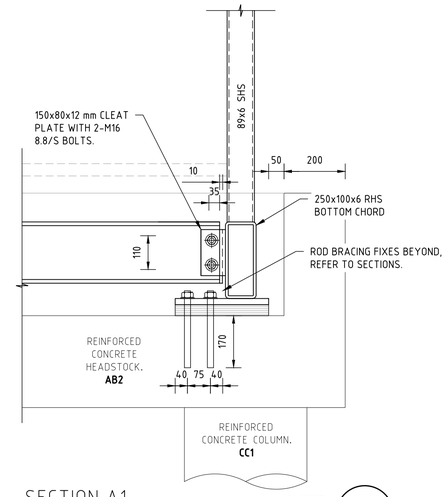
DETAIL 2
DETAIL AT EASTERN ABUTMENT

SHEET C10
SCALE 1:10



DETAIL 3
DETAIL AT WESTERN ABUTMENT

SHEET C10
SCALE 1:10



SECTION A1
SECTION AT ABUTMENT 2

SHEET -
SCALE 1:10

0 200 400 600 800 1000mm
SCALE 1:10 (A1), 1:20 (A3)

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STEELWORK DETAILS
SHEET 1 OF 2

PROJECT: LAKE CONJOLA SUP BRIDGE
AT: LAKE CONJOLA ENTRANCE ROAD, LAKE CONJOLA
FOR: ZAUNER CONSTRUCTIONS

Design: J.HYNES
Drawn: J.HYNES
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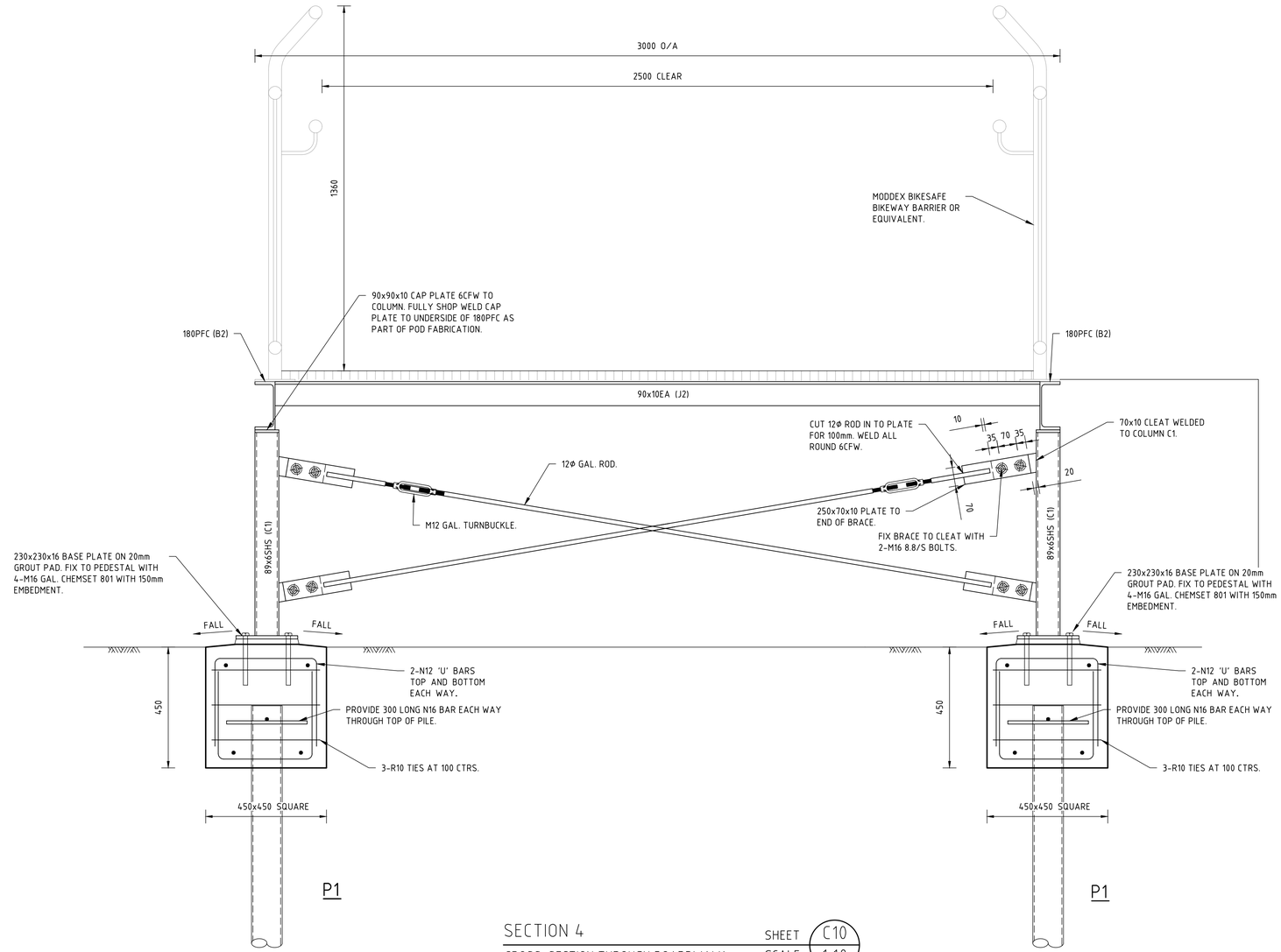

SECTION 4 — SHEET C10

CROSS-SECTION THROUGH BOARDWALK — SCALE 1:10

0 200 400 600 800 1000mm

SCALE 1:10 (A1), 1:20 (A3)

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STEELWORK DETAILS
SHEET 2 OF 2

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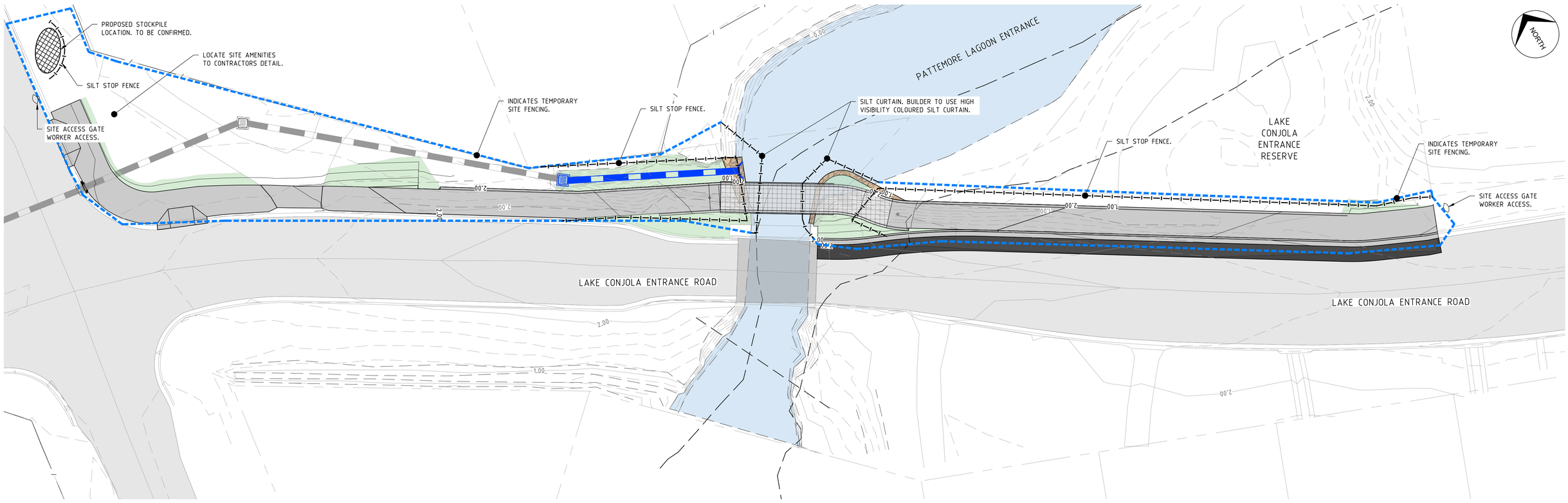

SEDIMENT EROSION CONTROL PLAN

SCALE: 1:200

LEGEND

- EXISTING MINOR CONTOURS AT 0.20m INTERVALS.
- EXISTING MAJOR CONTOURS AT 1m INTERVALS.
- MINOR CONTOURS AT 0.20m INTERVALS.
- MAJOR CONTOURS AT 1m INTERVALS.
- EXISTING PROPERTY BOUNDARY.
- INDICATES MINIMESH RAISED BOARDWALK SHARED PATH.
- INDICATES PROPOSED 2.5m WIDE CONCRETE SHARED PATH.
- PROPOSED SITE BOUNDARY.
- SILT STOP FENCE (SD 6-5).

0 5 10 15 20m

SCALE 1:200 (A1), 1:400 (A3)

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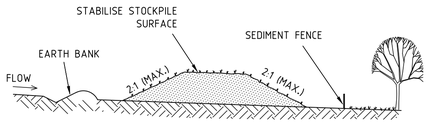
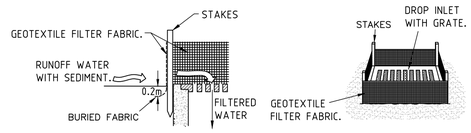


STOCKPILES (SD 4-1)

NTS

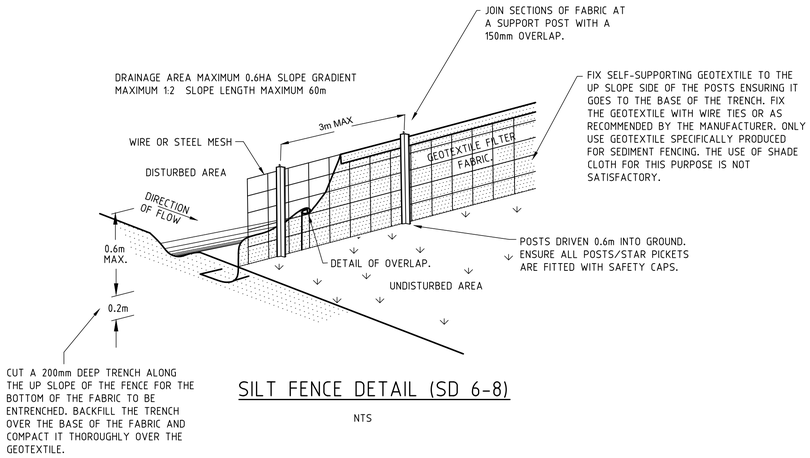
CONSTRUCTION NOTES

1. PLACE STOCKPILES MORE THAN 2 (PREFERABLY 5) METRES FROM EXISTING VEGETATION, CONCENTRATED WATER FLOW, ROADS AND HAZARD AREAS.
2. CONSTRUCT ON THE CONTOUR AS LOW, FLAT, ELONGATED MOUNDS.
3. WHERE THERE IS SUFFICIENT AREA, TOPSOIL STOCKPILES SHALL BE LESS THAN 2 METRES IN HEIGHT.
4. WHERE THEY ARE TO BE IN PLACE FOR MORE THAN 10 DAYS, STABILISE FOLLOWING THE APPROVED ESCP OR SWMP TO REDUCE THE C-FACTOR TO LESS THAN 0.10.
5. CONSTRUCT EARTH BANKS (STANDARD DRAWING 5-5) ON THE UPSLOPE SIDE TO DIVERT WATER AROUND STOCKPILES AND SEDIMENT FENCES (STANDARD DRAWING 6-8) 1 TO 2 METRES DOWNSLOPE.



GEOTEXTILE FILTER FABRIC DROP INLET SEDIMENT TRAP

NTS



SILT FENCE DETAIL (SD 6-8)

NTS

STANDARD SCHEDULE OF EROSION & SEDIMENT CONTROL MEASURES TO BE IMPLEMENTED DURING CONSTRUCTION.

1. ALL EROSION SEDIMENT AND POLLUTION CONTROLS ARE TO BE IN ACCORDANCE WITH "SOILS AND CONSTRUCTION - MANAGING URBAN STORMWATER", 4th EDITION, LANDCOM, MARCH 2004 (THE BLUE BOOK).

2. CONSTRUCTION SHALL BE PHASED SO THAT LAND DISTURBANCE IS CONFINED TO AREAS OF WORKABLE SIZE. THIS WILL LIMIT THE DURATION DISTURBED AREAS ARE TO BE EXPOSED TO EROSION. PERIMETER/DIVERSION BANKS ARE TO BE STABILISED IMMEDIATELY AFTER THEY ARE CONSTRUCTED.

3. TOPSOIL STOCKPILES ARE TO BE LOCATED AS DIRECTED BY SUPERVISING ENGINEER OR SURVEYOR. STOCKPILES ARE TO BE IMMEDIATELY VEGETATED BY SEED AND FERTILIZER APPLICATION FOLLOWING FINAL PLACEMENT AND WATERING TO PROMOTE REVEGETATION. HAYBALES OR SEDIMENT FILTER FENCES ARE TO BE PLACED AROUND THE PERIMETER OF THE STOCKPILES TO ACT AS EROSION AND SEDIMENT CONTROLS.

4. SEDIMENT AND DEBRIS ARE TO BE REMOVED FRO ARE 60% FULL. ALL SEDIMENT REMOVED SHALL BE DISPOSED OF AS DIRECTED BY SUPERVISING ENGINEER OR SURVEYOR.

5. ALL CUT AND FILL BATTERS SHALL HAVE A GRADE OF 4H:1V OR AS SHOWN. ANY WITH A SLOPE LENGTH IN EXCESS OF 7 METRES SHALL HAVE A 1.5m WIDE BERM CONSTRUCTED INTO THE TOE OR THE TOP OF THE BATTER AND TEMPORARY BARRIERS OF HAY BALES SHALL BE CONSTRUCTED TO DIVERT THE WATER EITHER DOWN HALF ROUND PIPES AND INTO DRAINAGE STRUCTURES OR ALONG DIVERSION DRAINS. UPON COMPLETION OF SHAPING AND DRAINAGE WORKS BATTERS AND DRAINAGE LINES SHALL BE TOPSOILED TO A MINIMUM DEPTH OF 100mm (MAX 125mm) SEEDED AND MULCHED WITH ANY FAILED AREA RESOWN.

6. TEMPORARY EROSION AND SEDIMENT CONTROLS ARE TO BE INSTALLED DURING CONSTRUCTION. THESE CONTROLS ARE TO INCLUDE -

A. PLACING OF TEMPORARY CROSS BANKS OF EARTH, SANDBAGS AND HAYBALES ACROSS DISTURBED ROAD SURFACES. THESE ARE TO BE CHECKED AND REPAIRED IF NECESSARY AT THE END OF EACH WORKING DAY.
B. PLACING OF SANDBAGS AROUND INLET PITS AND HEADWALLS DURING CONSTRUCTION TO TRAP SEDIMENT AND ALSO TO PREVENT WATER FROM BY-PASSING THE INLET.
C. BY PLACING OF SEDIMENT TRAPS AT KERB INLETS.

7. ANY CONSTRUCTION EXITS SHALL BE CONSTRUCTED USING SHAKER GRID.

8. ALL SEDIMENT CONTROL DEVICES SHALL BE RETAINED WHILE ANY DISTURBED AREAS REMAIN OR ARE CONTRIBUTING SEDIMENT TO STORMWATER SYSTEM. NO DEVICES SHALL BE REMOVED UNTIL SUPERVISING ENGINEER OR SURVEYOR GIVES DIRECTION.

9. ADDITIONAL SEDIMENT & EROSION CONTROL MEASURES TO BE PROVIDED AS PER SHOALHAVEN CITY COUNCILS REQUIREMENTS.

AIR & NOISE POLLUTION CONTROL

1. SUPPRESS DUST BY THE FOLLOWING METHODS WHERE APPLICABLE:
   a) STAGE WORKS TO LIMIT THE EXTENT OF EXPOSED AND UNPROTECTED AREAS.
   b) CONDUCT REGULAR SPRAYING OF WATER.
   c) COVER AND SECURE VEHICULAR LOADS ENTERING/EXITING THE SITE.
   d) USE AN ENVIRONMENTALLY FRIENDLY CHEMICAL SPRAY TO BIND SOIL TOGETHER THUS STABILISING UNUSED SOIL.
   e) RESTRICT SPEED OF VEHICLES ONSITE.
   f) COVER STOCKPILES TO PROTECT THEM FROM WIND.
   g) PROVIDE 1.8m HIGH DUST SCREENS; SHADE CLOTH, PVC BANNER OR POLYESTER MESH; SECURELY FIXED TO PERIMETER FENCE.

2. IMPLEMENT MEASURES TO LIMIT AIR POLLUTION BY VEHICLES AND PLANT WORKING ON OR PASSING THROUGH THE SITE.

3. MAINTAIN POLLUTION CONTROL MEASURES DURING CONSTRUCTION AND UNTIL FULL STABILISATION. ROUTINELY INSPECT EACH WEEK AND AFTER SIGNIFICANT RAINFALL EVENTS. REPAIR AND REINSTATE WORKS AS NEEDED TO MAINTAIN PROTECTION. RECORD MAINTENANCE ACTIVITIES AND DETAILS AND PROVIDE TO EPA FOR INSPECTION WHEN REQUESTED.

4. ENSURE ALL CONSTRUCTION WORK THAT GENERATES NOISE TAKES PLACE ONLY WITHIN THE PRE-APPROVED OPERATING HOURS FOR THE PROJECT:
   -MONDAY TO FRIDAY, BETWEEN 7A.M. & 6P.M.
   -SATURDAY, BETWEEN 8A.M & 3P.M.

Rev.	Amendments	Approved	Date
1	ISSUED 95% FOR REVIEW	P.LITTLE	19.09.2023

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RESIDENTIAL - COMMERCIAL - INDUSTRIAL

SEDIMENT EROSION CONTROL DETAILS

Design: J.HYNES
Drawn: J.HYNES
Checked: P.LITTLE
Date: 19.09.2023

PROJECT: LAKE CONJOLA SUP BRIDGE
AT: LAKE CONJOLA ENTRANCE ROAD, LAKE CONJOLA
FOR: ZAUNER CONSTRUCTIONS

Drawing No. 23344/C15
Rev 1

SGD11 PLAN

SCALE: 1:500

SURVEY MARK AUDIT SCHEDULE

Phase 1 - Investigation								Phase 2 - Proposed Impact		
Project Mark ID	Scims Mark ID	Type	Origin	*Coordinates*				*Pre-Construction Field Audit*		
				Datum	Easting	Northing	Zone	Mark Status	Project Impact (Designer)	Inspection Date
GIP1		GIP		GDA2020	271105.702	6094258.822	56	Not Found	SAFE	15/04/2022
DHW1		DHWFD	DP1261771	GDA2020	271100.954	6094201.013	56	Found Intact	SAFE	15/04/2022
DHW2		DHWFD	DP1261771	GDA2020	271092.154	6094190.818	56	Found Intact	SAFE	15/04/2022
GIP2		GIP	DP22285	GDA2020	271090.141	6094178.674	56	Not Found	SAFE	15/04/2022
GIP3		GIP	DP22285	GDA2020	271086.329	6094129.253	56	Not Found	SAFE	15/04/2022
GIP4		GIP	DP382920	GDA2020	271117.001	6094204.529	56	GONE	GONE	15/04/2022
GIP5		GIP	DP605515	GDA2020	271112.052	6094168.315	56	GONE	GONE	15/04/2022
GIP6		GIP	DP235985	GDA2020	271335.854	6094057.476	56	Not Found	SAFE	15/04/2022
DHW3		DHW	DP1027810	GDA2020	271168.788	6094150.938	56	Not Found	VULNERABLE	15/04/2022
DHW4		DHW	DP260673	GDA2022	271178.595	6094140.789	56	GONE	GONE	15/04/2022
DHW6		DHW	UNKNOWN	GDA2020	271153.920	6094162.173	56	Found Intact	VULNERABLE	15/04/2022
DHW7		DHW	UNKNOWN	GDA2020	271219.910	6094108.079	56	Found Intact	SAFE	15/04/2022
DHW8		DHW	UNKNOWN	GDA2020	271325.822	6094078.351	56	Found Intact	SAFE	15/04/2022
DHW9		DHW	DP251181	GDA2020	271241.815	6094111.665	56	Found Intact	SAFE	15/04/2022
PM1	PM113639	PM	DP1125372	GDA2020	271114.801	6094187.695	56	Found Intact	VULNERABLE	15/04/2022
SS1	SS83740	SSM	DP1125372	GDA2020	271315.290	6094066.886	56	Found Intact	SAFE	15/04/2022
SS2	SS112497	SSM	DP1125372	GDA2020	271114.812	6094289.607	56	Found Intact	SAFE	15/04/2022
PM2	PM40389	PM	SCIMS	GDA2020	271111.85	6094174.11	56	GONE	GONE	15/04/2022

LEGEND

- EXISTING MAJOR CONTOURS (1m)
- EXISTING MINOR CONTOURS (0.2m)
- EXISTING PROPERTY BOUNDARY
- INDICATES RAISED SUP BOARDWALK AND BRIDGE
- INDICATES PROPOSED 2.5m WIDE CONCRETE SHARED USE PATH
- INDICATES EXISTING TREE TO REMAIN
- INDICATES EXISTING TREE TO BE REMOVED

SGD11 LEGEND

- TO BE DESTROYED
- VULNERABLE
- SAFE
- ALREADY GONE

0 10 20 30 40 50m

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

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1	ISSUED 95% FOR REVIEW	P.LITTLE	19.09.2023

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SGD11 PLAN AND TABLE

PROJECT: LAKE CONJOLA SUP BRIDGE
AT: LAKE CONJOLA ENTRANCE ROAD, LAKE CONJOLA
FOR: ZAUNER CONSTRUCTIONS

Design: J.HYNES
Drawn: J.HYNES
Checked: P.LITTLE
Date: 19.09.2023
Drawing No. 23344/C16
Rev 1

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 (nearest records are approx. 3km to the south of 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*	May occur nearby. Refer to Section 3.2.2 and Section 3.3.
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.
Leafless Tongue Orchid *Cryptostylis hunteriana*	Vulnerable NSW BC Act and EPBC Act	The larger populations typically occur in woodland dominated by Scribbly Gum *Eucalyptus sclerophylla*, Silvertop Ash (*E. sieberi*), Red Bloodwood *Corymbia gummifera* and Black Sheoak *Allocasuarina littoralis*; appears to prefer open areas in the understorey of this community and is often found in association with the Large Tongue Orchid *C. subulata* and the Tartan Tongue Orchid *C. erecta*.	Unlikely to occur. No suitable habitat present within the site.
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 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.	Possibly occurring over or in proximity to the site, but unlikely to utilise or rely on available habitat within the site.
Gibson's Albatross *Diomedea gibsoni*	Vulnerable BC Act and EPBC Act	Breeding is confined to New Zealand. The species regularly occurs off the NSW coast form Green Cape to Newcastle. The species feeds pelagically (open ocean) on squid, fish and crustaceans.	Unlikely to occur within the site. No suitable breeding or foraging habitat present.
Shy Albatross *Thalassarche cauta*	Vulnerable BC Act and EPBC Act	The Shy Albatross is circumpolar in distribution, occurring widely in the southern oceans. Islands off Australia and New Zealand provide breeding habitat. The specie is pelagic (open ocean) inhabiting tropical and subtropical marine waters.	Unlikely to occur within the site. No suitable breeding or foraging habitat present.

Black-browed Albatross *Thalassarche cauta*	Vulnerable NSW BC Act and EPBC Act	The Black-browed Albatross has a circumpolar range over the southern oceans, and are seen off the southern Australia coast mainly during winter. Spends most of its time at sea, breeding on small isolated islands. This species feeds on fish, crustaceans, offal, and squid.	Unlikely to occur within the site. No suitable breeding or foraging habitat present.
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	Possibly occurring over or in proximity to the site, but unlikely to utilise available habitat within the site.

		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.	
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.	Possibly occurring over or in proximity to the site, but unlikely to utilise available habitat within the site. No breeding habitat or favoured foraging habitat.
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 saltmarsh or grassy areas. Nests are shallow scrapes in sand above the high tide mark, often amongst seaweed, shells and small stones.	Possibly occurring within or in close proximity to the site. Further assessment has been undertaken in Section 3.2.
Lesser Sand-plover *Charadrius mongolus*	*EPBC Act:* Endangered *NSW BC Act:* Vulnerable	In non-breeding grounds in Australia, this species usually occurs in coastal littoral and estuarine environments. It inhabits large intertidal sandflats or mudflats in sheltered bays, harbours and estuaries, and occasionally sandy ocean beaches, coral reefs, wave-cut rock platforms and rocky outcrops. It also sometime occurs in short saltmarsh or among mangroves.	Possibly occurring within or in close proximity to the site. Further assessment has been undertaken in Section 3.2.

		The species feeds mostly on extensive, freshly-exposed areas of intertidal sandflats and mudflats in estuaries or beaches, or in shallow ponds in saltworks. They roost near foraging areas, on beaches, banks, spits and banks of sand or shells and occasionally on rocky spits, islets or reefs. The species does not breed in Australia.	
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.	Possibly occurring within or in close proximity to the site. Further assessment has been undertaken in Section 3.2.
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	Unlikely to occur within the site. No suitable habitat present.

		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 & 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	Unlikely to occur within the site. No suitable habitat present. No breeding or foraging habitat present.

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 thespecies 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.	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.	Unlikely to occur within the site. No suitable habitat present. No breeding or foraging habitat present.
Eastern Ground Parrot *Pezoporus wallicus wallicus*	Vulnerable NSW BC Act	The Ground Parrot occurs in high rainfall coastal and near coastal low heathlands and sedgelands, generally below one metre in height and very dense (up to 90% projected foliage cover).	Unlikely to occur within the site. No suitable habitat present.
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	Possibly occurring over or in proximity to the site, but unlikely to utilise available habitat within the site. No breeding habitat (hollow-bearing trees).

		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	
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 Turpentine *Syncarpia glomulifera*, Black She-oak *Allocasuarina littoralis*, Blackwood *Acacia melanoxylon*, Rough-barked Apple *Angophora floribunda,* Cherry Ballart Exocarpus cupressiformis and a number of eucalypt species. requires old growth elements-hollow bearing tree resources for nesting and prey resource. Nests in large tree hollows in large eucalypts that are at least 150yrs old. Often in riparian areas. Large home range	Possibly occurring over or in proximity to the site, but unlikely to utilise available habitat within 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 fond 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.	Unlikely to occur within the site. No suitable habitat present.
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	Unlikely to occur within the site. No suitable habitat present.
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.	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	Possibly occurring over or in proximity to the site, but unlikely to utilise available habitat within the site. Nearest roost is approximately five kilometres away in Yatte Yattah Nature Reserve. The site does not provide a food source for the species.
Yellow-bellied Sheathtail-bat *Saccolaimus flaviventris*	Vulnerable NSW BC *Act*	Roosts singly or in groups of up to six, in tree hollows and buildings; in treeless areas they are known to utilise mammal burrows. When foraging for insects, flies high and fast over the forest canopy, but lower in more open country. Forages in most habitats across its very wide range, with and without trees; appears to defend an aerial territory. Breeding has been recorded from December to mid-March, when a single young is born. Seasonal movements are unknown; there is speculation about a migration to southern Australia in late summer and autumn	Possibly occurring over or in proximity to the site, but unlikely to utilise available habitat within the site. No roosting habitat or food resources affected.
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.	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.
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.	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 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.	May occur on-site and nearby. Refer to Section 3.2.2.
Golden-tipped Bat *Phoniscus papuensis*	Vulnerable NSW BC Act	Found in rainforest and adjacent wet and dry sclerophyll forest up to 1000m. Also recorded in tall open forest, *Casuarina*-dominated riparian forest and coastal *Melaleuca* forests.	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.

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.
Squirrel Glider *Petaurus norfolcensis*	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.
Sperm Whale *Physeter macrocephalus*	Vulnerable NSW BC Act	Wide, but patchy distribution from the tropics to the edge of the polar pack-ice in both hemispheres. Concentrations of Sperm Whales tend to occur where the seabed rises steeply from a greater depth, beyond the continental shelf.	Unlikely to occur within the site. No suitable habitat present.
